

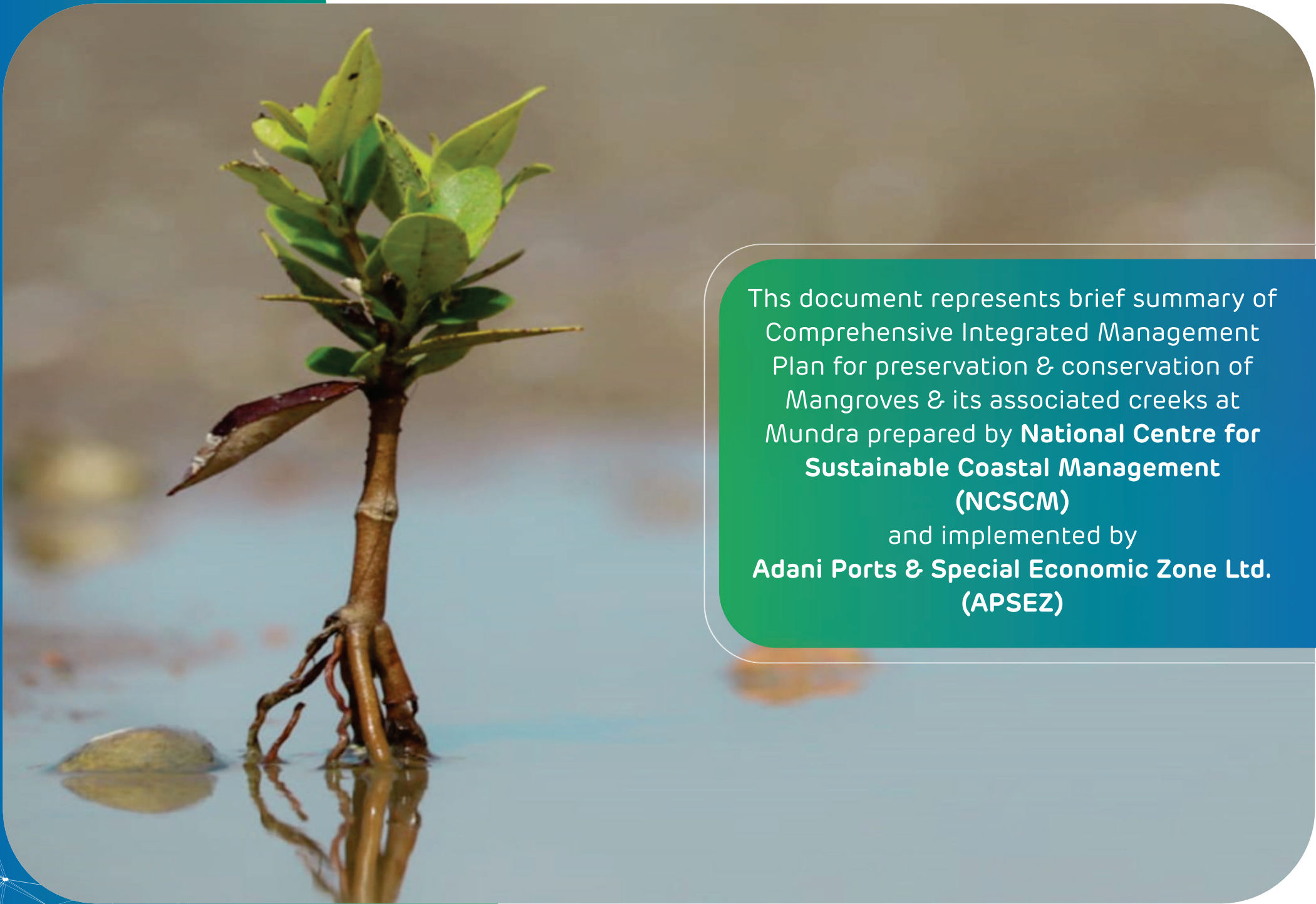
Mangroves Conservation Plan - Status FY 2021

adani

Ports and
Logistics



Adani Ports & Special Economic Zone Ltd.



