

OVERVIEW

Over the past few decades, the people of Qatar have had strong ties and significant socio-economic relationship with the Arabian Gulf, due to its high commodity value as the primary source of the national wealth since early history and during the fishing and pearl diving days, up to the oil and gas era. It is well known that the State of Qatar has witnessed recent rapid economic growth and active modernization associated with massive construction development and urbanization. Most of this development and urbanization are concentrated within the coastal zone and along with the shoreline areas, which is likely to cause adverse environmental problems and have negative impacts on the delicate marine environment and ecosystem of the Arabian Gulf. In addition, some offshore islands are situated within the eastern busy Qatari marine exclusive economic zone, where most of the oil and gas operations and urbanization activities are ongoing. Despite the role of these Islands as a biodiversity hotspot, limited information is available about the typology and sensitivity of their ecological ecosystem components. This research explored and investigated the typology of the main components of the ecosystem of these two islands, Halul and Al-Alyia, and conduct sensitivity and vulnerability assessment according to the known guidelines and standards to highlight the potential ecological risk and suggest the required recommendations for the sustainable management plan, within the frame of Qatar National Vision 2030 (QNV2030). Thus, The objectives of this research are: (1) Typology mapping of the main components of the ecosystem of these islands. (2) Sensitivity and vulnerability assessment (3) Potential ecological risk assessment towards sustainable management plan. Aiming to support the decisionmakers in the management and restoration strategies for recovering the biological functionalities of the ecosystems/natural resources

ISLANDS



Figure (2): Map of Qatar showing Halul and Al Alyia Islands

### Halul and Al-Alyia Islands

- Located in offshore and coastal zones respectively (Figure 2).
- Different anthropogenic pressures, and threats intensity
- Different surrounding depths, hydrodynamic regimen and related temperatures.
- House ecosystems under different functionality status.
- **Halul Island**
  - Far away from the coast of Qatar / >5m deep
  - Fishing activity was excluded,
  - Components of the ecosystem still functional.
- **Al Alyia Island**
  - Very close to coast / <5m deep
  - Facing the northern part of the Greater Doha
  - exposed to the overfishing history and excessive sedimentation.

### Terrestrial and marine Ecosystem

**Halul Island** - The main components of the natural environment are as follows:

- Beach rock and shallow cap rock
- Sand beaches / turtle nesting
- Functional Coral reef formations
- Scattered deep coral assemblages
- Sea or tidal channel.

**Al-Alyia Island** - main components of the natural environment are as follows:

- The mangrove (*Avicennia marine*)
- Sabha ecosystem - Birds nesting (*Socotra cormornats*) richness zone
- Collapsed coral reefs
- Massive Oyster Beds / seagrass bed seascape interaction

