المركز الوطني
لتنمية الحياة الفطرية
National Center for Wildlife
المملكة العربية السعودية

Farasan Islands Protected Area

Management Plan

2024-2030

EXECUTIVE SUMMARY

The Development of the Site Management Plan is not only PA Management's best practice but is one of the critical requirements for attaining the IUCN Green List Status, the PA Management is seeking to achieve. Besides, the development of the Plan is also in accordance with Article 3 of the Wildlife Protected Areas Law which empowers the NCW to Manage Protected Areas in the Kingdom of Saudi Arabia. Once approved the Site Management Plan will repeal the Juzur Farasan Biosphere Reserve Abbreviated Management Plan for the year 2021 – 2023 which was co-developed following the IUCN abbreviated management planning framework elaborated in the IUCN's Protected Areas Planning Guideline Series No 10. In that regard, this Site Management Plan shall guide the implementation of day-to-day activities in managing the Farasan Islands Protected Area (FIPA) from 2024 – 2030.

This Site Management Plan (SMP) is structured into six sections which are then subdivided into several subsections as follows; In Section One, the SMP provides the biogeography of Saudi Arabia, its Social and Political Contexts, and the History of Protected Areas in the Kingdom. Besides, the Section provides an Introduction to the 10 Protected Areas, Management Plan Objectives, and an overview of conducted field studies. Chapter Two presents a detailed description of the legal status of the protected area, policy, and legal framework. Specifically, the section covers the institutional and legal settings of the Protected Area. The latter includes detailed descriptions of the national and international obligations, laws, rules, regulations, guidelines, and plans that support the management of the PA and its resources. Section Three provides a comprehensive introduction to the PA and an assessment of the protected area including its location, accessibility, administration, and management in addition to the PA's physical, cultural, financial, socioeconomic, biological, and human resources. Conversely, the section presents threats and pressures that affect major site values in addition to SWOT analysis.

Furthermore, in Section Four, the SMP focuses on the vision and target outcomes and the section further describes stakeholders' consultation outcomes, major site values, and protected area vision, mission, and goals under which strategic objectives and operational KPIs are presented. Section Five presents the Strategy and Road Map in three subsections covering threat mitigation and restoration initiatives, zoning and phasing strategy in addition to operations. The last Section (Section Six) describes enablers, and implementation plans under three themes operational design focusing on governance structure, organization, and people: implementation strategy detailing several management plans and monitoring approaches. The SMP also constitutes references,

eight appendices representing eight specific management plans with their tables, figures, and pictures that provide additional supporting information.

TABLE OF CONTENTS

Executive Summary 2

Table of Contents 4

List of Figures 7

List of Tables 8

List of Photos 9

List of Maps 10

Abbreviations/ Acronyms xi

1 Section One: Introduction xii

1.1. Biogeography of Saudi Arabia xii

1.2. Social and Political Context xii

1.3. History of Protected Areas in the Kingdom xii

1.4. Introduction to the 10 Protected Areas xii

1.5. Management Plan Objectives and Objectives xiii

1.6. Overview of conducted field studies xiii

2 Section TWO: Legal Status and Policy Framework 14

2.1. Current and Future Policy Framework 14

2.1.1 Institutional 14
2.1.2 Legal Setting 14
2.1.3 Directives for Protected Area Management 14
2.1.4 Institutional Setting 15

2.2 Farasan Island Protected Area's Legal Setting 17

2.2.1 Establishment History 17
2.2.2 Cultural Values 17
2.2.3 Protected Area Policy Enviroment 18
2.2.4 International Obligations - UNESCO 18

2.3 Management Plan PA Specific Framework 20

2.3.1 Adaptive Management 20
2.3.2 Management Plan PA Specific Framework – Setting Limits of Acceptable Change 20

Section THREE: Protected Area Assessment 22

3.1 Introduction and Overview of the PA 22

3.1.1 Overview 22
3.1.2 Administrative Features 25
3.1.3 Socio-economic Features 25

3.2 Context and Accessibility 26

3.3 Management, Resources and Infrastructure 27

3.3.1 Financial Resources 27
3.3.2 Human Resources – Staffing 28
3.3.3 Equipment & Vehicles 29
3.3.4 Infrastructure 29

3.4 Physical EnvirOnment Analysis 32
3.4.1 Topography 32
3.4.2 Reef Geology 33
3.4.3 Oceanography 33
3.4.4 Climate 33
3.5 Biological Environment Analysis 34
3.5.1 Habitats 34
3.5.2 Reef descriptions and faunal analysis 37
3.5.3 Other Marine Fauna and Flora 42
3.5.4 Fisheries 44
3.5.5 Terrestrial plants 45
3.5.6 Terrestrial Fauna 47
3.5.7 Avifauna 49
3.5.8 Reptilia 52
3.5.9 Amphibians 53
3.5.10 Insects 53
3.6 Tourism Assets, Activities and Use 54
3.6.1 Existing facilities 54
3.6.2 Recreational diving in the Farasan Islands 54
3.7 Socio-Cultural and Heritage Assets 55
3.8 Stakeholder Analysis....57
3.8.1 Stakeholder Mapping 57
3.9 Current Threats and Pressures 61
3.10 Strengths, Weaknesses, Opportunities and Threats 66
Section FOUR: Vision and Target Outcomes....72
4.1. Stakeholder Consultation outcomes 72
4.2. Major site values 73
4.3. Protected area vision, mission and goals 76
4.3.1 Strategic objectives and operational KPIs 76
Section FIVE: Strategy and Roadmap 85
5.1 Threat mitigation and restoration initiatives 85
5.2 Zoning and phasing strategy 87
5.2.1 Marine wildlife.... 91
5.2.2 Terrestrial habitats & wildlife 92
5.2.3 Bird Maintenance & enhancement Programme 100
5.2.4 Climate change mitigation and adaptation plan 101
3 Section SIX: Enablers and Implementation Plan 101
3.1 6.1. Operational design 101
3.1.1 6.1.1 Governance structure 101
3.1.2 6.1.2 Organization 102
3.1.3 6.1.3 People 103
3.2 6.2. Implementation Strategy 104
3.2.1 6.2.1 Contact and Communication Plan 104

3.2.2 6.2.2 Tourism Development 105
3.2.3 6.2.3 Waste Management Plan 106
3.2.4 6.2.4 Marine Management 106
3.2.5 6.2.5 Wildlife – mammal and Birdlife population management 107
3.2.6 6.2.6 Sustainability 112
3.2.7 6.2.7 Infrastructure 112
3.2.8 6.2.8 Staffing 113
3.2.9 6.2.9 Vessels and Vehicles 114

3.3 6.3 Monitoring approach 114

4 References 117

LIST OF FIGURES

Figure 1: Designation and registration process for PAs in KSA.....15
Figure 2: Facilities at the Farasan NCW headquarters.....30
Figure 3: Climate data for Farasan Archipelago, southern Red Sea, Kingdom of Saudi Arabia 34
Figure 4: Non-metric multidimensional scaling ordination of coral reef community 42
Figure 5: Farasan Islands Protected Area stakeholder profile.....61
Figure 6: Schematic representation of data layers and their use towards defining appropriate zonation.....88

LIST OF TABLES

Table 1: Administrative features 25
Table 2: Current staffing of the Protected Area 28
Table 3: Current vehicle and equipment present in the PA 29
Table 4: Farasan Islands PA infrastructure including ranger stations 30
Table 5: Associated metadata for each of the surveys undertaken 39
Table 6: General percentage cover ± standard deviation as a proportion of total cover. 39
Table 7: Coral community structure percentage 40
Table 8: Fluctuations since 1989, in the gazelle population estimates on the Farasan Islands 48
Table 9. Species of bird triggering IBA status in the Farasan Islands PA 50
Table 10: The reptiles of the Farasan islands 53
Table 11: Summary of key Farasan Islands Protected Area stakeholders 58
Table 12: Risk assessment including likelihood and consequence of threats and pressures 62
Table 13: Threats and pressures to the coral reefs 65
Table 14: SWOT Analysis for the Farasan Islands PA 66
Table 15: Stakeholder consultation outcomes 72
Table 16: Priority Area KPIs 78
Table 17: Specific objectives and targeted end states for key priority areas of the plan. 79
Table 18: Threat Mitigation and Restoration Initiatives 85
Table 19: Proposed Limits of Acceptable Change for the Farasan gazelles. 93
Table 20: The timetable for actions to be taken in habitat restoration 94
Table 21: Development and execution of the Farasan gazelle management Strategy 95
Table 22: Proposed timetable to implement the Gazelle Strategy 97
Table 23: Strategies and programs to protect and monitor turtle nesting sites 98
Table 24: Action steps to recover the dugong population in the Farasan Islands 100

LIST OF PHOTOS

Photo 1: The Sarso Island racer, found only on Sarsi Island.....52

LIST OF MAPS

Map 1: Map of the Farasan Islands 24
Map 2: Current key and major infrastructure within the Protected Area 31
Map 3: Farasan Islands Terrestrial Vegetation Map 37
Map 4: Primary zones of gazelle activity identified in 1988 49
Map 5: Apparent Fishing Effort Farasan, Dec-Mar 2024. **Error! Bookmark not defined.**
Map 6: 2022 Marine Vessel Traffic Density 64
Map 7: Zoning of the Protected Area Required Interventions 91

ABBREVIATIONS/ ACRONYMS

IBA	Important Bird & Biodiversity Area
COP	Conference of Parties
DM	Dive Master
IBAT	Integrated Biodiversity Assessment Tool
IUCN	International Union for the Conservation of Nature
KSA	Kingdom of Saudi Arabia
MAB	Man and the Biosphere Programme
MEWA	Ministry of Environment, Water and Agriculture
NCW	National Centre for Wildlife
NCWCD	National Commission for Wildlife Conservation and Development
PA	Protected Area
SCUBA	Self-Contained Underwater Breathing Apparatus
UNESCO	United Nations Educational, Scientific, and Cultural Organization

1 SECTION ONE: INTRODUCTION

1.1. BIOGEOGRAPHY OF SAUDI ARABIA

The Kingdom of Saudi Arabia is about 2,000,000 km^2, occupying four-fifths of the Arabian Peninsula. It is the 13th largest country, covering 1.64% of the world's land area and 8% of the land area of Asia.

Saudi Arabia divides naturally into seven terrestrial physiographic regions (with 30 subregions) and two marine regions (Child & Grainger, 1990). More recently, a new classification defines in a hierarchical manner a total of 4 Realms, 20 Eco-regions and 65 Ecosystems (Llewellyn, 2023). More information on these ecosystems and their fauna and flora is contained in the Master Document.

1.2. SOCIAL AND POLITICAL CONTEXT

The social and political context of each country shapes the way in which biodiversity conservation and management is undertaken. More information on the country, its National Biodiversity Strategy and Vision 2030 is outlined in the Master Document.

1.3. HISTORY OF PROTECTED AREAS IN THE KINGDOM

The Kingdom of Saudi Arabia has two policy documents: the National Biodiversity Strategy and Action Plan (NBSAP) and the Protected Area System Plan, which set national targets and a vision for Protected Areas in the Kingdom. The Kingdom has a long tradition of Himas. Conservation is based on new formal legislation and regulations started in 1981 as is detailed in the Master Document.

1.4. INTRODUCTION TO THE 10 PROTECTED AREAS

The 10 areas for which Management Plans are currently being compiled each address specific conservation elements that have been identified in the System Plan. They

complement each other through their different size, topography, landscapes, ecosystems and biodiversity.

1.5. MANAGEMENT PLAN OBJECTIVES AND OBJECTIVES

The National Center for Wildlife (NCW) requires an approved five-year management plan for each of its 10 protected areas, based on International Union for Conservation of Nature (IUCN) standards. The full objectives and structure of these plans are detailed in the Master Document.

1.6. OVERVIEW OF CONDUCTED FIELD STUDIES

Two field visits were undertaken, a preliminary one between 3 and 5/11/2023 and a follow-up on the 30/11 – 6/12/23. The visits were led by the National Center for Wildlife (NCW) and focused on consultations and site visits. The technical experts on those visits covered the disciplines of ecology and biodiversity conservation, Protected Area planning including financial and organizational aspects, law enforcement, tourism planning and development and stakeholder consultation.

A high-level threat and risk assessment was conducted, incorporating discussions with Protected Area staff, management, field visits, and analysis of current management plans, maps and geographical data. This process identified the prevalence and impact of threats, creating a risk-level profile and examining underlying causal factors and potential mitigation strategies. Additionally, on-site evaluations with rangers offered insights into the immediate pressures on specific locations and the limitations of current patrol strategies. A terrain, time, and distance appreciation exercise were undertaken to understand the size of the PA, its terrain and topography challenges as they relate to law enforcement, and the various threats and challenges.

Dives were undertaken by the ICS team on the coral reefs off Ablatt, the NE perimeter of Farasan, the SE and SW tip of Qummah, and the northern side of Damsk (see Table 5 for coordinates of the dive sites).

2 SECTION TWO: LEGAL STATUS AND POLICY FRAMEWORK

2.1. CURRENT AND FUTURE POLICY FRAMEWORK

2.1.1 INSTITUTIONAL

Although in practice there is much emphasis on community involvement (see NCW Mission statement), there is an institutional policy framework for Protected Areas. The 2019 decision establishing NCW includes a reference to the priority of local community engagements in its national mandate. Together with the environmental bylaw and the protected areas regulations, this represents a main pillar to the participation and engagement of local communities in the planning and management of protected areas.

The intent is to have a future policy framework based on principles that guide the revised national system plan for protected areas; this would signify a greater emphasis on rights collaborative arrangements for local communities.

2.1.2 LEGAL SETTING

General: The Kingdom has promulgated various Royal Decrees with respect to the establishment and management of protected areas and which directs the Ministry of Environment, Water and Agriculture through the National Centre for Wildlife for their implementation.

The National Environment Law no 62300 dated 21-11-1441H and its subsidiary Protected Areas Regulations no 48824-1-1443 dated 5-2-1443H, articulate the definition of protected areas and the set of guidelines, and procedures pertaining to their establishment, management, and monitoring.

The main legal instrument which is relevant to the establishment of the Farasan Islands Protected Area is the "Executive Regulations for Protected Areas for the Environment System issued by the Royal Decree No. (M/ 165) on 19/11/1441 H. This Decree grants NCW executive privilege to apply the provisions of the Decree to all protected areas administered or supervised by the Center within the Territory of the Kingdom, and also for the issuing of licenses for private reserves, in accordance with the requirements and controls it sets.

2.1.3 DIRECTIVES FOR PROTECTED AREA MANAGEMENT

Article 5 of the same Executive Regulations relate to the regulations governing the management of Protected Areas with the main directives being:

(2) The NCW issues a decision to appoint a team of NCW staff to manage each protected area, including powers, competences, administrative controls, financial resources, decision-making mechanism, etc.

(3) The management team prepares and updates the management plan for the protected area to achieve the sustainable development and accreditation of living organisms, habitats, and biodiversity from the Centre, and identifies all aspects of management, including protection ranges within the protected area.

(4) The NCW should appoint a supervisory board for any protected area that includes and is not limited to representatives from the Centre, researchers, environmental associations, and the community located in the vicinity of the protected area; the decision to appoint includes the functions and powers of this council.

(5) The NCW should fence what it sees as sites within protected areas and must develop landmarks indicating the boundaries of the protected area and guidelines setting out the objectives and scopes of protection in accordance with the management plan.

(6) The NCW will establish the necessary facilities in each protected area in accordance with the protected area management plan.

2.1.4 INSTITUTIONAL SETTING

NCW Mandate: The Farasan Islands Protected Area is currently managed by the NCWCD's successor, the NCW which was set up in 2019 (Cabinet Decree Number 417) with a new and enlightened mandate and mission statement* as part of the transformation of the Kingdom's environmental sector.

A National Registry for Protected Areas: Since 2021 a National Register for protected areas has been established with the issuance of the Royal Decree No. 26384 dated 22/4/1441 H (27/11/2021 G) instructing the registration and designation of all protected areas in the Kingdom to be undertaken by the NCW of the Ministry of Environment, Water and Agriculture (MEWA).

The schematic flowchart below illustrates the process for the designation and registration of protected areas in the Kingdom of Saudi Arabia (KSA):

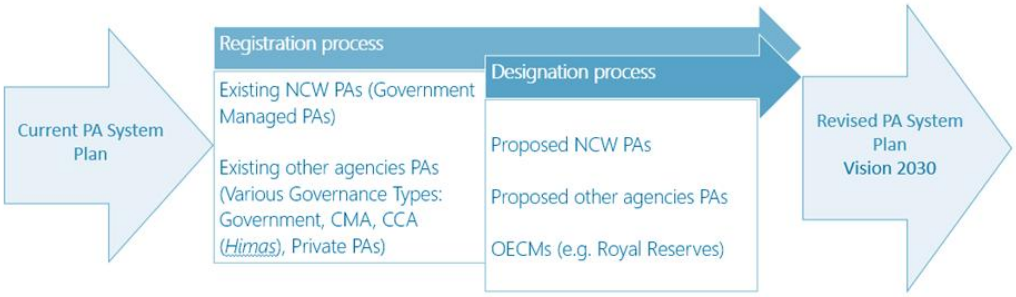


Figure 1: Designation and registration process for PAs in KSA

***NCW Mission Statement**: "Preserving and developing wildlife, biodiversity, and ecosystems by enhancing community participation through comprehensive and effective

programs to achieve environmental sustainability and maximize social and economic benefits".

2.1.5 Some Laws, Regulations, Guidelines, and Plans that support the Management of Farasan Islands Protected area and its resources

i) Environmental Law and its Executive Regulations including Executive Regulations for Protected Areas, Sustainable Management of the Marine and Coastal Environment, Environmental Rehabilitation of Degraded Sites and Remediation of Polluted Sites, Vegetation Cover Development and Combating Desertification, Trade in Wildlife Species, Their Products and Derivatives.

ii) Farasan Islands Protected Establishment Decree

iii) Juzur Farasan Biosphere Reserve Abbreviated Management Plan 2021 - 2023

iv) Farasan Islands Biosphere Reserve Strategy 2024

v) UNESCO MAB Strategy 2015-2025 and Technical Guidelines for Biosphere Reserves

vi) Law of Endangered wild species and their products trafficking

vii) Law of Hunting Wild Animals and Birds and Executive Regulation for Hunting Terrestrial Wildlife Species

viii) Law of Fishing, Investment and Preservation of Live Aquatic Resources within Territorial Waters of the Kingdom of Saudi Arabia

ix) Marine Scientific Research Law and Its Implementing Regulations

x) Law of Municipalities and Rural Areas 1977

xi) Tourism Law and its implementation regulations

xii) Cultural Heritage Law

xiii) National Protected Areas System Plan (Draft?)

xiv) Farasan Island Development Committee

xv) The Agriculture Law and its Implementing Regulation

xvi) Water Law and its Executive Regulations

xvii) Waste Management Law 2021 and its Executive Regulations

xviii) Others that are related to the management of the Protected Area and its resources.

2.2 FARASAN ISLAND PROTECTED AREA'S LEGAL SETTING

2.2.1 ESTABLISHMENT HISTORY

The Farasan Islands were nominated in 1988 by the National Commission for Wildlife Conservation and Development (NCWCD) Board of Governors as a protected area. The NCWCD was a parastatal established in 1986 to develop and implement plans to preserve wildlife in its natural ecology, and to propose the establishment of proper protected areas and reserves for wildlife and to manage such reserves.

The Farasan Islands were then proclaimed as a 'protected area' by the Cabinet of Ministers Decision No 77 dated 02/06/1417H (October 14, 1996).

The Farasan Islands form a large archipelago of over 170 islands and islets lying 40-90 km offshore from the city of Jazan. The Farasan Islands Protected Area is managed (see Tenure below) by the NCWCD's successor, the National Center for Wildlife (NCW) which was set up in 2019 (Cabinet Decree Number 417) with a new and enlightened mandate and mission statement as part of the transformation of the Kingdom's environmental sector (15/10/1996G) under the Protected Areas Law (Royal Decree No M/12 dated 26/10/1415H.

Land Ownership/Tenure. The NCW is the administrative authority for the Farasan Islands Protected Area, but within the jurisdiction of the imarah of Jazan, and in liaison with other government agencies. Since 1989 the Ministry of Defense has overall authority over land uses and activities on the islands, and reserves the option to develop a military base in Janabah Bay. The land tenure on the islands is a mixture of State (Defense and Municipal) and private holdings.

Though Farasan al-Kabir, Saqid, and Qummah Islands are permanently inhabited the main centers of habitation are concentrated on Farasan Kebir in Farasan town and adjacent Al-Masilah village with the present population numbering around 12,000. There are Coastguard stations and/or temporary fishing camps on other islands.

The population is basically non-tribal consisting of a mixture of people of Tihami, Yemeni and east African origin, with a history of fishing and pearling across the southern Red Sea and even trading to India.

2.2.2 CULTURAL VALUES

The Farasan Islands have been lived on for millennia which has resulted in long standing cultural values.

Sites of Cultural significance: the ruins surrounding the palm groves of Wadi Matar are fenced off as an archaeological site; the Turkish fort northeast of Farasan town: the

distinctive architectural heritage including intricately carved houses of pearl merchants northeast Farasan town; the five-domed Najdi Mosque in Farasan town.

Traditional cultural practices: the chief festival is the Hareed festival when parrot fish are caught by hand after a full moon in April. Annual trapping in late spring of migrant passerine birds on Baqil Island, to render their fat for food and medicine, is a major community event.

2.2.3 PROTECTED AREA POLICY ENVIROMENT

The Kingdom's revised protected area system plan, being readied for publication in early 2024, outlines the process guiding the development of Saudi Arabia's national system of protected areas. The Plan recognizes that individual protected areas are the foundation of the system plan and collectively they help to balance the system plan's different conservation objectives.

The plan identifies the following objectives for a protected area's management:

- Conserve the composition, structure, function, and evolutionary potential of biodiversity.
- Contribute to regional conservation strategies (as core reserves, buffer zones, corridors, stepping-stones for migratory species, etc.).
- Maintain diversity of landscapes or habitats and their associated species and ecosystems.
- Be of sufficient size to ensure the integrity and long-term maintenance of the specified conservation targets or be capable of being increased to achieve this end.
- Maintain in perpetuity the values for which it was assigned.
- Be operating under the guidance of a management plan, and a monitoring and evaluation program that supports adaptive management; and
- Have a clear, effective, and equitable governance system.

2.2.4 INTERNATIONAL OBLIGATIONS - UNESCO

Man and Biosphere (MAB): The nomination of Juzur Farasan Protected Area as a Man and Biosphere Reserve was approved by the International Coordinating Council of the United Nations Educational, Scientific, and Cultural Organization (UNESCO's) Man and the Biosphere Programme (MAB-ICC) on September 15, 2021.

The Saudi Wildlife Authority (predecessor to NCW) developed an abbreviated management plan for 2021-2023 that embedded the concept of the Man and Biosphere

Programme as a management tool for the transitional period, with designated Core Zones, Transition Zones and Buffer Zones[1].

MAB UNESCO's General Conference approved the Seville Strategy for Biosphere Reserves and the Statutory Framework of the World Network of Biosphere Reserves in 1995; the latter functions as the "soft legal framework" for the development and formal recognition of Biosphere Reserves

The Statutory Framework (Article 4, paragraph 7) requires that every biosphere reserve have a 'management policy or plan' (section 4.1.2), envisioned as an overall framework for all stakeholders to collaborate towards achieving the goals defined for the biosphere reserve and to address emerging challenges. A management plan needs to address all zones of a biosphere reserve equally. However, while conserving biodiversity is necessary in all three areas, the different zones provide a variety of instruments to this end. An appropriate Governance structure is also a requirement to fully implement the concept of a biosphere reserve.

The MAB Programme and Biosphere Reserves need visibility, recognition and acknowledgement in the legal system of any country. Consequently, Action A3.1 of the Lima Action Plan (2016–2025) states that biosphere reserves need to be recognized in legislation and policies. The status of each biosphere reserve is subject to a periodic review every ten years based on the criteria of Article 4 of Statutory Framework.

World Heritage: The Juzur Farasan Protected Area is proposed as a Natural World Heritage Site and was placed on Saudi Arabia's Tentative List for Natural World Heritage Sites in September 2018. In 2019 it was submitted to the UNESCO WH nomination tentative list with a justification of Outstanding Universal Values for Criterion x.[2]

If Juzur Farasan is to be inscribed as a WHS, Saudi Arabia would have certain international obligations towards its protection, conservation and management. Key obligations include:

1. Protection and Conservation: States Parties are responsible for ensuring the protection, conservation, and preservation of the cultural and natural heritage sites within their boundaries. This includes taking appropriate legal, scientific, technical, administrative, and financial measures to safeguard these sites.

[1] In the Biosphere Reserve zonation, Core Areas cover 2,876.00 sq. km. (350.00 sq. km. terrestrial and 2,526.00 sq. km. marine), and Buffer Zones cover 2,856.82 sq. km (321.00 sq. km. terrestrial and 2,535.82 sq.km. marine). Transition Zones inside the protected area cover 36.18 sq. km., all terrestrial. The protected area is largely surrounded by a marine Transition Zone of approximately 2,422 sq. km., which extends to the Saudi coastline at Jazan and to the edge of Saudi Arabia's Exclusive Economic Zone, except along the Yemen boundary, which is contiguous with the Reserve's southern boundary.

[2] Criterion x: Contains the most important and significant natural habitats for in-situ conservation of the biological diversity of the Red Sea region as a global hotspot and a conservation priority, including threatened species of outstanding universal value from the point of view of science or conservation.

2. Management and Planning: Developing and implementing management plans that outline strategies for the conservation, presentation, and sustainable use of World Heritage Sites is essential. These plans should involve stakeholders, local communities, and experts to ensure effective management.
3. Monitoring and Reporting: States Parties are required to monitor the state of conservation of their World Heritage Sites and report regularly to UNESCO on their condition, any threats or changes, and the measures taken to address them.
4. Legal Protection: Putting in place legal frameworks and regulations to safeguard the sites from potential threats such as urbanization, pollution, natural disasters, climate change, and unauthorized developments. This may involve establishing buffer zones, legal protections, and regulations governing the use of the site.
5. Public Awareness and Education: Promoting public awareness and understanding of the importance of World Heritage Sites, their significance, and the need for their protection. This often involves educational programs, interpretation centers, and community engagement initiatives.
6. International Cooperation: Collaborating with other States Parties, international organizations, and stakeholders to exchange information, expertise, and resources for the conservation and management of World Heritage Sites.
7. Emergency Measures: Taking immediate action in case of emergencies or sudden threats to the sites, such as natural disasters or armed conflicts, to minimize damage and ensure their recovery.