This document represents brief summary of Comprehensive Integrated Management Plan for preservation & conservation of Mangroves & its associated creeks at Mundra prepared by **National Centre for Sustainable Coastal Management (NCSCM)** and implemented by **Adani Ports & Special Economic Zone Ltd. (APSEZ)**



Aligned Towards

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Signatory Towards



Ports and Logistics

SDG-1
No Poverty



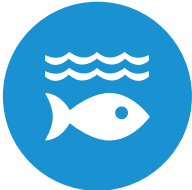
SDG-2
Zero Hunger



SDG-13
Climate Action



SDG-14
Life Below Water



SDG-15
Life on Land



Mapping Biodiversity interfaces with business operations



Considering the impacts of business decisions on biodiversity

The implementation of Mangrove Conservation Plan and continuous efforts towards it, not only emphasizes APSEZ's commitment towards implementation of its Environment Policy, but also simultaneously contributes towards achieving the aim of UN Decade 2021-2030 for Ecosystem Restoration



Environment Policy

Importance of Mangroves

- The term "mangrove" comes to English from Spanish (Portuguese), and is likely to originate from Guarani. It was earlier known "mangrow" (Portuguese manguê or Spanish mangle), but later on this word was corrupted via folk etymology influence of the word "grove".
- The mangrove forest is highly influenced under intertidal process of nearby marine water body. It also in some places, grows in the brackish water, or surrounding the delta of a river protected from sea waves.
- A mangrove community is composed of plant species whose special adaptations allow them to survive the variable flooding and salinity stress conditions imposed by the coastal environment.

The Convoluted Mangroves...

"Mangroves are defined as an assemblage of tropical and semi-tropical trees and shrubs that inhabit the coastal intertidal zone"



Salient Features of Mangroves

Mangroves are group of salt tolerant plant community, occurring mainly between latitude 24°N and 38°S intertidal regions of the world.



Survive in the limiting factor imposed by lack of oxygen, high salinity and diurnal tidal inundation.