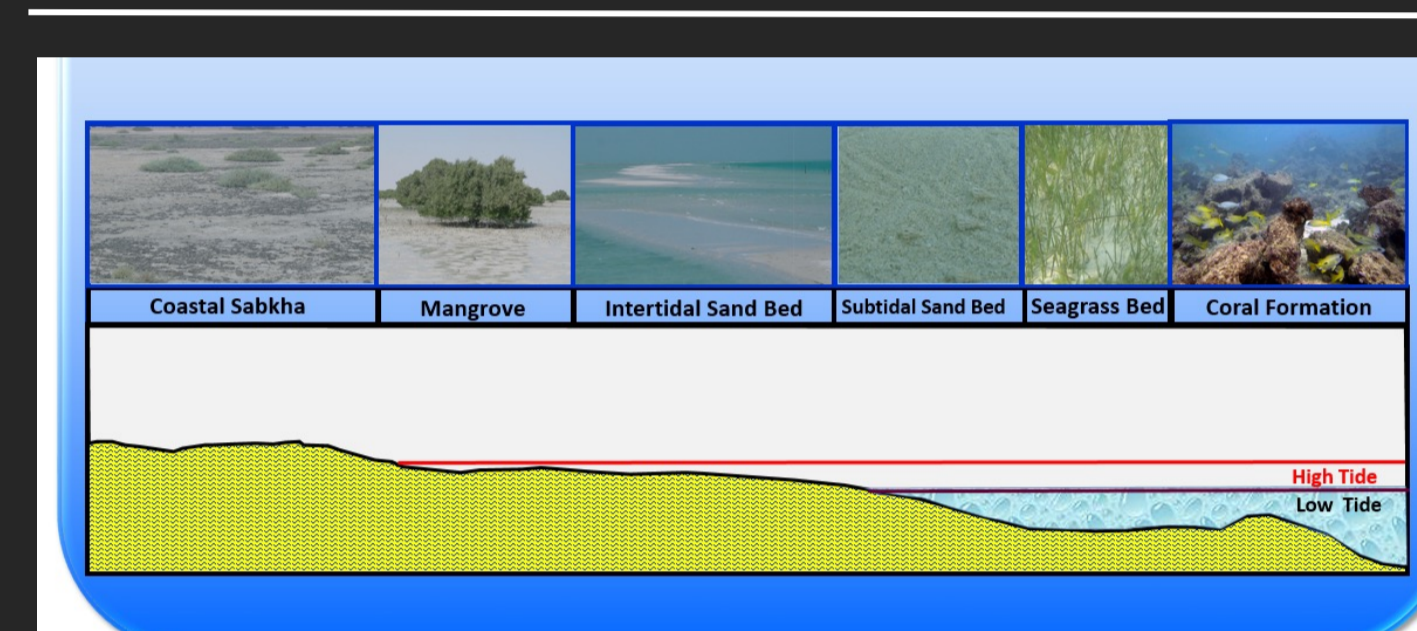


Figure (1): Generalized Sketch of the Main Components of the coastal and Nearshore Marine and Terrestrial Ecosystem

The main components of the marine and terrestrial ecosystem in the Islands are as follow:

- Coastal sabkha.
- Mangrove.
- Intertidal sand bed / beaches
- Subtidal sand bed
- Oyster beds/rocky substrate/algae bed.
- Seagrass bed.
- Coral Reef formations.

METHODOLOGY

### Typology Mapping

#### Typology and Sensitivity of ecosystems:

A sensitivity index based on the typology mapping has been determined and defined for every component of the marine and ecosystem types, based on their vulnerability, fragility and their interests for ecology and biodiversity.

Classification and sensitivity index of each type is presented in Table (1).

Table (1): Sensitivity and fragility classification system of the marine ecosystem according to the existing typology. [Modified after: SCENR (2008)].

### Sensitivity and Vulnerability Scale

No.	Typology	Sensitivity Class	Color
1	Coral Formations Dense Mangroves	Very High Sensitivity	Red
2	Reef Inner Slope Seagrass and Algae Beds Scattered Mangroves	High Sensitivity	Orange
3	Intertidal Sand Banks Mud Flats and Shallow Lagoons	Medium Sensitivity	Yellow
4	Coastal Sabkhas Beach Rock and Subtidal Cap Rocks Deep Seagrass and Algae Bds	Low Sensitivity	Green
5	Sea and Tidal Channels	Very Low Sensitivity	Light Green