Each country's specific obligations and strategies for fulfilling them may differ based on the unique characteristics of their World Heritage Sites and their national capacities.

2.3 MANAGEMENT PLAN PA SPECIFIC FRAMEWORK

2.3.1 ADAPTIVE MANAGEMENT

A useful definition of this Adaptive Management Cycle concept is: “Adaptive management incorporates research into conservation action. Specifically, it is the integration of design, management, and monitoring to systematically test assumptions in order to adapt and learn.” Salafsky *et al.* (2001).

2.3.2 MANAGEMENT PLAN PA SPECIFIC FRAMEWORK – SETTING LIMITS OF ACCEPTABLE CHANGE

The manner in which the management staff of The Farasan Islands Protected Area will check whether they are on track with their expectations in managing the terrestrial ecosystem, is to set ecosystem endpoints that reflect a desired state.

In terms of the LACs for habitats, these would define lower levels for the mangrove patches and the proportion of large trees. LACs would also be defined for those plant species endemic to the Farasan Islands and for the invasive aliens. It may also need to be applied to an upper limit of the land that can be cleared for cultivation of crops.

For fauna, LACs will apply to the number of Gazelles on Farasan Kabir island and selected population limits of other species are set by an interplay of the following requirements:

- Minimum population size that can fulfil the vision and that can withstand normal predator pressure.
- Minimum numbers of 'the species that make for a generally 'good' large animal viewing experience.
- Maximum number as dictated by the available vegetation resources.
- Balance between different feeding groups in terms of respective feeding requirements (bulk grazers, browsers, etc.) and respective roles.
- A balance of each feeding group in facilitating/denying access to vegetation resources by another feeding group.

These requirements balanced against the low success rate of certain species may lead to specific species becoming marginal or threatened. A decision may then be required as to whether a specific species is allowed to disappear or somehow survive or whether it should be pro-actively removed.

SECTION THREE: PROTECTED AREA ASSESSMENT

3.1 INTRODUCTION AND OVERVIEW OF THE PA

3.1.1 OVERVIEW

Geologically, the Farasan Islands consist of an originally more or less uniform, flat, fossil coral reef that rose 0–30 m above sea level during the late Pliocene to early Pleistocene Periods (McFayden, 1930). According to the UNESCO listing[3], there are 33 islands of significant size in the protected area and over 100 islets smaller than 20 ha. Only the larger islands are prominent above sea level, reaching an altitude of ~20-70 m. The Archipelago has significant floral diversity and a total of 191 flowering plants belonging to 53 families and 129 genera were recorded by Mutairi et al. (2012). Fifteen plant species are endemic to the Archipelago[4]. Species diversity particularly on the southern part of the Farasan Kabir Island is threatened by the invasion by the exotic invasive tree *Prosopis juliflora* and anthropogenic activities(Mutairi et al. 2012). The islands play an important role for migratory birds, as nesting sites, and are habitats for an endemic species of snake, the Sarso island racer *Platyceps insularis.* The islands and their surrounding waters provide rich feeding grounds and breeding sites for nationally and internationally important populations of several seabirds and species of raptor (Gladstone 2000a). The region has a high conservation value because of the diversity of terrestrial and marine habitats and their importance for marine mammals, turtles and seabirds, and a small artisanal fishery. As such, it was decided in 1988 to establish a marine protected area around the Farasan Islands (Gladstone, 1994, 2000, 2000a).

The islands are home to a population of the mountain gazelle *Gazella gazella farasani* that is currently the single largest population of the species in Saudi Arabia. The origin of these gazelles is still a mystery, but they are now regarded as a sub-species *Gazella gazella farasani* (Thouless & Bassri 1991). Gazelles were present on four islands but now only occur on Farasan Kebir. Another mammalian anomaly is the white-tailed mongoose *Ichneuman albicaudata* and there has been valid concern that it could have been introduced to the islands to control snakes (Masetti 2010). Of special importance on Sarso island is the snake *Platyceps insularis* or the Sarso island racer that occurs nowhere else in the world.

The islands are accessible by ferry from Jazan (Jezan, Jizan; spellings vary), making it a suitable destination for diving excursions.

3 https://whc.unesco.org/en/tentativelists/6370/#:~:text=The%20Farasan%20Islands%20are%20a,protected%20area%20covers%205%2C408%20sq

4https://www.plantdiversityofsaudiarabia.info/Biodiversity-Saudi-Arabia/Vegetation/Farasan%20Islands.htm

Map 1: Map of the Farasan Islands

3.1.2 ADMINISTRATIVE FEATURES

Table 1: Administrative features

Date of Establishment:	
October 1996 by a cabinet decree number R/8056	
Reasons for Protection:	• To preserve the largest wild population of Farasani Gazelle and diverse marine life including coral reefs, mangroves, and marine mammals. • To manage the region's rich biodiversity as part of Saudi Arabia's heritage
Existing Management Objectives:	• Conservation of marine and terrestrial ecosystems and their endemic species. • Engagement with local communities to integrate sustainable economic development. • Development and enforcement of regulations to ensure environmental protection • Applying the Biosphere concept and tools as the main management framework
Tenure:	• Predominantly state-owned, with certain private and municipal portions recognized within the boundaries
Size and Sectors:	• Total approximately 5,408 sq. km • Marine Area: Approximately 4,698 sq. km • Terrestrial Area 710 sq. km
Imarahs/Districts:	• Farasan Governorate in the Imarah of Jazan
Nearest Cities (Population over 100,000):	• Jazan
Central Coordinates:	• Lat: 16° 45' N Long: 41° 55' E
Altitude:	**Min Elevation**: **-13 metres above sea level (m asl)** **Mean Elevation**: 1.42 m asl **Max Elevation**: 60

3.1.3 SOCIO-ECONOMIC FEATURES

The Farasan Islands have a rich history of human habitation, spanning ancient civilizations, pre-Islamic eras, and continuing through Islamic and modern times. Alongside their role in commerce, these islands served as strategic maritime bases for various global powers. The unique architectural style of the Farasan Islands reflects the extensive trade conducted by local traders, especially pearl traders, who interacted with merchants from the Gulf, East, and West (Ali *et al.,* 2018).

According to a 2010 report from the Department of Statistics and Information, the total population of the Farasan Governorate was 18 016, including Saudis and non-Saudis. Of these, 15 992 were Saudis. The study focused on individuals aged 3 to 30 years, totaling 5 433, with 1 058 having completed university-level education. Moreover, 1 467 residents held university degrees, 721 had diplomas, and 3 285 completed high school or equivalent education. Additionally, 7 238 residents aged 15 years or older were part of the workforce, while 6 749 were outside the workforce, including students, homemakers, retirees, and others (Elbannaa & Ali, 2021).

The livelihoods of the inhabitants of Farasan Islands primarily revolves around government employment, marine fisheries, and domestic tourism (UNESCO, 2019). The inhabitants of the Farasan region engage in diverse activities such as fishing, subsistance agriculture, sheep breeding, and the production of handicrafts, alongside working in government sectors. The marine environment influences certain activities like pearling, coastal fishing, and the extraction of raw amber (Elbannaa & Ali, 2021).

Dispersed across the Farasan Islands are nine (9) primary settlements. These settlements are connected by the main road, which is categorized as a secondary road. Residential purposes predominate in these settlements, with public amenities supplementing the mixed contingent upon the scale and density of each individual settlement. Five of these communities—Farasan, Al Qessar, Al Mehraq, Sair, and Al Hussayen—are situated on the main island, Farasan Al Kabir.

The most populous settlement is Farasan, which features the following public amenities: commercial and open spaces, public facilities, health facilities, educational facilities, religious facilities, social facilities, and governmental facilities. Sajid Island, the second largest, comprises four settlements (Sajid, Khotib, Al Mahsor, and Abu Towq), the majority of which are residential and only a few sites are devoted to facilities.

3.2 CONTEXT AND ACCESSIBILITY

The Jazan region is located in the southwestern part of the Kingdom of Saudi Arabia, spanning a distance of 300km along the southern coast of the Red Sea. The Jazan Region is adjacent to the Assir Region in the north, the Republic of Yemen to the east and south, and the Red Sea to the west. The administrative capital of Jazan Region is the city of Jazan,

which is a port city. It includes thirteen governorates, one of these governorates is Farasan.

The Farasan Islands are strategically situated in the Red Sea, approximately 50 kilometers away from the city of Jazan. The archipelago comprises more than two hundred islands, of which only approximately thirty-six are situated above sea level. The primary inhabited islands are Farasan Al Kabir Island and Sajid Island. Furthermore, several unpopulated islands function as breeding grounds for a significant population of avian species and as a protected area for Farasani gazelles. The island possesses stunning coastlines and abundant marine fauna.

Farasan Al Kabir is the largest island. The area covers approximately 409 square kilometers and consists of four primary settlements (Farasan, Al Mehraq, Sair, and Al Hussayen). Among these settlements, Farasan has the highest population and is slated for future expansion. Sajid Island is the second largest island. The area covers approximately 169 square kilometers and consists of four primary settlements: Sajid, Khotib, Al Mahsor, and Abu Towq. There exists a bridge that links the islands of Farasan Al Kabir and Sajid.

The Farasan islands are exclusively linked to the city of Jazan via its port, which is traversed by a ferry boat twice daily. Furthermore, private operators operate small private speedboats that are accessible at the Al Hafa touristic port. One primary thoroughfare (secondary thoroughfare) traverses Farasan Al Kabir Island and is linked to Sajid Island via the Al Maadi Bridge. The road hierarchy is restricted to tertiary roads situated within the settlements and secondary roads that run along the Farasan Al Kabir and Sajid Islands.

3.3 MANAGEMENT, RESOURCES AND INFRASTRUCTURE

3.3.1 FINANCIAL RESOURCES

The National Center for Wildlife (NCW) operations within the Farasan PA are solely reliant on government funding. The financial functions are managed at the national level in Riyadh and directed through NCW. No revenue is generated from visitors or tourism, and any fines imposed are directed to the Government coffers through the Ministry of Environment, Water and Agriculture (MEWA).

While the Center has adequate financial resources to run its operations and supports the management of its complex ecological system, The skills and staff available are adequate to effectively implement all operational programs of the protected area and its management plan.

3.3.2 HUMAN RESOURCES – STAFFING

While the PA covers an area of 5,408 km², the available 74 rangers (excluding housekeepers – Table 2) suggests that the density of rangers in the PA is 0.0139 per kilometer square, meaning one ranger covers ~73 km². The size of the area that is covered by one range in Farasan Islands PA is relatively close compared with the sizes recommended by the IUCN and researchers/scientists. Specifically, deployment of at least one ranger to cover between 5 km² (IUCN, 2016) and 50 km² (James et al., 1999; Appleton et al.,2022).

Table 2: Current staffing of the Protected Area

DEPARTMENT	QUANTITY	TITLE	ROLE
Management	1	Protected Area Manager	Overall, in charge of the Protected Area
	1	PA Technical Advisor	Advises PA Manager and the PA Directorate.
	2	Administrative Manager	Administers site-level Finance, Human Resources and General Administration
	1	Administrative Receptionist	Manages reception and visitor inquiries, assists with administrative duties.
	1	Logistics Manager	Vehicles and General Operations Support
	4	Community and Tourism Liaisons	Engage with local communities and manage tourism-related activities
	2	Environmental Control Unit	Monitors environmental conditions and collects data
Rangers	2 42 18	Head of Patrol Unit Terrestrial Rangers Marine Rangers	Conduct terrestrial and Cmarine field patrols focused on monitoring and observations, including enforcement of regulations.
Other	2	Housekeepers	Maintain cleanliness and provide meals for staff
Total	76		

The main focus area of the PA staff and daily operations include conducting antipoaching patrols, and surveillance/monitoring of wildlife and its habitats. The rangers are the only field-based staff who conduct vehicle and boat-based patrols jointly with other agencies. The terrestrial patrols are focused on the protection of shorelines, nesting sites, sensitive areas, habitats, and monitoring and protection of the core area where the Farasani gazelle, sea turtles and other threatened species and wildlife resources are found. Marine patrols are focused on monitoring fishing activity and compliance with fishing regulations. However, the PA staff are positive, motivated, and proud of their Protected Area's role and its status as the largest marine protected area in the Kingdom. They have good levels of local knowledge and generally good relationships with the local residents and communities. Currently, the functions of community liaisons, tourism management and environmental monitoring are conducted by rangers who have been assigned to these roles.

3.3.3 EQUIPMENT & VEHICLES

Table 3: Current vehicle and equipment present in the PA

QTY	CATEGORY	DESCRIPTION
11	Vehicles	• Toyota Land Cruisers and Isuzu Pickups and FJ Cruisers • All vehicles fitted with a Fleet Management System, incl. in-vehicle cameras. Connectivity via GSM and Satellite. • All vehicles fitted with 2-way radios.
7	Boats	• 20-ft Walk Around Centre Console, Mono Hull • Twin Outboard Motors
2	Motorbikes	• Intended for conducting shoreline patrols

3.3.4 INFRASTRUCTURE

The infrastructure in the PA is primarily designed to support human settlement and development. It encompasses a wide range of facilities such as towns, smaller settlements, buildings, road networks, small ports, houses, shops, power stations, desalination plants, hospitals, schools, and other infrastructure associated with human settlement. In addition, there are Navy facilities on the islands and several abandoned or derelict buildings that are no longer in use.

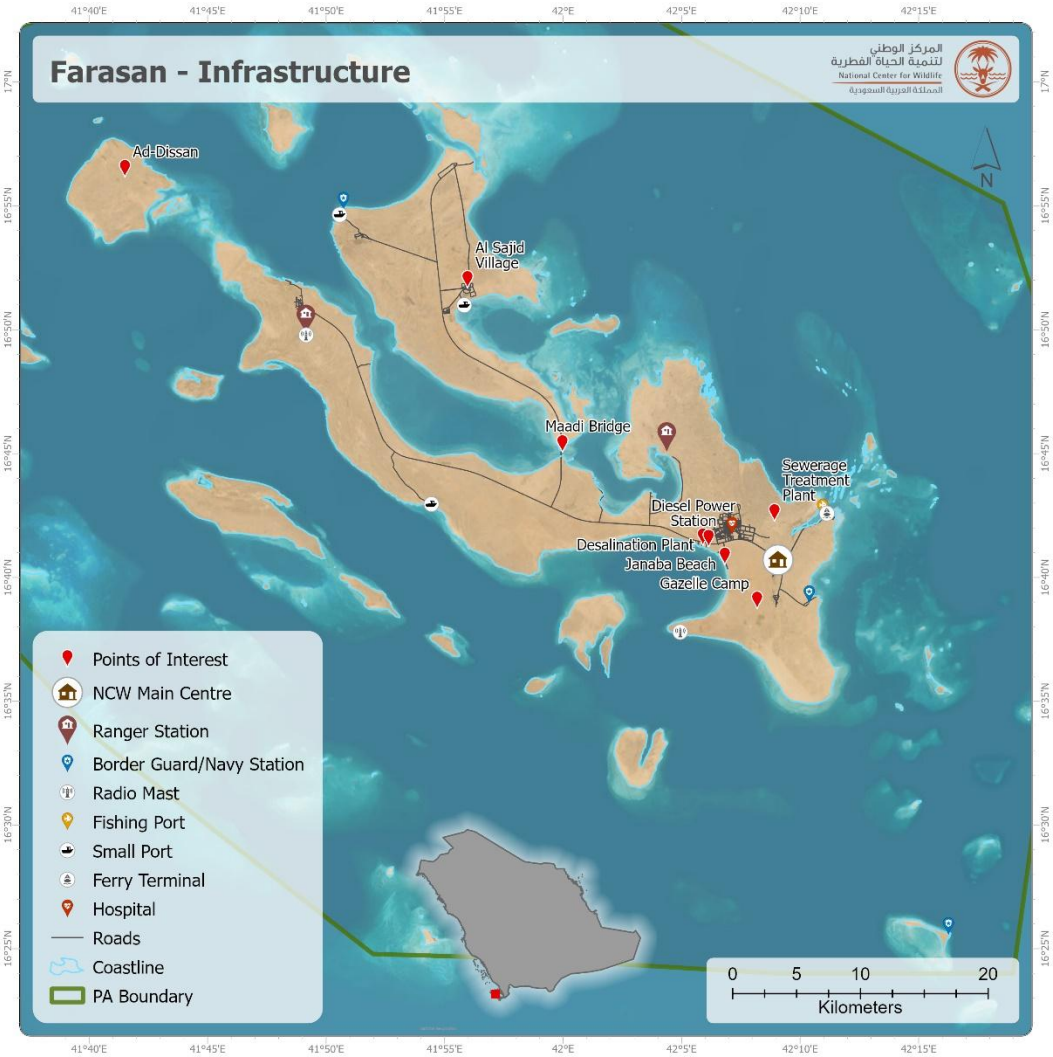
Figure 2: Facilities at the Farasan NCW headquarters.

Regarding NCW's infrastructure, it mainly comprises a Main Centre building which serves as the PA headquarters and operations centre, and two outlying ranger stations, which are adequate for their current needs. However, there are plans to upgrade the main centre to improve visitor experience. The Gazelle release camp buildings, structures, and fencing require substantial refurbishment, repairs, and maintenance to be usable in the future.

Table 4: Farasan Islands PA infrastructure including ranger stations

QTY.	INFRASTRUCTURE	LOCATION/DETAILS
1	Main Centre	• Administrative and Operational headquarters of the PA • Located on the Main Road between the Port and Farasan town

QTY.	INFRASTRUCTURE	LOCATION/DETAILS
		• Administrative Offices • Parking Area • Visitor Centre • Workshop and General Storage Area
3	Operational Ranger Stations	Situated near Al Qessar/Al Mehraq, Sayir and Saged.
1	Observation Building	Situated in the NE corner of the Gazelle Release Camp
	0.12 km² Gazelle Release Camp	Situated in the Core area, 4km SSW of the Main Centre
3	Radio Communication Tower	Located at Ranger Stations



Map 2: Current key and major infrastructure within the Protected Area

3.4 PHYSICAL ENVIRONMENT ANALYSIS

3.4.1 TOPOGRAPHY

The Farasan archipelago—like its African counterpart, the Dahlak Archipelago—is a unique assembly of coral-formed islands located on the Farasan Bank at the Arabian site of the southern Red Sea. The rugged surface and the tropical-arid climate form a harsh landscape in which only a few mammal species have managed to survive (Thouless & Al Bassri 1991).

- The Islands are primarily composed of coral reefs, limestone, and volcanic rocks. They were formed through a combination of geological processes including volcanic activity, sedimentation, and coral reef growth over millions of years. They are surrounded by extensive coral reefs, which play a crucial role in shaping the geomorphology of the region. These reefs provide habitats for diverse marine life and protect the islands from erosion by dissipating wave energy.
- Karst Topography: Limestone formations on the islands have been subject to karst processes, resulting in the formation of caves, sinkholes, and other distinctive landforms. These features are often found in areas where groundwater dissolves the limestone over time, creating unique geological formations.
- The coastline of the Farasan Islands is characterized by sandy beaches, rocky shores, and coastal cliffs. Erosional processes, such as wave action and weathering, continuously shape the coastline, leading to the formation of sea caves, arches, and stacks. Caves and ledges in coastal cliffs are important nesting site for Sooty falcons.
- Inland areas of the islands are dominated by sand dunes and salt flats. Wind plays a significant role in shaping these landforms, constantly reshaping the dunes and redistributing sediment across the landscape.
- Tidal Flats and Mangroves: Some areas of the islands feature tidal flats and mangrove forests, which are important ecosystems supporting diverse flora and fauna. These environments are influenced by tidal processes and provide critical habitat for migratory birds and marine life.
- Human Impacted landscapes: While the Farasan Islands remain relatively pristine compared to other coastal regions, human activities such as fishing, tourism, and infrastructure development have begun to exert pressure on the delicate island ecosystems. Conservation efforts are underway to preserve the unique geomorphological features and biodiversity of the islands.

Overall, the geomorphology of the Farasan Islands reflects a dynamic interplay of geological processes, marine influences, and human activities, making it a fascinating area for scientific study and conservation.

3.4.2 REEF GEOLOGY

The reefs comprise ancient fossilized coral structures and salt domes, with some volcanic features, and are shallow (mostly ≤20 m) and surrounded by gently sloping sandy substrata. Many of the reefs are typified by a *Sargassum* belt on the reef crest. Historically, the Farasan coral communities were described as depauperate and living in turbid waters (Sheppard and Sheppard, 1991).

3.4.3 OCEANOGRAPHY

The oceanography in the Red Sea is complex (Bower and Farrar, 2015). Nearly stationary gyres and narrow boundary currents dominate and are regulated by seasonal winds and the seabed topography. There appears to be a nearshore northward drift bearing warm water in the SE region of the Red Sea (i.e. including the Farasan Islands). Water exchange occurs through the Gulf of Aden where more saline water, resulting from evaporation, leaves the Red Sea at the surface, and less saline water enters at depth. The southern Red Sea is the warmest, with temperatures ranging from 25°C in winter to 32°C in summer (Shaltout, 2019). The normal tidal range is small, with peak tides of about 0.5 m, but there are seasonal and geographical long-term variations in water level over longer periods (Bemert and Ormond, 1981).

3.4.4 CLIMATE

The climate of the Farasan Islands in the Red Sea is characterized as hot and arid, typical of a desert environment. Summers are scorching, with temperatures often exceeding 40°C (104°F), while winters are milder but still warm, averaging around 20-25°C (68-77°F). Rainfall is sparse, primarily occurring between November and March, with annual precipitation ranging from 50 to 100 millimeters. Strong winds, especially during the summer months, can contribute to the arid conditions of the islands. The nearest weather station is in Jazan.

The following figure shows the mean rainfall and maximum and minimum temperatures per month.

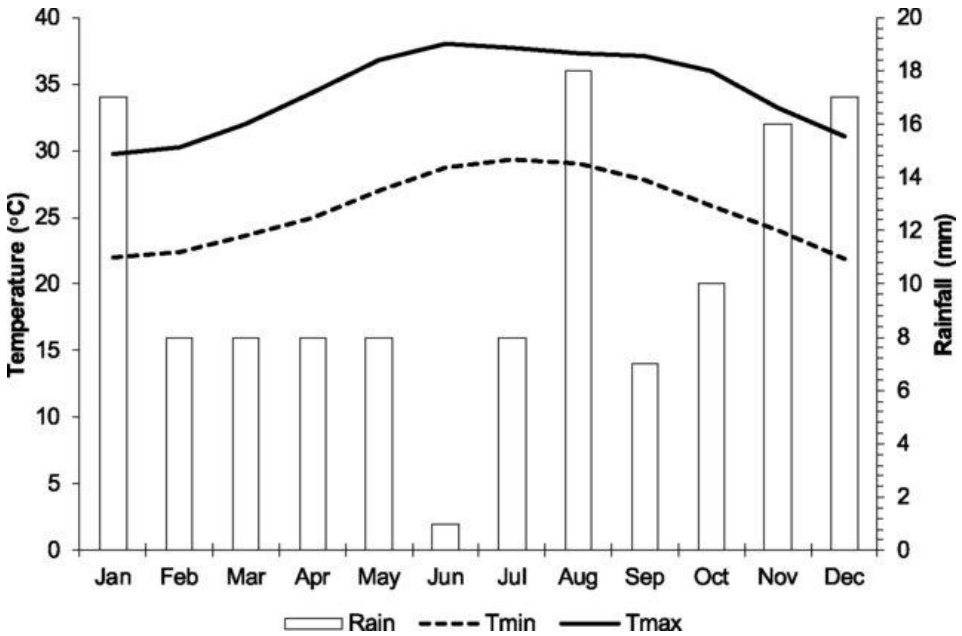


Figure 3: Climate data for Farasan Archipelago, southern Red Sea, Kingdom of Saudi Arabia

Source: Online, 2024[56]

3.5 BIOLOGICAL ENVIRONMENT ANALYSIS

3.5.1 HABITATS

The Farasan Islands Protected Area is comprised of the following ecosystems as identified by Llewellyn (2023): Southern Red Sea Shoreline, Southern Tihamah Coastal Plain, Red Sea Mangroves, Southern Red Sea and Pelagic Sea (Map 3). These ecosystems cover the following area:

Ecosystem	Surface area (km^2)	% for whole PA	% of Terrestrial Area
Red Sea Mangroves	3.25	0,06%	0,43%
Southern Red Sea	5,016.03	86,82%	0%

5 http://www.worldclim.org

6 https://whc.unesco.org/en/tentativelists/6370/#:~:text=Most%20rain%20falls%20in%20October,31%C2%B0C%20in%20winter.

Southern Red Sea Shoreline	54.37	0,94%	7,14%
Southern Tihamah Coastal Plain	704.17	12,19%	92,44%
TOTAL	5,777.82	100,00%	100,00%

The important terrestrial habitats noted in the UNESCO proposal (National Center for Wildlife 2020) areas are:

Arid Plains: Largely ancient reef pavement, sand-covered in places. Apart from a brief flush of annuals such as *Justicia flava* after winter rains, this habitat is barren except where cracks and gullies in the limestone collect silt and water. The most conspicuous shrubs are those which are uneaten: *Capparis sinaica* and *Indigofera oblongifolia* with *Abutilon pannosum* dominant on silt, and, especially evident in western Farasan and southern As-Saqid islands, the large succulent *Euphorbia*. The woody herbs *Zygophyllum simplex, Blepharis ciliaris* and the sedge *Cyperus jemenicus* are intermittent but widespread in sand. There are occasional trees of *Hyphaene thebaica, Salvadora persica* and *Acacia ehrenbergiana (salam).* This habitat is easily accessible to man and is rather sterile except for lizards and desert birds.

Dense Shrub: This habitat is associated with silt pans, valley bottoms, and pockets of good soil within outcrops of rocky land. Pans and valley bottoms are well vegetated with *Acacia ehrenbergiana,* an important forage plant. In broken land, growing with the Acacia are large *Salvadora persica* trees which are not much grazed. Alien invasive *Prosopis juliflora* has spread in the last twenty years, as well as handsome thicket of *Phoenix dactylifera*.