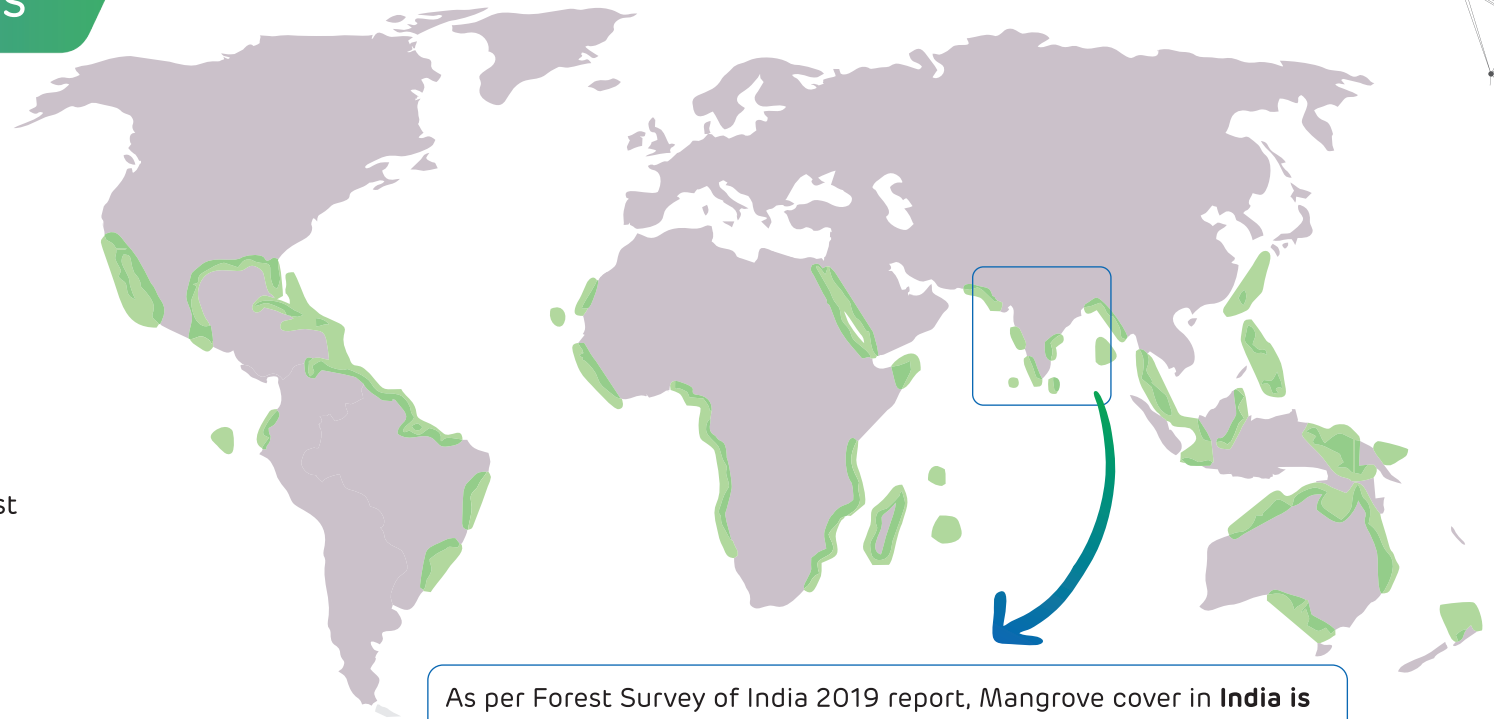
Succulent leaves, sunken, stomata, aerial breathing roots called 'pneumatophores', vivipary, stilt roots, etc. are some of the major adaptations



"The Sundarbans of India and Bangladesh is the only largest mangrove forest in the world. While Kachchh is the second largest mangrove habitat in the country, after the Sundarbans. It is perhaps one of the most difficult coasts for mangroves to grow because of extreme heat and salinity."

Distribution of Mangroves

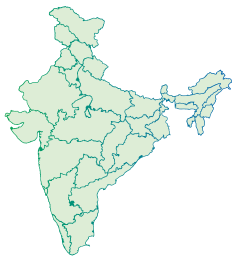
The mangroves cover in the world is 0.15 million sq.km which is 1% of the Tropical forest of the world. Mangroves are mostly distributed over 123 countries and territories in the tropical and sub-tropical regions. Asia has the largest extent of the world's mangroves. About 40% of the world's mangroves cover is found in south East Asia followed by South America, North Central America and west and central Africa. Amongst the remaining six regions (South Asia, Australia/New Zealand, East and South Africa, Pacific Ocean, East Asia, Middle East), South Asia has the highest percentage 6.8% comprising 10,344 sq. km mangrove cover, India has about 3% of the total mangrove cover in South Asia.



As per Forest Survey of India 2019 report, Mangrove cover in **India is 4,975 sq km**, which is 0.15% of the country's total geographical area. West Bengal has 42.45% of India's mangrove cover, followed by Gujarat 23.66% and A&N Islands 12.39%. **Gujarat shows maximum increase of 37 sq km in mangrove cover between 2017-2019.**

"Map Source: World Map of Mangrove distribution"

Important Species in India



Avicennia officinalis, Morinda citrifolia, Rhizophora mucronata, Sonneratia alba, Avicennia alba, Bruguiera cylindrica, Heritiera littoralis, Phoenix paludosa, Morinda citrifolia, Ceriops tagal.

