

# SHORE LINE CHANGE ATLAS OF THE INDIAN COAST

(Volume-I)

Gujarat, Daman and Diu



SPACE APPLICATIONS CENTRE, ISRO  
Ahmedabad

August-2021

<b>DOCUMENT CONTROL AND DATA SHEET</b>	
Report No. and Date	SAC/EPISA/GHCAG/GSD/ATLAS/2020/01, August 2021
Title	Shoreline Change Atlas of India (Volume – I Gujarat, Daman and Diu)
Type of Report	Atlas (Other documents)
No. of Pages, Tables, Figures, Plates	152, 3, 1, 4
No. of References	4
Authors	Project Team (As per attached list)
Originating Unit	GSD/GHCAG/EPISA/SAC
Abstract	This Atlas comprises of shoreline change maps prepared using satellite data of 2004-06 and 2014-16 time-frames on 1:25,000 scale for the entire country (Volume – I shows maps of Gujarat, Daman and Diu). The maps show eroding, stable and accreting coast. Data used, methodology, results, area under erosion and accretion and status of coastal protection measures are briefly described. Around 1052 km of the Gujarat coast is estimated to be in stable condition. Erosion is estimated along 110 km while accretion is along 49 km. Gujarat state is estimated to have gained an area of 208 ha of land due to deposition of sediments while due to erosion, the state have lost an area of 313 ha.
Keywords	Shoreline change map, erosion, accretion, stable coast, coastal protection measures.
Security Classification	Unrestricted
Distribution	General

How to cite: “Ratheesh R., Rajput P., Bhatti H, Rajawat A.S, and Rajak D.R, 2021, Shoreline Change Atlas of India-Volume I, Space Applications Centre-ISRO, Ahmedabad. Report no: SAC/EPISA/GHCAG/GSD/ATLAS/2020/01”.

## **PROJECT TEAM**

Shri Ratheesh Ramakrishnan  
Ms. Preeti Rajput  
Shri Hiren Bhatti  
Dr. A.S Rajawat  
Dr. D. Ram Rajak

### **Map Quality Check Team**

Shri T.V.R Murthy  
Shri J.G Patel  
Shri R.J Bhanderi  
Shri B.P Rathore  
Shri Manish Parmar

एस. के. हालदार  
अध्यक्ष  
तथा पदेन सचिव, भारत सरकार  
**S. K. HALDAR**  
**CHAIRMAN**  
& *ex-officio* Secretary  
to the Government of India



भारत सरकार  
जल शक्ति मंत्रालय  
जल संसाधन, नदी विकास और गंगा संरक्षण विभाग,  
केन्द्रीय जल आयोग  
Government of India  
Ministry of Jal Shakti  
Deptt. of Water Resources,  
River Development and Ganga Rejuvenation,  
**Central Water Commission**

## MESSAGE

The Coastal Zone represents a complex environmental entity, which is in constant interaction with the marine and terrestrial processes. The coastal zone has been receiving increased attention due to the immense anthropogenic pressure and inevitable development activities related to trade and transport. The coast is bestowed with rich bio-diversity and fragile ecosystems like mangroves and coral reefs that are highly sensitive to any climatic and environmental changes.

The coastal region, due to the influence of natural and anthropogenic forces and the sporadic events like cyclones undergo severe erosions leading to loss of human livelihood and crucial biodiversity besides critically damaging the coastal constructions and aesthetic quality that attracts huge economic benefits. Quantifying coastal change is essential for calculating trends in erosion, evaluating processes that shape coastal landscapes and predicting the response of coast to future storms and sea-level rise. The dynamic natures of the coast prompt for frequent monitoring and comprehending the coastal erosion activities. Space technology has been effectively deployed in identification and measurement of such activities.

Space Applications Centre (SAC) in collaboration with a large number of scientific organization & universities of the country has carried out various scientific investigation/inventory of the entire coastal zone of India using satellite data like impact of sea level rise on the Indian coastal environment, development of Coastal Zone Information System (CZIS), mapping and monitoring of coral reefs and mangroves, inventory of the coastal land use etc. One such significant work was preparation of Shoreline Change Atlas of India for the time frame 1989-91 and 2004-06.

The present Shoreline Change Atlas is an outcome of the shoreline change mapped for the entire Indian coast between the time frames of 2004-06 and 2014-16 carried out by Space Applications Centre, ISRO, Ahmedabad based on recommendation of Coastal Protection and Development Advisory Committee (CPDAC) at the request of Central Water Commission, Department of Water Resources, River Development & Ganga Rejuvenation, Ministry of Jal Shakti, Government of India.

I congratulate the team of scientists for carrying out such an important study for the entire Indian coast. This study assumes greater significance in the context of planning shoreline protection measures to be constructed by various maritime States and UTs. I am sure this atlas will be highly useful not only to the coastal zone managers and to the authorities involved but also to the scientific community working in the coastal environment and climate change studies.

(S.K. Haldar)  
Chairman  
Central Water Commission





सत्यमेव जयते

भारत सरकार GOVERNMENT OF INDIA  
अंतरिक्ष विभाग DEPARTMENT OF SPACE  
अंतरिक्ष उपयोग केंद्र  
SPACE APPLICATIONS CENTRE  
अहमदाबाद AHMEDABAD - 380 015  
(भारत) / (INDIA)

दूरभाष / PHONE : +91-79-26913344, 26928401

फैक्स / FAX : +91-79-26915843

ई-मेल / E-mail : director@sat.isro.gov.in

एन एम देसाई / N M Desai  
विशिष्ट वैज्ञानिक / Distinguished Scientist  
निदेशक / Director



## FOREWORD

Coastal zone is one of the most fragile ecosystems having rich biodiversity and is characterised by constant interactions between various natural processes and human activities. Human interventions along the global coastal zones are profoundly increasing and may lead to disastrous consequences, if developmental activities are carried out with improper understanding of the coastal processes. In addition, the coastal ecosystems are also vulnerable to natural phenomena such as waves, tides, storm surges, erosion etc.

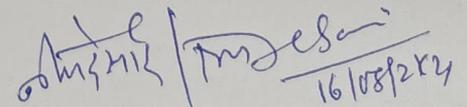
India has more than 7500 km. long coastline with diverse coastal ecosystem and hence, Coastal Zone in India, assumes its importance, more so because of high population pressure, development of various industries, spurt in recreational activities, exploitation of renewable and non-renewable natural resources, discharge of waste effluents and municipal sewage etc. The Indian shoreline is also dotted with vital coastal habitats like mangrove and coral reefs, ecological sensitive and biologically diverse regions and archaeologically and culturally important places. The natural and anthropogenic activities change the equilibrium of sediment transport along the coast and induce coastal erosion, thereby threatening the valuable resources. In view of its dynamic nature, frequent monitoring of the coast is also required and that can be achieved only through satellite based methods.

In India, the use of satellite data for coastal zone studies have been initiated by Space Applications Centre (SAC), ISRO, Ahmedabad in collaboration with various scientific organisations and universities across the country. For the past 30 years, SAC has been engaged in conducting various national level programmes aimed at detailed scientific investigations and preparing inventory of the entire coastal zone of India. I am happy to know that geo-sciences team at SAC/ISRO has completed Indian coastal shoreline change analysis (for 2004-06 and 2014-16 time frames) using Resourcesat-1&2 LISS-IV data and publishing these maps in the form of an atlas in six (6) volumes.

I am sure, this 6-volume atlas will be useful to the scientific community and decision makers in investigating the coastal challenges as well as for taking appropriate actions to protect the Indian coast, which will go a long way in conserving the coastal environment of the country. I would like to place on record my deep appreciation for all those scientists and support staff, who have made contributions for the successful execution of this project.

Place: Ahmedabad

Date: 16 August 2021

  
(एन एम देसाई) / (N M Desai)  
निदेशक / Director

भारत सरकार  
अंतरिक्ष विभाग  
अंतरिक्ष उपयोग केन्द्र  
आंबावाडी विस्तार डाक घर,  
अहमदाबाद-380 015. (भारत)  
दूरभाष : +91-79-26913050, 26913060  
वेबसाईट : www.sac.isro.gov.in/www.sac.gov.in



Government of India  
Department of Space  
**SPACE APPLICATIONS CENTRE**  
Ambawadi Vistar P.O.  
Ahmedabad - 380 015. (INDIA)  
Telephone : +91-79-26913050, 26913060  
website : www.sac.isro.gov.in/www.sac.gov.in

I M Bahuguna  
Deputy Director, EPSA



## PREFACE

*Coastal regions of the world undergo a continuous process of erosion & accretion due to natural reasons and anthropogenic as well. The climatic change and consequently the rise in sea level is likely to be one of the major factors causing coastal erosion and accretion in the near future. The risks and hazards arising due to coastal erosion have raised a serious concern for the Indian coastal regions too, as a large population survives on the economy of its resources. Coastal erosion and accretion are reflected as the shift in the shoreline. Hence, a systematic and repetitive inventory and monitoring of shoreline change are the pre-requisite for a proper coastal management and forms the baseline data to carry out coastal protection measures by the maritime States and Union Territories besides its use by the scientific community.*

*Space Applications Centre (ISRO) had brought out Atlas of maps showing shoreline changes for the entire Indian coast between time frame 1989–1991 and 2004–2006 at 1:25,000 scale. The project was funded by Coastal Management Directorate, Central Water Commission, Ministry of Water Resources, New Delhi. Coastal Protection and Development Advisory Committee (apex body concerned with planning of coastal protection measures at the national level in India) requested Space Applications Centre to update the existing shoreline change maps using recent satellite data (2014-16 time frame) for assessing status of coastal erosion. The mapping has been completed at 1:25,000 scale using IRS LISS IV data and changes in shoreline have been brought out between 2004-06 and 2014-16 time frame.*

*The atlas also shows location and type of coastal protection measures taken up by maritime states and UTs based on the data provided. The atlas has been brought out in six volumes covering the entire Indian coastline. Six volumes contain 618 maps prepared covering 7549 km of the Indian coastline. The maps suggest that about 1144 km is under erosion, 1084 km is under accretion and 5321 km of the coastline has been observed showing no change.*

*I congratulate the entire team specially Mr. Ratheesh Ramakrishnan, Scientist SF and Mrs. Preeti Rajput, Scientist SD of Space Applications Centre, ISRO Ahmedabad.*

(I M Bahuguna)

## SUMMARY

Shoreline is a dynamic geomorphological entity that coincides with the physical interface of land and ocean. The shoreline responds to the coastal processes exerted by waves, tides, nearshore currents and the resultant sediment transport and the pressure exerted by anthropogenic influences. The equilibrium in the sediment supply gets disturbed due to either natural phenomena or human intervention causing shoreline changes. The shoreline changes are attributed as erosion (accretion), where the shoreline shift landwards (seawards). The change in shoreline positions are of essential importance to the coastal scientists, engineers and managements, where the shoreline change information is required in the design of any sustainable management plans.

Coastal erosion ails threat to the life and livelihood along the shoreline, destroying settlements and infrastructures like road and pose major hazard to the ecologically sensitive habitats like mangroves and turtle nesting grounds. Coastal erosion, as in other maritime countries, is a serious problem along the Indian coast. India forms a peninsula and has a long coast on its east and west regions with varied coastal processes dominating the coastal dynamics. The Indian coast is relentlessly modified by the mounting development activities along the coastal region, which under improper management at times leads to severe coastal erosion.

Inventory related to coastal erosion are a pre-requisite in understanding the coastal dynamics of the region. Planning measures for sustainable development along the coastal region require a systematic inventory of shoreline changes. In this view, Space Applications Centre in collaboration with Central Water Commission, mapped the shoreline changes for the time frame 1989-91 and 2004-06 on 1:25, 000 scale for the entire Indian coast based on multirate remote sensing data in GIS environment. The database were then used to generate A3 size Shoreline Change Atlas of all the maritime states of India. Central Water Commission requested to update the existing shoreline change maps (1989-91 & 2004-06 time-frame) using the satellite data of 2014-16 time-frame. The major objective was to prepare digital shoreline change atlas on 1:25, 000 scale in GIS environment using the shoreline delineated for the time-frame 2004-06 and 2014-16, depict and quantify shoreline changes as eroding/accreting/stable, show status of shoreline protection measures taken by respective states.