## Results and Discussion

### Halul Island

#### Typology

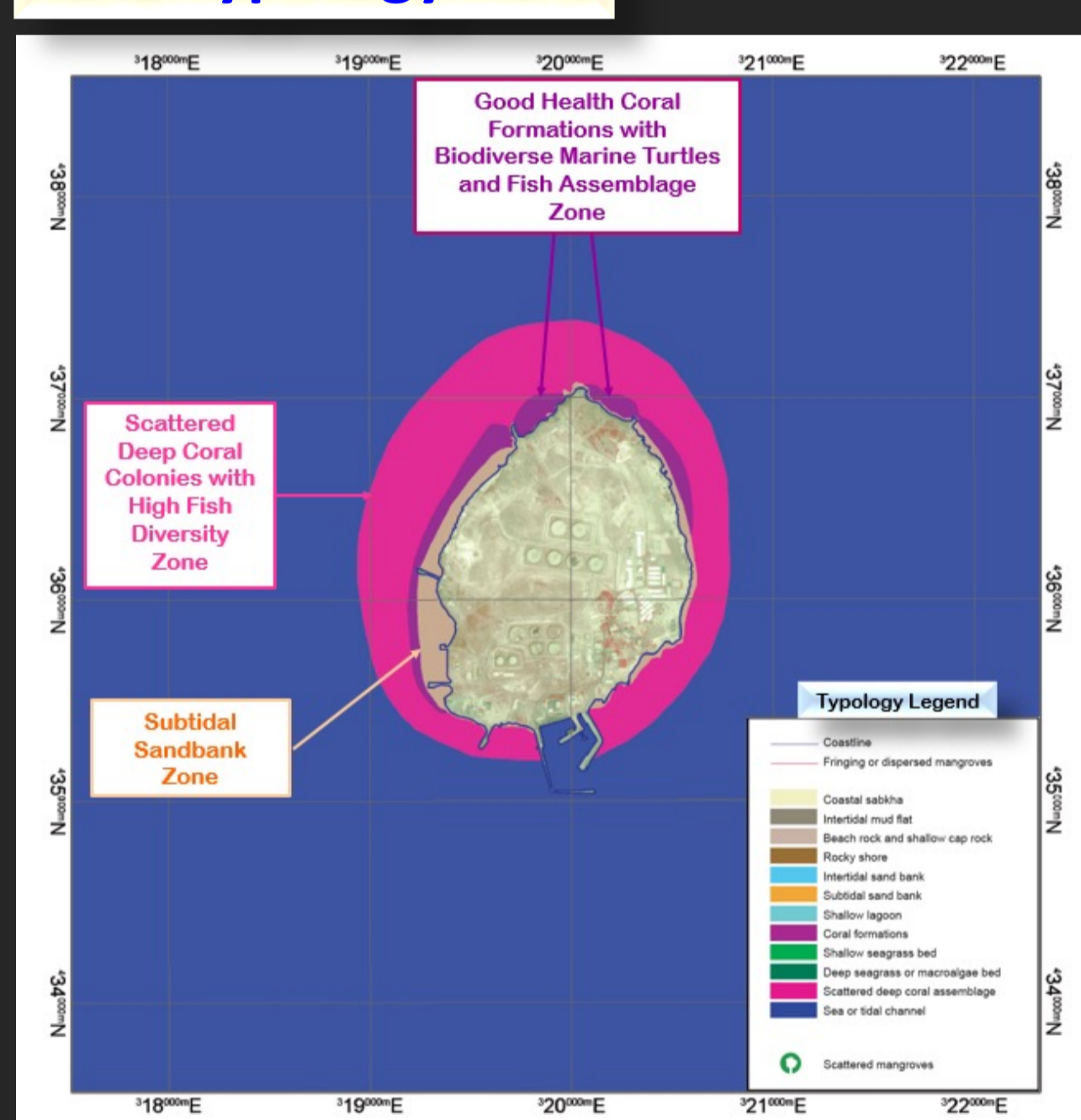


Figure (3): Typology map of the Halul Island

#### Sensitivity

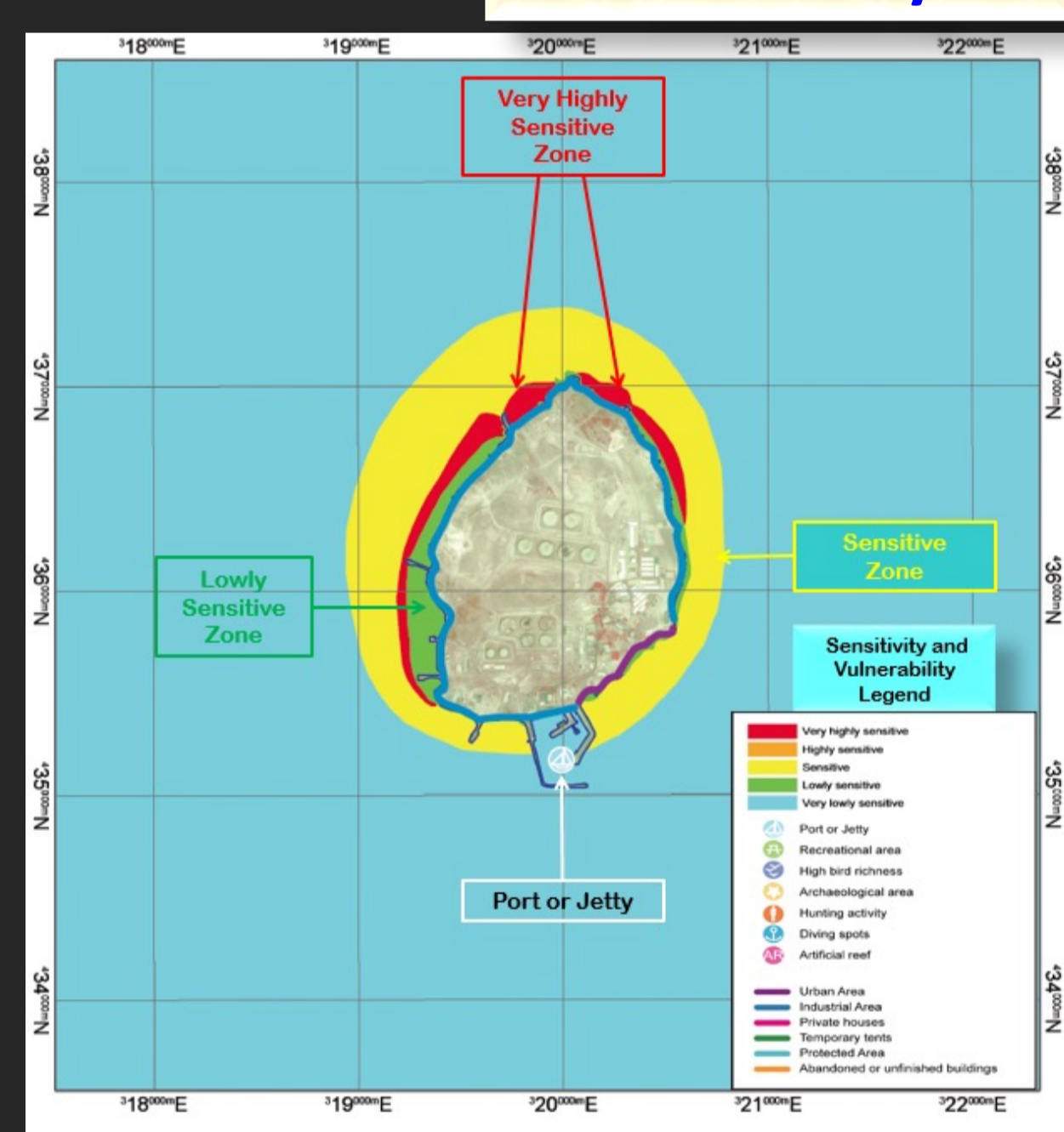


Figure (4): Sensitivity and vulnerability map of the Halul Island

#### Vulnerability (Remarkable wildlife)

- The most diverse coral Reef formations of the Qatari Waters.
- High dish diversity and population.
- Sea Turtles nesting spots.

#### Sensitivity, vulnerability

- The northern and western zone of the Island. Coral reefs with **High ecological Value** for fish stock hotspot

### Natural Value and Risk Factors

**Natural Values** - It is possible ranking the ecosystems in Qatar Marine Region according with their intrinsic ecological and economic value, such as:

1. **Coral reefs** - Very high value due the associated fish stock, associated biodiversity and importance for building seascapes. Value for the entire marine environment.
2. **Oyster beds** - Very high value due their systemic service as a natural filters in the Arabian Gulf and the associated biodiversity. Habitat builder and functional species with high value for the entire marine environment.
3. **Seagrass and Mangrove** - With very high value those natural nurse ecosystems house several fish-stock species during their juvenile stages; support the health existence of coral reefs and oyster beds; they are the most important Blue Carbon Fixers.

**Risk Factors** - There are cryptical risks for those ecosystems: Urban development (construction - removing entire habitats / or sediment killing corals); destructive and excessive fishing methods; Anchoring, (fishing port and Harbors); Wastewater release.