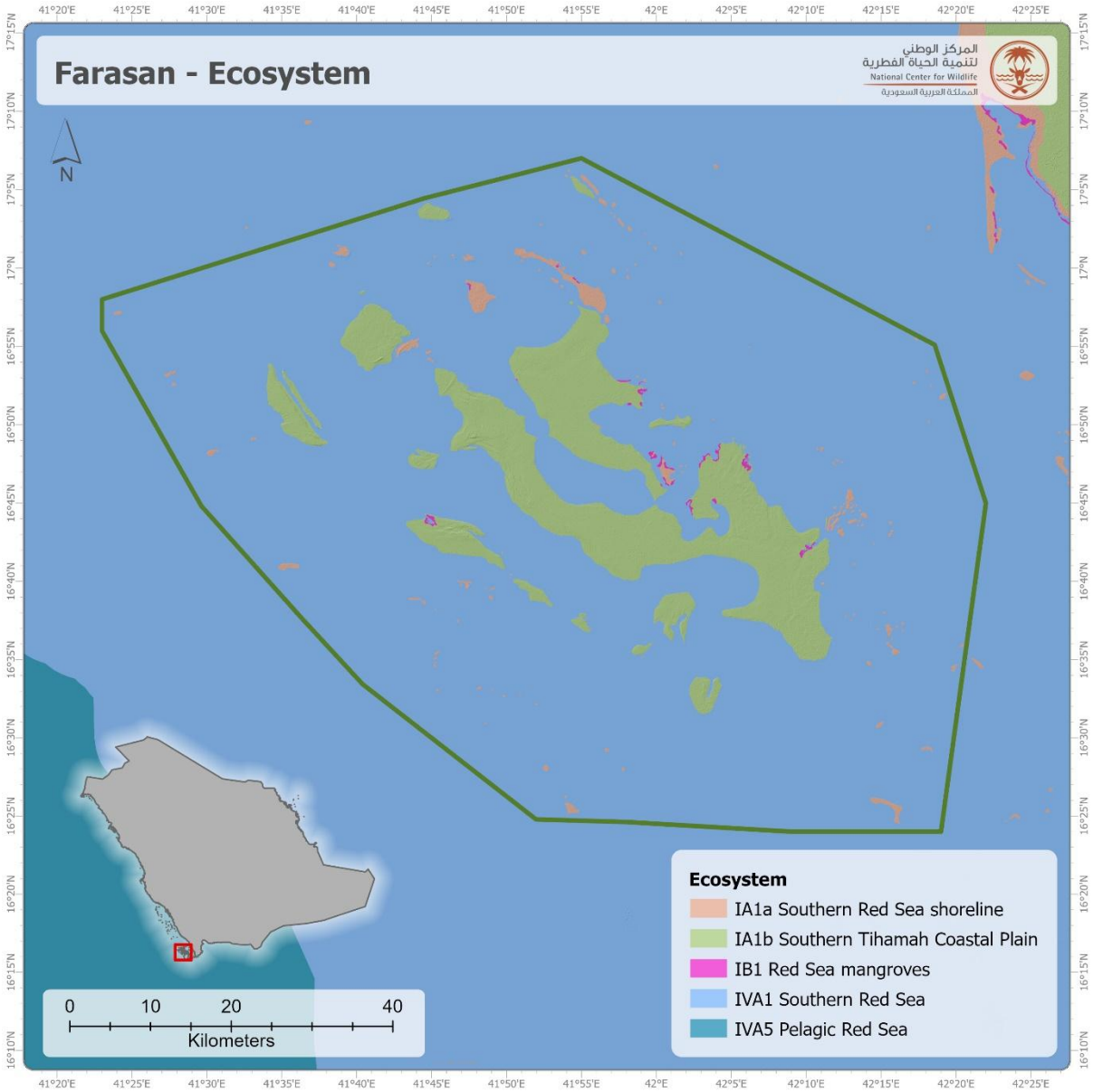
Coastal Halophyte Shrub: Silty sands line the shores of southeastern and northeastern Farasan and most of As-Saqid islands. Belts of salt-tolerant pioneer xerophytes such as *Arthrocnemum macrostachyum, Halopeplis perfoliata, Limonium axillare* and *Zygophyllum* species at an average cover of 50% occur near the shore, falling off 100-200 m inland to barren land except in swales and depressions. These long-rooted species stabilize and enrich the soil and provide food and nesting sites for shorebirds. On sands further inland *Limonium axillare* is also common. Along the coasts, *Atriplex farinosa, Suaeda monoica,* S. *vermiculata,* and *Cyperus conglomerates* are all locally frequent. This habitat is important to breeding shorebirds, especially on isolated islands, some of which are covered with *Suaeda* Shrub, and even to young fish which use the winter-flooded saltflats fringed with *Zygophyllum* and *Limonium.*

The Mangroves: A*vicennia marina* lines many sheltered coasts. But in Khawr al-Qandal, North Sulayn I. and northwest Zufaf I. There are also large stands of *Rhizophora*

mucronata which is rare in the Red Sea. These mangrove swamps are carpeted with blue-green algal mats and are a fertile refuge for marine invertebrates, young fish, shrimp and large nesting birds, and *Avicennia* leaves are eaten by gazelles. Mangroves grow on fifteen of the northern islands in sheltered muddy creeks and rock channels protected from winter waves. Their total area is about 3.30 km^2 (NCW UNESCO).

Turtle nesting beaches: These beaches typically consist of sandy shores with access to both the sea and suitable nesting areas above the high tide line. The habitats are characterized by warm waters, coral reefs, seagrass beds, and mangrove forests, providing important foraging and nesting grounds for the turtles. The beaches offer suitable conditions for nesting, with soft sand where the turtles can dig their nests and lay their eggs. Minimal disturbance on these beaches is important.

Dunes and sand flats: The Dunes and Sand Flats on the Farasan Islands are vast stretches of low-lying coastal land characterized by their sandy terrain and shallow waters. These areas are crucial habitats for various marine species, including migratory birds, fish, and invertebrates. The flats are often submerged during high tide but become exposed during low tide, creating an expansive landscape that supports diverse ecosystems. They are also important breeding grounds for marine life and serve as feeding grounds for birds and marine mammals. Additionally, the Dunes and Sand Flats are also popular among tourists for activities such as birdwatching, fishing, and nature exploration.



Map 3: Farasan Islands Ecosystem Map

3.5.2 REEF DESCRIPTIONS AND FAUNAL ANALYSIS

The Farasan Islands have reefs different from the more typical, accretive coral reefs found in the northern Red Sea (see Sheppard and Sheppard, 1991). The islands and their reefs are founded upon ancient fossilized coral structures and salt domes, with some volcanic features, and the Farasan reefs are shallow (mostly ≤20 m) and surrounded by gently sloping sandy substrata. Many of the reefs are typified by a *Sargassum* belt on the reef crest. Historically, the Farasan Islands were described as depauperate coral communities living in turbid waters (Sheppard and Sheppard, 1991).

Dives were undertaken by the ICS team off Ablatt, the NE perimeter of Farasan, the SE and SW tip of Qummah, and the northern side of Damsk.

The reefs were typical of the southern Red Sea with a variable cover of soft and hard corals, algae, sponges and a few colonial ascidians. The fish diversity was good. We were shown the best reefs and our skipper reported that there was a mass mortality of corals about ten years ago (i.e.2014 which was associated with the bleaching event); however, it was reported that there has been recovery. Last year's record global warming bodes ill for the reefs with the excessive increases in temperature that have been recorded (Schmidt, 2024).

The reefs of Ablatt comprise a series of rocky outcrops intersected by sand-filled gullies, dropping off to sloping sediments. The shallow reef crests were dominated by *Sargassum*. There was evidence of large, domed *Porites* colonies, but these had been decimated by bleaching and were heavily eroded. The grazing urchin, *Diadema*, was much in evidence. Despite the degraded conditions of the reefs, they had a sparse but diverse cover of corals, sponges and colonial ascidians.

The reefs off the NE perimeter of Farasan formed a fringing reef of bommies not dissimilar to the reefs at Ablatt but were more degraded. Some dying coral colonies were still coated with a fungal film, indicating a recent mortality, probably from warming-related bleaching.

The Qummah reefs comprised rocky shelves dropping in short walls to sloping sediments with some bommies until sand predominated. Here the cover of corals, sponges and ascidians was more diverse but still sparse. Numerous coral colonies that had been impaired by recent bleaching were still infected with a fungal or algal film. *Diadema* was again evident. Good conditions are needed to dive off the southern tip of Qummah as it is subject to strong currents.

A reef off the northern edge of Damsk Island had the conformation of the emergent Farasan islands; it appeared to be a sunken island and was flat on the top with a perimeter broken by walled gullies. It is deeper than the other reefs described here (a maximum of 27 m) and is clearly subject to more turbid conditions; encrusting and massive sponges were much in evidence, and corals more typical of mesophotic (light-limited) reefs.

Details of the reef cover are outlined in the following tables.

Table 5: Associated metadata for each of the surveys undertaken

SITE	ABLATT_1	ABLATT_2	DAMSK_1	FARASAN_1	FARASAN_2	QUMMAH_1	QUMMAH_2	QUMMAH_3
Survey Date	2023/12/03	2023/12/03	2023/12/02	2023/12/03	2023/12/03	2023/12/02	2023/12/02	2023/12/02
Coordinates	16° 48.526'N	16°47.712'N	16° 34.046'N	16°46.411'N	16°45.198'N	16° 35.948'N	16° 36.128'N	16° 36.435'N
	42° 10.777'E	42° 12.171'E	42° 03.948'E	42° 07.178E	42° 08.044E	42° 01.940E	42° 01.777E	42° 01.139'E
Depth	8 - 10 m	8 - 10 m	20 - 27 m	11 - 14 m	9-11 m	7 - 16 m	7 - 20 m	2 - 18 m
Quantified area	41.5m²	49m²	73.5m²	63.5m²	60.5m²	71.5m²	108.5m²	49.5m²
No. of quadrats	83	98	147	127	121	143	217	99
No. of data points	830	980	1470	1270	1210	1430	2170	990

Table 6: General percentage cover ± standard deviation as a proportion of total cover.

CATEGORY	ABLATT_1	ABLATT_2	DAMSK_1	FARASAN_1	FARASAN_2	QUMMAH_1	QUMMAH_2	QUMMAH_3
Living	84.7±14.8	67.3±24.	73.0±25.2	75.9±19.7	56.6±20.9	58.8±29.7	45.0±30.0	63.1±30.2
Non-living	15.3±14.8	32.7±24.	27.0±25.2	24.2±19.7	43.4±20.9	41.2±29.7	55.0±30.0	36.9±30.2
Live hard coral	37.0±25.0	4.4±10.1	9.8±16.9	5.3±8.4	1.7±5.7	14.3±17.5	12.9±16.4	44.6±29.0
Live soft coral	Not detected (ND)	ND	1.7±7.2	ND	ND	19.5±31.1	7.4±16.0	0.1±1.0

CATEGORY	ABLATT_1	ABLATT_2	DAMSK_1	FARASAN_1	FARASAN_2	QUMMAH_1	QUMMAH_2	QUMMAH_3
Diseased/bleached coral	16.9±17.4	4.8±7.9	0.8±3.8	22.1±25.1	12.3±14.9	2.1±6.6	2.2±7.3	7.9±13.9
Recently dead coral	15.2±14.5	2.1±6.6	0.4±1.9	31.4±19.8	11.1±14.4	2.0±6.3	1.9±6.4	14.4±17.1
Sponge	2.5±7.1	7.3±10.7	28.8±23.1	0.8±3.3	3.9±7.6	1.8±5.3	7.4±12.6	0.2±1.4
Turf algae	3.1±6.3	34.6±20.	21.8±17.3	14.2±15.5	32.1±19.1	8.5±14.7	8.1±13.4	3.3±8.1
Macroalgae	8.3±13.7	2.5±11.0	ND	14.1±17.6	0.9±3.5	0.1±1.7	0.1±1.2	0.1±1.0
Crustose coralline algae	15.1±14.6	6.3±9.6	0.4±2.1	15.5±13.5	4.3±7.1	6.0±11.6	0.5±2.4	4.4±8.4

Table 7: Coral community structure percentage

CATEGORY	ABLATT_1	ABLATT_2	DAMSK_1	FARASAN_1	FARASAN_2	QUMMAH_1	QUMMAH_2	QUMMAH_3
Branched	Not detected (ND)	ND	ND	ND	ND	1.6±6.0	2.5±8.0	19.3±23.7
Digitate	ND	0.1±1.1	0.2±1.8	ND	ND	0.4±3.1	1.0±4.9	0.1±1.0
Encrusting	1.4±6.1	ND	4.9±12.7	ND	0.1±0.9	0.8±3.4	2.0±7.6	0.5±2.7
Foliose	0.1±1.1	ND	0.1±0.8	0.1±0.9	ND	ND	ND	0.2±8.7
Massive	35.2±24.4	4.1±9.8	1.5±8.9	5.2±8.2	1.3±5.3	10.4±15.0	2.7±7.4	15.9±22.4
Mushroom	ND	ND	0.1±0.8	ND	ND	ND	ND	ND
Sub-massive	0.3±2.4	0.1±1.1	3.1±0.7	ND	0.3±1.8	1.1±4.2	4.2±7.2	0.3±1.7
Tabular	ND	ND	ND	ND	ND	ND	0.6±6.1	6.4±17.6

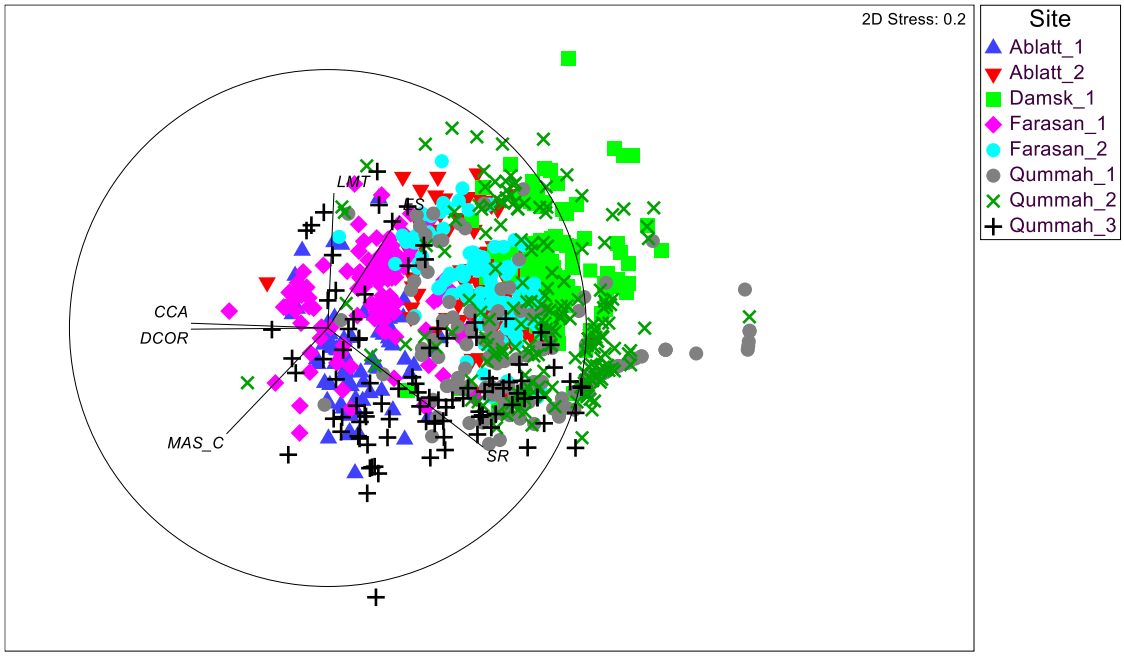


Figure 4: Non-metric multidimensional scaling ordination of coral reef community

The significance of these results of the rapid assessment is that the reefs are not in good condition. Overall, the living cover was high, but much of the living cover comprised crustose coralline algae and a turf-like growth that had invaded dead substratum. The latter resulted mainly from bleaching and many colonies that were recently affected were covered by an algal or fungal film. Except at one site at Qummah where branching corals were more common, massive corals were by and large the most common but were impaired and eroded by bleaching. Massive corals are usually more resilient to climate change but lack structural complexity and thus provide poor habitat for invertebrates and fishes which enhance biodiversity. Sponges were abundant at Damsk, this being a deeper reef with greater turbidity and reduced light. However, these results should be interpreted with a caution as they present a snapshot of some of the most accessible reefs at the few islands that were visited during the assessment. More detailed surveys of the extensive reefs shown in the Bruckner *et al*. (2012) atlas of Saudi Red Sea marine habitats are needed; these would reveal more information on the extent of the reefs and their quality, and would provide a basis for zonation of these valuable marine resources. Despite their impaired quality, the southern reefs offer good divinf opportunities under the calm sea sonditions.

3.5.3 OTHER MARINE FAUNA AND FLORA

3.5.3.1 FISH

Fish communities form three distinct groupings: outer reefs; back islands; and front islands - with the highest diversity and biomass occurring on outer reefs at the northwest

end of the Archipelago (Bruckner, 2011). Although reef fish populations were found to be relatively diverse, Bruckner (2011) detected some signals of high fishing pressure, with significantly lower diversity and biomass than that seen on the Farasan Banks. This included a lack of large predators, a low abundance of herbivores, high numbers of juvenile and subadult fishes, and a dominance by small omnivores, especially damselfishes. The islands are known to host a unique seasonal aggregation of the parrotfish *Hipposcarus harid* (Gladstone, 1996; Spaet, 2013). At least 231 species of marine fish have been recorded in the Farasan Archipelago (Gladstone, 2000).

3.5.3.2 MACROALGAL REEFS

Most of the islands are fringed by macroalgal and coral reefs. The north-west side of Sajid has historically supported extensive macroalgal reefs (Gladstone, 2000a). As noted, some reef crests are characterised by a heavy growth of the seaweed *Sargassum*. Their presence can be ascribed to a measure of nutrient-rich upwelling that occurs in the southern Red Sea (Bruckner *et al*., 2012). Other species of brown macroalgae encountered were *Turbinaria* spp., *Padina pavonia* and *Lobophora variegata*. The unpalatable and articulated green coralline algae, *Halimeda,* was also found on some of the coral reefs.

3.5.3.3 SEAGRASS MEADOWS

Seven species of seagrass occur in the Farasan Islands (*Thalassia hemprichii, Thalassodendron ciliatum, Halodule uninervis, Halophila ovalis, H. stipulacea, Cymodocea rotunda, Enhalus acoroides*). Seagrass meadows are largest and most abundant in the shallow waters between Farasan and Sajid Islands; elsewhere they are small and scattered (Gladstone, 2000a). Southern Sajid Island reportedly has extensive seagrass beds and dugong habitat. Other important seagrass areas include Tobtah, Zifaf, and Shura Island.

3.5.3.4 MANGROVES

Outstanding mangroves were visited on the NE shore of Farasan consisting of a small grove of *Avicennia marina* at each mangrove entrance and its fringes, and dense stands of *Rhizophora mucronata* in the middle and upper reaches. These must constitute important breeding and nursery grounds for fish and Crustacea. The total area of mangroves is ~3 km^2 (Gladstone, 2000a). Of significance is that two of the six Red Sea populations of *R. mucronata* occur in the MPA. Mangroves are patchily distributed and appear limited by the lack of freshwater habitat. The largest stand used to occur within the port of Farasan Island (Gladstone, 2000a), but recent aerial imagery indicates patches of mangrove forests are largest on the eastern side of Sajid Island and Humr Island. Pelicans use the *Rhizophora* treetops for nesting, providing a valuable opportunity for ecotourism, *providing that it is regulated*. Boats approaching too close to the nests clearly disturb the

birds and it is recommended that land-based hides adjacent to the mangroves be used for this purpose instead.

61 TURTLES

The islands, especially the offshore islands, are nesting sites for hawksbill and green turtles (Mancini et al., 2015; Tanabe et al., 2023). Night excursions to view egg-laying turtles, *under strictly controlled conditions*, may be an opportunity for ecotourism but also reducing predation levels by white-tailed mongoose and egg stealing incidences. Turtle eggs are consumed by the locals, and turtles themselves, when they can. Similarly, turtles can be accidentally caught in gill nets as bycatch and there may be conflict between the locations of artisanal fishing camps and turtle nesting beaches (Gladstone, 2000a). Green Sea turtles nest in isolated islands on beaches with firm deep sand (Anon, 2020) while Hawksbill turtles nest on the western end of Farasan al-Kabir, Dhi Dhahaya, Ad-Dissan, Kayyirah, Al-Baghlah, Al-Ajhan, Zahrat Sumayr al-'Ulya, Zahrat Sumayr as-Sufla, and Shuma islands, of which Kayyirah is the most important nesting site (Anon, 2020).

3.5.3.6 MARINE MAMMALS

Marine mammals are also known to occur in the Red Sea. These mammals include the **Bryde's whale**, Omura's whale, humpback whale, dwarf sperm whale, killer whale, **false killer whale**, short-finned pilot whale, **Risso's dolphin**, **Indian Ocean humpback dolphin**, rough-toothed dolphin, **Indo-Pacific bottlenose dolphin**, **common bottlenose dolphin**, **pantropical spotted dolphin**, **spinner dolphin**, striped dolphin and the **Indo-Pacific common dolphin, among others** (Notarbotolo et al., 2017). Nevertheless, only mammals in **bold font** occur regularly in the Red Sea. Dugongs are known to occur in the Farasan Islands, however, during interviews none of the respondents confirmed their sightings. Some of these marine mammals may be viewed during inter-island travel *under strictly regulated conditions*.

3.5.4 FISHERIES

Gladstone (2000a) provides a record of the status of the Farasan Islands fisheries immediately prior to proclamation of the Farasan Protected Area. At that stage there were 381 artisanal fishers and 442 licensed commercial fishing boats. However, the latter are no longer allowed to conduct fishing within the PA boundaries and there are also restrictions on the use of destructive fishing gears and heavy penalties for the law violators. Some for the common fishing gear recorded by Gladstone (2000a) included demersal fish trawls, gill nets and fish traps, and reef fish were targeted as well as deeper species. Greater fishing efforts were causing a reduction in the size of the fish and total catches; this was causing conflict between the artisanal and commercial fishers. While there was evidence of the harvest of pearl oysters (*Pinctada radiata*) in the past, only four divers were still collecting this oyster in one locality at the time of Gladstone's (2000a)

study; the clam (*Tridacna maxima*) was also being collected then. There was no evidence of clam or oyster harvesting during our visit.

While majority of the residents are said to engage in fishing activities, accurate information about the current number of boats that engage in fishing activities remains largely unknown, a situation which necessitates a close monitoring of fishing activities and the threats they pose. The fishery is regulated by the Ministry of Environment and Fisheries (size andgear restrictions, licensing and species-specific regulations). Fishery represents one of the major threats to marine biodiversity and its environment/habitat. As a results, the Kingdom imposes heavy fines for fishery law violators including those who catch sharks. For instance, the fine for killing a Dugong is 1 million Riyals while for killing Sea Cucumber is 4000 Riyals. If not closely monitored and strictly controlled, commercial fishing, poaching, and smuggling will likely cause a significant negative effect on the fishery resources.

A Farasan fisherman who has been fishing for ~35 years was interviewed. He noted that there is a good relationship between NCW and the community. The latter want to collaborate and report transgressions – they know that they are dependent on the marine resources and that sustainability is important to their fishery.

The fisherman reported that the water has been cooler around the Farasan Islands in the last couple of years (greater upwelling?) and the fish harvest has improved. Only small traditional boats (~2000***) and nets are used 5-10 miles offshore. They are not allowed to approach the islands, hence do not fish near reefs. However, evidence of reef fish were found in catches atthe fish market. There are size and seasonal restrictions. A festival known as Hareed (and Kunnah?) involves the capture of an aggregating parrotfish species (*Hipposcarus harid*) within a mangrove cove at al-Hasees (Gladstone, 1996). Kunnah is associated with the capture of migrating kingfish.

The commercial catch includes a diversity of fish with small numbers of parrots and rock cod (Reef associates should be given protection.). Sharks are a bycatch which is discarded at sea, even though most are dead. Turtles are not captured. The fish appeared to be sold by auction; ~30% of the catch is consumed locally, the balance going to mainland markets. Refrigeration trucks were evident at the market, probably heading to the mainland.

3.5.5 TERRESTRIAL PLANTS

Based on the habitat survey reports. Wacher et al note "Collenette and Tsagarakis (2001) record 188 plant species from the approximately 760 square kilometer total area of islands making up the group. This places the Farasan Islands seventh in the list of NCW Protected Areas for numbers of plant species and with an average of 0.27, fifth in terms

of species per square kilometer. A relatively recent study also found that the Archipelago constitutes a significant floral diversity and a total of 191 flowering plants belonging to 53 families and 129 genera were recorded by Mutairi et al. (2012). The flora shares affinities with both the African and Arabian floras (Hassan & Al-Hemaid, 1996) and has 17 species that are endemic to Saudi Arabia (Collenette & Tsagarakis, 2001). Considering that Saudi Arabia has only about 40 endemic species (Fisher *et al* 1998), the flora of the islands, and especially Farasan Kebir, is of high conservation priority. It is therefore extremely important that the vegetation is considered as being of equal importance as the gazelles in the planning zones of different conservation and development actions on Farasan Kebir.

The vegetation of the Farasan Islands is characterized by a unique blend of coastal, desert, and mangrove ecosystems, contributing to the islands' diverse ecological landscape.