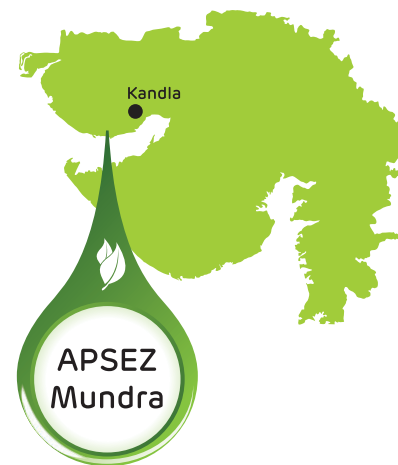
Dominant species in Kachchh:



Avicennia marina (more than 95%), Aegiceras corniculatum, Ceriops tagal, Rhizophora mucronata

Mangroves Growth Story : Mundra

The Gulf of Kachchh is one of the rare ecological zones in the world having rich biodiversity, having several Ecologically Sensitive Ecosystems (ESAs) with coral reefs on its southern coast and mangroves along the creeks on the northern coast. In many areas the creek systems have narrow channels and contribute to the fishery resources of the Gulf. The Gulf serves as a gateway for western part of India with a natural depth, serving as an ideal location in establishment of ports and related infrastructure. It has two large ports namely Kandla Port at Kandla and Adani Port at Mundra.



The Adani Port and Special Economic Zone (APSEZ) Ltd has been operating the Port on the landward sides of Navinal, Bocha, Baradimata and Kotdi creek systems. Bocha Island, which is situated between the Navinal and Bocha creeks, has luxuriant growth of mangroves. Extensive mangrove formations occur in these creek systems. Hence forming an association of floral and faunal distribution in the waters and over the mangrove areas.

Action Plan

"Anticipating the undebatable significance of mangroves in the coastal ecosystems of Kachchh a significant role has been played by APSEZ."

✓ Ministry Recommendation

Ministry of Environment, Forest and Climate Change (MoEF&CC) recognized the need to maintain the integrity of the creeks and their mangrove ecosystem at Mundra recommended APSEZ to prepare a Comprehensive and Integrated plan for preservation and conservation of mangroves and its associated creeks in and around the APSEZ.

✓ APSEZ Engagement

Based on the Terms of Reference (ToR) approved by Gujarat Coastal Zone Management Authority (GCZMA), APSEZ had engaged the services of National Centre for Sustainable Coastal Management (NCSCM) to prepare the Conservation Plan.

✓ NCSCM Study Plan

NCSCM with its meticulous planning develop the conservation plan providing details on the current status of mangroves and their trends compared to the past. NCSCM also recommended strategies to maintain the mangrove health and adequate flow of seawater in the creeks that have mangroves.



Methodology

Bathymetry survey of creeks

Step 1

Step 2

Topography survey of intertidal areas by procuring satellite images for analysis of mangrove cover

Mangrove survey (health and area demarcation)

Step 3

Step 4

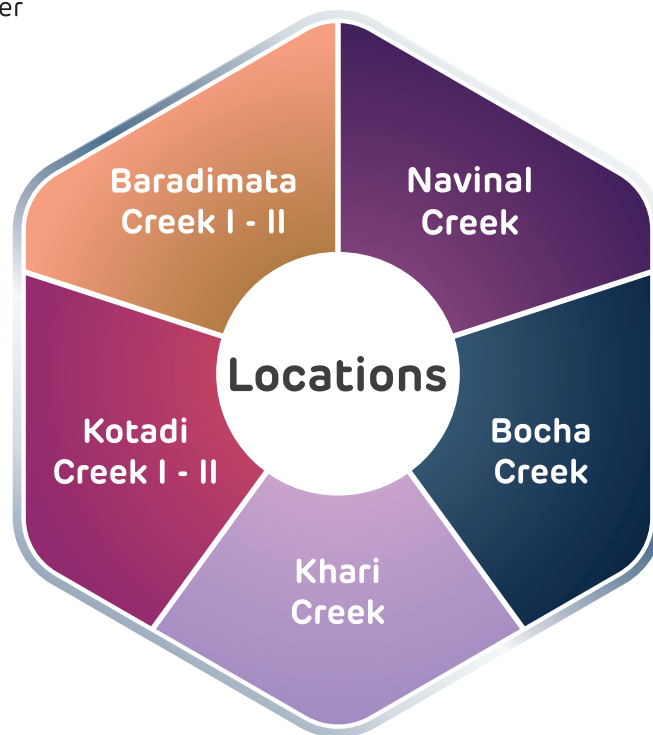
Sampling of soil and water for analysis of physico-chemical and biological parameters