Assessment of shoreline change using satellite images have gained its applicability owing to the synoptic observations covering a large spatial scale and its availability in temporal domain. LISS-4 images of 2014-16 (on board Resourcesat-2) and 2004-06 (on board IRS P6) time-frames

have been used to delineate the shoreline for entire Indian coast. The high tide line (HTL) is considered as the shoreline and on-screen digitization of the HTL has been carried out based on the geomorphic indicators.

The shoreline change status along 7549 km of the Indian coast is assessed that excludes river/creek mouths. About 1144 km of the Indian coast is under erosion, while 1084 km of the coast is accreting and the coastline is observed to be stable along 5321 km. The Indian coastal region have in total lost around 3680 ha of land due to erosion whereas around 4042 ha of area have been gained due to accretion. West Bengal coast is having around 35 percentage of its coast under erosion, which is the largest among the Indian coastal state and percentage of shoreline under accretion is the largest for Andhra Pradesh state (26%). Percentage of stable coast is largest along the Gujarat coast (87%) followed by the Lakshadweep Islands (82%), while more than 57 percentage of the West Bengal coast is under either erosion or accretion. A long coastal stretch to the northern Andhra Pradesh coast is eroding whereas a long coastal stretch along the Saurashtra coast of Gujarat is stable in nature.

The major natural processes involved in the coastal erosion are the wave induced erosion and littoral drift. Alongshore shift of inlets are observed due to growth of spits and erosion at the other side and is dominant at Chilika inlet, Odisha and Mulki-Pavanje Estuary, Karnataka. The processes of longshore sediment transport occurring naturally along the coasts are highly altered by the constructions of breakwaters and have triggered coastal erosion due to obstruction of the littoral drift. Sand mining and land reclamation are the other anthropogenic activities altering the sediment dynamics and triggering coastal erosion. Andaman and Nicobar Island is observed to have critical shoreline changes, where the coast is regaining the equilibrium after the subsidence, uplift and erosion due to tsunami associated with the 2004 mega earthquake. The inventory along with current status of coastal protection measures taken up by concerned state departments has been used to prepare a Shoreline Change Atlas of the Indian Coast.

The baseline data are aimed towards initiating appropriate action by concerned Maritime states and UTs besides use by the scientific community as well decision makers of the country. The Atlas shall function as a reference material to obtain information on the status of shoreline changes during 2004-06 and 2014-16 time-frames along entire Indian coastline. Areas under coastal erosion and status of coastal protection measures taken up by respective maritime State and Union Territory are depicted and can be used for planning coastal protection measures.

# CONTENTS

	Page No
SECTION-I	
1 INTRODUCTION	1
2 DATA USED	4
3 METHODOLOGY	5
4 RESULTS	
GUJARAT, DAMAN AND DIU	7
5 ENDUSE	12
ACKNOWLEDGEMENTS	13
REFERENCES	14
SECTION-II	
i) SHORE LINE CHANGE MAPS	15
ii) HOT SPOTS OF SHORELINE CHANGE	141
iii) LIST OF SATELLITE DATA USED	144

## LIST OF TABLES

Table no	Title	Page No.
1	Mapsheet-wise results of shoreline changes for 2004-06 and 2014-16 time-frame for Gujarat, Daman and Diu coast.	9
2	Satellite data used for Gujarat, Daman and Diu coast (2004-06 time-frame)	145
3	Satellite data used for Gujarat, Daman and Diu coast (2014-16 time-frame)	149

## LIST OF FIGURES

Figure no	Title	Page No.
1	Shoreline change status of Gujarat, Daman and Diu coast	8

## LIST OF PLATES

Plate no	Title	Page No.
1	Shoreline change at Nana Bhadiya (41F05SE) marked on LISS IV images of IRS P6 and Resourcesat-2	142
2	Shoreline changes along the spit near Ghandvi (41G05SW) marked on LISS IV images of IRS P6 and Resourcesat-2	142
3	Coastal erosion to the northern bank of Narmada River at Ambheta (46C10NW) marked on LISS IV images of IRS P6 and Resourcesat-2	142
4	Coastal erosion to the north of Dandi (46D13NW) marked on LISS IV images of IRS P6 and Resourcesat-2	143

# 1. INTRODUCTION

The coastal zone is in constant interaction between various natural processes and human activities that leads to a modification of its geomorphology. Coastal zone in India assumes its importance due the presence of fragile ecosystems and its interaction with anthropogenic activities. The coast is also subjected to exploitation of natural resources and is used as a medium for discharge of waste effluent and municipal sewages. The coastal regions are also overburdened with mounting developmental activities, increasing load on harbours, spurt in recreational activities and above all petroleum exploration activities.

Shoreline is a dynamic geomorphological entity, which responds to the external forces exerted by waves, tides, nearshore currents and the resultant sediment transport. When the resultant sediment transport entering a particular area is greater than the sediment going out from the area, accretion or beach development takes place. On the other hand, when there is a deficit of the incoming sediment supply into a particular area with reference to the sediment going out of the same area, beach erosion takes place. The equilibrium in the sediment supply is fairly maintained by the coastal geomorphic environment. However, sometimes this equilibrium gets disturbed due to either natural phenomena or human intervention. Natural phenomenon like intense wave activities during monsoon, cyclones and changes in river mouth during flood conditions contributes towards disrupting the equilibrium, while construction of coastal structures like breakwaters, dam construction in the rivers are the human interventions

India has a long shoreline of about 7500 km including its island territories. The destruction and loss of land due to erosion is a severe problem, particularly for a country like India facing an increased population growth. Erosion of the coastal region poses a major threat not only to the human population, but also to the vital coastal ecosystem. The dynamic interaction between nearshore features and the hydrodynamics of the region, termed as coastal processes, determines the stability of the adjacent shoreline. Moreover, various developments along the coast enhance the changes in the shoreline. Indian coast forms a peninsula and has a long coast on its east and west regions with varied coastal processes dominating the coastal dynamics. These include tide-

dominated regions along the northern parts of the west coast, open coast with high wave energy along the southern parts of the west coast, strong longshore sediment transport along the southern parts of the east coast and the coast strongly influenced with river discharges along the northern parts of the east coast. The coastal geomorphology and the land-use pattern along the Indian coast also show a varied range, which includes coral reefs, mangrove belts, tidal mudflats, rocky coasts, wide sandy beaches and deltaic and bay environments.

The Indian coast is relentlessly modified by the mounting development activities along the coastal region, which under improper management at times leads to severe coastal erosion. Management plans with proper understanding of the coastal processes and coastal dynamics are needed to achieve sustainable development along the coastal region, where planning measures have to be taken up at the national level. Inventory related to coastal erosion are a pre-requisite in understanding the coastal dynamics of the region. Planning measures for sustainable development along the coastal region require a systematic inventory of shoreline changes occurring along the entire Indian coast on 1 : 25,000 scale. Space Applications Centre, along with Coastal Protection and Development Advisory Committee (CPDAC) (apex body concerned with planning of coastal protection measures at the national level in India) have brought out shoreline change atlas (SAC, 2014 and Rajawat et al, 2015). The atlas depicts the shoreline changes for the time-frame 1989-1991 (using SPOT-1/2 HRV1-MLA) and 2004–2006 (using IRS-P6 LISSIV), that was mapped on 1 : 25,000 scale for the entire Indian coast.

Coastal Management Directorate, Central Water Commission, Ministry of Water Resources, New Delhi have requested to update the existing shoreline change maps (1989-91 & 2004-06 time-frame) using recent satellite data (2014-16 time-frame) for assessing coastal erosion. CPDAC recommended the need for preparation of Shoreline Change Atlas of the Indian coast showing information related to coastal erosion derived from satellite data and protection measures undertaken by all maritime states of India. It is in this context, Space Applications Centre in collaboration with Central Water Commission, have mapped the shoreline for the time-frame 2014-16 on 1:25, 000 scale for the entire Indian coast based on LISS-IV images of 2014-16 in GIS environment. The information is

catalogued as per Survey of India topographical map indexing which is 1:25000 Scale.

The major objective is to prepare digital shoreline change atlas on 1:25, 000 scale in GIS environment using the shoreline delineated for the time-frame 2004-06 and 2014-16. The atlas shall depict and quantify shoreline changes as eroding/accreting/stable, show status of shoreline protection measures taken by respective states and generate A3 size state wise Coastal Atlas of all the maritime states of India.

The detailed objectives are:

- i) To prepare shoreline database of 2014-16 time-frame for all the maritime states and UT.
- ii) To quantify and classify the shoreline as shoreline under erosion, stable and accretion for entire Indian coast by integrating shoreline using database of 2004-06 and 2014-16 period.
- iii) To integrate the information on coastal erosion and shoreline protection measures of all the maritime states and UT of India in GIS environment.
- iv) To generate Six Volumes of A-3 size coloured Coastal Atlas of India (Volume I covering Gujarat, Daman & Diu, Volume II covering Maharashtra & Goa, Volume III covering Karnataka & Kerala, Volume IV covering Tamil Nadu, Pondicherry & Andhra Pradesh, Volume V covering Odisha & West Bengal and Volume VI covering Lakshadweep & Andaman & Nicobar).

## **2. DATA USED**

High tidal line is demarcated using IRS-P6 LISSIV data of 2004-06 period and Resourcesat-2 LISS-IV data of 2014-16 time-frame procured from NRSC. The LISS-IV is a multispectral (three-VNIR-band) push-broom camera having a spatial resolution of 5.8m with a swath of 23.9km for IRS-P6 and 70km for Resourcesat-2. Both the satellites orbits in a sun-synchronous orbit at an altitude of 817km with a 5-day revisit cycle.

Detailed list of the satellite data used is given in the Annexure-III. In few cases where suitable data were not available, the data of nearest time-frame was used. Shoreline changes are computed with respect to the spatial changes in the Highest High Tide Line. The status of coastal protection measures taken up by maritime states and UTs was provided through Central Water Commission (CWC), New Delhi. These were prepared in spatial format and were put in the GIS database.

### **DATABASE Standards**

Satellite images of Resourcesat LISS-IV, having a spatial resolution of 5 m is used for both 2004-06 and 2014-16 time frame. Geometric projection for the images are set to UTM (Standard LANDSAT projection for Indian region). Image to image rectifications are carried out with an overlap error less than 1 pixel.

The vector layers are projected in polyconic projection system, with a planimetric accuracy of 6.25 m and weed tolerance of 3.125 m. Onscreen digitization are carried out in 1:12,500 scale. "State" and "year" attributes are created for the high tide line digitised using the satellite images.

### 3. METHODOLOGY

We have undertaken following steps to prepare shoreline change atlas:

- i. LISS-IV images of 2014-16 (on board Resourcesat-2) and 2004-06 (on board IRS P6) time-frames have been used to delineate the shoreline for entire Indian coast. LANDSAT orthorectified products are used as base map. Image to image co-registration is carried out on LISS-IV images of both time-frames to bring the data set to same geo-reference with an error of +/- 1 pixel.
- ii. High tide line (HTL) is considered as the shoreline. On-screen digitization of the HTL has been carried out based on the geomorphic indicators (NCSCM, 2015). Image interpretation keys based on Nayak et al (1991) is used to identify the geomorphic indicators to delineate the HTL.
- iii. The HTL is prepared for all maritime states and Union territories of India on 1:25,000 scale. The 1°X1° grid consists of 8X8 rectangular grids or cells. Each rectangular grid or cell represents one Survey of India (SOI) topographic area on 1:25,000 scale.
- iv. Limited field checks were carried out and based on field observations, corrections were incorporated while finalizing the map. Field photographs were also taken during the field visits.
- v. Accuracy Assessment: Classification as well as planimetric accuracy of the maps was assessed while carrying out the fieldwork. Overall, the classification accuracy of these maps range from 90-95% at 90% confidence level. The Planimetric Accuracy of these maps is 6.25 m as per SOI standard.
- vi. Spatial layer for habitation (as point feature) and, rail and road (as line features) are taken from CZIS database.
- vii. Spatial analysis techniques are used to compute the spatial shift among the HTL of different time frame.
- viii. Polygons for areas under erosion and accretion were created.