- Coastal Vegetation: Along the shores of the Farasan Islands, woody plants such as salt-tolerant shrubs and grasses thrive in the harsh coastal environment. These species have adapted to saline soils and strong winds, providing stabilization for coastal dunes and contributing to the resilience of the coastline against erosion.
- Desert Vegetation: Inland areas of the islands are dominated by desert vegetation, including drought-resistant plants such as acacia trees, thorny shrubs, and succulents. These plants have evolved mechanisms to conserve water in arid conditions and play a crucial role in preventing soil erosion and maintaining ecosystem stability.
- Mangrove thickets are of particular importance and consist mainly of A*vicennia marina* which lines many sheltered coasts. There are also three relatively large stands of *Rhizophora mucronata* which is rare in the Red Sea. These swamps are carpeted with blue-green algal mats and are a fertile refuge for marine invertebrates, young fish, shrimp and large nesting birds, and *Avicennia* leaves are eaten by gazelles. Mangrove swamps are very productive, especially in leaf detritus, and support much life. A rich flora of tiny algae and fauna of planktonic larvae, crabs, snails, young shrimps, and fish live there, especially among the stilt roots of the *Rhizophora.* Larger animals that find refuge here are the mudskipper fish, spoonbills, herons, and pelicans which nest in the *Rhizophora*, safe from mongoose and rats. They are critical to the crab plover population as they form a major part of their diet, the crab *Metamograpsus messor.*
- Tidal Flora: Along the tidal flats and shallow waters surrounding the islands, various species of seagrasses and algae flourish. These underwater plants provide food and shelter for marine organisms, contribute to nutrient cycling, and help maintain water quality in the surrounding marine environment.
- Human Impact: Human activities such as urbanization, agriculture, and overgrazing have put pressure on the vegetation of the Farasan Islands. Conservation efforts are underway to protect and restore native vegetation, preserve fragile ecosystems, and mitigate the impact of human activities on the island's biodiversity.

In summary, the vegetation of the Farasan Islands is a mosaic of coastal, desert, and mangrove ecosystems, supporting a rich diversity of plant life adapted to the challenging environmental conditions of the Red Sea region. These diverse habitats contribute to the ecological significance and natural beauty of the islands, making them an important area for conservation and scientific study.

3.5.5.1 PROBLEM PLANTS

Several alien invasive plant species have been reported on the Farasan Islands. Those that pose the biggest problem are:

Prosopis juliflora (Mesquite): This species, native to Central and South America, has invaded many arid and semi-arid regions worldwide, including the Arabian Peninsula. It competes with native vegetation and alters soil composition, posing a threat to local biodiversity. Importantly Wronski *et al.* 2012, found that the Farasani gazelles feed on mesquite pods and thus play a significant role in the spread of *Prosopis juliflora.*

Parkinsonia aculeata (Jerusalem thorn): Another species native to the Americas, Jerusalem thorn has become invasive in various parts of the world, including the Arabian Peninsula. It forms dense thickets, displacing native plants and altering habitat structure.

Leucaena leucocephala (White lead tree): Native to Central America, white lead tree is a fast-growing, nitrogen-fixing plant that has invaded many tropical and subtropical regions, including the Farasan Islands. It can outcompete native vegetation and degrade habitats.

3.5.6 TERRESTRIAL FAUNA

3.5.6.1 MARINE MAMMALS

See Section 3.5.3. 3.5.3 Other Marine Fauna and Flora.

3.5.6.2 TERRESTRIAL MAMMALS

Two vertebrate species are endemic to the islands, the Farasani gazelle *Gazella g. farasani* and the snake, the Sarso racer, *Platyceps insularis,* which was first discovered in 1964 on Sarso island and only occurs on Sarso. The IUCN classification of this species is still listed as Data Deficient. The most recent survey is that of Ak Obaid *et al. (*2023) which notes several new records.

The Farasani gazelle: The Farasani gazelles are now recognized as a subspecies of the Mountain gazelle or Idmi and classified as *Gazella gazalla farasani* (Thouless & Al Bassri K 1991). The gazelle population on Farasan Kebir fluctuates at around 1000 animals and the numbers of removals and natural deaths are unknown. The speculation by Wacher *et*

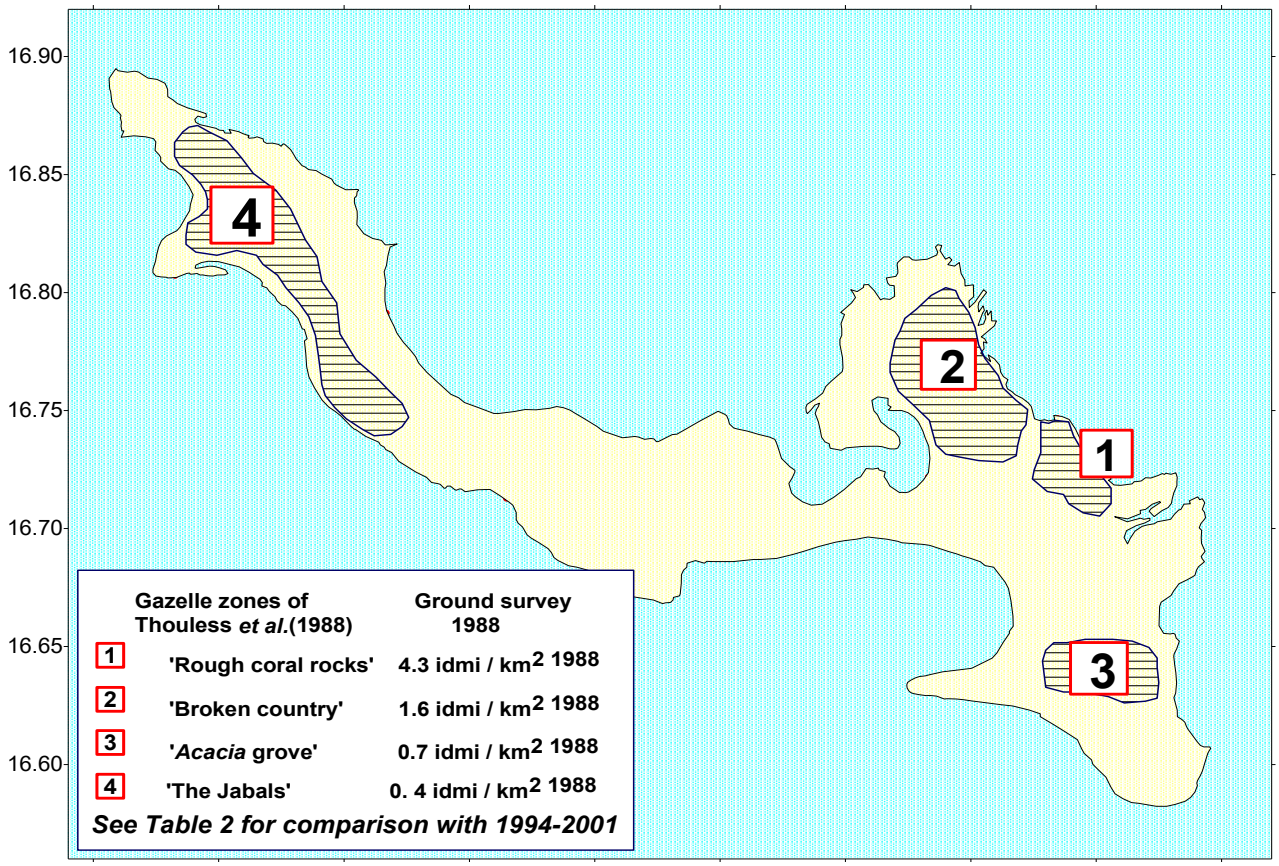
al (2001) could be the reason why this population has not experienced wild fluctuations is probably correct and it is suggested below that this irregular removal becomes a planned one based on data, with support by the local people.

The population on As Saqid was recorded as being much smaller and previous work suggests that decline is due to illegal hunting. A valuable summary of this population's status and importance is given by Cunningham & Wronski (2022) and is summarized in the table below. The population on Farasan Kabir is the largest population of the species in Saudi Arabia. The species formerly occurred on four islands but it is likely that the species has been hunted to extinction on Qumaah and Saged Islands. So Far, only viable population is on Farasan Kabir and is estimated to be 1200 individuals (Cunningham and Wronski, 2011) . The table below, adapted from Cunningham and Wronski (2011) gives a summary of the trends. It is assumed from this that the species now only occurs on Farasan Kebir.

Table 8: Fluctuations since 1989, in the gazelle population estimates on the Farasan Islands

ISLAND LOCATION	HIGHEST POPULATION ESTIMATE	YEAR OF POPULATION PEAK	2009 ESTIMATE	CURRENT STATUS
Farasan Kebir	1694	2001	1039	1,200
As Sequd	41	1992	Signs only	No data
Zifaf	100-150	1989	1	No data
Qumaah	25	1990	Absent	Last seen in 1990

Thouless *et al* (1988) mapped the distribution of gazelles on Farasan Kabir and illustrate the importance of retaining a corridor between the eastern and western concentrations (see figure below).



4 Map 4: Primary zones of gazelle activity identified in 1988 0
Source: Thouless *et al.* 1988

- **Mustelids:** The only mustelid is the White-tailed mongoose *Ichneuman albicaudata,* and Massetti (2010) speculates that this species may have been intentionally introduced to control snakes. The species is known to prey on ground nesting birds including osprey (Fisher 2001) and turtles' eggs. Research into the possibility that the species may be an alien species is needed which will inform their management or eradication.
- **Rodents:** Three rodent species, however, two species *Gerbillus nanus* and *Acomys dimidiatus* are native species, the latter being quite common. Lastly, *Rattus rattus* is exotic species which occurs on the islands and is considered an invasive alien species.

- **Bats:** Bat records from Farasan Islands include *Triaenops persicus* is reported for the first time from Saudi Arabia based on echolocation calls. The presence of *Pipistrellus kuhlii* (Kuhl, 1817) is common on both Farsan and As Saqid. The most recent survey (Al Obaid et al 2023) notes a cave on As Saqid with both *Rhinopoma cystops* and *Asellia patrizii* present.

3.5.7 AVIFAUNA

Avifauna were assessed qualitatively and *ad hoc* during the site visit from 1-5 December 2023. Habitats covered included coastal, island, mangrove, desert Shrub and urban areas. A total of 33 species were recorded during this period. These included three raptor species, kestrel (*Falco tinnunculus*), osprey and the globally Endangered Egyptian vulture (*Neophron percnopterus*). The Farasan Islands supports the only breeding colony of <50 breeding pairs of Egyptian vultures in Saudi Arabia and the largest population in the country (Bruckner *et al.* 2013). The islands' population of pink-backed pelican (40+ pairs) is probably the largest breeding colony of the species in the entire Red Sea (Anon 2020). Furthermore, the Farasan Islands were the location of the most recent sighting in the Kingdom of the Arabian Bustard, last seen in 2017, and possibly now extinct in the country (Boland & Alsuhaibany, 2020).

A total of 145 bird species have been recorded (Anon 2020). It is an Important Bird and Biodiversity Area (IBA), due to it having globally threatened species; globally and regionally large congregations; species with unfavorable conservation status in the Arabian Peninsula; and species with favourable conservation status but concentrated in the Arabian Peninsula (Boland et al. 2020). Internationally significant populations of seabirds include pink-backed pelicans (*Pelecanus rufescens*), common noddy (*Anous stolidus*), crab plover (*Dromas ardeola*), osprey (*Pandion haliaetus*) and sooty falcon (*Falco concolor*). Nationally significant populations of the pink-backed pelican (*P. rufescens*), brown booby (*Sula leucogaster*), spoonbill (*Platalea leucorodia*), crab plover (*D. ardeola*), and bridled tern (*Sterna anaethetus*) are also found.

It appears that Seabirds' eggs are illegally harvested and allegedly exploited for their "rich-quality protein". Similarly, feral cats are also implicated for preying on the eggs of the nesting seabirds on some islands (BirdLife International, 2024). Similarly, large numbers of migrant shrikes are trapped to extract their fat (for cooking). On the two main islands, there are also threats to the habitat from uncontrolled grazing.

The site was identified as an Important Bird & Biodiversity Area in 1994 because it was regularly supporting significant populations of the species listed below (Birdlife International, 2024).

Table 9. Species of bird triggering IBA status in the Farasan Islands PA

SPECIES	ENGLISH NAME	IUCN RED LIST CATEGORY	SEASON	YEAR(S)	POPULATION ESTIMATE AT SITE	IBA CRITERIA MET
Platalea leucorodia	Eurasian Spoonbill	Least Concern	breeding	1993	10 breeding pairs	A4i, B1i
Platalea leucorodia	Eurasian Spoonbill	Least Concern	winter	1990-1992	59-82 individuals	A4i, B1i

SPECIES	ENGLISH NAME	IUCN RED LIST CATEGORY	SEASON	YEAR(S)	POPULATION ESTIMATE AT SITE	IBA CRITERIA MET
Ardea goliath	Goliath Heron	Least Concern	resident	1993	1-4 breeding pairs	B1i, B2
Sula leucogaster	Brown Booby	Least Concern	breeding	1993	150 breeding pairs	B1ii
Charadrius alexandrinus	Kentish Plover	Least Concern	winter	1990-1992	351-500 individuals	A4i, B1i
Charadrius mongolus	Siberian Sand Plover	Endangered	winter	1990-1992	180-310 individuals	B1i
Arenaria interpres	Ruddy Turnstone	Least Concern	winter	1990-1992	307-354 individuals	B1i
Dromas ardeola	Crab-plover	Least Concern	resident	1993	110 breeding pairs	B3
Anous stolidus	Brown Noddy	Least Concern	breeding	1993	10,000 breeding pairs	A4i, B1i
Larus hemprichii	Sooty Gull	Least Concern	resident	1993	545 individuals	B3
Larus leucophthalmus	White-eyed Gull	Least Concern	non-breeding	1992	21 individuals	B2
Larus leucophthalmus	White-eyed Gull	Least Concern	breeding	1993	300 individuals	A1, A4i, B1i, B2
Onychoprion anaethetus	Bridled Tern	Least Concern	breeding	1993	12,150 individuals	A4i, B1i
Sternula saundersi	Saunders's Tern	Least Concern	resident	1993	20 breeding pairs	B3
Sternula saundersi	Saunders's Tern	Least Concern	winter	1990-1992	365-595 individuals	A4i, B1i, B3
Sterna repressa	White-cheeked Tern	Least Concern	breeding	1993	8,300 individuals	A4i, B1i, B3

SPECIES	ENGLISH NAME	IUCN RED LIST CATEGORY	SEASON	YEAR(S)	POPULATION ESTIMATE AT SITE	IBA CRITERIA MET
Neophron percnopterus	Egyptian Vulture	Endangered	resident	1992	20-65 breeding pairs	B2
Falco concolor	Sooty Falcon	Vulnerable	breeding	1993	32 breeding pairs	B2

3.5.7.2 ARABIAN BUSTARD (ARDEOTIS ARABS)

The last sighting of the Arabian bustard in Saudi Arabia was in 2017 on the Farasan islands. The species is now possibly extinct in the wild. The reason for its extinction on the Farasan Islands is unknown but if the white-tailed mongoose is a threat to the ground nesting ospreys, it is very possible that this predator contributed to the loss of the bustard. Due to its wide range, the bustard was not considered vulnerable by IUCN, although there is believed to have been a strong decrease in the population. In 2012 the species was uplisted to Near Threatened. The primary cause of the decrease appears to be heavy hunting pressure, with habitat degradation and destruction also playing a major role.

3.5.8 REPTILIA

The most noteworthy reptile recorded on the Farasan islands is the endemic snake, the Sarso Island racer, *Platyceps insularis,* which was first discovered in 1964 on Sarso Island and only occurs on Sarso Island. The IUCN classification of this species is still listed as Data Deficient.

Photo 1: The Sarso Island racer, found only on Sarsi Island

Source: B. Trapp

The most recent survey is that of Ak Obaid *et al.* (2023) which notes several new records. A list of the reptiles recorded on the islands is provided in the table below.

Table 10: The reptiles of the Farasan islands

SCIENTIFIC NAME	ENGLISH NAME	STATUS ON RED SEA	IUCN STATUS
Chelonia mydas (nesting)	Green turtle	Nesting in the PA	Endangered
Lepidochelys olivacea	Olive Ridley turtle	Present	Endangered
Caretta caretta	Loggerhead turtle	Present	Endangered
Eretmochelys imbricata (nesting	Hawksbill turtle	Nesting in the PA	Critically Endangered
Dermochelys coriacea	Leatherback turtle	Nesting in PA	Endangered
Platyceps rhodorachis	Cliff racer	Present on Farasan Islands	Not threatened
*Platyceps insulanus**	Sarso island racer	The only known site	Data deficient
Echis borkini	Yemen carpet viper	Present on Farasan Islands	Not threatened
Hemidactylis farsani	Farasan Islands half-toed gecko	Island endemic	Data deficient
Hemidactylus flaviviridis	Yellow-bellied house gecko	Present on Farasan Islands	Least concern
Hemidactylus Robustus	Red sea half-toed gecko	Present on Farasan Islands	Least concern
Mesalina arnoldi	Yemen desert lizard	Present on Farasan Islands	Least concern
Ptyodactylus hasselquistii	Egyptian fan-toed gecko	Present on Farasan Islands	Least concern
Eumeces schneiderii	Golden long-legged skink	Present on Farasan Islands	Least concern
Pristurus flavipunctatus	Yellow-spotted Semaphore gecko	Present on Farasan Islands	Least concern

3.5.9 AMPHIBIANS

Only one amphibian has been recorded on the Farasan islands, the Arabian toad *Sclerophrys arabica*. Its status is currently regarded as Least Concern.

3.5.10 INSECTS

The invertebrate fauna of the Farasan islands is diverse, but little studied. There is the preliminary study of Coleoptera by Abdel-Dayem *.et al* (2020) that recorded 179 species of beetle but no new endemics.

3.6 TOURISM ASSETS, ACTIVITIES AND USE

In 2018, the Saudi Arabian government selected the Farasan Islands as a pilot national site for the development of tourism, specifically emphasizing the implementation of sustainable tourism principles and strategies. Tourism in the Farasan Islands is primarily it is seasonal approximately 4,000-5,000 individuals, predominantly Saudi Arabian families, flock to the northern and eastern beaches. Farasan al Kabir and Qummah are home to well-preserved heritage houses from the early 1900s, showcasing opulent Ottoman architecture. These architectural gems serve as a major draw for tourists.

The islands possess significant potential for ecotourism, particularly if the preservation of the natural landscape is not compromised by urban development. The convergence of the sea's colors, the sparsely vegetated coastlines, the distant islands on the horizon, and the sky, create a purifying and soothing ambience that will be disrupted by any form of development. In addition, the regularity with which gazelles, sizable avian species such as pelicans and flamingos, and, in aquatic environments, dolphins are observed, along with a diverse array of coral landscapes beneath the sea, can contribute to the development of an immersive experience. This has the potential to serve as the foundation for the establishment of eco-tourism on the islands, as larger-scale tourism would have detrimental effects.

3.6.1 EXISTING FACILITIES

The current amenities consist of multiple ranger stations that offer general guidance and information to visitors and are accessible to visiting scientists. One of the primary responsibilities of the rangers is to monitor and regulate any unauthorized intrusion by visitors into the core areas of biodiversity.

The municipality provides tents, water, and rubbish collection services for beach campers in the designated temporary camping areas near Farasan Town. In addition, the town of Farasan has two small hotels that are directly overseen by the local municipality.

The current visitor count to the Farasan Islands is significantly low and falls well below the site's capacity, especially when compared to the size of the area and other similar national and international tourist destinations.

3.6.2 RECREATIONAL DIVING IN THE FARASAN ISLANDS

Snorkeling occurs adjacent to some islands (on algae covered rocks), and SCUBA diving in deeper areas; there is more snorkeling than SCUBA diving. The south is considered

superior to the north. Diving is also available quite far out in the west. New sites are being discovered all the time. Since diving operations are infrequently conducted by only a few operators, it was hard to get information or numbers but there seems to be as much focus on seasonal tourism as diving. Seasonal effects are:

Summer: The focus is on locals with one boat/dive operator based on Farasan (from Qummah) who really knows the reefs in the south. He has a vision of developing a fully-fledged diving venture. Two Dive Masters (DMs) that are based in Jazan (there may be a few more) operate on the mainland and bring occasional groups to the Farasan Islands and dive in the south (a few dive boat loads of ten). They have other occupations, so diving is conducted over weekends, mostly at the end of the month after payday. There is also a labor camp 90 km from Jazan (Chinese) and they mount some dive groups.

Winter: A three-month season brings some foreign visitors and local families during the school vacation to the Farasan Islands, but mainly as tourists. However, diving is slowly growing in popularity and is being 'discovered'; again, the DMs have a vision to develop the industry as more diving sites are being discovered. About 30 foreign divers visited the Farasan Islands in 2023. Foci are sharks (Qumma), snorkeling (some caves), corals and fish. At present, there are about 10-15 diving sites. Qummah has four, Upkr 3-4, Damsk one shallow and two deep.

There is potential for the expansion of diving and the need for a diving center. A local from Qummah Island has a great vision for the development of a dive industry for the islands.

3.7 SOCIO-CULTURAL AND HERITAGE ASSETS

The Islands have likely been utilized for fishing and pearling for thousands of years, as indicated by the presence of ruins believed to be vestiges of a South Arabian civilization dating back 1500-3000 years. Monolithic door jambs, inscriptions, ceramics, and obsidian and copper artifacts are present. The examination of species discovered in shell middens indicated the presence of organisms that were used as sustenance and likely for the purposes of coloring and producing fragrances.

Located northeast of Farasan Town, there is a small fort that signifies the presence of a Turkish vilayet called Hudaydah. Nearby, amidst palm trees near the harbor, sits the charming village of Al-Qisar, built with coral-stone. Additionally, in the area, there are ancient Himyaritic structures that hold archeological significance, serving as relics of the pearling industry. There are many beautiful examples of the unique architectural legacy of the islands, including antique residences of pearl merchants that are beautifully carved in a manner that may have been influenced by craftsmen from southern Yemen and

covered with gypsum plaster. The mosque in Farasan Town features intricate carvings and has five domes.

The Farasan Islands preserve one of the largest concentrations of shells mounds known than anywhere in the world. The collection comprises over 3,000 shell specimens, ranging in size from small to large, with some reaching a height of 5 meters. The majority of these mounts are situated on the periphery of the coral reef in close proximity to the coastline. Additionally, they were documented in diminutive, shallow gulfs that served as breeding grounds for mollusks. These gulfs gradually became desiccated as a result of both a decrease in sea level and tectonic shifts.

Analysis of shell middens indicates that they have existed for a period ranging from 3000 to 6000 years. Nevertheless, it is common for them to be more recent, with some dating back only 400 years. They were created as a consequence of the clamming activities associated with pearling that occurred over numerous centuries. Considering the information provided, the shell middens are regarded as a highly significant cultural heritage that may possess exceptional global uniqueness. Therefore, it is crucial to prioritize their protection and prevent their destruction due to development projects.

The primary component of intangible heritage in Farasan is exemplified by the Hareed "parrotfish" festival, during which the local inhabitants of the islands come together to coordinate a large-scale traditional fishing event specifically targeting this species of fish. The longnose parrotfish is a frequent migratory visitor to the Farasan Islands, originating from the Indian Ocean. It establishes both permanent and temporary residence in the shallow gulfs and straits found on the islands. Research indicates that fish congregate in a specific gulf on the main island of Farasan during the full moon period from late February to early April each year. Evidence indicates that the fish gathering occurs at the same time as the yearly reproductive activities of reef corals.

The Harid festival is the largest secular gathering in the islands and has gained significant recognition as a local tradition, with widespread participation from the islanders. The primary festival activity involves employing a traditional method of trapping by initially using fishing nets and then substituting them with uniformly cut sticks made from a local reed called Qasab (*Phragmites australis*), which is commonly found along the island's shorelines. This confers significant cultural importance to the reeds, necessitating their protection and monitoring. Traditionally, the festival featured a spectacle where numerous men, adolescents, and young girls would enter the ocean to catch fish using only their hands. Prizes were awarded to those who caught the greatest number of fish. The festival proceeded by extending invitations to local vocalists and wordsmiths to showcase their talents and receive subsequent recognition through the presentation of trophies and symbolic awards sponsored by local entrepreneurs and government officials.

Another significant facet of intangible culture is traditional agricultural practices that include subsistence farming, camel herding, artisanal fishing, and other folklore activities.

The islands clearly exhibit a significant presence of traditional local knowledge, which is actively passed down through generations, particularly among male members of the community. When it comes to the practice of raising camels, there are remnants of circular locations where animals were gathered that can be found throughout the islands. Additionally, there are distinct indications of areas dedicated to worship that are connected to this activity.

Moreover, there is compelling evidence that the islands still possess the traditional expertise required for the construction and upkeep of coral stone walls. This is evidenced by the repeated discovery of the remains and locations associated with these activities. According to some local residents, the presence of foreign workers who are willing to work for lower wages is causing a decline in the skills of local workers. This is because locals are choosing to take government jobs that are more convenient and less demanding. Additional research conducted in 2016 also indicates that the occupations associated with boat construction and pearling have not completely disappeared from the islands.

Finally, it is imperative to record and preserve the spoken accounts of the traditional knowledge and expertise pertaining to the utilization and supervision of resources in the islands. The most effective approach would involve collaborating with the elderly population in order to safeguard and retain the society's collective memory pertaining to traditional skills and practices. By incorporating cultural tourism, the islands can tap into their development potential and ensure their long-term sustainability (Juzur Farasan MAB nomination, 2020).

3.8 STAKEHOLDER ANALYSIS

3.8.1 STAKEHOLDER MAPPING

A stakeholders' mapping exercise conducted in 2018 identified and classified all key stakeholders associated with the Farasan Islands protected area. These are the local governor, tourism and heritage commission, fisheries department, attorney general office, air defense department, border guards' department, local municipalities, local community leaders, education department, local farmers, transport department.

In the following table, the Farasan Islands Protected Area stakeholders are grouped according to their level of interest in the Farasan Islands Protected Area outcomes, their ability to influence decision-making, and their level of authority or mandate to make decisions that can impact the PA.

The matrix below provides the stakeholder analysis results.