### Al Alyia Island

#### Typology

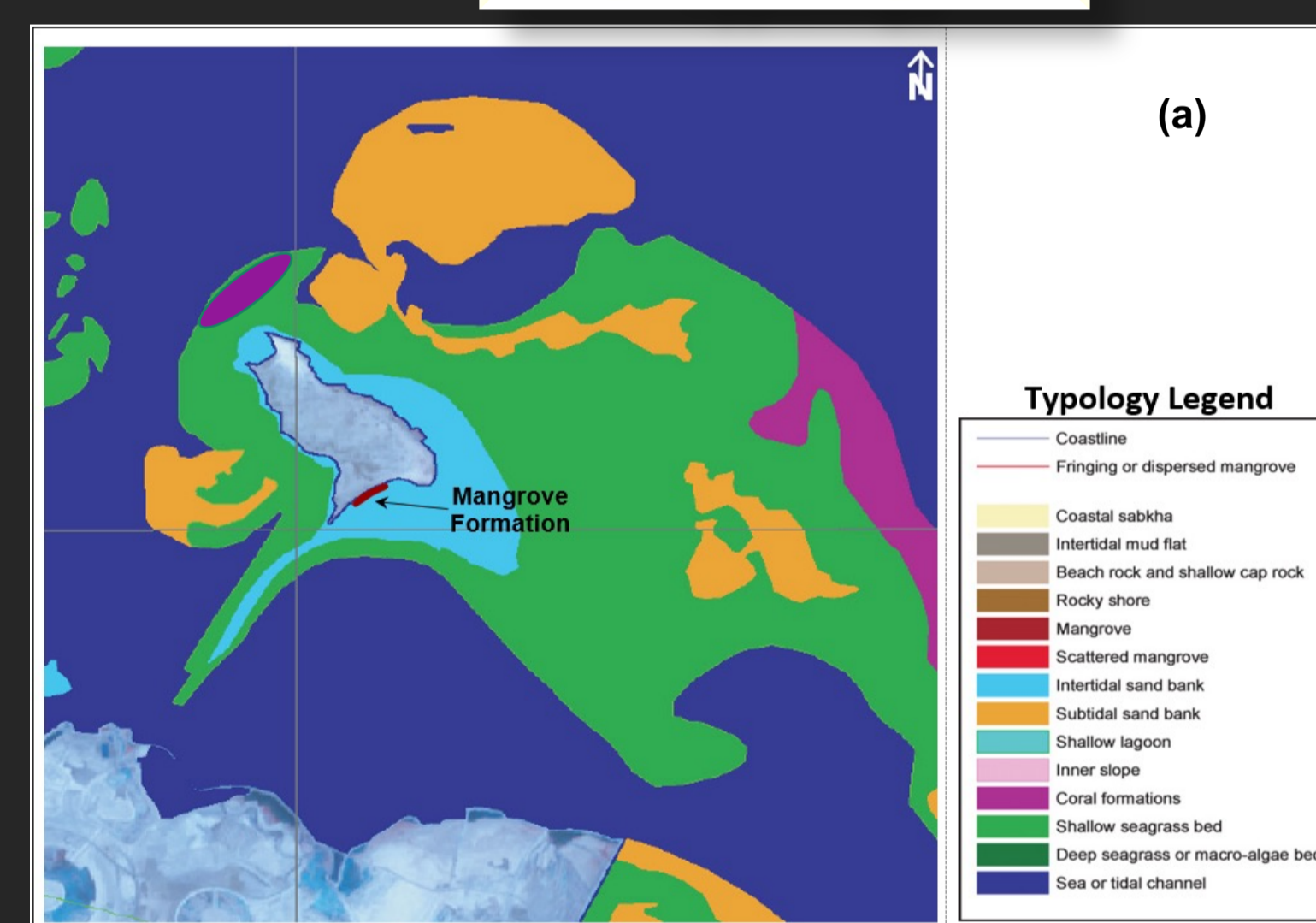


Figure (5a,b): Typology maps of Al Alyia Island.