Tide and currents data collection (incl. residence time of tidal water)

Step 5

Step 6

Focus Group Discussions with the community in the close vicinity of the project area



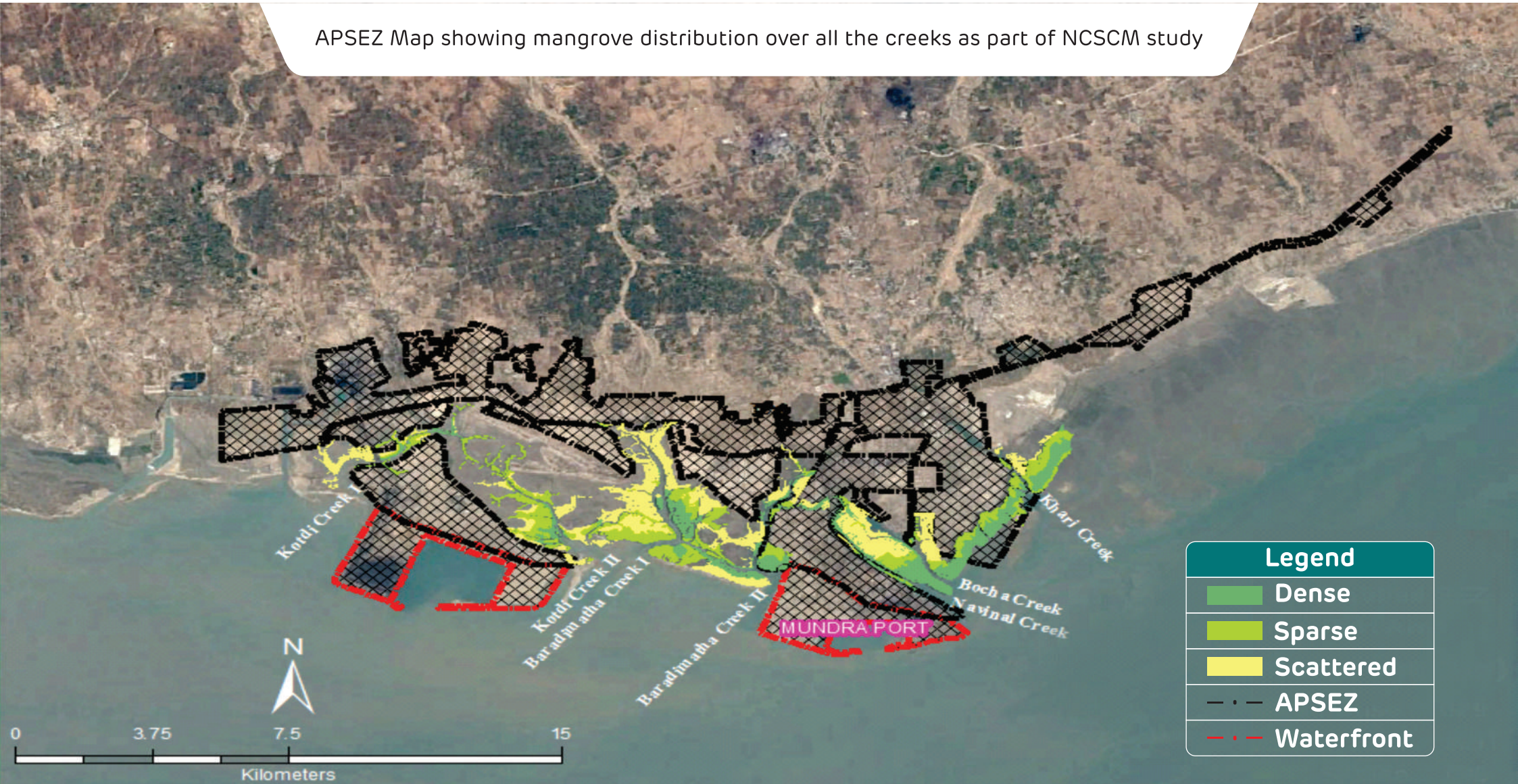
Area

The total length of all creeks, studied was estimated to be **43.18 km**



Project Study Area

APSEZ Map showing mangrove distribution over all the creeks as part of NCSCM study



Outcome 2016-17

①



Mangrove cover in and around APSEZ increased from 2096 Ha in 2011 to 2340 Ha in 2016-17. On comparing the data it was found that there is a substantial growth in mangrove cover to the tune of 246 Ha between 2011 to 2017.

②



There was no obstruction to any water stream (creeks / branches of creeks / rivers).

③



The Conservation Plan was submitted to the Gujarat Coastal Zone Management Authority (GCZMA). It was approved with the recommendation, to undertake the compliance monitoring of the mangrove conservation area & to study the health of mangroves in creeks.