Table 11: Summary of key Farasan Islands Protected Area stakeholders

ENTITY NAME	ROLE	CATEGORY	LEVEL OF INFLUENCE	LEVEL OF INTEREST
GOVERNMENT ENTITIES				
National Center for Wildlife	NCW plays a critical role in safeguarding Saudi Arabia's rich biodiversity, ensuring the sustainable use of natural resources, and promoting harmony between human activities and the conservation of wildlife and their habitats.	Strategic Partner	High	High
Ministry of Environment, Water, and Agriculture	Responsible for environmental policy, regulations, and conservation efforts.	Strategic Partner	High	High
Special Forces for Environmental Security	Responsible for enforcement of environmental and wildlife regulations	Strategic Partner	High	High
PA Management and Rangers	On the ground knowledge of threats and opportunities	Strategic Partner	High	High
Saudi Environmental Society	Works on environmental awareness, education, and sustainable development	Interest Group	Low	Low
Saudi Standards, Metrology, and Quality organization	Sets standards and regulations for environmental conservation and sustainability	Interest Group	High	Low
Saudi Heritage Preservation Society	Works to safeguard and promote the cultural heritage of the Farasan Islands, which includes archaeological sites, traditional architecture, cultural practices, and intangible heritage.	Interest Group	High	Low
National Center for Waste Management (MWAN)	Responsible for waste management within the KSA	Interest Group	High	Low
Ministry of Tourism (MoT)	Responsible for investment, development, and licensing.	Interest Group	High	Low

ENTITY NAME	ROLE	CATEGORY	LEVEL OF INFLUENCE	LEVEL OF INTEREST
Ministry of Culture	Cultural and heritage focus with high support to the PA	Interest Group	High	High
Heritage Commission	Responsible for advancing and preserving the heritage sector in the Kingdom	Strategic Partner	High	Low
Local Police	Security and law enforcement	Interest Group	High	Low
Judicial system	Legal and social with limited support to the PA	Interest Group	High	Low
Governor of the Farasan Islands	The governor of the Farasan Islands is responsible for overseeing the administration, development and management of the islands.	Strategic Partner	High	High
Border Guard	The Saudi Border Guard plays a crucial role in safeguarding the nation's security, particularly in border regions	Strategic Partner	High	High
PRIVATE SECTOR				
Renewable Energy Companies	Increasingly important stakeholders focusing on sustainable energy solutions.	Secondary Stakeholder	Low	Low
Saudi Investment Recycling Company	Tasked with developing recycling industries and a circular economy.	Secondary Stakeholder	Low	Low
Local hotels and restaurants	Hotels and restaurants in the adjacent communities.	Enabler	Low	High
Fishermen	Fishermen are key stakeholders in marine conservation efforts as they directly interact with marine resources.	Secondary Stakeholder	Low	Low
Diving Community	Divers often have a deep appreciation for marine environments and can advocate for their protection.	Secondary Stakeholder	Low	Low
Tourism Private Sector	Tourism service companies providing guided and non-guided tourism packages to local and international clients.	Enabler	Low	High

ENTITY NAME	ROLE	CATEGORY	LEVEL OF INFLUENCE	LEVEL OF INTEREST
NGOS AND CIVIL SOCIETY				
Environmental Advocacy Groups	Organizations focused on biodiversity, conservation, and sustainable development.	Strategic Partner	High	High
Community-Based Organizations	Engaged in grassroots initiatives and local conservation efforts.	Enabler	Low	High
Religious leaders and preachers	Religious and social with limited support to the PA	Enabler	Low	High
ACADEMIC AND RESEARCH INSTITUTIONS				
Universities and Research Centers	Conduct studies on environmental issues, provide expertise, and contribute to policy recommendations.	Enabler	High	High
Schools	Social focus with good support for the PA concept	Enabler	Low	High
INTERNATIONAL PARTNERS AND ORGANIZATIONS				
United Nations (UN) Agencies	Collaborate with Saudi Arabia on various environmental projects and initiatives. These include the Convention on Biodiversity and the UNFCCC.	Strategic Partner	Low	High
GENERAL PUBLIC AND VISITORS				
Local Communities	Directly affected by environmental policies and initiatives and can play a role in advocacy and implementation.	Enabler	Low	High
Community Leaders and Opinion Leaders	Shape public perception and discourse on environmental issues.	Enabler	Low	High
Visitors – elite groups	Special interests with high support for the PA	Enabler	Low	High
Visitors – regular	General interests in recreation with limited awareness of the PA importance	Enabler	Low	High

ENTITY NAME	ROLE	CATEGORY	LEVEL OF INFLUENCE	LEVEL OF INTEREST
Illegal Wildlife hunters	Personal and social focus with high level of hostility towards the PA	Enabler	Low	High

The PA relies on its stakeholders to guide, manage, support, and protect it. Communities,

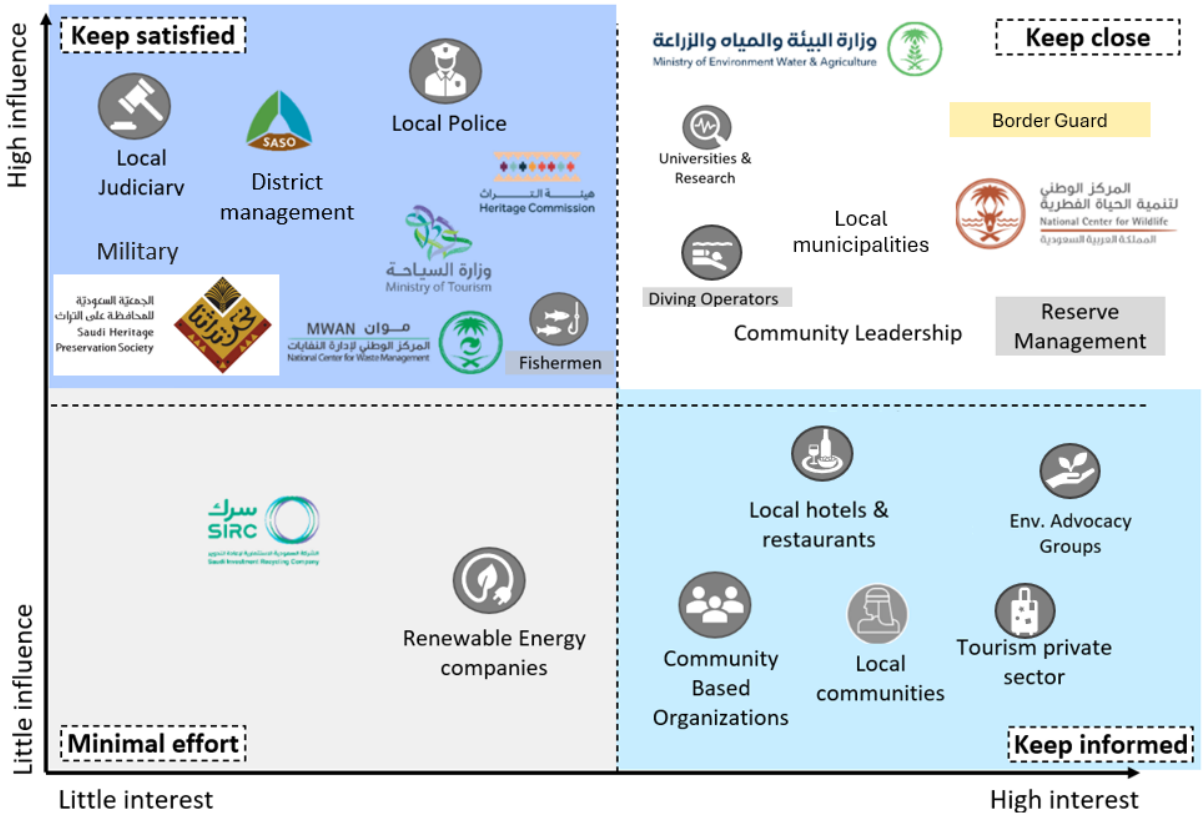


Figure 5: Farasan Islands Protected Area stakeholder profile.

particularly those reliant on the natural resources of the Farasan Islands PA play a critical role in the success or failure of a plan. Stakeholder analysis should be a regular exercise, where the effectiveness and the outcomes of the engagements are evaluated, and the results are used to redefine the stakeholders.

3.9 CURRENT THREATS AND PRESSURES

The Farasan Islands Protected Area faces several significant ecological threats that challenge its sustainability. Key concerns include coral bleaching, primarily due to climate change, which significantly affects the coral reefs. Sedimentation also hinders coral recovery by covering the reefs with a layer of sediment. Human activities such as

boat anchoring and potential pollution from nearby developments and shipping add to these natural threats. Additionally, potentially unsustainable fishing practices and the poaching of seabird and turtle eggs underline the urgent need for improved enforcement and compliance, education, awareness and the involvement of local communities in the sustainable management of the natural resources.

A high-level risk assessment approach and methodology were utilized to identify threats and pressures. This involved conducting staff and management interviews, stakeholder interviews, focused discussions, field visits and dives by specialists. In addition, previous proposed plans, registers, research reports, available data, and literature were reviewed through desktop and GIS analysis.

The methodology for Ranking and evaluating threats and pressure levels is done utilizing a standard 5x5 risk matrix.

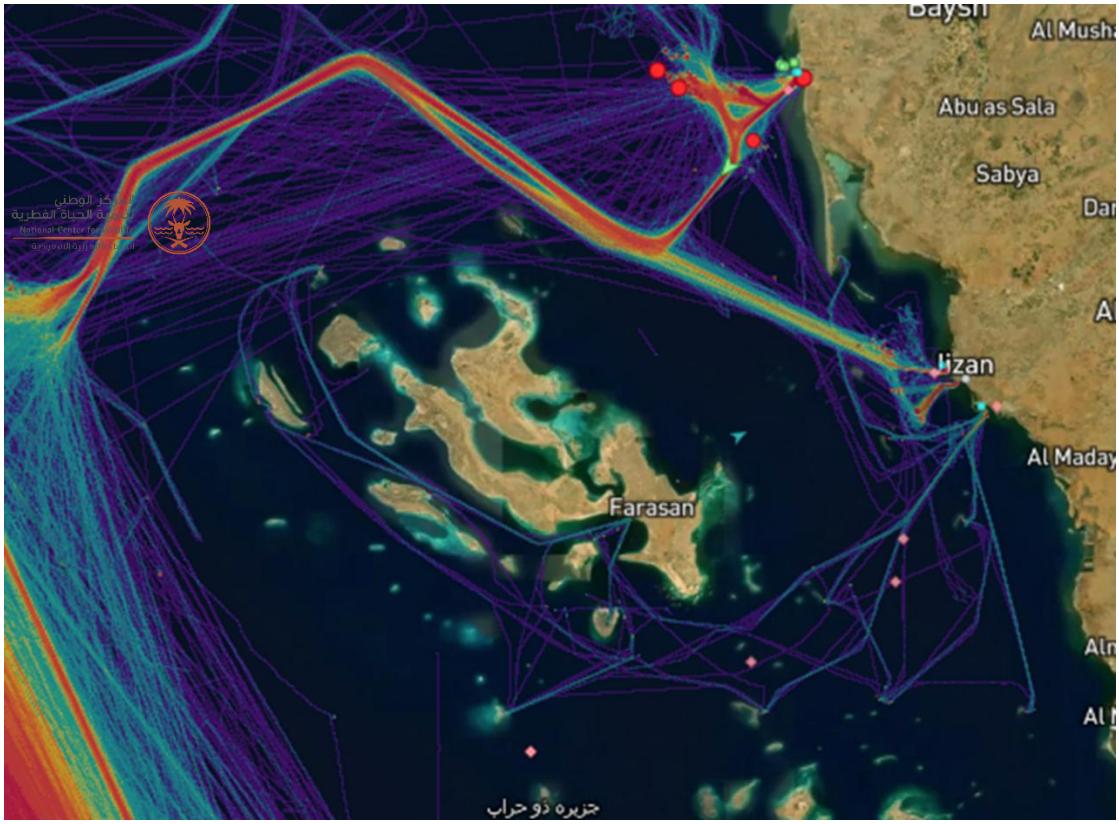
Table 12: Risk assessment including likelihood and consequence of threats and pressures

Likelihood				Consequence		
		Negligible	Minor	Moderate	Major	Severe
Almost certain	90% and higher likelihood of occurring	11	16	20	23	25
Likely	Between 30% and less than 90% likelihood of	7	12	17	21	24
Possible	Between 10% and less than 30% likelihood of	4	8	13	18	22
Unlikely	Between 3% and less than 10% likelihood of	2	5	9	14	19
Rare	Less than 3% likelihood of occurring	1	3	6	10	15
E: extreme risk, immediate action required						
H: high risk, senior management attention required						
M: moderate risk, mgt. responsibility should be specified						
L: low risk, manage by routine procedures						
Based on the original MIL STD 882B (US Department of Defence 1993)						

HABITATS	LIKELIHOOD (RARE TO ALMOST CERTAIN)	CONSEQUENCE (NEGLIGIBLE TO SEVERE)	RANKING AS PER 5X5 RISK MATRIX
Poaching, bird and turtle nest disturbance, and egg collecting	Likely	Severe	24
Oil spill pollution	Possible	Severe	22
Coral bleaching	Almost certain	Major	23
Deleterious Bird Hunting in Important Bird Areas	Almost certain	Major	23
Sea level rise & loss of coastal habitat (e.g. mangroves)	Almost certain	Major	23
Lack of general awareness	Almost certain	Moderate	20

HABITATS	LIKELIHOOD (RARE TO ALMOST CERTAIN)	CONSEQUENCE (NEGLIGIBLE TO SEVERE)	RANKING AS PER 5X5 RISK MATRIX
Environmental Impact of Recreational Activities	Almost certain	Moderate	20
Anchoring on the reefs	Almost certain	Moderate	20
Shoreline pollution	Almost certain	Moderate	20
Ignorance of the marine boundaries and regulations	Likely	Moderate	17
Reef fishing	Likely	Moderate	17
Illegal and Unregulated Fishing Practices	Likely	Moderate	17
Predation by white-tailed mongoose, and feral dogs and cats	Likely	Moderate	17
Overfishing	Possible	Moderate	13
Terrestrial Overgrazing by Wildlife and Livestock	Possible	Moderate	13

Threats from disturbance and impact of commercial shipping appear to be low as majority of large vessel traffic emanating from the commercial ports in Jizan and Jizan Economic City avoids the MPA (see figure below):



Map 5: 2022 Marine Vessel Traffic Density[7]

Source **: 2022 AIS Data**

The most significant threats and pressures to the coral reefs in the Farasan islands, in order, appear to be:

- **Bleaching**

  Despite the coral communities in the southern Red Sea being adapted to temperature and salinity extremes (Sheppard and Sheppard, 1991), there was substantial bleaching on the Farasan reefs. Much of this would be related to climate change.
- **Sedimentation**

  A lot of the dead coral substratum was covered by a layer of fine sediment that must be an impediment to the recovery of coral growth.
- **Boat anchoring**

  Boat anchors are particularly destructive on coral reefs, and this clearly occurs in the Farasan Islands. Education on and enforcement of regulations against this practice is urgently needed.

[7] There is low commercial vessel traffic through the MPA as vessels respect the boundaries. There is high traffic emanating from the commercial ports in Jizan and Jizan Economic City.

- **Litter and pollution**

  There was little evidence of litter or pollution on the reefs, but this could change with the envisaged developments on Farasan and Sajid.
- **Oil pollution**

  The Red Sea conveys considerable merchant shipping with the associated hazard of oil pollution in the event of a shipping disaster. No evidence of oil pollution was observed.
- **Fish stocks**

  A healthy reef is associated with and dependent on a representative fish community. While diverse fish species were observed on the reefs, reef species were also seen in the fish market, indicating that reefs are targeted despite regulations prohibiting this.

Table 13: Threats and pressures to the coral reefs

THREAT	DESCRIPTION
Bleaching	Climate change-related coral bleaching is an ongoing concern and has clearly affected the Farasan reefs.
Reef fishing	While fishing is prohibited within 500 m of the islands, reef fish were seen in the fish market, emphasizing the need to enforce the regulations by patrol craft.
Boat anchoring	Boat anchors are particularly destructive to coral reefs, and this was observed at locations visited in the Farasan Islands. Education and enforcement of regulations against this practice are urgently needed.
Oil Pollution	No evidence of oil pollution was observed but the level of commercial shipping in the area.
Low reef fish stocks	A healthy reef is associated with and dependent on a representative fish community. The fish communities on the Farasan reefs were representative but not prolific; the latter is probably attributable to poor reef health, and possibly some fishing pressure.
Pollution	While no evidence of pollution was evident on the reefs, some terrigenous litter and flotsam and jetson must collect on the coral reefs.
Crown-of-thorns starfish	Crown-of-thorns starfish *Acanthaster planci* are present but are currently at insignificant numbers. They are a natural predator of coral but can devastate reefs when they form plagues that have been linked to poor water quality, resulting from bad land-use practices and unsustainable terrestrial development.

3.10 STRENGTHS, WEAKNESSES, OPPORTUNITIES AND THREATS

Table 14: SWOT Analysis for the Farasan Islands PA

	STRENGTHS	WEAKNESSES	OPPORTUNITIES	THREATS
Biodiversity Conservation	• Diversity of marine and terrestrial habitats • Representative fish and coral communities • Deeper reefs should manifest resilience. • Recovery reported on reefs from 2014 bleaching. • Excellent mangroves in good condition • Large population of Farasan gazelles • Important Bird & Biodiversity Area (IBA) • Man and Biosphere Reserve. • Internationally & nationally significant populations of seabirds	• Limited participation of local communities in conservation activities. • Lack of enforceable integrated land use plan and associated bylaws. • Presence of human settlements and livestock within the PA boundaries. • The spread of Alien invasive birds' species that eat both eggs and nesting birds. • The Spread of Alien plants invasive species on the southern part of Farasan Kabir that compete with native species. • Presence of Feral cats which prey on the	• Heavy reliance of local communities on fishery resources presents an opportunity for collaboration in conserving wildlife. • The PA attracts a wide range of researchers	• Poaching of wildlife resources in the terrestrial and marine ecosystems. • Climate change-related coral bleaching • Reef damage from anchoring • Increased negative effects of Alien invasive species (Prosopis) and Indian House Crows on biodiversity • Plastics and Oil pollution. • Illegal exploitation of migratory birds, Seabirds' and turtles' eggs. Possible conflict between locations of artisanal fishing

	STRENGTHS	WEAKNESSES	OPPORTUNITIES	THREATS
	• Endangered pink-backed pelican breeding colony & only Egyptian vulture breeding colony in KSA • Nesting beaches for endangered Sea turtles and critically endangered Hawksbill turtles. • Several island endemics • Tourism season 3-4 months long – Ideal, gives environment a chance to recover. • The most important bird breeding populations on the Red Sea. • Important mangrove forest with two species. • The Farasan gazelle only occurs here. • Stopover for passage migrants.	eggs of ground nesting birds.		camps and turtle nesting beaches • Increased negative effects of •White-tailed mongoose on turtles and birds' eggs. •Increased competition between Livestock and gazelles. •Increased human influences and human-wildlife conflicts. •Destruction of essential wildlife habitats including mangrove forests. Coral reefs, Sea grasses, sandy and rocky shorelines. •Destruction of vegetation by offroad driving vehicles.

	STRENGTHS	WEAKNESSES	OPPORTUNITIES	THREATS
	• Probable relict dugong population.			
Responsible Visitor Management and Sustainable Tourism Development	• Sense of place – remoteness of the islands • Good port facilities to mount visitor excursions (diving, etc.) • The outreach to the wider archipelago offers a wider experience to the destination. • The PA constitutes several suitable snorkeling sites. • • Potential PA for having diverse tourism products and activities.	• There is a lack of adequate tourism infrastructure and amenities including hotels, restaurants, leisure, entertainment, sports and F&B facilities. • Tourism in the region is a fairly new phenomena and the market is still growing. • Limited access to credit, restrictions on foreign ownership, complexity of procedures and the labor market hinder investment attraction. • Competing developments along the Coast of the Red Sea. There are limited tourism products and activities. Limited means of transport to	• Additional activities (bird and marine mammal watching) • Opportunity to develop a 'living exhibit' at the new visitor center. • Saqid island would be ideal for tourist development. (rewilding of Gazelles and pristine beautiful beaches, away from the Farasan town). • Proposed waterparks, resorts and line of lodges with water-based activities including jet skis. • Airport development proposed a few years ago.	• Impact of Off-road driving on the aesthetic value of the PA. • Littering

	STRENGTHS	WEAKNESSES	OPPORTUNITIES	THREATS
		the PA (There is neither airport nor car rental options). • Short tourism season - only 3-4 months long	• Waterplane planned. • Car rental company proposed for the islands – fell through too expensive. • Plans to build the world's longest bridge between Jizan and Farazan. • Heritage Village project	
Cultural, Heritage and Socio-Economic	• Fishermen recognise value of NCW; good relationship with NCW • There is a wide range of historic periods represented on the islands and is unusually rich • Published research on built heritage and archaeological sites • The cultural activities, such as the Hareed Fish Festival,	• No dive center. • Low visitor numbers to the heritage and cultural sites.	• Potential to develop a heritage route linking several sites and areas • Potential to undertake an oral history project to record the memories of elder members of the community	

	STRENGTHS	WEAKNESSES	OPPORTUNITIES	THREATS
	that occur seasonally and attract visitors from Jazan and the surrounding region. • Rich cultural and historical heritage sites such as the village of Al Qessar the Ottoman Castle, Al Rifai house, Al Sa'egh School etc.			
Protected Area Management	• Experienced Rangers with knowledge of the terrestrial and coastal environments. • Main Station strategically and conveniently well-positioned • Facilities adequate • 3 Radio towers provide good coverage. • Adequate number of vehicles for current staff numbers (4 x FJ	• limited to fully equipped ranger rapid response posts. • Lack of disaster plan.	• Use of technology to surveil marine and terrestrial areas. • Stakeholder education • Establish an NCW-stakeholder liaison committee to foster good relationships & collaboration. • Investigate suitability of high-performance craft for rapid marine response	• Distance and time from the mainland is a challenge for staff welfare. • Fishing perceived to pose the greatest threat to the PA. • Diesel fuel station on the island

	STRENGTHS	WEAKNESSES	OPPORTUNITIES	THREATS
	Cruisers and 5 x LC Pickup) • Local ports and the ability to launch from shore allow access. • Community's see NCW as protecting their resource from others. • Good relationships with local community • Good terrestrial capacity			

SECTION FOUR: VISION AND TARGET OUTCOMES

4.1. STAKEHOLDER CONSULTATION OUTCOMES

Table 15: Stakeholder consultation outcomes

SECTOR	ISSUES/SUBJECT OF DISCUSSIONS
PA Management	• Need more detailed habitat mapping • Need for a disaster plan • Need more information on fisheries
Fishermen	• Fishermen value and appreciate NCW • Fishermen would like to collaborate and report transgressions – they know that they are dependent on the marine resources and that sustainability is important to their fishery.
Recreational diving community	• Sense of place – isolation and remoteness of the islands • Good port facilities to mount diving excursions • Good diving on representative southern Red Sea reefs • A dive center is needed • Resident on Qummah has a vision to develop a diving lodge. • Distance from Jazan makes Farasan a remote site; will be remedied if the land-bridge is constructed
Communities and individuals	• Local communities and fishermen to participate in conservation initiatives. • Local communities and fishermen to participate in educational campaigns to elevate conservation awareness. • Local communities to contribute to community enterprise development. • Local communities are concerned about tourism growth and the capacity of the Ferry, especially with regard to transporting vehicles across to the Island which is experiencing significant backlogs. • Local communities would like to see more recreational activities.

4.2. MAJOR SITE VALUES

Category	Type of Value	Description
Ecological Value	The largest population of Farasani Gazelle	The Farasan Islands host the largest population of endemic and naturally occurring Farasani Gazelle, Gazelle gazelle farasani in the Kingdom of Saudi Arabia (~1,200 individuals).
	Critical habitat for critically endangered hawksbill turtle, globally endangered green turtle, and other organisms.	The area provides suitable breeding and nesting sites for the critically endangered hawksbill turtle (*Eretmochelys imbricata*) and endangered green turtle *(Chelonia mydas).* Over 250 turtle nesting sites have been recently recorded on the Islands. Besides, the area provides suitable habitats for the largest population of free-ranging Farasani mountain gazelle (*Gazella gazella farasani).* Similarly, mangroves and coral reefs provide shelter and spawning grounds to a wide range of marine life.
	The largest patch of Mangrove Forest in the country and the region.	The Farasan Islands represent one of the three most extensive mangrove patches in the Arabian Peninsula which is now regionally and globally threatened. Two species of mangrove are found in the area *Avicennia marina* and *Rhizophora mucronata.*
	Biodiversity stronghold of the Kingdom and the region.	Farasani Islands PA is recognized as a Man and Biosphere Reserve (MAB) by UNESCO, an Important Bird and Biodiversity Area (IBBA) by Birdlife International, and an Important Plant Area (IPA) in the Arabian Peninsula by IUCN. These recognitions reflect how richest the area is, in terms of flora and fauna diversity. The area is renowned for its unique floristic composition made up of a variety of herbs, shrubs, and trees. In particular, the area

		supports a significant number of rare and endemic plants including *Kickxia corallicolae*, *Nothosaerva brachiate, Basilicum polystachyon,* and *Ipomea hochstetteri*. In terms of fauna, the area hosts several iconic species of mammals including the largest remaining population of Farasan Gazelles, remnant population of Dugongs (*Dugong dugon*), five species of dolphins including *Stenella longirostris*, *Tursiops truncates,* and *Stenella attenuate*; Hampback whale (*Megaptera novaeangliae*), minke whale (*Balaenoptera acutorostra*) and Patrizi's trident leaf nose bat (*Asellia patrizii*), among others. Similarly, the area is rich in avifauna and over 145 (120 classified and 25 unclassified) species of birds inhabit the islands. Some of the renowned birds found in the area include the endangered Egyptian vulture (*Neophron percnopterus*), pink-backed pelican (*Pelicanus rufescens*), Greater Flamingo (*Phoenicopterus ruber*), Osprey (*Pandion haliaetus*) and Sooty Falcon (*Falco concolor*). Other animals found in the area include 231 species of fish, nine species of herpetofauna (1 amphibian and 8 reptiles), and several species of terrestrial and marine invertebrates.
	Ecosystem services and products	The area provides several ecosystem services and products that are critical for the well-being of local communities. For instance, mangrove and seagrass ecosystems serve as sinks for pollutants, and organic and inorganic materials, control floods, and improve coastal water quality. Additionally, mangrove and coral reef ecosystems support life underwater, protect shorelines from currents, waves, and storms, and thus, prevent beach erosion. In terms of ecosystem products, the Farasan Islands' Marine Protected Area provides local

		communities with seafood products incl. such including fish, crustaceans, mussels, sea cucumbers, and seaweeds which are critical protein and income sources to the local communities and beyond.
Economic Value	Economic opportunities	The PA presents several opportunities for socioeconomic development to the neighboring communities through tourism activities, artisanal and commercial fishing activities, farming, and livestock keeping.
	Source of employment	Farasan Islands Protected Area is one of the popular tourism destinations in the Kingdom. The protected area has promoted the development of tourist facilities such as lodges, hotels, and camps in the islands which come along with employment opportunities. More importantly, over 95% of the Protected Area's employees come from the Farasan Islands.
Socio-cultural Value	Cultural Value	Farasan Islands Protected Area constitutes several Historical and Cultural Heritage Sites recognized by the National Cultural Heritage Commission. Some of the key heritage resources found in the Islands include Al Qassar Heritage Walk, Luqman Castle, Najdi Palace, and Ottoman Fort.
	Aesthetic and Recreational Value	The Area's strategic location, beautiful sand beaches, and the rich natural and cultural heritage found in the reserve attract domestic and international tourists to the area. While natural heritage is attributed to its rich biodiversity, cultural heritage is attributed to its unique geographical location, ancient history, Islamic traditions, and Bedouin heritage.
	Medicinal Value	Farasan Islands supports the growth of enormous plant species some of which possess curative properties. Some of the medicinal plants found in the area include *Suaeda aegyptiaca* (Vernacular name:

		Suwwad), *Pulicaria jaubertii* (Al-Arar/Eter Elraee), *Commiphora gileadensis* (Al-bisham), *Capparis decidua* (Tandhab), *Cleome brachycarpa* (Birbran), *Abutilon Pannosum* (Rayn), *Limonium axillare* (Qattaf), *Tamarix aphylla* (Al -Athl), *Grewia tenax* (Khadar), *Zygophyllum coccineum L.* (Harm) *and Zygophyllum album* (Ritrit/Herm). Some of these plants provide raw materials for many pharmaceutical industries in the region and globally.
	Nutritional Value	Farasan Islands' Marine Protected Area provides seafood which serves as an important source of protein to communities living in the Islands and mainland. The most common fish found in Farasani are Hamour and Parrotfish.
	Scientific Value	Both terrestrial and marine resources provide an opportunity for local and international scientists and researchers to conduct cutting-edge research that advances science and our understanding.
	Educational Value	Being approximately 40 km from the mainland, the Farasan Islands Protected Area provides conservation education to children, youth, adults, students, and the public.