#### Sensitivity

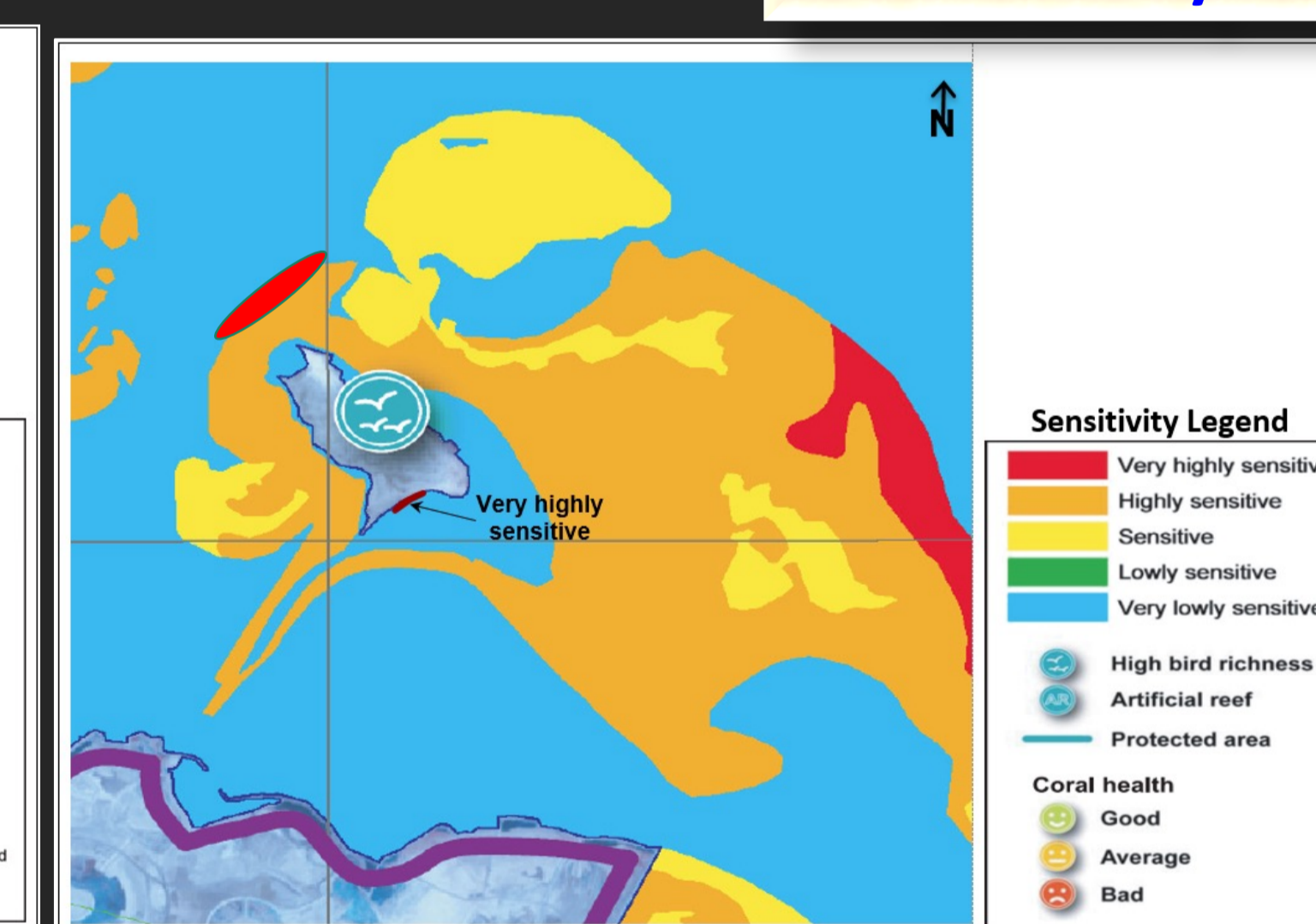


Figure (6): Sensitivity map of Al Alyia Island.

#### Sensitivity analysis:

- **Seagrass / oyster beds:** high functionality, sensitive zone with **High ecological value**
- **Mangrove (*Avicennia marine*) Formation Zone:** This zone is classified as **very high sensitive zone**.
- ***Socotra cormornats* Richness Zone:** The most common birds in this island. Hot spot for this and some other birds. **High ecological value**.

#### Vulnerability (Remarkable wildlife)

- The dense mangrove formations.
- Hot spot for bird gathering and richness zone.
- Large areas with seagrass/oyster-bed seascapes
- Collapsed coral reef / functional only for attracting fish species / without corals

### Recommendations

- ✓ Increase the investment in **restoration** of the main ecosystems with high ecological and economic value, such as: Coral Reef, Oyster Bed. For improving their functionality.
- ✓ Applying this mapping method and sensitivity classification for all marine areas around Qatar for supporting the management plans.
- ✓ A long-term **conservation** program for the good and healthy recovers of target hotspot areas.
- ✓ Regular **monitoring** program of the water quality within the coastal area and the coral reefs zones, in order to avoid any pollution from oil seepage or any other source.
  - With a clear **mitigation** plan for quick action plan for remediation measures in case of any detected pollution.
- ✓ Implementation of an efficient **management** plan. For a smart and sustainable exploration of high value natural resources and target species, such as sea-turtles, birds, dolphins and whale-sharks. Including:
  - Production and **reintroduction** of target habitat-builder-species, such as corals and oysters.
  - Minimizing of the bright light sources from the Island specially: on the nesting sites, hatchling sites and towards the areas of the coral formations.
  - Control fishing activity / **banning threats** and destructive methods in restoration areas.
  - Blue tourism implementation - e.g. Limitation of the access to the beaches and nesting sites of the turtles, especially during the nesting period.