Mangrove Cover In & Around APSEZ
+246 Ha **+11.74%**
Increased Growth Between 2011-2017



Outcome 2019-20

1



As a part of management plan, APSEZ entrusted NCSCM to carry out the status analysis on mangrove coverage and to draw an inference on mangroves health, by comparing against the outcome of 2016-17.

2



NCSCM using Google Earth images, studied the distribution of mangroves in Kotdi, Baradimata, Navinal, Bocha and Khari creeks. The high resolution Google Earth images of 2016-17 were used as a source for comparison which showed a marginal difference of +58 Ha compared to the earlier data.

3



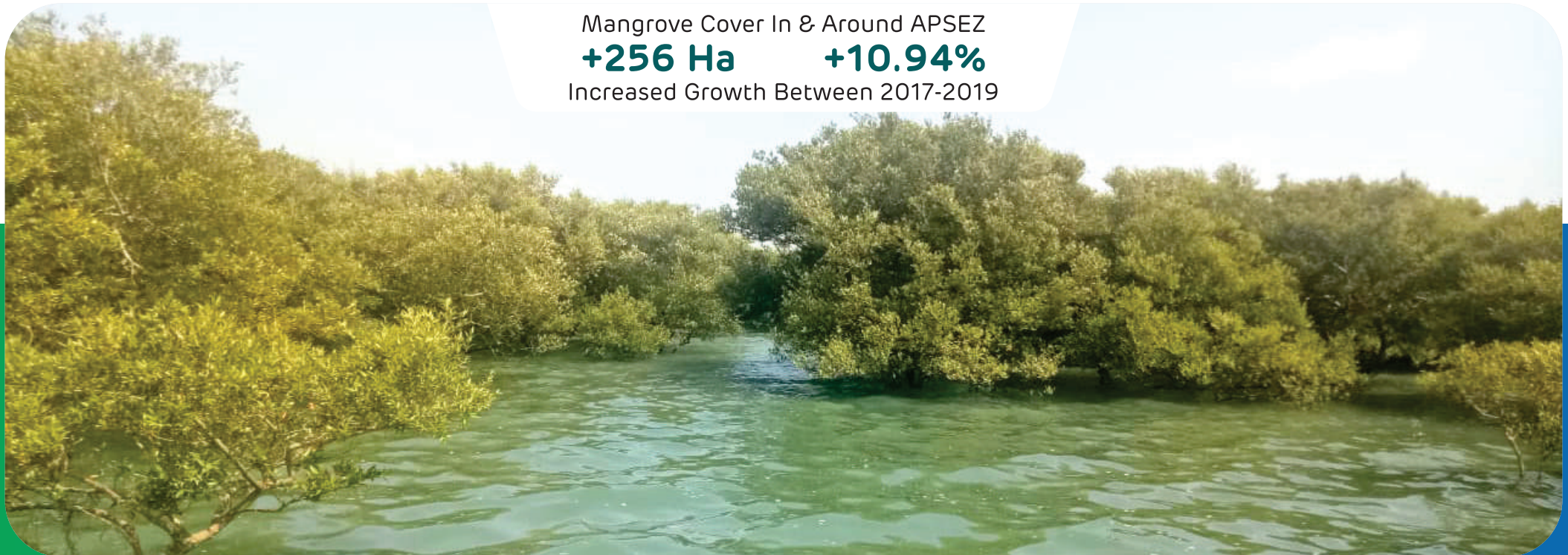
The study revealed that there was an increase of mangrove cover between March 2017 and September 2019 with an extent of 256 Ha which is about 10.94% rise in growth rate. It reveals that the mangrove and the tidal system in the creeks remained undisturbed over this period.