4.3. PROTECTED AREA VISION, MISSION AND GOALS

4.3.1 STRATEGIC OBJECTIVES AND OPERATIONAL KPIS

Resourcing and capacity	Independent marine patrol and response capability to be developed – manpower, training, leadership, boat and diving facilities.

Enforcement, Compliance & Security	Security and Protection plan implemented to address site-specific threats and challenges. Establish a dedicated Marine Antipoaching Unit capable on extended multi-day and night patrols (larger vessels)
Zoning	Detailed mapping needed for development of an updated zonation plan.
Stakeholders	Fishers; diving community; potential for bird tourism.
Education and Awareness	Education on activities and jurisdiction of NCW needed. Make the community aware of the value of "their" wildlife. Train local people in bird monitoring.
Biodiversity	Reefs, mangroves, seagrass beds, birds, turtles, island endemics; reintroduction of Arabian Bustard; conservation of Egyptian vulture; uncontrolled grazing; alien species/vermin control. Protect turtle and bird nesting; remove alien vertebrates; implement a gazelle management strategy, livestock grazing policy and plan. Regulate entrance to the fishery in the PA
Training, Research & Monitoring	Coral reef, bird & turtle monitoring; skipper, boat crew & scuba diver recruitment & training. Monitor nesting success of turtles and birds. Research the status of white-tailed mongoose. Monitor habitats, turtles and birds, dugong survey.
Tourism	Potential for diving tours, bird and whale watching.
Sustainability	Monitoring needed to establish sustainability of fisheries. Develop a grazing strategy. Develop a mangrove conservation strategy.

The key KPIs for each priority area are summarized as follows:

Table 16: Priority Area KPIs

VISION	OBJECTIVES	KPIS	2030 EXAMPLE TARGET
Become a leading biosphere area, preserving Farasan's marine and terrestrial ecosystems, endemic species and culture, while sustainably managing its tourism potential and harvestable resources	1. Improved PA status and management	Gain local NCW autonomy; develop co-management structures with stakeholders, I&AP; hold regular NCW-I&AP liaison committee meetings	More effective PA management
	2. Improved capacity for marine patrols	Operationalize current boat fleet Procure a larger vessel enabling overnight and multi-day patrols Recruit/train boat skippers, crew, and scuba divers	Regular marine patrols: regulations and zonation of PA enforced
	3. Improve fisheries regulations and controls	Regulate entrance to the fishery in the PA; ensure no commercial/industrial fishing in PA	Improved fish stocks
	4. Foster collaborative research and monitoring programs with appropriate institutions	Identify research and monitoring needs; develop partnerships with appropriate research institutions; establish feedback mechanisms to management	Regular, targeted research and monitoring providing feedback to management
	5. More detailed habitat mapping, leading to a zonation plan	Targeted mapping of sensitive resources; development of zonation plan in liaison with I&AP	Zonation plan implemented
	6. Alien & vermin control	Training and equipping staff for alien and vermin control	Reduced/eliminated alien plants and feral predator species

VISION	OBJECTIVES	KPIS	2030 EXAMPLE TARGET
	7. Develop a broad Public & User Education Program	Target schools, public, fisheries and tourism sector	20 education training programs conducted annually; improved community 'buy-in'
	8. Promotion of diving and avitourism	Develop a dive center and bird observation sites; identify and foster local initiatives to develop ecotourism	Productive but regulated ecotourism
	9. Codes of conduct (diving, whale and bird watching, pelican nesting sites)	Develop codes of conduct with tour operators and representative users	Ecotourism activities in harmony with the environment and fauna
	10. Reintroduction of Arabian Bustard	Acquire nucleus population of original, genetically true Arabian Bustard; establish a breeding center	Re-established Arabian Bustard population

Table 17: Specific objectives and targeted end states for key priority areas of the plan

NO	KEY AREA	SPECIFIC OBJECTIVES	TARGETED END STATES (2030)
1	Resourcing and Capacity	• Acquire suitable marine craft for effective marine patrolling. • Acquire scuba gear for diving operations, including a compressor and dive store, etc. • Train marine staff as divers for reef monitoring and collaboration in research. • Train local people as birding guides.	• Equipped with appropriate marine craft. • Fully equipped scuba diving team. • Appropriate staff trained to assist in monitoring and research, including scuba diving. • Competent, trained, and equipped bird guides.
2	Area Integrity and	• Develop and implement a Strategic Security and Protection Plan to reduce/eliminate identified site-specific threats and challenges.	• Establishment of area and boundary integrity. • Entire area routinely patrolled and illegal activity significantly reduced to sustainable levels.

NO	KEY AREA	SPECIFIC OBJECTIVES	TARGETED END STATES (2030)
		• Increased ranger capacity and provision of specialized training. • Routine Maritime, Shoreline and Terrestrial Patrols – Night and Day • Adequate Patrol Coverage • Increased Mobility including improved access to restricted areas. • Comprehensive and robust monitoring systems.	• A Zero Tolerance approach to illegal and incompatible activities. • Appropriately Selected, adequately trained and strategically deployed rangers, team leaders, managers and support staff as dictated by the Strategic Security Plan. • A fully functional Domain Awareness System
3	Zoning	• Marine habitat mapping and detailed bathymetric mapping of the marine environment. • Protect sensitive sites, especially coral bleaching and breeding refugia, bird nesting sites, and dugong feeding grounds. • Habitat and resource monitoring with seasonal closures or rotational use, if needed. • Ensure PA boundary is apparent on all official maps, vessel echosounders and GPS navigation systems. • Develop and delineate educational tourism zoning areas • Describe zoning categories in terms of character, use, and management priorities. • Revise staffing positions and numbers to allow for the management of the tourism zone. • Update signage and boundary markers	• Developed zonation plan based on improved knowledge of the marine habitats. • Regulations in place for seasonal closures or rotation of harvested/heavily visited areas. • Enhanced climate change resilience. • Improved awareness of PA. • Standardized zoning terminology and approach across all NCW PAs. • Zoning plan and descriptive tables with realistic LACs for visitor types and numbers, and Infrastructure implemented. • Monitoring and adaptive management improves zoning and establishes LACs for each zone. • Staffing as per the management plan requirements. • Signage requirements and content design completed for each management zone.
4	Community Engagement	• Establish NCW-stakeholder liaison committee to engender good relationships and a sense of co-ownership and co-management.	• Advisory forum established and functional (meeting quarterly and preparing minutes of meetings).

NO	KEY AREA	SPECIFIC OBJECTIVES	TARGETED END STATES (2030)
5	Education and awareness	• Educate stakeholders, local communities, and visitors about NCW, its functions and value. • Educate stakeholders on the purpose and extent of the Farasan Islands PA, and their responsibilities in access and use of its resources. • Educating local communities and visitors about their responsibilities in preserving arid ecosystems. • Conducting outreach programs with the area's youth to raise awareness about conservation and sustainable living practices. • Develop ecotourism operator's programs.	• Educational program developed and operational. • Educational center developed • Local community specific awareness program developed. • At least 30 outreach or educational programs to be undertaken per annum. • Ecotourism operator programs.
7	Biodiversity conservation	• Enforcement of the no-anchoring and fishing regulations. • Revision and expansion of the fisheries regulations in accordance with IUCN Red Listings. • Monitor representative habitats and key biodiversity e.g. turtles, birds, nesting, etc. • Control alien plant species. • Remove and control alien invasive vertebrates e.g. cats, rats	• Active compliance regulation. • Fisheries regulations improved in accordance with IUCN Red Listings. • Reduced pressures and disturbances on biodiversity. • Real time information on the status of representative habitats and key biodiversity. • Enhanced climate change resilience.
8	Training Research and monitoring	• Development of collaborative (NCW-University) reef, fish community, seagrass, mangrove and water and sediment quality monitoring and research programs. • Establish a research officer position for the monitoring of birds and ungulates.	• Collaborative research and monitoring programs provide valuable feedback to NCW managers. • Qualified research officer permanently stationed in the PA. • Baselines established and management-oriented research focused on challenges being undertaken

NO	KEY AREA	SPECIFIC OBJECTIVES	TARGETED END STATES (2030)
		• Regular monitoring of key indicators such as species populations, invasive species eradication, and habitat recovery/health. • Monitor LACs for habitat, biodiversity and tourism.	• Conduct annual census of bird populations.
9	Visitor management and tourism development	• Development of protocols and regulations for recreational usage of reefs and other marine habitats. • Develop a dive center and bird observation sites. • Identify and foster local initiatives to develop ecotourism. • Bird guides are trained to observe all protocols. • Ensure all tourism development proposals are responsive to the applicable IUCN Green List Indicators. • Take cognizance of and be responsive to, the needs and aspirations of all stakeholders, including the local community. • Identify and describe appropriate target markets. • Identify and describe a range of appropriate educational focused tourism experiential areas that showcase the biodiversity, landscapes and cultural historic assets of the PA. • Identify and describe appropriate visitor activity typologies compatible with the PA's character and its conservation values and environmental sensitivities.	• Adequate protection of sensitive sites, including closure, if needed, of coral bleaching and breeding refugia, bird nesting sites, and dugong feeding grounds. • A fully resourced dive center and clearly demarcated bird observation sites and hides (land-based in the case of the pelican nesting sites). • Users are fully informed of PA regulations and active policing of user activities. • A high-level tourism development framework that will guide the tourism development and management within the Protected Area for the next 5 years. • Detailed designs for tourism developments drafted • Concessioning / lease agreement process undertaken with private sector for management of all visitor activities and facilities • Viewpoints points, hides and interpretive signage developed • Visitor center developed • Trails established and marked • Local guides trained and equipped • Codes of conduct drafted • Environmental education, training and participatory programs developed

NO	KEY AREA	SPECIFIC OBJECTIVES	TARGETED END STATES (2030)
		• Identify and describe appropriate tourism amenity typologies compatible with the PA's character and its conservation values and environmental sensitivities. • Identify and describe appropriate tourism products and tourism operational models. • Identify and describe appropriate visitor and tourism management guidelines, including carrying capacity and effective access control.	• Environmental monitoring of visitor impact on biodiversity and habitats • Environmental monitoring and auditing of all visitor activities and facilities • Visitor satisfaction & feedback monitoring system in place • LACs established and adjusted based on visitor satisfaction and environmental monitoring
10	Sustainability - Pollution & waste	• Routine cleanup of shoreline plastic pollution. • Energy efficiency and greening of Protected Area infrastructure and management. • Waste management plan.	• Improved environmental status and monitoring of condition. • Waste management plan implemented. Waste streams monitored and waste reduction actions in place. The PA is ready to start introducing recycling when it is introduced in the adjacent municipalities.
10	Sustainability - Climate change and adaptation	• Detailed marine habitat and bathymetric mapping of the marine environment. • Assessment of habitat susceptibility and resilience. • Protection of potential refugia from climate change. • Assess the potential impacts of climate change on the PA and its biodiversity (Climate change impact assessment). • Develop strategies to mitigate the impacts of climate change on arid environments and their inhabitants.	• The establishment of PA areas for sustainable regeneration and recovery. • Enhanced climate change resilience. • Climate change impact assessment prepared and results presented to management. End of year 2. • Strategies developed and supported by management – end of year 2. • Strategies to address key risks implemented as per the climate change impact assessment implementation schedule. • GHG emissions baseline established for 2025 (end of year 1). Mitigation and monitoring plan agreed and GHG

NO	KEY AREA	SPECIFIC OBJECTIVES	TARGETED END STATES (2030)
		• Implementing measures to adapt to changing climatic conditions and their effects on biodiversity. • Reduction in CO_2eq emissions to meet the NDC 2030 commitments.	emissions reduced by 50% over 2024 baseline so as to meet the KSA NDC of 50% reduction by 2030.

SECTION FIVE: STRATEGY AND ROADMAP

5.1 THREAT MITIGATION AND RESTORATION INITIATIVES

Table 18: Threat Mitigation and Restoration Initiatives

MITIGATION/RESTORATION INITIATIVE	OVERVIEW	ENABLING CONDITIONS
Spill Identification, Risk, and Response Training for Oil and Hazardous Chemical Spill Pollution	• Staff are trained to identify spill risks and signs. • Protocols are developed jointly to alert and collaborate with NCEC and stakeholders during an oil and chemical spill response plan. • Regular training and joint scenarios are conducted.	• It is essential to have effective coordination and access to updated spill response training, technology, personal protective equipment, and containment equipment for managing spills.
Awareness and education campaigns that focus on boundaries, zonation and regulations	• Launch educational campaigns to inform fishermen, boaters, and the public about the objectives, boundaries, and regulations of the protected area. • Engage with users prior to entering the area and while at sea.	• Collaboration with local communities, schools, and media • Funding for campaign materials and events.
Coral Reef Restoration and Monitoring - Coral Bleaching	• Map coral reefs for sensitivity or resilience	• Protection of resilient reefs as sanctuaries and breeding refugia for coral replenishment
Protection of other marine habitats: Mangroves and seagrass beds	• Map other marine habitats (mangroves, seagrass beds)	• Protection of important mangroves and seagrass beds, both important nursery and feeding areas, from

MITIGATION/RESTORATION INITIATIVE	OVERVIEW	ENABLING CONDITIONS
		unsustainable exploitation
Community Engagement and Outreach to improve the Lack of General Awareness of the PA	• Develop and foster community stewardship by organizing workshops, beach clean-up events, and free tours	• Support involvement by local NGOs, schools, and businesses • Volunteer participation
Enforcement and Surveillance -	• Increased and focused patrols and presence in critical habitats • Install surveillance cameras • Implement strict prosecution and penalties for violations • Coordinate efforts with local law enforcement and role players.	• Funding for equipment and staffing • Legal framework for prosecution.
Habitat Protection and Land-Use Planning	• Designate critical habitats as no-development zones • Promote sustainable land-use practices.	• Legislation to protect critical habitats • Collaboration with urban planners and the private sector.
Promotion of Sustainable Fishing Programs to Prevent Unsustainable Fishing	• Jointly monitor the application and enforcement of catch limits and gear restrictions by the Fisheries Department • Promote alternative livelihoods for fishermen – preference for NCW Ranger positions. • Enhance protection of IUCN Red Listed fishes in addition to sharks, skates & rays	• Regulation enforcement • Education on sustainable practices • Recognition and incentives for compliance. • Ban retention of IUCN Red Listed fishes in addition to sharks, skates & rays • Regulate entrance to the fishing

MITIGATION/RESTORATION INITIATIVE	OVERVIEW	ENABLING CONDITIONS
	• Enhanced protection of the marine environment	
Pollution Control and Treatment - Industrial Effluent Discharge	• Mandate the use of treatment facilities for any discharge and effluents. • Regularly monitor water quality near discharge sites • Collaboration with NCEC.	• Strict enforcement of environmental regulations • Penalties for non-compliance • Recognition for Compliance • Industry collaboration.
Environmental Impact and Regulation of Recreational Activities	• Implement permit systems for identified high-impact activities and develop guidelines, codes of conduct, and services for eco-tourism.	• Tourism/recreational sector engagement • Infrastructure for controlled access to sensitive areas • Environmental education for tourists

5.2 ZONING AND PHASING STRATEGY

Zonation is a spatial exercise that benefits from numerous data inputs that can be superimposed as layers to assist with the definition of desirable or undesirable zone options. A number of such data layers are already available for the Protected Area or have been derived as secondary products during the current zonation process.

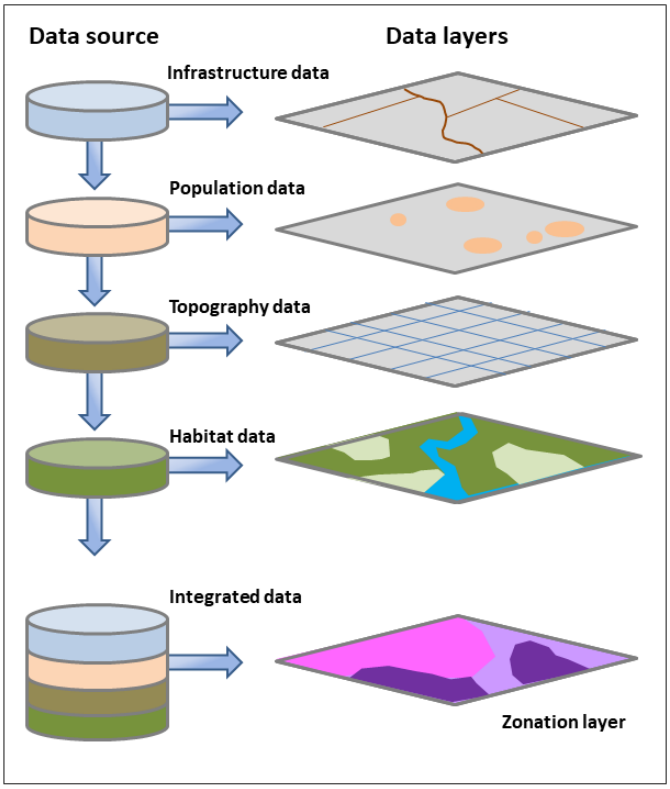


Figure 6: Schematic representation of data layers and their use towards defining appropriate zonation.

The data layers used to inform the zoning plan for the Protected Area includes the following:

- Areas of biodiversity importance and conservation importance, including
  - Mangrove areas
  - Seagrass areas
  - Fish nursery areas
  - Turtle nesting hotspots
  - Egyptian vulture and pelican nesting sites
  - Coral reefs
  - Islands
  - Coastal buffer (500m) and shallow bays and inlets.
- Cultural heritage and archaeological sites
- Habitats and land cover, terrestrial versus marine areas, secluded undisturbed islands.
- Prime habitat for the Farasan gazelle.
- Existing anthropogenic impacts, including:
  - Infrastructural and industrial developments
  - Scattered buildings and other assorted infrastructure
  - High voltage power lines.

  - Main surfaced roads and internal road network
  - Intensive artisanal and commercial fishing areas.
  - Intensive ship and boat traffic areas
- Existing high value visitor areas.

Application of the zonation in descending order of impact

Terrestrial:

- **Sanctuary**
  This zone offers the highest level of protection to highly sensitive areas. In the context of the Protected Area, Sanctuary areas should be applied to environmental hotspots that need higher levels of protection than those offered by other wilderness categories. An example of this application is the mangrove area on the eastern shore of Farasan Island, where the endangered pink-backed pelican roosts in the mangrove forests. This area is sensitive to disturbance by tourist boats accessing the narrow waterways within the mangrove forest. See adjacent photo illustration.

- **Restricted (51,260 ha) (8.9%)**

  This zone can be considered as a type of 'Wilderness Zone' with varying degrees of high biodiversity and conservation value. It includes the smaller uninhabited islands within the Protected Area, as well as the essentially undeveloped sections of the main islands which are still largely in a natural state. These areas provided a refuge for birds, nesting turtles, and the Farasan gazelle, whilst providing the visitor opportunity to visit secluded 'quiet' areas on foot.

- **Low Intensity Use Zone (14,026 ha) (2.4%):**

  The Low Intensity Use zone includes areas on the two main islands that are impacted by anthropogenic activities and facilities to a limited extent. This area is characteristically semi-rural with numerous unsurfaced roads and tracks, scattered farmsteads and utility lines. This zone serves as a transition between the High Intensity Use Zone and the Wilderness Zones.

- **High Intensity Use Zone (9,363 ha) (1.6%):**

  This includes areas on the main islands that are significantly impacted upon by urban, residential and light industrial development. The various towns and villages, the harbor, main surfaced roads, and the desalination and power plants are examples of areas zoned as High Intensity Use Zones. Ideally, any further large scale development should be concentrated within this zone.

Marine:

- **Sanctuary**

  Very similar to the terrestrial Sanctuary areas, this zone offers the highest level of protection to highly sensitive marine areas. In the context of the Protected Area, Sanctuary areas should be applied to environmental hotspots that need higher levels of protection than those offered by other wilderness categories. An example of this application is the waterways accessing the mangrove area on the eastern shore of Farasan Island, where the endangered pink-backed pelican roosts in the mangrove forests. This area is sensitive to disturbance by tourist boats accessing the narrow waterways within the mangrove forest.

- **Restricted (201,728 ha) (35.0%)**

  This zone can be considered as a type of 'Wilderness Zone' with varying degrees of high biodiversity and conservation value. It includes the smaller inlets and sheltered bays along the coastline as well as areas of high coral reef density, seagrass areas, fish nursery areas, and mangrove areas.

  The marine Restricted Zone provides visitors opportunities to explore marine areas that are largely free of high impact marine activities such as commercial, recreational and artisanal fishing.

- **Low Intensity Use Zone (135,576 ha) (23.5%):**

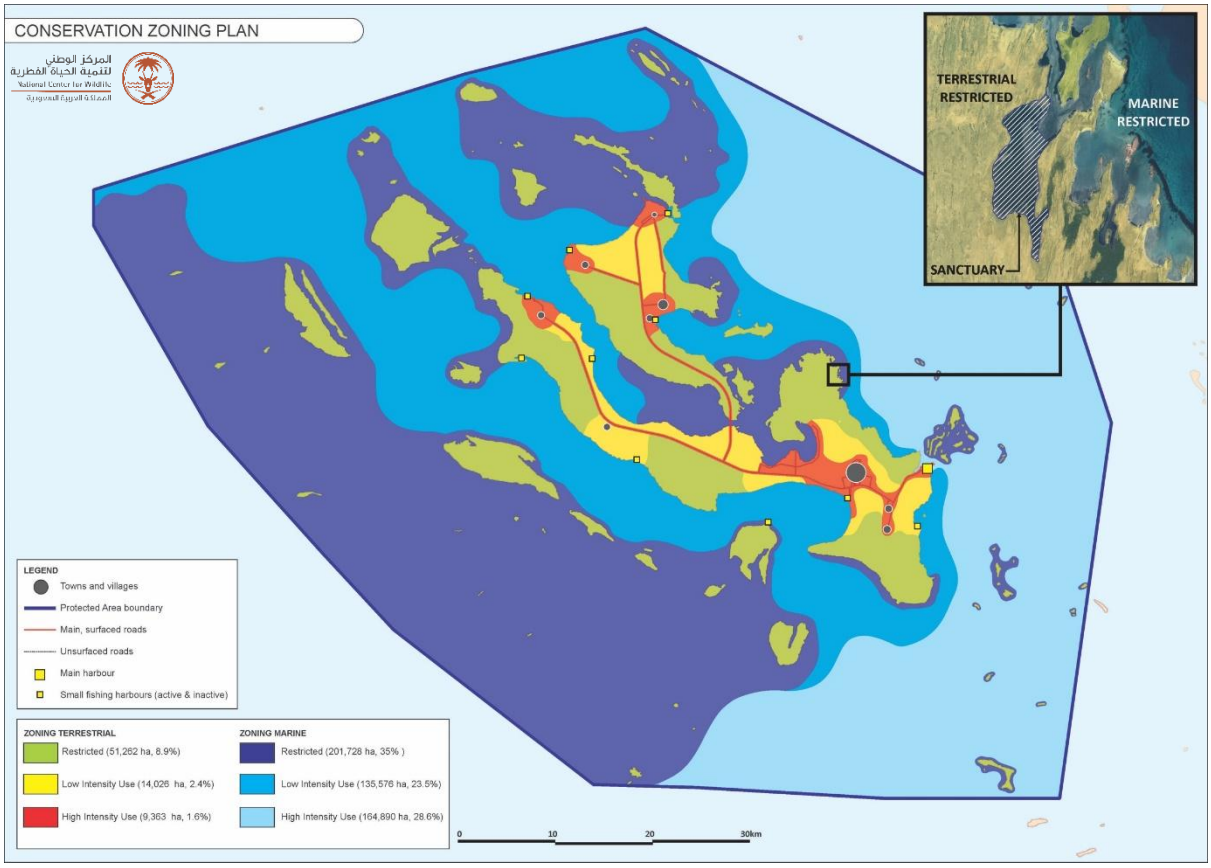
  The shoreline areas are buffered with a Low Intensity Use zone. The buffer protects the shoreline (and associated coral reefs, seagrass areas, and mangrove forests) from impacts related to high density boating and fishing activity.

- **High Intensity Use Zone (164,890 ha) (28.6%):**

  The remainder of the marine area is zoned as High Use Zone. This includes the deeper waters that are extensively used for fishing, off-shore drilling, and are subject to very high boat traffic.