- ix. Areas under erosion and accretion were measured for the main shoreline (excluding creeks, river mouths, estuaries). Shore length under erosion, accretion and stable categories were measured for the main shoreline (excluding creeks, river mouths, estuaries). Areas with no changes were considered as stable.
- x. A table containing the length of eroding, accreting and stable coast along with the area of erosion and accretion for each SOI grid has been generated for the maritime state and U.T.
- xi. Shoreline protection measures have been depicted as per the information provided by the maritime State/UT agencies through Central Water Commission.
- xii. A standard map composition and layout were finalised and have been used for final map composition of each map.
- xiii. Final maps depicting shoreline changes were utilized for preparing shoreline change Atlas of the Indian coast (Six Volumes). Volume I covers Gujarat, Daman & Diu, Volume II covers Maharashtra & Goa, Volume III covers Karnataka & Kerala, Volume IV covers Tamil Nadu, Puducherry & Andhra Pradesh, Volume V covers Odisha & West Bengal and Volume VI covers Lakshadweep & Andaman & Nicobar Islands.

## 4. RESULTS

The shoreline change maps of Gujarat, Daman and Diu coasts at each SOI grid at 1:25000 scale are given in Section-II.

### **Gujarat, Daman and Diu**

Gujarat coast is the northern part of west coast of India located between 20°00' - 24°45' N latitudes and 68°00' - 73°30' E longitudes. It is the longest coast amongst the nine coastal states of India. It is bounded by the Arabian Sea in the west and has two Gulfs i.e. Gulf of Khambhat aligned in N-S direction and Gulf of Kachchh aligned in the E-W direction. The tidal range upto 8-11 m is observed with strong tidal currents in the Gulf of Khambhat. These regions show wide intertidal zone. Tide dominating, wave dominating and fluvio-marine coastal processes have shaped the major coastal landforms viz., sub-tidal mudflats, inter-tidal mudflats, high-tidal mudflats, palaeo-mudflats, shoals, islands, salt flats, salt marshes, beaches, sand dunes, coastal plains, creeks, estuary, mangroves, coral reefs, coral islands, rocky/cliffy coasts etc. Besides the natural coastal processes, large industrial and developmental activities along the coast such as salt industries, cement industries, oil & natural gas exploration, brackish water aquaculture, ports and harbours is altering the coastal landforms, land use and land cover causing changes in the coastal dynamics and shoreline changes.

Shoreline change analysis is carried out along 1210 km of the Gujarat coast. The change analysis have avoided the coastal segments at major ports and harbours. Around 87% of the Gujarat coast is estimated to be in stable condition that accounts to about 1052 km. Erosion is estimated along 110 km while accretion is along 49 km. Figure 1 shows the shoreline change status of Gujarat coast. Gujarat state is estimated to have gained an area of 208 ha of land due to deposition of sediments while due to erosion, the state have lost an area of 313 ha. Details of erosion/accretion status at each SOI grid is given in Table 1.

The shoreline change analysis of Gujarat is carried out by dividing the entire coast into four sectors based on coastal processes, geological and geomorphological characteristics. The northern part comprises the Gulf of Kachchh region, followed by the Saurashtra coast, the Gulf of Khambhat coast and the South Gujarat coast.

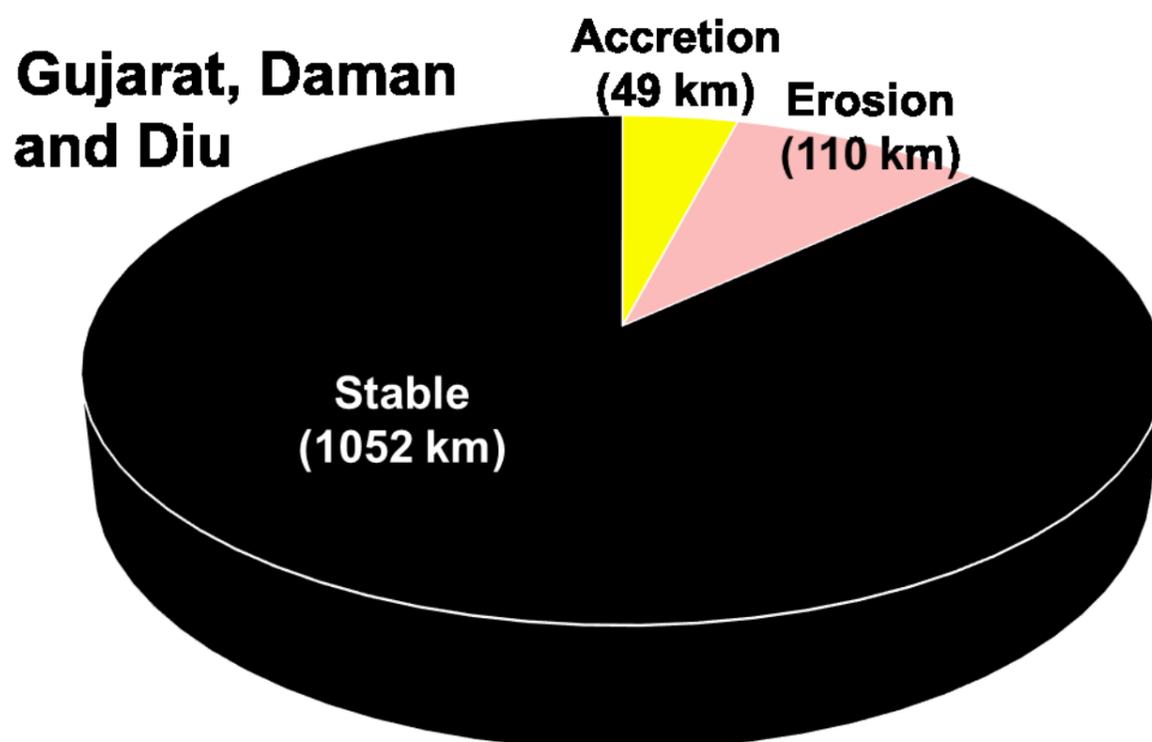


Figure 1: Shoreline change status of Gujarat, Daman and Diu

The Gulf of Kachchh is fringed with vast tidal mudflats and interleaving river/creek systems and tidal currents play vital role in the sediment transport. The coast north to Mandvi is subjected to wave activities from the open ocean. About 90% of the coast in this sector is stable. Erosion is along 20 km while accretion along 19 km of the coast within the Gulf of Kachchh region. Plate 1 shows the changes in the shoreline near Nana Bhadiya (41F05SE) to the west of Mundra. Along the northern coast of the Gulf of Kachchh erosions are observed to the south of Rukmavati River (41F05SW), near Mandvi (41F05SW), north of Kharod River (41F01SE), north of Nayaro River near Rapar Gadhvali (41A16SW). Erosion along the southern coast of Gulf of Kachchh is mainly observed at Rampar (41J05SE) and at Arambhada (41F03NW).

The rocky coast along the Saurashtra region is primarily unchanged with 96% of the coast estimated as stable. Minor shoreline changes are observed along the river/inlet mouths where 12 km of the coast is under erosion and only 9 km is under accretion. The shoreline change along the spit near Ghandvi (41G05SW) is shown in plate 2. The erosion along the Saurashtra coast is marginal and in patches along the coast at Baradia (41B16NE and 41F04SW), at the mouth of Hiran and Kapila River (41L05NE) and to the south of Doliya (41P09NE and 41O12SE).

The Gulf of Khambhat coast is eroding along 45 km, accretion is along 14 km and the coast is stable along 178 km. The coastal erosion to the northern bank of Narmada River at Ambheta (46C10NW) is shown in plate 3. Significant erosion is observed to the north of Kuda (46C06NW), at the coast of Vadgam (46B07SE) and to the north of Muradpor Neja (46B12NW). The other region subjected erosion are at Sartanpar (46C03SW), Mathavda (46C03SE and 46C03NE), Bhadbhediya (46C06SW), Rahtalav (46B08NW), Mirajpor (46C11SE) and at Dumas (46C12SE).

The South Gujarat coast have under gone significant erosion where 33 km of the total 107 km of the shoreline is under erosion. Accretion is along 8 km and 66 km of the coast is stable in nature. Plate 4 shows severe erosion to the north of Dandi (46D13NW). Severe erosions are along Borsi (46D13NW), Onjal (46D13SW), near Bhadeli Jagalala (46D14NW and 46D14NE) and at Kolak (46D15NW). Erosions along the South Gujarat coast are also observed to the north of Udwarda (46D15NW), Kalai (46D15SW), north of Umergaon (46D12NE) and at Govada (46D12NE).

Table 1: Mapsheet-wise results of shoreline changes for 2004-06 and 2014-16 time-frame for Gujarat, Daman and Diu coast

Serial No.	Map Sheet No.	Erosion Area (ha)	Erosion Length (km)	Accretion Area(ha)	Accretion Length (km)	Stable Length (km)	Total Length (km)
1	41A10NW	0.00	0.00	0.00	0.00	10.86	10.86
2	41A06SE	0.35	0.20	0.12	0.19	12.20	12.59
3	41A10SW	0.00	0.00	0.00	0.00	1.66	1.66
4	41A07NE	0.00	0.00	0.00	0.00	0.73	0.73
5	41A11NW	0.43	0.26	0.00	0.00	8.97	9.24
6	41A11SW	0.00	0.00	0.00	0.00	0.38	0.38
7	41A11SE	0.00	0.00	0.00	0.00	6.55	6.55
8	41A12NW	3.55	1.01	1.49	0.99	6.22	8.21
9	41A12NE	1.15	0.18	1.63	0.60	9.59	10.37
10	41A12SE	0.00	0.00	0.00	0.00	6.23	6.23
11	41A16SW	7.29	4.09	0.00	0.00	10.36	14.45
12	41A16SE	0.00	0.00	0.52	0.20	4.25	4.45
13	41I12SW	2.20	1.06	0.41	0.22	4.09	5.37
14	41B13NE	1.58	0.00	0.00	0.00	9.30	9.30
15	41F01NW	0.12	0.10	0.00	0.00	14.29	14.38
16	41F01NE	0.00	0.00	0.00	0.00	0.49	0.49
17	41F13NE	6.30	0.78	0.63	0.49	4.87	6.15
18	41J05NE	0.00	0.00	0.00	0.00	3.16	3.16
19	41J09NW	1.06	0.05	0.00	0.00	5.27	5.33
20	41F01SE	0.38	0.39	1.04	0.75	11.44	12.58
21	41F05SW	2.61	1.81	5.28	1.98	9.01	12.80
22	41F05SE	4.87	1.83	1.93	0.75	10.11	12.69
23	41F09SW	9.43	2.03	35.88	3.78	0.26	6.07
24	41F09SE	0.00	0.00	0.00	0.00	0.32	0.32
25	41F13SW	2.17	1.26	24.14	1.04	7.33	9.63