4

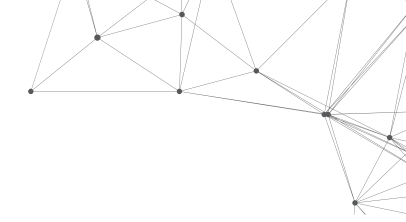


Analysis of data between categories indicated that there was an increase in dense mangroves along with the conversion of scattered into sparse, that shows the growth of mangroves in a progressive direction.

Mangrove Cover In & Around APSEZ
+256 Ha **+10.94%**
Increased Growth Between 2017-2019



Flourishing Progress



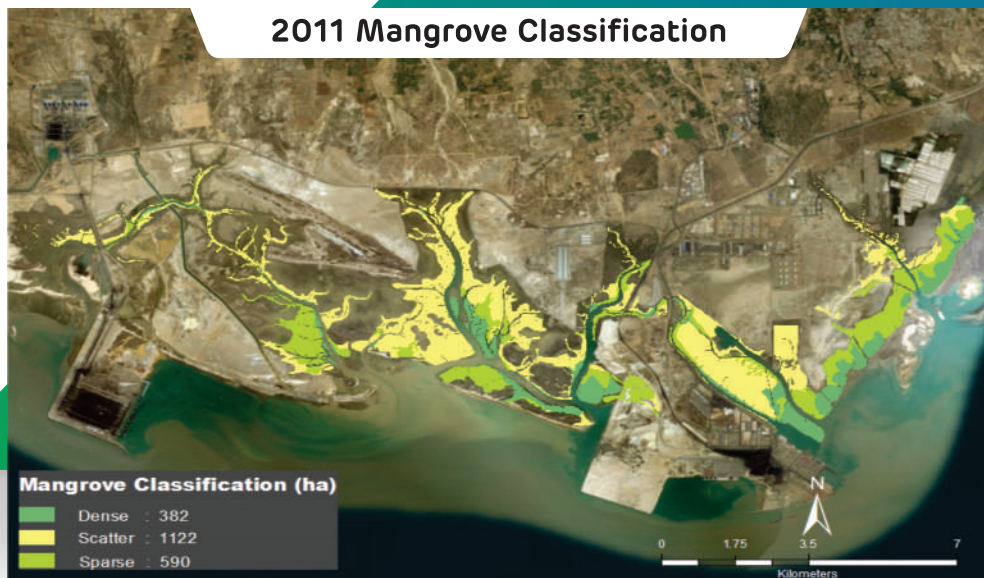
2019-20 Mangrove Classification



Total Growth Rate of +23.97%

Growth Rate +10.94%

2011 Mangrove Classification



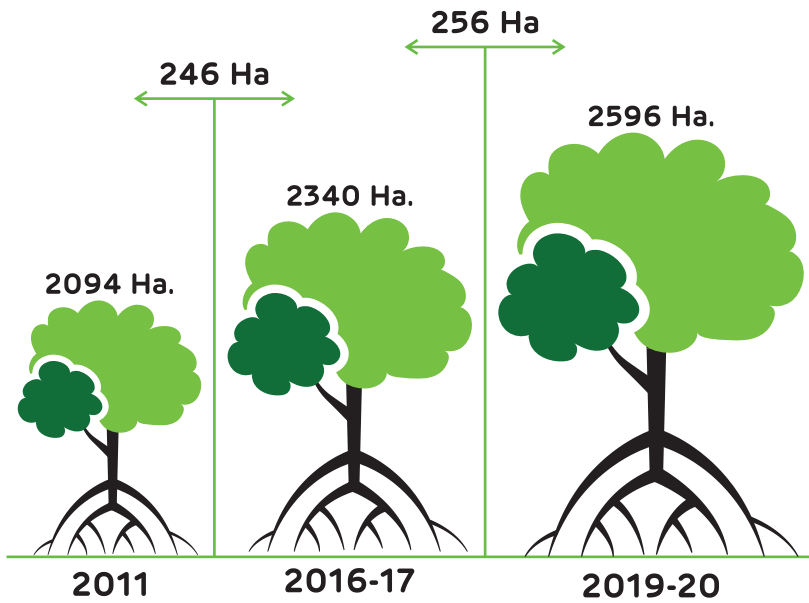