Note: Further marine habitat and bathymetric mapping of the marine environment is required to further detail the zonation plan. This will include overlay zones that accommodate seasonal and rotational closures (fishing), closed areas (military areas) and sanctuaries (sensitive areas and breeding refugia).

The map below presents the revised zoning plan. Note the insert, which illustrates an example of micro zoning where certain specific areas may require further detailed analysis and zoning. This example demonstrates how the popular mangrove area may require the application of a Sanctuary Zone to restrict access and protect the mangroves from boat traffic.



Map 6: Zoning of the Protected Area Required Interventions

5.2.1 MARINE WILDLIFE

Development of a fully equipped dive store would enable marine monitoring (e.g. reef monitoring) and essential survey work. The development of moderate levels of diving, bird and marine mammal watching, and possibly of turtle nesting, can be contemplated, provided codes of conduct are drafted for this and strictly regulated.

The following interventions are recommended:

- Sound information must be disseminated on the marine borders, zonation and regulations of the PA, especially amongst fishermen.
- Capacity building in the marine staff to institute regular patrols to improve compliance with the regulations, especially in the fishing areas.
- Capacity building of marine staff for scuba diving.
- Acquisition of appropriate marine vessels and support facilities for rapid response and access to the islands.
- Include a fully resourced dive store.
- Enforcement of the no-anchoring and fishing regulations.

- Improve and expand fisheries regulations to include IUCN Red Listed fishes in addition to sharks, skates and rays.
- Regulate entrance to the fishery in the PA.
- Conduct a dugong survey.
- Development of protocols and regulations for recreational usage of the reefs and other marine habitats.
- Sensitive ecotourism site development, e.g. observation of pelican nesting from land-based hides, and not by boat.
- Establish NCW-stakeholder liaison committee to engender good relationships and a sense of co-ownership and co-management.
- Development of collaborative (NCW-University/Institute) reef, fish community, mangrove and water and sediment quality monitoring and research programs.
- Detailed marine habitat and bathymetric mapping of the marine environment, followed by appropriate zonation (including seasonal and rotational closures), with assessment of resilience and sensitivity to climate change and other pressures, and protection of potential climate change and breeding refugia, sensitive bird nesting sites, and dugong feeding grounds.
- Eradicate/control alien feral predators.

5.2.2 TERRESTRIAL HABITATS & WILDLIFE

5.2.2.1 SET LIMITS OF ACCEPTABLE CHANGE IN HABITATS AND GAZELLE POPULATIONS

The manner in which the management staff of The Farasan Islands Protected Area will check whether they are on track with their expectations in managing the terrestrial ecosystem, is to set ecosystem endpoints that reflect a desired state.

In terms of the LACs for habitats, these would define lower levels for the mangrove patches and the proportion of large trees. LACs would also be defined for those plant species endemic to the Farasan Islands and for the invasive aliens. It may also need to be applied to an upper limit of the land that can be cleared for cultivation of crops.

For fauna, LACs will apply to the number of Gazelles on Farasan Kabir island and selected population limits of other species are set by an interplay of the following requirements:

- Minimum population size that can fulfil the vision and that can withstand normal predator pressure.
- Minimum numbers of ‘the species that make for a generally ‘good’ large animal viewing experience.
- Maximum number as dictated by the available vegetation resources.
- Balance between different feeding groups in terms of respective feeding requirements (bulk grazers, browsers, etc.) and respective roles.

- A balance of each feeding group in facilitating/denying access to vegetation resources by another feeding group.

These requirements balanced against the low success rate of certain species may lead to specific species becoming marginal or threatened. A decision may then be required as to whether a specific species is allowed to disappear or somehow survive or whether it should be pro-actively removed.

The Limits of Acceptable Change (LAC) for the gazelles are given below are for a both Farasan Kebir and As.

Table 19: Proposed Limits of Acceptable Change for the Farasan gazelles.

FARASAN GAZELLES	UPPER POPULATION LIMIT	LOWER POPULATION LIMIT	BIRTH RATE PER ADULT FEMALE - %	YOUNG SURVIVAL AT 1 YEAR %
Farasan	1000	500	80	40

5.2.2.2 DEVELOP A HABITAT MANAGEMENT POLICY AND HABITAT MAP OF THE ISLANDS

The development of a more detailed vegetation map of the islands and a policy for conserving unspoiled habitats and managing those that are impacted by farming and livestock.

5.2.2.3 START THE MONITORING OF VEGETATION

Measuring change of vegetation is the foundation stone of successful habitat and wildlife management. It can start by being simple but repeatable fixed-point photographs taken at the same time each year and then marked fixed transect lines along which each species is recorded and its distance from the line. After a few years the changes in species composition and density will provide objective measures of change and allow conclusions to be drawn and management interventions applied, if they are necessary.

5.2.2.4 DEVELOP A CONTROL PROGRAM FOR ALIEN PLANTS

Different control methods are required for each species. Some need to be physically removed and the rootstock poisoned to prevent regrowth. There may be conflicts with pollution prevention objectives and a risk assessment is required for each approach proposed.

Mechanical Control: Physical removal of invasive plants through methods like manual pulling, cutting, mowing, or using machinery (where appropriate) to clear infested areas. It is likely that *Prosopus juliflora* and *Calotropis procera* will require both mechanical removal and chemical treatment. Refer Appendix

Examples include the WWF guidelines (Martens, 2021) https://wwfafrica.awsassets.panda.org/downloads/a_practical_guide_to_managing_invasive_alien_plants_web.pdf

Chemical Control: Using herbicides or other chemical treatments targeted at invasive plants. This method requires careful consideration of environmental impact and adherence to strict guidelines for application.

Biological Control: Introducing natural enemies or biological control agents specific to the invasive species to reduce their population. This might include insects, pathogens, or grazing animals that feed on invasive plants.

Research and Monitoring: Conducting research on invasive species to better understand their behavior, spread, and ecological impacts. Regular monitoring helps assess the effectiveness of control measures and adapt strategies accordingly.

In Saudi Arabia, the Ministry of Environment, Water, and Agriculture, along with various research institutions and conservation organizations, collaboratively work on invasive species management. They often focus on species such as *Prosopis juliflora* (mesquite), and other invasive plants that threaten native habitats, water resources, and agricultural lands.

Collaboration among stakeholders, research institutions, and local communities is crucial for successful invasive species management in the country.

Table 20: The timetable for actions to be taken in habitat restoration

ACTIONS TO BE UNDERTAKEN	2025	2026	2027	2028	2029	2030
NCW accepts habitat actions in plan						
NCW commissions habitat map of						
NCW commissions a habitat Policy/Plan						
NCW adopts habitat management plan						
Remove of alien invasive plants						

5.2.2.5 DEVELOP A FARASAN GAZELLE CONSERVATION STRATEGY:

It is recommended that NCW develop a Farasani Gazelle Conservation Strategy as a priority. The objective will be to restore the gazelles to their former range on and then to

manage them for a sustainable offtake, either for introduction elsewhere or for controlled hunting.

- Update the status of the population and recommend a monitoring program.
- Recommend optimal carrying capacity for Farasan Kabir and islands to which animals are to be translocated.
- Identify the conditions needed on each island for the reintroduction of gazelles.
- Plan the reintroduction of gazelles to their former island distribution.

5.2.2.6 ADOPT POLICY TO MANAGE GAZELLES WITHIN CARRYING CAPACITY OF ALL HERBIVORES.

The Carrying Capacity of an area for herbivores is a function of geology, topography, climate and rainfall and using these, a useful limit can be determined for management purposes. 'Ecological Carrying Capacity' (Caughley 1977, McCullough 1979) is loosely defined here as the size of a species' population in an area as determined by the capacity of that area to support the individuals in that population and which enables them to reproduce. Ecological Carrying Capacity is generally difficult to measure. It is not a static figure and It reflects climatic conditions and the influence of past and current land use and management practices.

It is considered premature to undertake a desk calculation to estimate a Carrying Capacity for gazelles with such a fine scale as there is on Farasan Kabir and without knowing the numbers of livestock. This requires a dedicated study as part of the management plan for the Gazelle populations. The gazelle population is presently large enough for a sustainable offtake and this should initially be by live capture to restock those islands from which it has gone extinct.

Before gazelles are translocated to the mainland, NCW must develop a policy where gazelles from the Farasan islands are not mixed with any mountain gazelles on the mainland but kept separate as a pure *Gazella g. farasani* bloodline until more is understood about them.

The steps needed to develop and execute the Gazelle Policy are recorded in the table below.

Table 21: Development and execution of the Farasan gazelle management Strategy

ACTIONS NEEDED	BY WHEN	METHODOLOGY	RESPONSIBLE	MEASURABLE RESULT
NCW agree that a Gazelle Conservation Strategy is needed for the Farasan Islands	Decide by June 2025	Review Farasan Plan and consider the	NCW	Resolution is taken to develop a Farasan gazelle strategy and that

ACTIONS NEEDED	BY WHEN	METHODOLOGY	RESPONSIBLE	MEASURABLE RESULT
		proposal for the plan.		it will be done by either NCW, a university or by consultants.
If Strategy is to be done by University or Consultants then TOR will need to be developed . This should examine controlled licensed hunting.	TOR developed by July 2025	Required outcomes must frame the TOR with realistic timeframe and budget decided.	NCW	TOR are developed and distributed as part of the Request for Proposals.
Contract is awarded for Farasan Gazelle Management Strategy	By November 2025 and completed by mid-2026	Field work review status, carrying capacity and former distribution. Workshops with community & NCW.	NCW	A practical Strategy is developed, that if put into operation will enhance the status of the species and provide a sustainable offtake for both the further population expansion and benefits for the community on the Farasan Islands.
Build capacity in NCW to undertake ungulate capture and translocation on an increasing scale.	TOR developed by NCW. Course to take place over six months.2025/2026	Identify the species, numbers and landscapes where operations needed.	NCW & Consultants	Practical training program provided to selected NCW staff. Both theory and practical and part of the course may take place outside Saudi Arabia. Equipment and materials for the

ACTIONS NEEDED	BY WHEN	METHODOLOGY	RESPONSIBLE	MEASURABLE RESULT
				capture unit is acquired.

The proposed timetable to implement the Gazelle Strategy includes deliverables from above and is stipulated in the table below.

Table 22: Proposed timetable to implement the Gazelle Strategy

ACTIONS TO BE UNDERTAKEN	2025	2026	2027	2028	2029	2030
Commission a Gazelle Conservation Strategy						
Commence more detailed monitoring						
Prevent illegal hunting & trapping of gazelles.						
Determine optimal Stocking Rate for population and develop Action plan.						
Plan reintroduction to former range						
Award contract to train a NCW capture unit.						
NCW staff trained in ungulate capture						
NCW acquire capture equipment						
NCW undertake capture and translocations.						
Examine the possibility of controlled licensed hunting of gazelles and make recommendations.						

5.2.2.7. DEVELOP STRATEGIES AND PROGRAMS TO PROTECT AND MONITOR TURTLE NESTING SITES.

The conservation of the turtles requires a strategy with each of the threats being considered and mitigation measures developed and implemented. These are summarized in the table below.

Table 23: Strategies and programs to protect and monitor turtle nesting sites

PROBLEMS, RISKS OR DANGERS	OBJECTIVES	ACTIVITY / MANAGEMENT ACTION	CALENDAR / URGENCY / PRIORITY	RESPONSIBILITY	INDICATORS AND TRENDS
Destruction of nests by fishermen and communities	Stop collection of turtle eggs and disturbance turtle nesting beaches	Consolidate engagement of communities in control and monitoring of nests	Priority and continuous	NCW	Number of nests protected/destroyed with involvement of communities; number of people engaged - measure trends. Number of nests will successfully be hatching.
	Bring communities into the protection of turtle and bird nesting areas and in guiding tourists.	Engage communities in ecotourism activities such as watching sea turtle making the nest, depositing the eggs and watching hatchlings emerge	Continuous, medium priority	NCW	Number of tours completed, number of tourists and community members engaged
	Eliminate nest robbing and destruction by humans.	Perform daily guarding and enforcement of all nesting area during the nesting season	Priority and continuous	NCW	Number of patrols and poachers and number of nests robbed.
	Enforce legislation as a deterrent when necessary	Apply fines as stipulated in the legislation/regulations	Priority and continuous	NCW	Number of fines applied and paid
Accidental capture by fishermen	Avoid mortality due to accidental captures in seine fish nets	Raise awareness of communities in relation to freeing the animals from the nets	Continuous	NCW	Number of meetings held and number of people that participated; amount of materials distributed

PROBLEMS, RISKS OR DANGERS	OBJECTIVES	ACTIVITY / MANAGEMENT ACTION	CALENDAR / URGENCY / PRIORITY	RESPONSIBILITY	INDICATORS AND TRENDS
	Rangers become skilled in monitoring, guiding and protection	Train rangers and communities in techniques to resuscitate turtles.	Medium priority, continuous	NCW	Rangers and people trained; number of turtles successfully reanimated
	Eliminate gillnets and in vicinity of turtle nesting colonies.	Improve enforcement system in what regards the use of gillnets and longlines inside the Protected Area	Urgent, priority and continuous	NCW	Number of patrols and offenders
Monitoring	Monitor reproductive ecology of turtles	Continue to consolidate monitoring of nests and juveniles in the whole Protected Area (MOMS)	Priority and continuous	NCW	Number of samples, frequency and sample size (statistical validation)
Research	Improve knowledge of turtles' biology, and ecology in the Farasan Islands.	Start a tagging program	Priority and continuous	NCW	Number of publications when compared with reports completed, medium and impact of publications (journals, conferences, etc.)

5.2.2.8 MAMMAL REINTRODUCTIONS

As part of the proposed Gazelle Management Strategy, it is recommended that the possibility of reintroducing gazelles back onto the islands where they are now extinct is investigated and that conditions suitable for their survival restored. Then a planned and managed live capture reintroduction from Farasan Kebir is implemented.

Once the aerial dugong survey has been carried out and the results evaluated, if it is found that there are no dugongs left then a Strategy for the dugongs needs to be developed. This should follow the steps as outlined in the table below.

Table 24: Action steps to recover the dugong population in the Farasan Islands

ACTION STEPS	2025	2026	2027	2028	2029	2030
Plan an aerial dugong survey						
Undertake dugong survey						
If no dugongs develop a strategy						
Ensure safe areas for dugongs						
Plan to reintroduce dugongs						
Implement dugong reintroduction						

5.2.3 BIRD MAINTENANCE & ENHANCEMENT PROGRAMME

General recommendations are that transformation of any shoreline habitat is opposed and that there is a strictly enforced ban on offroad driving. Furthermore, that the erecting of transmission lines is minimized as much as possible and mitigation measures are employed where relevant to existing lines and any NCW should establish a partnership with Birdlife International and develop zonation protocols and regulations for avitourism and establish appropriate bird viewing areas and hides. Avifauna should also be incorporated into oil spill management plans. Light pollution should be minimized by not over developing the area, feral predators controlled, and the avian population monitored.

All nesting colonies should be GPS mapped and receive adequate protection during their respective breeding seasons. This also applies to species such as the Crab plovers, Pink-backed pelicans, Egyptian vulture and Sooty falcons. It is recommended that nesting platforms for Ospreys are erected on Farasan Kabir so that eggs and chicks cannot be raided by the white-tailed mongoose. Any viewing of pelicans at nesting sites should be accomplished from land-based hides and not by approaching the nests by boat, which disturbs them. Furthermore, that vermin such as feral cats, feral dogs and exotic rodent and bird species such as the Indian house crow are eliminated as part of a vertebrate control programme.

Increasing suitable nesting sites for sooty falcons, by creating suitable small caves, should also be investigated.

5.2.3.1 MITIGATE TRANSMISSION LINE IMPACTS ON BIRD POPULATIONS:

Consideration of the impacts that any existing and any new transmission lines are or would likely have must be given due to the International Bird & Biodiversity status of the protected area and that several large and cumbersome species which are endangered have breeding populations in the protected area such as the Egyptian vulture and the Pink-backed pelican. Furthermore, transmission lines could threaten the success of re-introducing the likely nationally extinct Arabian Bustard because, like many other large birds, bustards are particularly prone to colliding with overhead lines.

Common flight paths of key species should be mapped in relation to transmission lines or any proposed lines in future. Furthermore, if there is evidence of bird fatalities based on carcasses beneath lines (taking into consideration that carcasses are likely to be scavenged too), then bird flight diverters must be installed or preferably the lines buried.

5.2.4 CLIMATE CHANGE MITIGATION AND ADAPTATION PLAN

Gazelles can better endure heat stress by the provision of shade trees and only when absolutely necessary the provision of suitable access to water.

3 SECTION SIX: ENABLERS AND IMPLEMENTATION PLAN

3.1 6.1. OPERATIONAL DESIGN

3.1.1 6.1.1 GOVERNANCE STRUCTURE

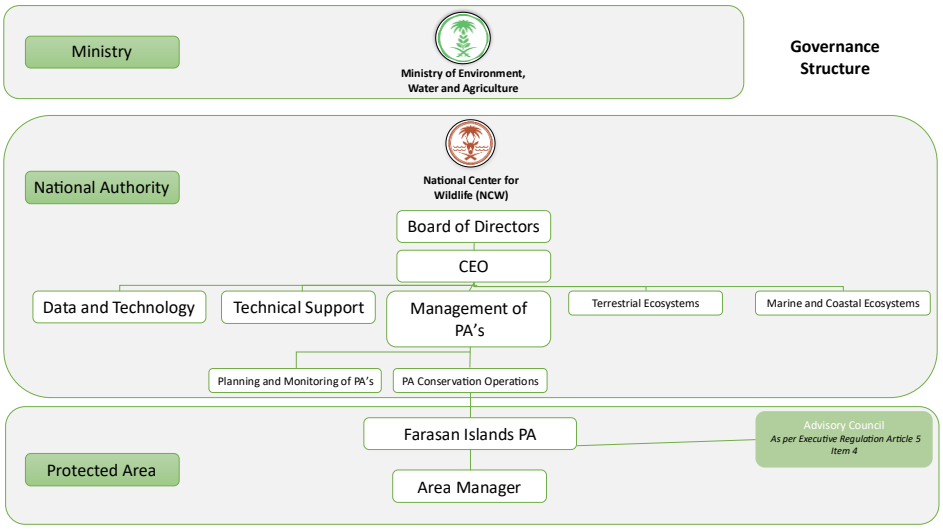


Figure 7: Governance Structure

The current national-level governance and organizational structure for the Farasan PA is considered appropriate.

However, to effectively achieve the objectives outlined in the management plan, it is essential that wherever feasible and necessary, devolution of responsibility for implementation takes place. This devolution is crucial for addressing site-specific needs and implementing the plan effectively. If operations remain entirely centralized, it may severely hinder implementation, thus necessitating the development of site-level capacity to manage the PA's unique needs and challenges.

The proposed ensuing departmental and organizational structure below reflects this site-level capacity, ensuring that the PA can function semi-autonomously within the framework set by the national authority.

3.1.2 6.1.2 ORGANIZATION

The organizational structure of the Farasan Islands Protected Area has been designed to optimize conservation efficacy and adaptability. To achieve this, dedicated departments have been created and implemented due to several key reasons.

Firstly, targeted engagement with stakeholders is needed. This includes residential, tourism, local governance, and commercial stakeholders who interact with or impact the marine and terrestrial ecosystems of the Farasan Islands.

Secondly, the diverse and complex environmental and conservation challenges of the Farasan Islands require specialized staff and capabilities. Specialization ensures that both environmental, marine, and terrestrial aspects of the protected area are managed effectively, adhering to both conservation goals and sustainable use practices.

Lastly, direct and consistent interaction with the environment is essential. Substantial field-based activities, including monitoring, research, and enforcement of regulations, are necessary to effectively manage and preserve the area's natural resources and biodiversity. Refer to Operational Plan for further rationale and details.

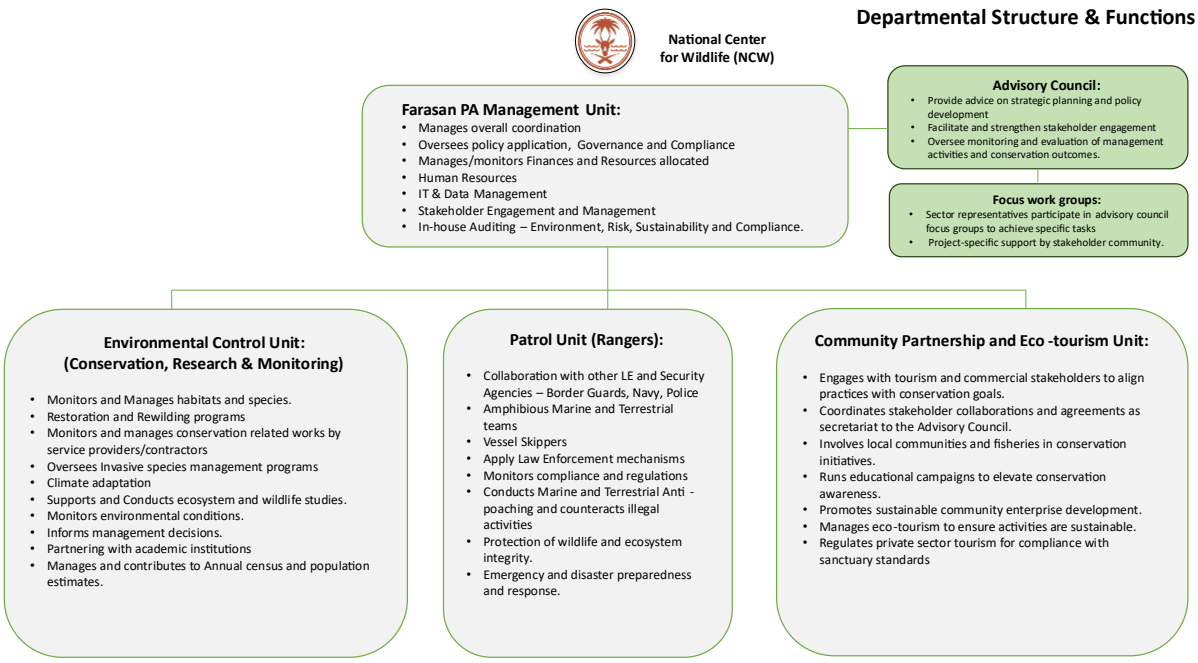


Figure 8: Proposed Departmental Structure

3.1.3 6.1.3 PEOPLE

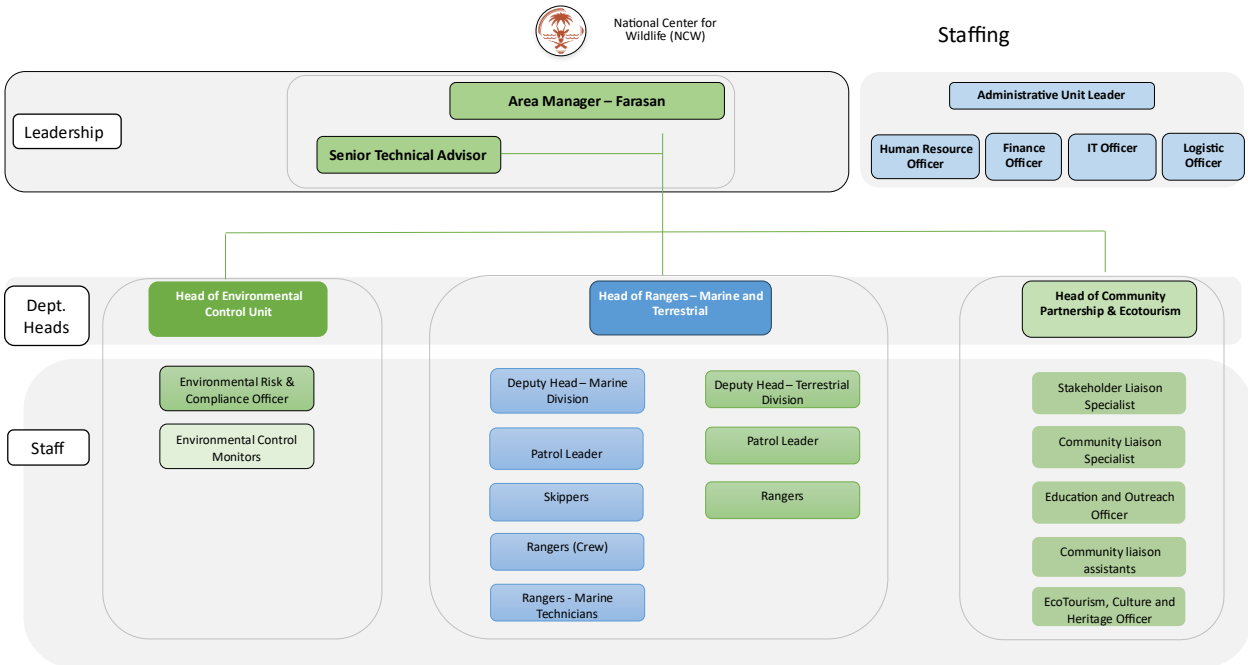


Figure 9: Proposed Staff Structure

The Farasan Islands Protected Area requires a multifaceted approach to achieve its conservation objectives in its complex marine, terrestrial, and coastal environments. The current patrolling approach is sufficient, but we can enhance it, and a more comprehensive and holistic conservation strategy is needed, including stakeholder

engagement, monitoring of marine and coastal ecosystems, fisheries management, and community outreach and education.

3.2 6.2. IMPLEMENTATION STRATEGY

The proposed development and implementation of the Protected Area departmental structure is designed to align with the concept of greater decentralization. This structure empowers the Protected Area to address its specific challenges and independently manage day-to-day operations. It reflects the capacity and information required at the site level, enabling the Protected Area to operate efficiently while adhering to the guidance provided by the national authority and the management plan.

The approach to implementation, for each activity area (e.g. ungulate management, applied research, rewilding, invasive species removal, impact mitigation, tourism development, etc.), is to undertake the following steps (Adaptive Management details in the Habitat and Wildlife Plan):

1. Identify and commence with a pilot implementation which has a limited scale and scope.
2. Monitor and evaluate the outcomes.
3. Improve the next implementation plan to incorporate the lessons learned.
4. Large scale implementation; and
5. Monitor results and feedback into future actions and follow-up actions.