26	41J05SE	2.72	1.64	0.00	0.00	4.33	5.96
27	41J02NE	0.00	0.00	0.00	0.00	3.23	3.23
28	41J06NW	0.17	0.27	3.41	1.85	3.20	5.33
29	41F14SE	0.00	0.00	0.00	0.00	5.52	5.52
30	41J02SW	2.41	0.40	0.00	0.00	5.78	6.18
31	41J02SE	1.06	0.43	5.24	1.35	9.89	11.67
32	41B15NE	0.00	0.00	0.00	0.00	7.26	7.26
33	41F03NW	3.92	1.36	0.00	0.00	43.56	44.93
34	41F03NE	0.43	0.29	0.06	0.00	25.00	25.29
35	41F11NE	0.00	0.00	0.00	0.00	3.82	3.82
36	41F15NW	1.44	0.45	0.00	0.00	4.97	5.42
37	41F15NE	0.00	0.00	0.00	0.00	12.61	12.61
38	41B15SE	0.55	0.36	0.00	0.00	16.07	16.42
39	41F03SE	0.00	0.00	0.00	0.00	10.72	10.72
40	41F07SW	0.00	0.00	3.95	1.75	13.15	14.90
41	41F07SE	0.52	0.16	5.56	2.13	19.99	22.28
42	46B11SW	4.90	1.45	6.44	0.93	10.94	13.31
43	41F11SW	0.00	0.00	1.03	0.48	22.80	23.28
44	46B07SE	27.49	8.36	0.76	0.25	6.15	14.75
45	41F11SE	0.00	0.00	0.00	0.00	1.71	1.71
46	46B07SW	0.00	0.00	0.00	0.00	8.20	8.20
47	41B16NE	1.78	1.66	0.00	0.00	6.93	8.59
48	41F04NW	2.32	1.90	0.00	0.00	8.14	10.03
49	46B12NE	0.00	0.00	0.00	0.00	2.84	2.84
50	46B12NW	27.02	8.04	0.15	0.08	5.19	13.31
51	46B08NW	8.24	1.09	0.00	0.00	8.82	9.91
52	46B04NE	0.00	0.00	0.00	0.00	7.32	7.32
53	41F04SW	0.00	0.00	0.00	0.00	10.08	10.08
54	41F04SE	0.00	0.00	0.00	0.00	8.15	8.15
55	46B12SW	6.35	0.91	0.00	0.01	8.81	9.73
56	46B04SE	0.52	0.24	2.86	0.34	20.70	21.28
57	41G01NE	0.00	0.00	0.05	0.08	10.55	10.63
58	41G05NW	0.00	0.00	0.00	0.00	8.27	8.27
59	46C01NE	0.00	0.00	0.00	0.00	0.57	0.57
60	41G05SW	3.82	1.75	2.48	0.45	6.37	8.56
61	41G05SE	2.30	1.15	0.25	0.14	10.70	11.99
62	41G06NE	0.00	0.00	0.00	0.00	6.36	6.36
63	46C10NW	19.99	5.81	30.82	4.59	6.34	16.74
64	41G10NW	0.18	0.00	2.63	0.68	15.51	16.19
65	46C06NW	17.99	2.27	1.05	0.41	6.96	9.63
66	46C10SE	0.00	0.00	0.00	0.00	3.99	3.99
67	41G10SW	0.00	0.00	0.00	0.00	1.43	1.43
68	41G10SE	0.35	0.00	2.34	0.42	17.08	17.50
69	46C06SW	4.45	2.66	0.22	0.17	12.49	15.32
70	46C11NE	7.37	1.62	2.31	0.79	8.33	10.74
71	41G11NE	0.00	0.00	0.00	0.00	1.67	1.67
72	46C07NW	0.00	0.00	0.00	0.00	0.98	0.98
73	41G15NW	2.21	0.42	0.00	0.00	15.77	16.18
74	46C03NE	2.46	1.13	1.71	1.39	14.26	16.78
75	46C11SE	7.25	3.54	0.12	0.11	7.82	11.47
76	46C11SW	0.00	0.00	0.00	0.00	1.54	1.54
77	41G15SW	0.00	0.00	0.00	0.00	3.86	3.86
78	46C03SE	0.86	0.62	0.38	0.20	5.78	6.59
79	41G15SE	0.00	0.00	0.00	0.00	14.03	14.03
80	46C03SW	4.14	2.76	2.05	1.53	5.92	10.21
81	46C12NE	3.10	1.46	0.40	0.37	12.39	14.22
82	41G16NE	0.00	0.00	0.00	0.00	6.27	6.27
83	46C04NW	0.71	0.47	2.41	1.03	22.40	23.90
84	41K04NW	0.43	0.13	0.00	0.00	12.48	12.61
85	41O16NE	0.00	0.00	1.69	1.35	2.77	4.12
86	46C12SE	4.95	2.22	16.47	4.01	9.37	15.59
87	46C12SW	0.00	0.00	0.00	0.00	1.55	1.55
88	41K04SW	0.00	0.00	0.00	0.00	5.80	5.80

89	41O16SE	0.00	0.00	0.00	0.00	13.45	13.45
90	41K04SE	0.00	0.00	2.24	0.89	13.83	14.72
91	41O16SW	0.38	0.21	0.95	0.78	22.43	23.42
92	41O12SE	0.11	0.21	0.00	0.00	8.92	9.14
93	46D13NW	24.81	7.25	3.70	0.79	3.29	11.33
94	46D09NE	0.01	0.00	0.00	0.00	5.38	5.38
95	41L01NE	1.44	0.39	0.00	0.00	2.40	2.78
96	41L05NW	0.00	0.00	0.67	0.14	15.42	15.56
97	41P09NE	1.18	0.95	1.96	0.53	7.44	8.92
98	41L05NE	1.56	0.37	10.60	1.77	2.67	4.81
99	41P09NW	0.65	0.51	3.00	0.19	13.57	14.27
100	41P05NE	0.00	0.00	0.00	0.00	8.50	8.50
101	46D13SW	12.00	5.32	2.29	1.73	4.32	11.37
102	41L05SE	0.95	0.53	0.35	0.17	11.20	11.90
103	41L09SW	0.82	0.51	0.38	0.00	16.08	16.59
104	41P05SE	0.00	0.00	0.00	0.00	9.69	9.69
105	41L09SE	0.40	0.18	0.14	0.07	6.92	7.18
106	41P05SW	0.00	0.00	0.00	0.00	16.98	16.98
107	41P01SE	1.78	0.23	2.49	0.53	15.12	15.88
108	41P01SW	0.00	0.00	0.00	0.00	5.16	5.16
109	46D14NE	10.09	2.19	0.00	0.00	0.38	2.57
110	46D14NW	10.03	3.34	0.00	0.00	5.40	8.75
111	41L10NE	0.00	0.00	0.00	0.00	7.76	7.76
112	41L14NW	0.61	0.34	0.00	0.00	17.01	17.35
113	41L14NE	1.50	0.54	0.00	0.00	20.25	20.78
114	41P02NW	0.00	0.00	0.00	0.00	11.56	11.56
115	46D14SE	2.71	1.68	6.40	2.06	10.24	13.99
116	46D15NE	0.88	0.21	0.00	0.00	0.00	0.21
117	46D15NW	8.74	3.74	1.56	1.05	10.47	15.26
118	46D15SW	8.16	4.37	0.61	0.37	12.94	17.68
119	46D11SE	0.00	0.00	0.50	0.22	0.83	1.05
120	46D16NW	0.00	0.00	0.00	0.00	0.25	0.25
121	46D12NE	6.90	4.62	0.00	0.01	8.15	12.78
	<b>Total</b>	<b>313.6</b>	<b>109.7</b>	<b>207.8</b>	<b>49.2</b>	<b>1051.5</b>	<b>1210.4</b>

## 5. END USE

Coastal management plans require a proper understanding of the coastal processes and coastal dynamics to achieve a sustainable development along the coastal region. The inventory of shoreline change is the pre-requisite in understanding the dynamics of the coastal region. As the Indian coastal regions are modified by mounting development activities, an improper management at times shall lead to severe coastal erosion. Planning measures for sustainable development along the coastal region require a systematic inventory of shoreline changes occurring along the entire Indian coast on 1: 25,000 scale.

The Atlas can be used as a reference material for obtaining information on status of shoreline changes during 2004-06 and 2014-16 time-frames along entire Indian coastline. Areas under coastal erosion and status of coastal protection measures taken up by respective maritime State and Union Territory are depicted and can be used for planning coastal protection measures.

The Atlas is extremely useful to Coastal Management Directorate, Central Water Commission for providing guidance towards coastal protection works in maritime states of India.

All the State Public Works Departments, Ports and Harbour Authorities, Coastal Regulation Zone Authorities shall be able to have better management of the shorelines in respective states.

## **ACKNOWLEDGEMENTS**

We would like to place on record our deep sense of gratitude to Shri Shri N. M. Desai, Director, Space Applications Centre, Ahmedabad for supporting this as an important activity. We are highly grateful to Dr. Raj Kumar, Director, NRSC, Hyderabad for providing guidance, encouragement and support for this work. We are thankful to Dr. I. M. Bahuguna, Deputy Director, Earth, Ocean, Atmosphere, Planetary Sciences and Applications Area (EPSA) and Dr. R. P. Singh Group Director, Geo-Sciences, Hydrology, Cryosphere Sciences & Applications Group (GHCAG) for coordinating the work of preparation of these Atlases.

We express special thanks to the Chairman and Members of Coastal Protection and Development Advisory Committee (CPDAC) for necessary support. We express deep gratefulness to the Director, Coastal Management Directorate, Central Water Commission, Ministry of Water Resources for his full support for this work and in organizing collection of coastal protection measures data from all the maritime States and U.T. of India.

We are highly grateful to the quality check team Shri T.V.R Murthy, Shri J.G Patel, Shri R.J Bhanderi, Shri B.P Rathore and Shri Manish Parmar for meticulously checking the shoreline change database and giving invaluable suggestion towards improving the same. We express our sincere gratitude to Ms. Savita Kumari and Ms. Anupama Sahoo for helping us in the map composition and database management.

Project team  
Shoreline Change Atlas

## REFERENCES

Nayak, S. R., Bahuguna, A., Shaikh, M., Rao, R. S., Trivedi, C. R., Prasad, K. N., Kadri, S. A., Vaidya, P. H., Patel, V. B., Oza, S. H., Patel, S. S., Rao, T. A., Shereiff, A. N. and Suresh, P. V., 1991, *Manual for mapping of coastal wetlands/landforms and shoreline changes using satellite data*: Technical Note, IRS-UP/SAC/MCE/TN/32/91 (Space Applications Centre, Ahmedabad), 63 p.

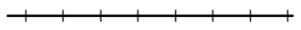
NCSCM, 2015, Manual on demarcation of High Tide Line and Low Tide Line and preparation of CZMP of the Coast of India. NCSCM Technical Report Series, 23 B.

Rajawat, A. S., Chauhan, H.B., Ratheesh, R., Rode, S., Bhanderi, R.J., Mahapatra, M., Mohit Kumar., Yadav, R., Abraham, S.P., Singh, S.S., Keshri, K.N and Ajai, 2015. Assessment of coastal erosion along the Indian coast on 1: 25,000 scale using satellite data of 1989–1991 and 2004–2006 time frames. *Curr. Sci.*, 109(2), 347–353.