2016-17 Mangrove Classification



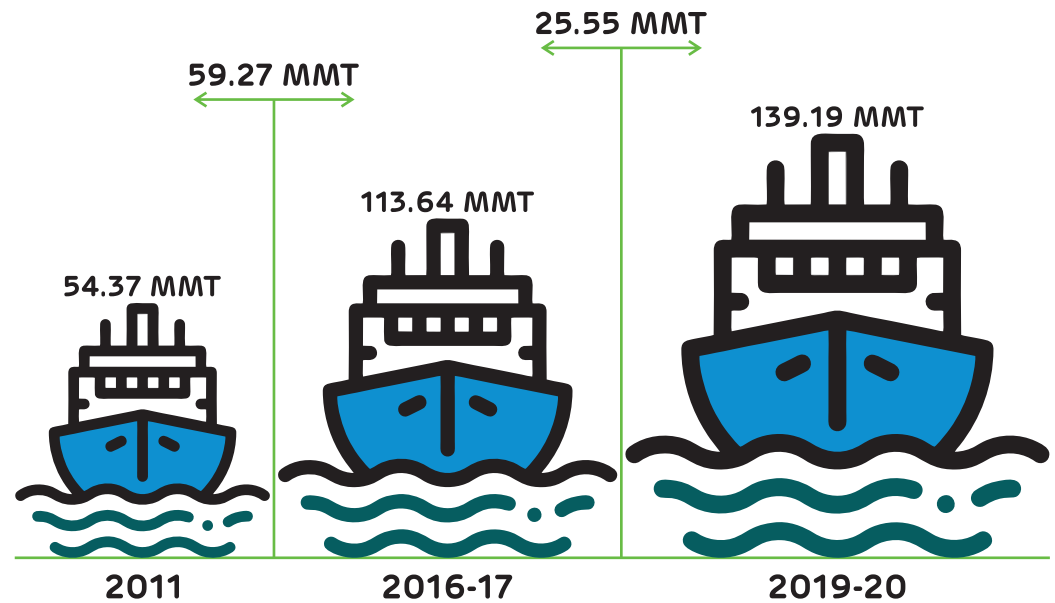
Growth Rate +11.74%

NCSCM Survey 2011-2020

Mangrove Cover



Cargo Handling



Mundra has undergone substantial development during this tenure and with the results of our mangrove conservation efforts, it can be concluded that the infrastructure development has not left any adverse impacts on the surrounding Ecology.

APSEZ is committed to continually comply to the recommendation of Mangrove Conservation Plan, as developed by NCSCM.

Our vision to thrive for making Adani Ports as Greener Ports will continue...