3.2.1 6.2.1 CONTACT AND COMMUNICATION PLAN

Table 25: Contact and Communication Plan

ACTIONS TO BE TAKEN	2025	2026	2027	2028	2029	2030
Formalize partnerships with strategic partners						
Increase public awareness about Farasan Islands and its biodiversity importance						
Conduct educational programs and school outreach programs						
Establish a multistakeholder forum for collective decision making						
Conduct regular community engagement workshops and events						
Establish at least two successful collaborations or joint initiatives with NGOs, research institutions, or governmental bodies per year.						

ACTIONS TO BE TAKEN	2025	2026	2027	2028	2029	2030
Ensure that role-players adhere to the sustainable tourism guidelines and that these are thoroughly communicated						
Successfully develop and implement an effective emergency communication plan to ensure timely dissemination of critical information during crises.						

3.2.2 6.2.2 TOURISM DEVELOPMENT

Table 26: Development schedule for tourism facilities

ACTIONS TO BE UNDERTAKEN	2025	2026	2027	2028	2029	2030
Concessioning / lease agreement process undertaken with private sector for management of all visitor activities and facilities						
Detailed designs for tourism developments drafted						
Visitor access processing facility developed at Farasan Harbour						
Viewpoints points, hides, trails and signage developed						
Visitor center developed						
4 picnic sites for up to 168 visitors developed						
2 pitch and strike campsites (total 40 pitches) developed						
Self-catering 48 bed beach lodge / group camp developed						
Beach Resort (30 keys, 60 beds) developed						
Glamping trails camp (16 beds) developed						
Upmarket beach lodge (32 beds) developed)						
Local guides recruited, trained and equipped						
Environmental education, training and participatory programmes developed						
Environmental monitoring of visitor impact on biodiversity and habitats						
Environmental monitoring and auditing of all visitor activities and facilities						
Visitor satisfaction & feedback monitoring system in place						
LACs established and adjusted based on visitor satisfaction and environmental monitoring						

3.2.3 6.2.3 WASTE MANAGEMENT PLAN

Table 27: Waste Management Plan

ACTIONS TO BE UNDERTAKEN	2025	2026	2027	2028	2029	2030
Engage an engineering or waste group to prepare the detailed plan						
Identify and quantify all waste streams and waste types within the PA (include rating the potential for reduction or recycling)						
Formalize waste management agreements with municipalities. To include municipal recycling plans						
Audit and detail the extent of existing structures and rubble to be removed from PA – prepare SOW for outsourcing clearing activities						
Outline a future waste recycling strategy and targets						
Establish extent of saline pollution from desalination plants						
Confer and collaborate with appropriate institutions regarding oil spills and appropriate rehabilitation						
Outline waste reduction strategy and targets						
Prepare waste management plan for NCW operated tourism/educational facilities						
Litter control plan						
Outline the expected structure and content of a typical tourism establishment waste management plan						
Prepare a waste education and awareness strategy						
Monitoring plan						

3.2.4 6.2.4 MARINE MANAGEMENT

Table 28: Marine Management Actions.

ACTIONS TO BE UNDERTAKEN	2025	2026	2027	2028	2029	2030
Capacity building in the marine staff (skipper, crew, scuba)						

ACTIONS TO BE UNDERTAKEN	2025	2026	2027	2028	2029	2030
Acquire appropriate marine craft and support facilities						
Procure diving and scuba gear, compressor, and safety gear						
Enforcement of the regulations						
Improve the fishing regulations						
Regulate entrance to the fishery in the PA						
Development of collaborative (NCW-University/Institute) reef, fish community, seagrass, mangrove and water and sediment quality monitoring and research programs						
Development of zonation, protocols, and regulations for recreational usage of the marine resources (including seasonal and rotational closures):						
Reefs						
Mangroves						
Seagrass beds, dugong feeding grounds						
Marine mammal watching						
Promotion of diving and avitourism (dive center, bird observation sites)						
Development of collaborative (NCW-University/Institute) research & monitoring programs:						
Water and sediment quality						
Reefs (nature and extent, zonation)						
Reef fish communities						
Mangroves						
Dugong survey						
Establish NCW-stakeholder liaison committee to engender good relationships and a sense of co-ownership and co-management						
Education drive to inform public & stakeholders of NCW objectives & jurisdiction						

3.2.5 6.2.5 WILDLIFE – MAMMAL AND BIRDLIFE POPULATION MANAGEMENT

Table 29: Actions to recover the Dugong population

ACTIONS TO BE TAKEN	2025	2026	2027	2028	2029	2030
Plan An Aerial Dugong Survey Dugong Survey						
Undertake Annual Dugong Survey						
If No Dugongs Develop a Strategy						
Ensure Safe Areas for dugongs						
Plan to reintroduce dugongs						
Implement Dugong Reintroduction						

Table 30: Action timetable for the Gazelle Conservation Strategy.

ACTIONS TO BE TAKEN	2025	2026	2027	2028	2029	2030
Commission a Gazelle Conservation Strategy						
Commence more detailed monitoring						
Prevent illegal hunting & trapping of gazelles.						
Determine optimal Stocking Rate for population and develop Action plan.						
Plan reintroduction to former range						
Award contract to train a NCW capture unit.						
NCW staff get trained in ungulate capture						
NCW acquire capture equipment						
NCW undertake capture and translocations.						
Examine the controlled licensed hunting option and make recommendations.						

Table 31: Action timetable for the Arabian Bustard Reintroduction.

ACTIONS TO BE TAKEN	2025	2026	2027	2028	2029	2030

Policy decision whether to reintroduce Arabian bustard to islands						
Consultancy to plan reintroduction of Arabian Bustard						
Create suitable conditions for bustard reintroduction. Possibly control white tailed mongoose.						
Build rewilding enclosures						
Procure founder stock and introduce						
Release progeny and monitor						

Table 32: Steps for habitat management policy, alien plant removal and mangrove rehabilitation plan

ACTIONS TO BE TAKEN	2025	2026	2027	2028	2029	2030
NCW accepts habitat actions in this plan						
NCW commissions a Habitat Policy/Plan						
Habitat Conservation Strategy & pan is done						
NCW adopts habitat management plan						
NCW appoints islands - based contractors						
NCW ensures training in alien removals						
NCW provides chemicals and equipment						
NCW lists order of priority of treatment						
NCW trains in Mangrove nursery						
NCW funds nursery startup						
Contractors manage their labour for alien						
NCW monitors & gives guidance						

Table 33: Actions to be taken to control alien vertebrates.

ACTIONS TO BE TAKEN	2025	2026	2027	2028	2029	2030
Plan the control of alien vertebrates						
Procure materials end equipment for control of aliens						
Train local staff in the use of equipment and materials						

ACTIONS TO BE TAKEN	2025	2026	2027	2028	2029	2030
Start & maintain control program						
NCW to press power utility and industry to attach reflectors to deter bird strikes and mortalities.						
Monitor results of control program						
Monitor response in local wildlife						

Table 34: Bird maintenance & enhancement program

ACTIONS TO BE TAKEN	2025	2026	2027	2028	2029	2030
Oppose transformation of natural shoreline habitat.						
Enforce a ban on offroad driving.						
Establish a partnership with Bird Life International.						
Build osprey nesting platforms on Farasan Kabir						
Development of zonation, protocols, and regulations for avitourism (including seasonal closures):						
Train local guides for bird watching						
Land-based hides to view pelican nesting sites						
Incorporate avifauna as a key priority in the oil spill management plan						
Oppose transformation and development of islands with bird breeding colonies						
Oppose/minimize the erection of overhead powerlines						
Install bird flight diverters on overhead lines where necessary						
Maintain bird flight diverters on overhead lines						
Consider the construction of bird hides at strategic locations, e.g. Pink-backed Pelican breeding colony.						
Minimize light pollution.						

ACTIONS TO BE TAKEN	2025	2026	2027	2028	2029	2030
Monitor the avian population.						
Feral predator control						

Table 35: Actions to resolve the status of the White-tailed mongoose and act in needed

ACTIONS TO BE TAKEN	2025	2026	2027	2028	2029	2030
NCW decide that it is important to determine if the mongoose is an introduced species.						
This project is allocated to a university or consultants						
If the species is introduced, then develop plan to eradicate						
Implement eradication of the white-tailed mongoose						

Table 36: Mitigation of transmission line impacts on bird populations

ACTIONS TO BE TAKEN	2025	2026	2027	2028	2029	2030
Undertake a regular monitoring program, documenting location, species, seasonality and numbers of bird mortalities along T-lines						
Partner with the power utility and academic institutions to prepare mitigations to reduce mortalities where necessary						
Pressure the power utility to bury lines or to implement mitigations (such as bird diverters) either along the entire line or at the identified hot spots.						

ACTIONS TO BE TAKEN	2025	2026	2027	2028	2029	2030
Monitor results and recommend improvements.						

3.2.6 6.2.6 SUSTAINABILITY

Table 37: Schedule for energy efficiency and climate change

ACTIONS TO BE TAKEN	2025	2026	2027	2028	2029	2030
CO_2e emissions audit						
Energy use reduction and greening strategy prepared						
Implement energy reduction and greening strategy to meet 2030 targets						
CO2e emissions audit						
Assess the potential impacts of climate change on the PA and its biodiversity (Climate change impact assessment).						
Develop strategies to mitigate the impacts of climate change on arid environments and their inhabitants.						
Plan & provide shade & waterholes in the fenced land zone						
Implementing measures to adapt to changing climatic conditions (including seasonal and rotational closures) and their effects on biodiversity						

3.2.7 6.2.7 INFRASTRUCTURE

Table 38: Development schedule for management Infrastructure

ACTIONS TO BE UNDERTAKEN	2025	2026	2027	2028	2029	2030
Maintenance and Refurbishment as required to current Built Infrastructure at Main Station and both Ranger Stations – Haarid and Saair.						

ACTIONS TO BE UNDERTAKEN	2025	2026	2027	2028	2029	2030
Refurbishment of Ranger Station at Gazelle Camp within the Core Area						
Procurement, positioning and manning of 2 Mobile Ranger Stations						
Maintenance, Service and Repairs to Radio Tower Masts						
Development of Infra, Camps, Hides and Platforms as per Gazelle and Bird Strategy						
Signage and notices designed, approved and installed at key points						
Project to identify, scope, remove/rehabilitate derelict and abandoned infrastructure within the PA, including environmental rehabilitation						

3.2.8 6.2.8 STAFFING

Table 39: Additional Staffing

ACTIONS TO BE UNDERTAKEN	2025	2026	2027	2028	2029	2030
Recruit, select, and train skippers with local knowledge and experience. Required competencies include Day and Night Maritime Operations, Diving and Multi-day Operations, Patrol Planning, Navigation, and Diver First Aid.						
Recruitment, Selection, training and deployment of an additional 25 Rangers over three years. Required competencies to included BFR training and Maritime Operations						
Recruitment, Selection, training and deployment of ten Environmental Control Monitors over three years.						
Appointment of Marine Technical Advisor on three-year Contract						
Appointment of 2 x Marine Technical Operations staff						

ACTIONS TO BE UNDERTAKEN	2025	2026	2027	2028	2029	2030
Appointment of 5 x Community Partnership and Ecotourism Staff						
Appointment of Environmental Risk Officer						

3.2.9 6.2.9 VESSELS AND VEHICLES

Table 40: Vessels and Vehicles

ACTIONS TO BE UNDERTAKEN	2025	2026	2027	2028	2029	2030
Refurbishment and Servicing of current Vessels – Vessels not being utilized to be hauled out, serviced and appropriately stored until required.						
Procurement of suitable 36-50ft live-aboard Patrol Vessel capable of 3–5-day Patrols (2 Skippers and 4 Crew). Vessel equipped with Radar, AIS, Thermal and Infrared, Dive Compressor and Equipment						
Lease of 6 additional Land Cruiser pickup vehicles over 3 years to support expanded Rangers (2) , Environmental Control (2) and Community Partnership (2) departments						

3.3 6.3 MONITORING APPROACH

In monitoring, evaluating and reporting on Protected Area management and the implementation of the management plan for the Farasan Islands PA, the following must be considered:

- Monitoring, evaluation and reporting is a fundamental aspect of adaptive management, enabling the assessment of management interventions and, if necessary, their modification in an effort to achieve the vision and objectives of the Farasan Islands Protected Area.
- Monitoring should be designed and implemented to determine the effectiveness of the implementation of the Farasan Islands PA management plan and as such

should be designed to be straightforward and practical for implementation by on-site staff.

- Records should be maintained of key management interventions, as set out in the management plan, and of problem events or incidents such as a tourist incident or environmental pollution incident.
- Scientific monitoring programs may be established to monitor specific management interventions such as those that relate to the need to maintain vegetation composition and diversity, wildlife carrying capacities and specific measures required for individual species.
- The outcomes of the monitoring process must be captured in an annual report, which should then also be used to inform the annual plan of operation that is developed for the Farasan Islands PA in the following year.
- A level of transparency must be instituted as part of the monitoring, evaluation and reporting process to ensure that the Farasan Islands PA maintains legitimacy regarding the activities and developments undertaken within it.

A list of monitoring requirements for the different domains has been compiled for the Farasan Islands PA below:

Table 41: Monitoring requirements per domain

DOMAIN	MONITORING REQUIREMENTS
Biodiversity Conservation	• Reef monitoring for coral cover and bleaching • Fisheries monitoring (species and total catch) • Detailed resource mapping followed by zonation plan • Follow up on mapping with mangrove and seagrass monitoring, if merited • Turtle nesting beaches to be GPS-mapped and nests recorded • Bird colonies mapped and censused • Annual census for dugongs and other marine mammals • Monitoring of alien species and white-tailed mongoose. • Climate monitoring (ensure that an Automatic Weather Station is operational on each of the larger islands and calibrated). Rainfall data from the rainfall station is to be collected monthly • Obtain climate outlook forum data for forthcoming rainy season. • Wildlife numbers / density trends / Sex & age classification by transect counts, waterhole counts

DOMAIN	MONITORING REQUIREMENTS
	etc. Antelope population census data must be accurate and suitable for management decisions • Wildlife seasonal activity patterns such as migration arrivals and departures. • Vegetation production and cover (enclosures and open areas where biomass is measured twice annually) • Tree growth (several tagged trees that are measured once a year for height and diameter and that are rated in term of vitality / browsing damage). • Document bird mortalities on cables and wires. • Document bird mortalities due to alien species predation.
Visitor Management & Tourism	• Visitor numbers with information on date of visit, entrance point used, provenance (local, international)
Community Engagement;	• Number of jobs filled by local people (annually) • Monetary amount in beneficiation through local service contracts and supplies (annually) • Community Based Organization development to support and expand mangrove and birding areas.
Area Integrity	• Patrol Coverage (density, tracks, heatmaps) and Observations utilizing Ranger based monitoring systems – Rasit or Domain Awareness System • Incident registers, perimeter integrity reports, offences schedules, staff attendance. • Focus on patrol quality not quantity
Protected Area Management	• Monthly inspections of the Farasan Islands infrastructure to identify and address maintenance needs. • Quarterly reviews of facility usage • Regular compliance and enforcement audits covering health and safety, environmental, risk and law enforcement to ensure policies are being followed
Sustainability (Waste, energy, climate change, pollution control	• Pollution (sediment, water quality, beach litter, industrial effluent and seepage, oil) • Measurement of water use at waterholes and each of the sites where amenities are provided. • Bi-annual environmental audit

4 REFERENCES

Abdel-Dayem. M.S, U.M. Abu El-Ghiet, T. M. Elsheikh, A. i A. Elgharbawy, Z. I. A. Al-Fifi, H. M. Aldhafer. (2020). The first survey of the beetles (Coleoptera) of the Farasan Archipelago of the southern Red Sea, Kingdom of Saudi Arabia. ZooKeys 959: 17–86 (2020)

Alhababy, A.M. (2017). Identify the Degradation of Coral Reefs Areas in Jazan Region and the Suggestions Toward Sustainable Conservation. *Life Science Journal*, *14*(5).

Ali, A.G.M., Elsheikha, A.A.A., Elbanna, E.M., and Peinado, F.J.M. (2018). An Approach to Conservation and Management of Farasan Islands' Heritage Sites, Saudi Arabia. *International Journal of Conservation Science*. Volume 9(2). Pp. 245-256.

Almalki, M. (2021). Breeding biology of Saunders's tern (*Sterna saundersi*) in the Farasan Islands, Kingdom of Saudi Arabia. *Saudi Journal of Biological Sciences*, *28*(3), pp.1931-1937.

Alongi, D.M., (2012). Carbon sequestration in mangrove forests. Carbon management. Vol. 3(3). Pp.313-322.

AlRashidi, M., Shobrak, M., Al-Eissa, M.S. and Szekely, T. (2012). Integrating spatial data and shorebird nesting locations to predict the potential future impact of global warming on coastal habitats: A case study on Farasan Islands, Saudi Arabia. *Saudi journal of biological sciences*, *19*(3), pp.311-315.

Anon. (2020). Juzur Farasan. Proposal for nomination as a biosphere reserve under the UNESCO MAP Program. December 2020. P. 112.

Arab News. (2020). *Saudi habitat 'hotspot' in line for global protection*. Available at: https://www.arabnews.com/node/1621556/saudi-arabia. Accessed: 5th May 2024.

Bantan, R.A. and Abu-Zied, R.H. (2014). Sediment characteristics and molluscan fossils of the Farasan Islands shorelines, southern Red Sea, Saudi Arabia. *Arabian Journal of Geosciences*, *7*, pp.773-787.

Bemert G, Ormond R. (1981). Red Sea Coral Reefs. Kegan Paul International, London, Boston.

BirdLife International (2024) Important Bird Area factsheet: Farasan Islands. Downloaded from https://datazone.birdlife.org/site/factsheet/farasan-islands-iba-saudi-arabia on 27/03/2024

Boland, C., Abdullah, A., Babbington, J., Shobrak, M. and Al-Boug, A. (2020). The Birds of Saudi Arabia. Saudi Aramco.

Boland, C. and Alsuhaibany, A. (2020). The Birds of Saudi Arabia. Volume 2: Species accounts. Saudi Aramco. Motivate Media Group.

Bower AS, Farrar JT. (2015). Air–Sea Interaction and Horizontal Circulation in the Red Sea. In: N.M.A. Rasul and I.C.F. Stewart (eds.), The Red Sea, Springer Earth System Sciences, Springer-Verlag Berlin Heidelberg, pp329-342, DOI 10.1007/978-3-662-45201-1_19.

Bruckner, A. (2011) Khaled bin Sultan Living Oceans Foundation Habitat Mapping and Characterization of Coral Reefs of the Saudi Arabian Red Sea: 2006-2009. Final Report Part II, Ras Qisbah, Al Wajh, Yanbu, Farasan Banks and Farasan Islands. Panoramic Press, Arizona, 248 pp.

Bruckner A, Rowlands G, Riegl B, Purkis S, Williams A, Renaud P, (2012), Atlas of Saudi Arabian Red Sea Marine Habitats. Khaled bin Sultan Living Oceans Foundation, Panoramic Press, 262 pp.

Child, G. & Grainger, J. (1990). A system plan for protected areas for wildlife conservation and sustainable rural development in Saudi Arabia. Riyadh, NCWCD. 389 pp.

DeVantier, L. and N. Pilcher. (2000). The Status of Coral Reefs in Saudi Arabia. Global Coral Reef Monitoring Network (GCRMN).

E-flora (2024). https://ffa.myspecies.info/node/8 Accessed 2024/04/23

El Shaffai, A., (2016). Field guide to seagrasses of the Red Sea. International Union for the Conservation of Nature. Eds A. Rouphael, and A. Abdulla (Gland: IUCN and Courbevoie: Total Foundation), p. 56.

Gladstone, W. (1994) The Farasan Marine Protected Area. Vol. 1: Biological resources, conservation values, human uses and impacts. NCWCD, Riyadh.

Gladstone W (1996) Unique annual aggregation of longnose parrotfish (*Hipposcarus harid*) at Farasan Island (Saudi Arabia, Red Sea). Copeia 1996:483–485

Gladstone, W. (2000a) The ecological and social basis for management of a Red Sea marine-protected area. Ocean & Coastal Management 43: 1015–1032.

Gladstone, W. (2000b) Farasan Islands Protected Area master management plan. NCWCD, Riyadh.

Gladstone W, (2002), Fisheries of the Farasan Islands (Red Sea). Naga, WorldFish Center Quarterly, 25: 30-34.

Hall, M., Llewellyn, O.A., Miller, A.G., Al-Abbasi, T.M., Al-Wetaid, A.H., Al-Harbi, R.J. and Al-Shammari, K.F., (2010). Important plant areas in the Arabian Peninsula: 2. Farasan archipelago. *Edinburgh Journal of Botany*, *67*(2), pp.189-208.

Khedher, K.M., Abu-Taweel, G.M., Al-Fifi, Z., Qoradi, M.D., Al-Khafaji, Z., Halder, B., Bandyopadhyay, J., Shahid, S., Essaied, L.A.A.T.A.R. and Yaseen, Z.M., (2022). Farasan Island of Saudi Arabia confronts the measurable impacts of global warming in 45 years. *Scientific Reports*, *12*(1), p.14322.

Llewellyn O. (2023). Saudi Arabia's ecosystem types from the Protected Area System Plan. National Centre for Wildlife, unpublished report.

Mahmoud, S.H. and Alazba, A.A., (2014). Identification of potential sites for groundwater recharge using a GIS-based decision support system in Jazan region-Saudi Arabia. *Water resources management*, *28*, pp.3319-3340.

Masseti, M., (2010). The mammals of the Farasan archipelago, Saudi Arabia. *Turkish Journal of Zoology*, *34*(3), pp.359-365.

Mandura, A. S. & Khafaji I , A. K. (1993). Human impact on the mangrove of Khor Farasan Island, southern Red Sea coast of Saudi Arabia. In: LEITH, H. & AL-MASSOM, A. (eds) Towards the Rational Use of High Salinity Tolerant Plants, Vol. 1, pp. 353–361. Dordrecht: Kluwer Academic Publishers.

Mancini A, Elsadek I, El-alwany MAN. (2015), Marine turtles of the Red Sea. In: The Red Sea, eds Rasul NMA, Stewart ICF, Springer, Berlin, Heidelberg. https://doi.org/10.1007/978-3-662-45201-1.

Masseti, M., (2014). Herpetological enigmas from the Arabian seas, with particular reference to the Sarso island racer, *Platyceps insularis* Mertens, 1965 (Farasan archipelago, Saudi Arabia). *Scripta Herpetologica. Studies on Amphibians and Reptiles in honour of Benedetto Lanza. Capula M. & Corti C.(eds.). Societas Herpetologica Italica/Edizioni Belvedere, Latina*, pp.99-116.

McFayden, W.A. (1930) The geology of Farasan Islands, Gizan and Kamaran Island, Red Sea. Geological Magazine: 310–332.

Mutairi, Khalid Al, Magdy El-Bana, Mashhor Mansor, Saud Al-Rowaily, and Asyraf Mansor, (2012). Floristic diversity, composition, and environmental correlates on the arid, coralline islands of the Farasan Archipelago, Red Sea, Saudi Arabia. Arid land research and management 26: 137-150.

National Commission for Wildlife Conservation and Development (NCWCD). (1995). Nature reserves and recreation areas: Report and master plan with guidelines. King Abdulaziz University, 1416, 82 pp.

Notarbartolo di Sciara G, Kerem D, Smeenk C, Rudolph P, Cesario A, Costa M, Elasar M, Feingold D, Fumagalli M, Goffman O, Hadar N, Mebrathu YT, Scheinin A, (2017) Cetaceans of the Red Sea. CMS Technical Series 33, 86 pp.

Schmidt G. (2024). Why 2023's heat anomaly is worrying scientists. Nature 627: 467.

Shaltout M, (2019). Recent sea surface temperature trends and future scenarios for the Red Sea. Oceanologia, 61: 484-504.

Sheppard CRC, Sheppard ALS, (1991). Corals and coral communities of Arabia. In: Buttiker, W. and Krupp, F., Eds., Fauna of Saudi Arabia. Vol. 12, Natural History Museum, Basle, 3-170.

Spaet J (2013) Predictable annual aggregation of longnose parrotfish (*Hipposcarus harid*) in the Red Sea. Mar Biodivers 43:179–180.

Tanabe LK, Cochran JEM, Berumen ML. (2023)., Inter-nesting, migration, and foraging behaviors of green turtles (*Chelonia mydas*) in the central-southern Red Sea. Nature, Scientific Reports 13:11222. https://doi.org/10.1038/s41598-023-37942-z

Turak, E., Brodie, J. and DeVantier, L. (2007). Reef-building corals and coral communities of the Yemen Red Sea. *Fauna of Arabia*, *23*, pp.1-40.

Thomas A, Mohammed A. El-Sheikh a, c, Ahmed H. Alfarhan a,Abdulrehman A. Alatar a, M. Sivadasan a, Mohammed Basahi b, Sami Al-Obaid A,Rajakrishnan (2016). Impact of alien invasive species on habitats and species richness in Saudi Arabia *(PDF) Impact of alien invasive species on habitats and species richness in Saudi Arabia*. Volume 127, April 2016, Pages 53-65 Avail https://www.researchgate.net/publication/284434718_Impact_of_alien_invasive_species_on_habitats_and_species_richness_in_Saudi_Arabia [accessed Mar 09 2024].

Thouless CR, Al Bassri K (1991) Taxonomic status of the Farasan island gazelle. J Zool Lond 223:151–159

UNESCO. (2019). *Farasan Islands Protected Area.* Available at: https://whc.unesco.org/en/tentativelists/6370/#:~:text=The%20Farasan%20Islands%20are%20a,the%20Kingdom%20of%20Saudi%20Arabia. Accessed: 5th May 2024.

Wacher. T, R. Robinson, A Al Toum, H. Mustapha, H. Mathami, A. Al Assaf, L. Al Huneish. **(**2021). Conservation Zones of Farasan Kebir. NCWCD Report. 111 pp.

Wronski. T, A.N.Mosfer, M. Placth . (2012). Endemic Farasan Gazelle *(Gazella gazella farasani*) enhances the dispersal of invasive *Prosopis juliflora* on Farasan Islands, Saudi Arabia. Revue d'Écologie (La Terre et La Vie) Année 2012 67-3 pp. 329-337

المركز الوطني
لتنمية الحياة الفطرية
National Center for Wildlife
المملكة العربية السعودية

www.ncw.gov.sa