SAC, 2014, Shore Line Change Atlas of the Indian Coast, Six volumes, SAC/EPISA/GSAG/GSD/A/01/14, May, 2014

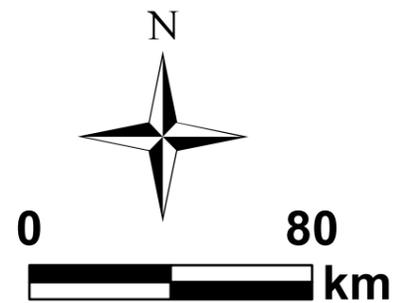
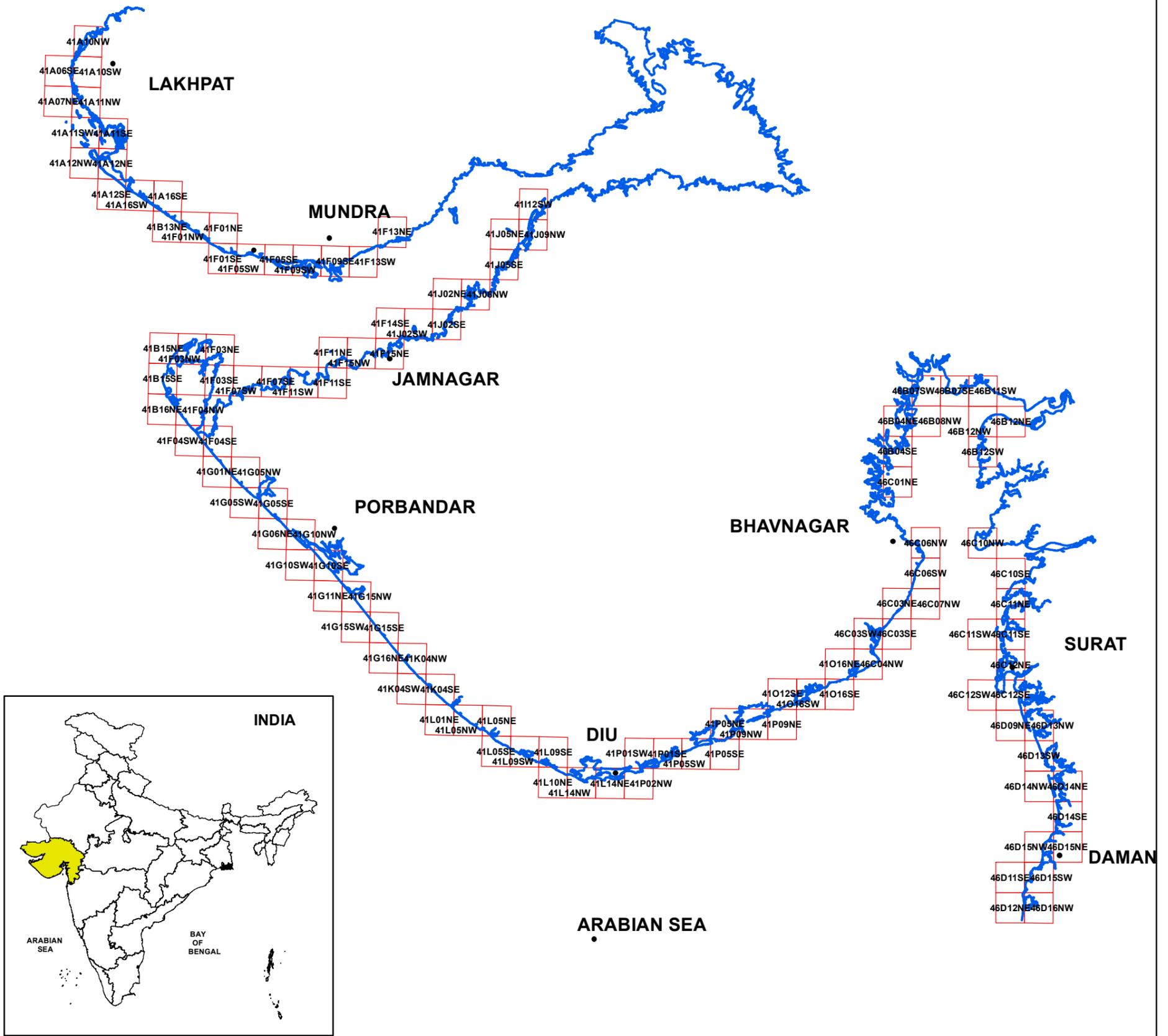
# **SHORELINE CHANGE MAPS**

# COMPLETE LEGEND TO SHORELINE CHANGE MAPS

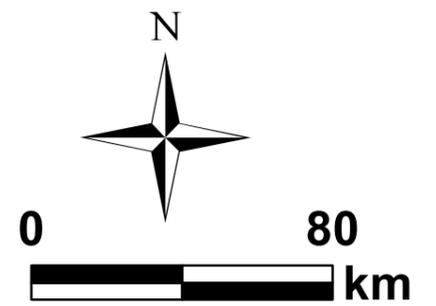
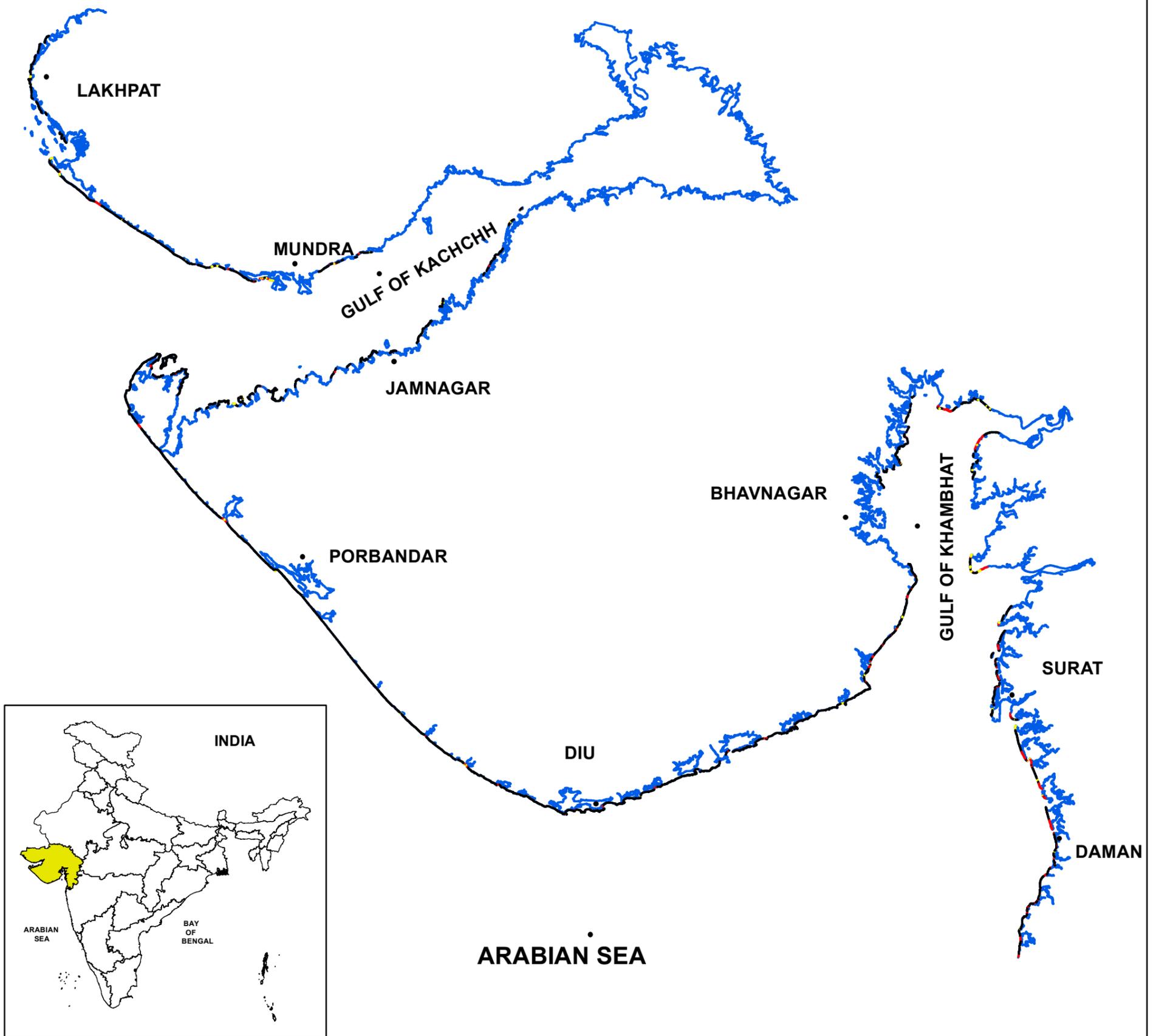
	EROSION
	ACCRETION
	HIGH-TIDE LINE 2014-16
	HIGH-TIDE LINE 2004-06
	STABLE
	ROAD
	RAILWAY
	SEA WALL
	GROYNES
	BREAKWATER
	JETTY
	STATE BOUNDARY
	PORT/HARBOUR
	HABITATION

**SHORELINE CHANGE MAPS**  
**GUJARAT, DAMAN AND DIU**

# INDEX MAP OF GUJARAT



# SHORELINE CHANGES OF GUJARAT



# SHORELINE CHANGE MAP

FOR OFFICIAL USE ONLY

KACHCHH DISTRICT

GUJARAT

SHEET NO. 41A10NW



## Legend

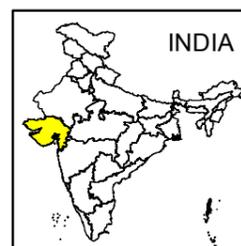
- HIGH-TIDE LINE 2014-16
- HIGH-TIDE LINE 2004-06
- STABLE
- ROAD
- JETTY
- HABITATION

## INDEX TO SHEETS

41A05SE	41A09SW	41A09SE
41A06NE	41A10NW	41A10NE
41A06SE	41A10SW	41A10SE



0 2 km



DATA SOURCE:  
IRS LISS4 IMAGES OF 2004-06 & 2014-16

PREPARED BY:  
SPACE APPLICATIONS CENTRE, ISRO, AHMEDABAD  
AND CENTRAL WATER COMMISSION, NEW DELHI



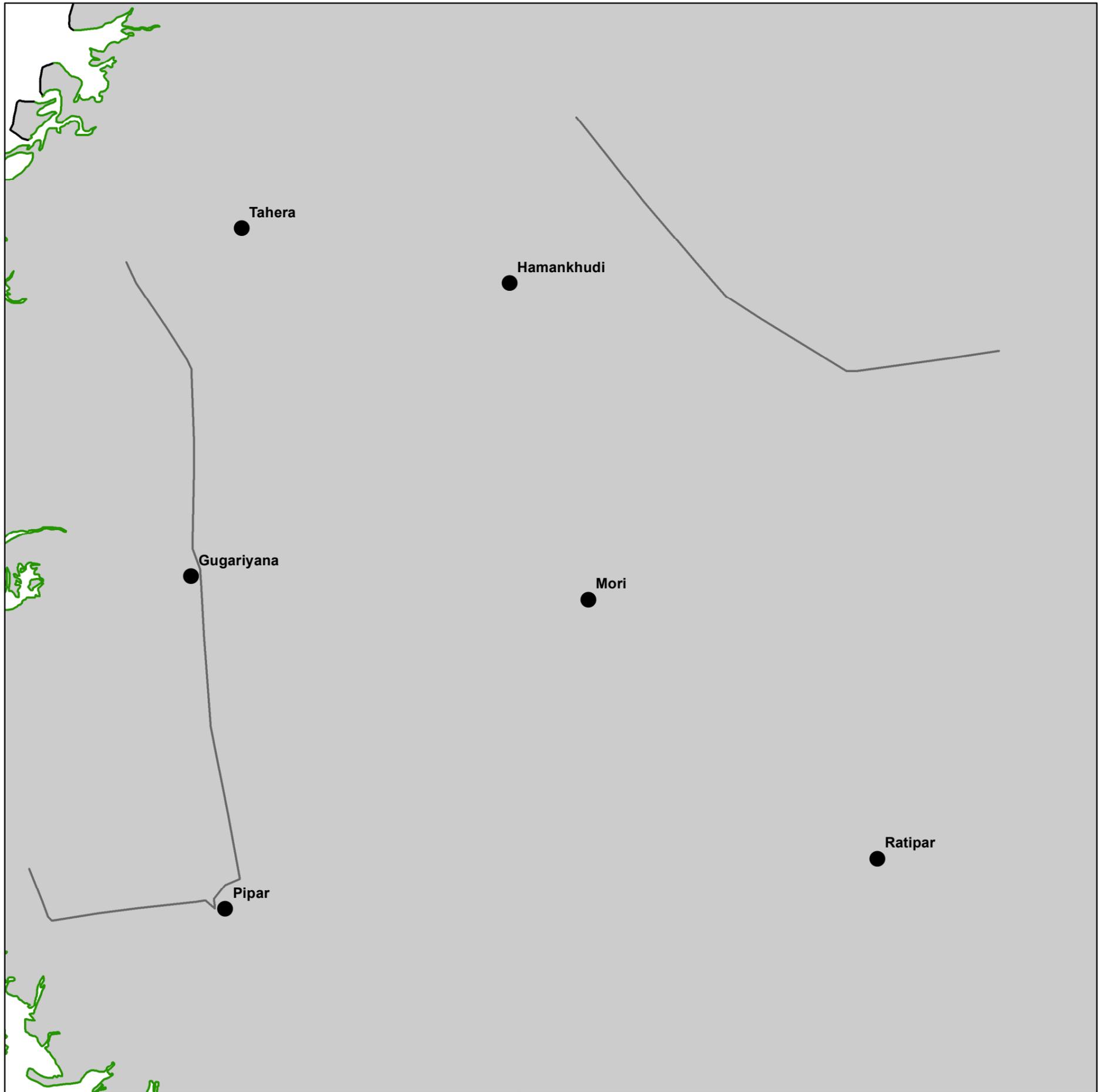
# SHORELINE CHANGE MAP

FOR OFFICIAL USE ONLY

KACHCHH DISTRICT

GUJARAT

SHEET NO. 41A10SW



## Legend

- HIGH-TIDE LINE 2014-16
- HIGH-TIDE LINE 2004-06
- STABLE
- ROAD
- HABITATION

## INDEX TO SHEETS

41A06NE	41A10NW	41A10NE
41A06SE	41A10SW	41A10SE
41A07NE	41A11NW	41A11NE



DATA SOURCE:  
IRS LISS4 IMAGES OF 2004-06 & 2014-16

PREPARED BY:  
SPACE APPLICATIONS CENTRE, ISRO, AHMEDABAD  
AND CENTRAL WATER COMMISSION, NEW DELHI



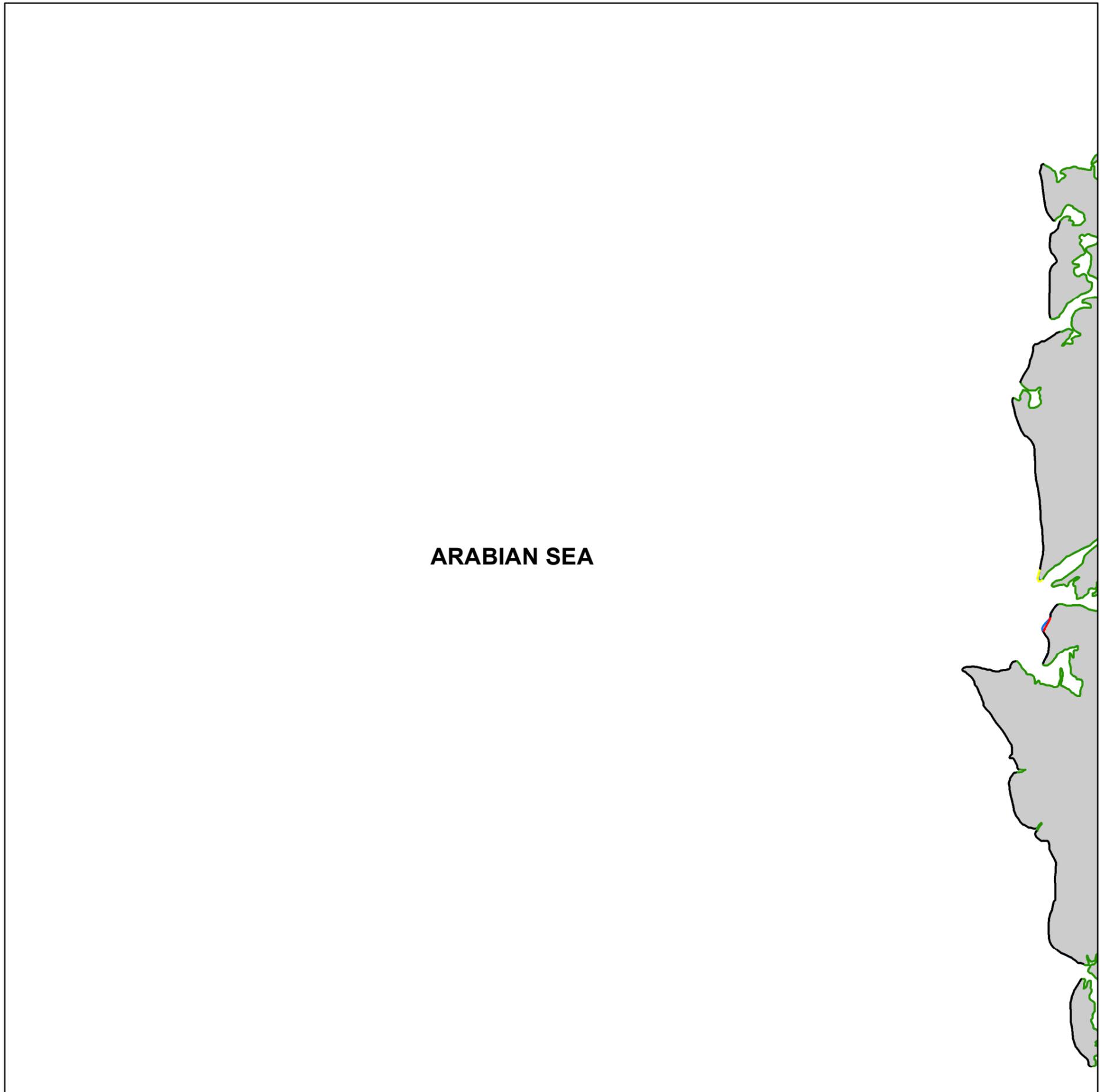
# SHORELINE CHANGE MAP

FOR OFFICIAL USE ONLY

KACHCHH DISTRICT

GUJARAT

SHEET NO. 41A06SE



ARABIAN SEA

### Legend

- EROSION
- ACCRETION
- HIGH-TIDE LINE 2014-16
- HIGH-TIDE LINE 2004-06
- STABLE

### INDEX TO SHEETS

41A06NW	41A06NE	41A10NW
41A06SW	41A06SE	41A10SW
SEA	41A07NE	41A11NW



DATA SOURCE:  
IRS LISS4 IMAGES OF 2004-06 & 2014-16

PREPARED BY:  
SPACE APPLICATIONS CENTRE, ISRO, AHMEDABAD  
AND CENTRAL WATER COMMISSION, NEW DELHI



# SHORELINE CHANGE MAP

FOR OFFICIAL USE ONLY

KACHCHH DISTRICT

GUJARAT

SHEET NO. 41A07NE

ARABIAN SEA

## Legend

-  HIGH-TIDE LINE 2014-16
-  HIGH-TIDE LINE 2004-06
-  STABLE



0 2 km



## INDEX TO SHEETS

41A06SW	41A06SE	41A10SW
SEA	41A07NE	41A11NW
SEA	41A07SE	41A11SW



DATA SOURCE:  
IRS LISS4 IMAGES OF 2004-06 & 2014-16

PREPARED BY:  
SPACE APPLICATIONS CENTRE, ISRO, AHMEDABAD  
AND CENTRAL WATER COMMISSION, NEW DELHI



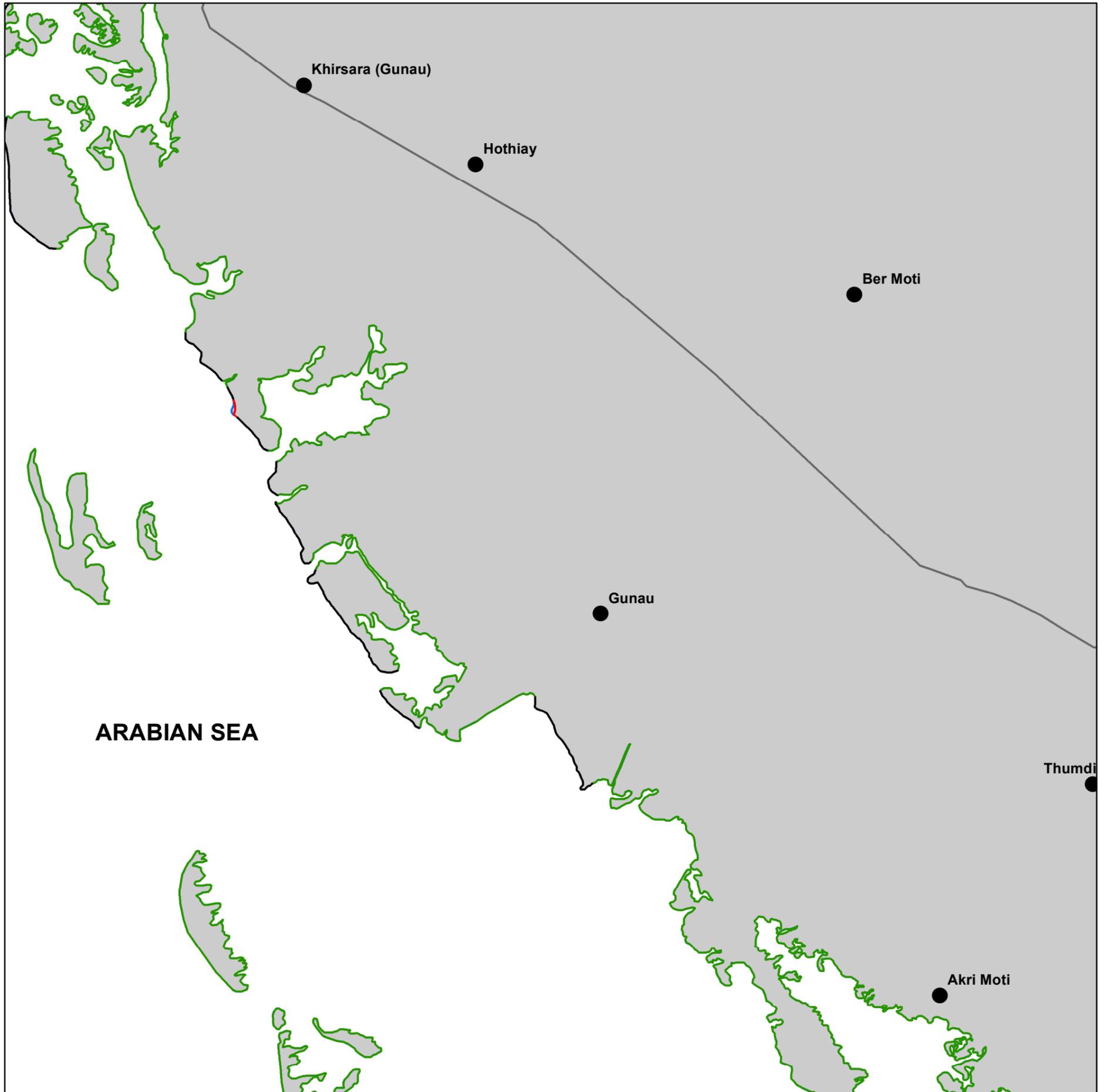
# SHORELINE CHANGE MAP

FOR OFFICIAL USE ONLY

KACHCHH DISTRICT

GUJARAT

SHEET NO. 41A11NW



## Legend

-  EROSION
-  HIGH-TIDE LINE 2014-16
-  HIGH-TIDE LINE 2004-06
-  STABLE
-  ROAD
-  HABITATION

## INDEX TO SHEETS

41A06SE	41A10SW	41A10SE
41A07NE	41A11NW	41A11NE
41A07SE	41A11SW	41A11SE



0 2 km



DATA SOURCE:  
IRS LISS4 IMAGES OF 2004-06 & 2014-16

PREPARED BY:  
SPACE APPLICATIONS CENTRE, ISRO, AHMEDABAD  
AND CENTRAL WATER COMMISSION, NEW DELHI



# SHORELINE CHANGE MAP

FOR OFFICIAL USE ONLY

KACHCHH DISTRICT

GUJARAT

SHEET NO. 41A11SW



### Legend

- HIGH-TIDE LINE 2014-16
- HIGH-TIDE LINE 2004-06
- STABLE

### INDEX TO SHEETS

41A07NE	41A11NW	41A11NE
41A07SE	41A11SW	41A11SE
SEA	41A12NW	41A12NE



0 2 km



DATA SOURCE:  
IRS LISS4 IMAGES OF 2004-06 & 2014-16

PREPARED BY:  
SPACE APPLICATIONS CENTRE, ISRO, AHMEDABAD  
AND CENTRAL WATER COMMISSION, NEW DELHI



# SHORELINE CHANGE MAP

FOR OFFICIAL USE ONLY

KACHCHH DISTRICT

GUJARAT

SHEET NO. 41A11SE



## Legend

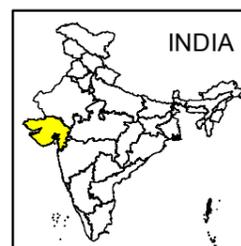
- HIGH-TIDE LINE 2014-16
- HIGH-TIDE LINE 2004-06
- STABLE
- ROAD
- JETTY
- HABITATION

## INDEX TO SHEETS

41A11NW	41A11NE	41A15NW
41A11SW	41A11SE	41A15SW
41A12NW	41A12NE	41A16NW



0 2 km



DATA SOURCE:  
IRS LISS4 IMAGES OF 2004-06 & 2014-16

PREPARED BY:  
SPACE APPLICATIONS CENTRE, ISRO, AHMEDABAD  
AND CENTRAL WATER COMMISSION, NEW DELHI



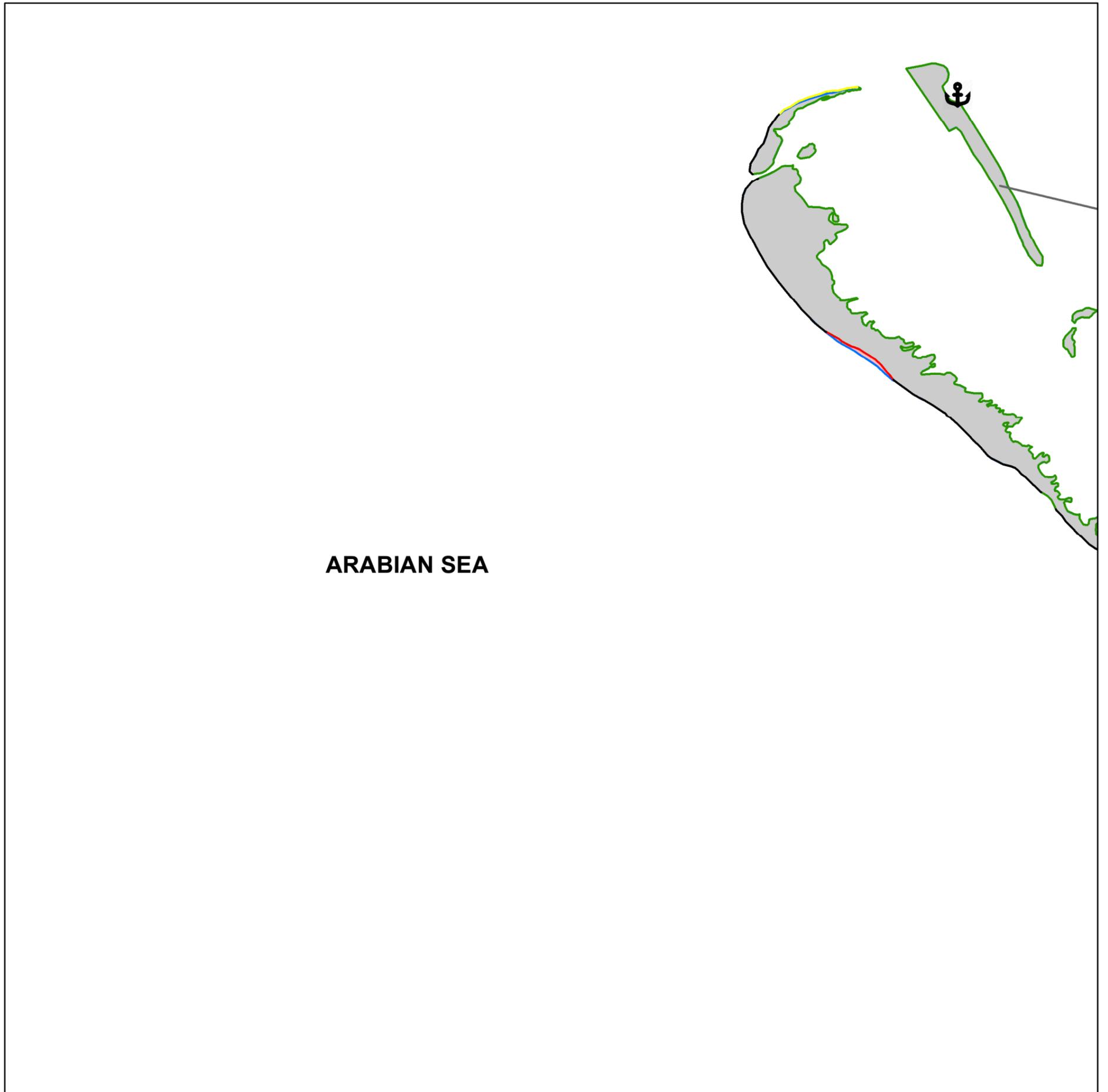
# SHORELINE CHANGE MAP

FOR OFFICIAL USE ONLY

KACHCHH DISTRICT

GUJARAT

SHEET NO. 41A12NW



## Legend

- EROSION
- ACCRETION
- HIGH-TIDE LINE 2014-16
- HIGH-TIDE LINE 2004-06
- STABLE
- PORT/HARBOUR

## INDEX TO SHEETS

41A07SE	41A11SW	41A11SE
SEA	41A12NW	41A12NE
SEA	SEA	41A12SE



DATA SOURCE:  
IRS LISS4 IMAGES OF 2004-06 & 2014-16

PREPARED BY:  
SPACE APPLICATIONS CENTRE, ISRO, AHMEDABAD  
AND CENTRAL WATER COMMISSION, NEW DELHI



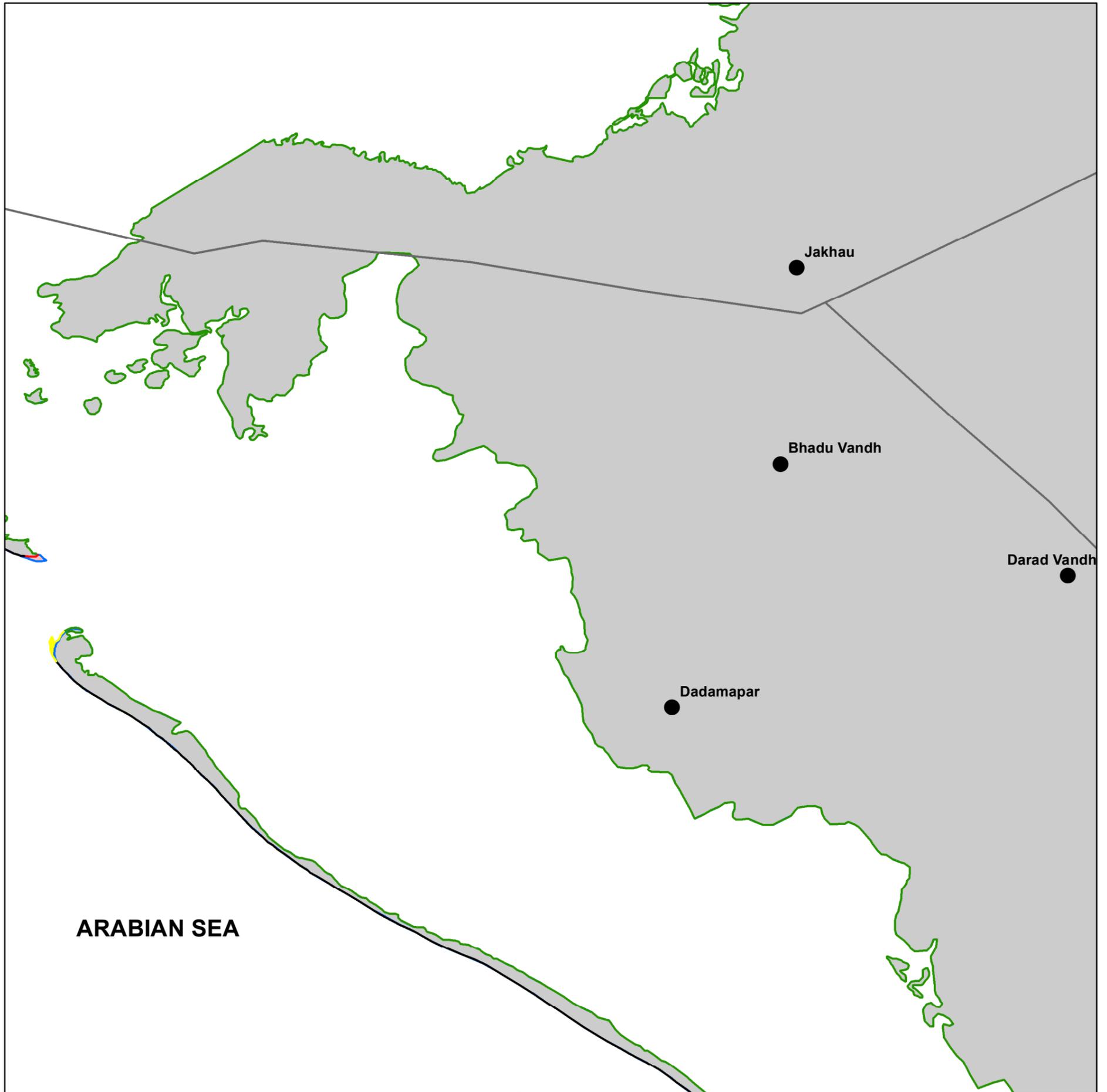
# SHORELINE CHANGE MAP

FOR OFFICIAL USE ONLY

KACHCHH DISTRICT

GUJARAT

SHEET NO. 41A12NE



## Legend

- EROSION
- ACCRETION
- HIGH-TIDE LINE 2014-16
- HIGH-TIDE LINE 2004-06
- STABLE
- ROAD
- HABITATION

## INDEX TO SHEETS

41A11SW	41A11SE	41A15SW
41A12NW	41A12NE	41A16NW
SEA	41A12SE	41A16SW



0 2 km



DATA SOURCE:  
IRS LISS4 IMAGES OF 2004-06 & 2014-16

PREPARED BY:  
SPACE APPLICATIONS CENTRE, ISRO, AHMEDABAD  
AND CENTRAL WATER COMMISSION, NEW DELHI



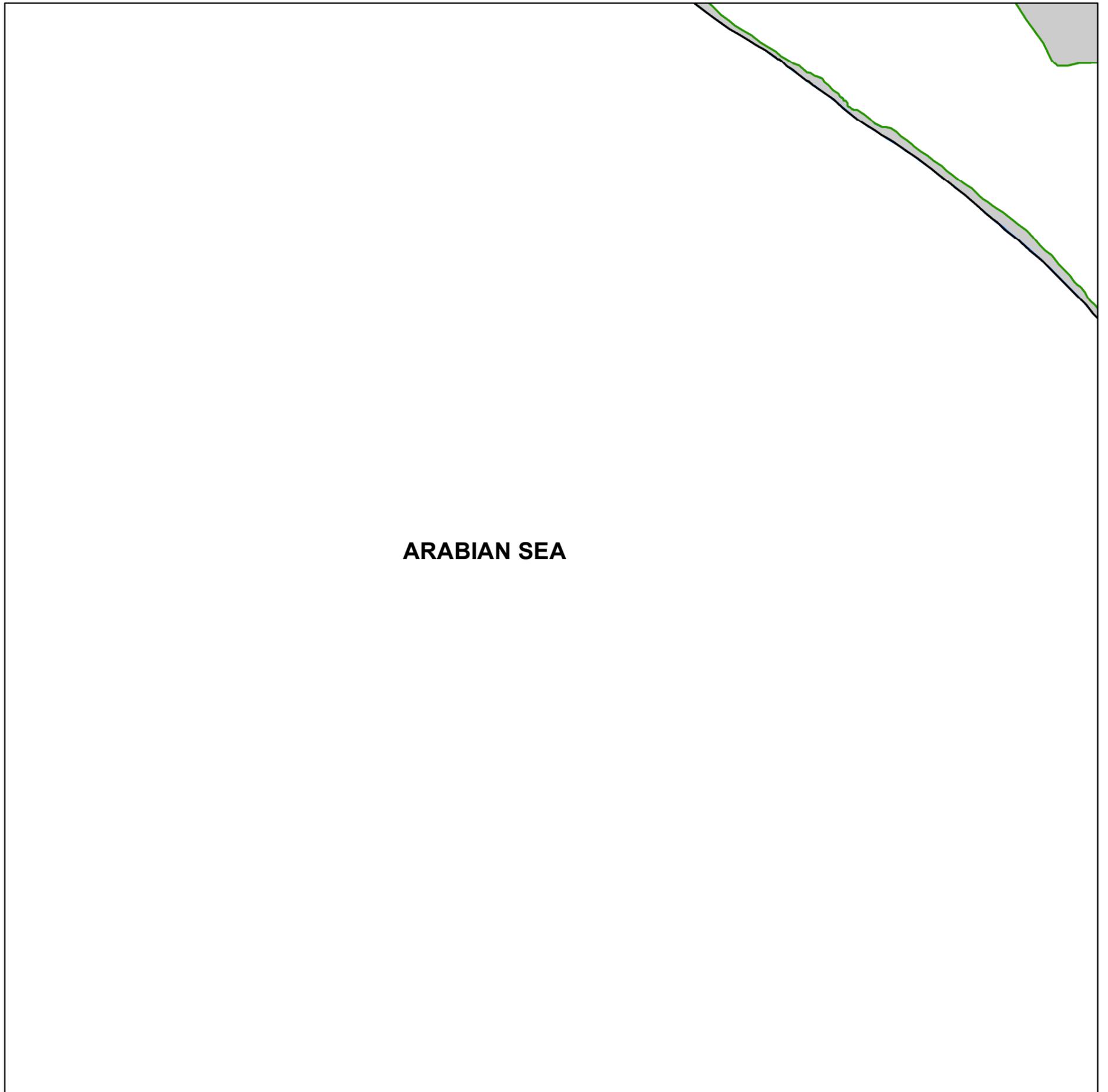
# SHORELINE CHANGE MAP

FOR OFFICIAL USE ONLY

KACHCHH DISTRICT

GUJARAT

SHEET NO. 41A12SE



ARABIAN SEA

### Legend

-  HIGH-TIDE LINE 2014-16
-  HIGH-TIDE LINE 2004-06
-  STABLE

### INDEX TO SHEETS

41A12NW	41A12NE	41A16NW
SEA	41A12SE	41A16SW
SEA	SEA	SEA



DATA SOURCE:  
IRS LISS4 IMAGES OF 2004-06 & 2014-16

PREPARED BY:  
SPACE APPLICATIONS CENTRE, ISRO, AHMEDABAD  
AND CENTRAL WATER COMMISSION, NEW DELHI



# SHORELINE CHANGE MAP

FOR OFFICIAL USE ONLY

KACHCHH DISTRICT

GUJARAT

SHEET NO. 41A16SW



ARABIAN SEA

## Legend

- █ EROSION
- HIGH-TIDE LINE 2014-16
- HIGH-TIDE LINE 2004-06
- STABLE
- ROAD
- HABITATION

## INDEX TO SHEETS

41A12NE	41A16NW	41A16NE
41A12SE	41A16SW	41A16SE
SEA	SEA	41B13NE



0 2 km



DATA SOURCE:  
IRS LISS4 IMAGES OF 2004-06 & 2014-16

PREPARED BY:  
SPACE APPLICATIONS CENTRE, ISRO, AHMEDABAD  
AND CENTRAL WATER COMMISSION, NEW DELHI



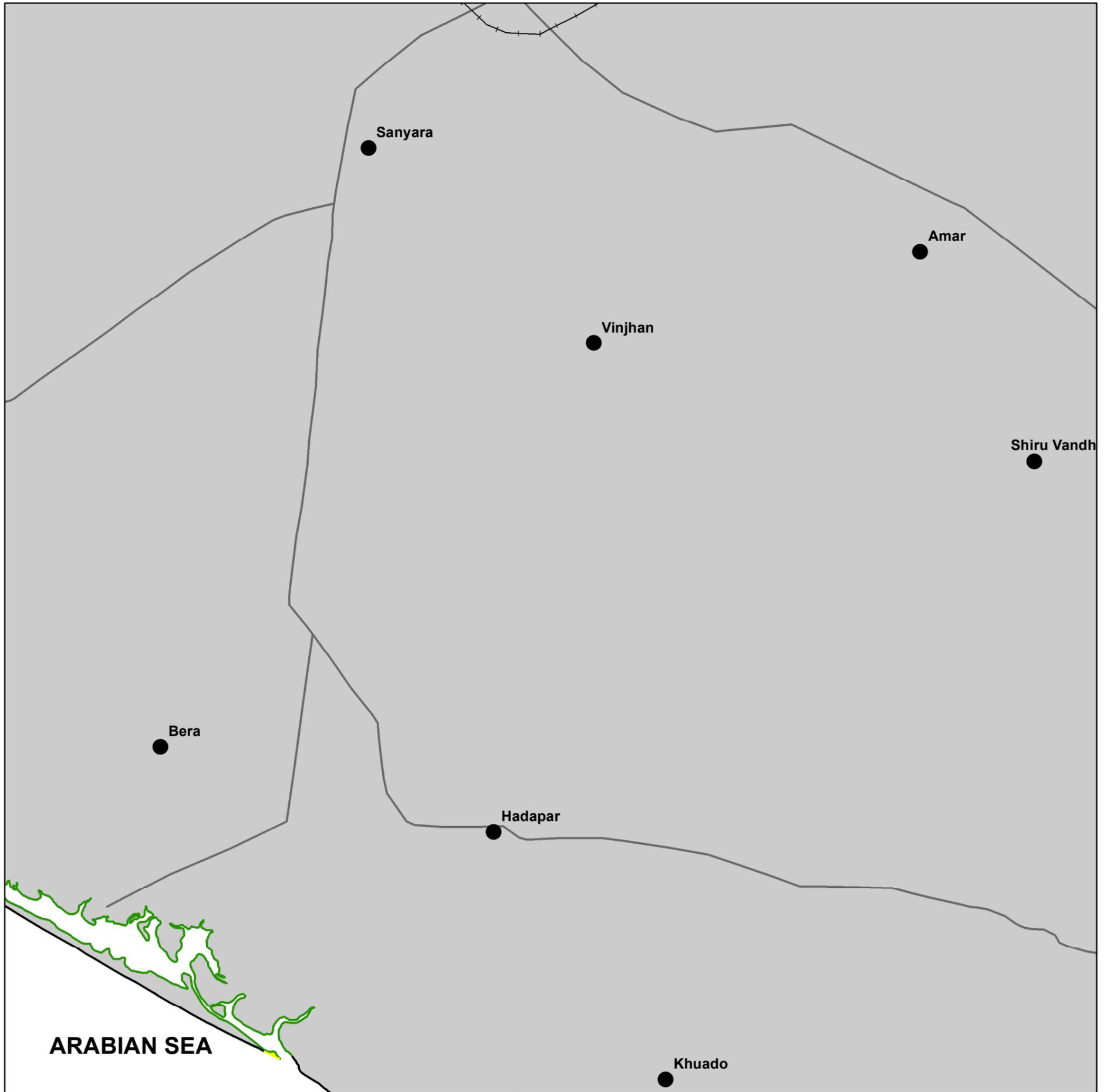
# SHORELINE CHANGE MAP

FOR OFFICIAL USE ONLY

KACHCHH DISTRICT

GUJARAT

SHEET NO. 41A16SE



## Legend

- ACCRETION
- HIGH-TIDE LINE 2014-16
- HIGH-TIDE LINE 2004-06
- STABLE
- ROAD
- RAILWAY
- HABITATION

## INDEX TO SHEETS

41A16NW	41A16NE	41E04NW
41A16SW	41A16SE	41E04SW
SEA	41B13NE	41F01NW



0 2 km



DATA SOURCE:  
IRS LISS4 IMAGES OF 2004-06 & 2014-16

PREPARED BY:  
SPACE APPLICATIONS CENTRE, ISRO, AHMEDABAD  
AND CENTRAL WATER COMMISSION, NEW DELHI



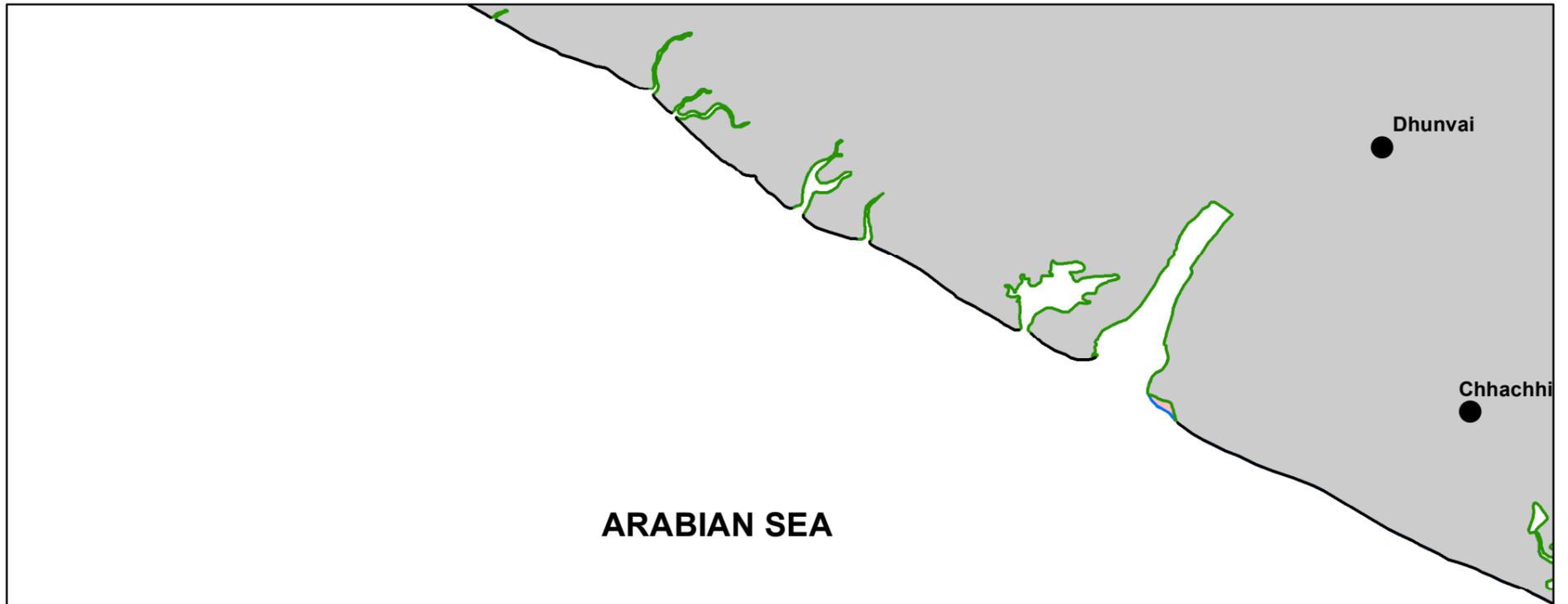
# SHORELINE CHANGE MAP

FOR OFFICIAL USE ONLY

KACHCHH DISTRICT

GUJARAT

SHEET NO. 41B13NE

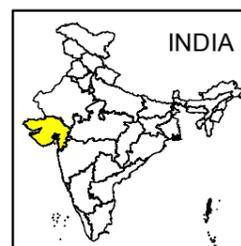


## Legend

- EROSION
- HIGH-TIDE LINE 2014-16
- HIGH-TIDE LINE 2004-06
- STABLE
- HABITATION

## INDEX TO SHEETS

41A16SW	41A16SE	41E04SW
SEA	41B13NE	41F01NW
SEA	SEA	SEA



DATA SOURCE:  
IRS LISS4 IMAGES OF 2004-06 & 2014-16

PREPARED BY:  
SPACE APPLICATIONS CENTRE, ISRO, AHMEDABAD  
AND CENTRAL WATER COMMISSION, NEW DELHI



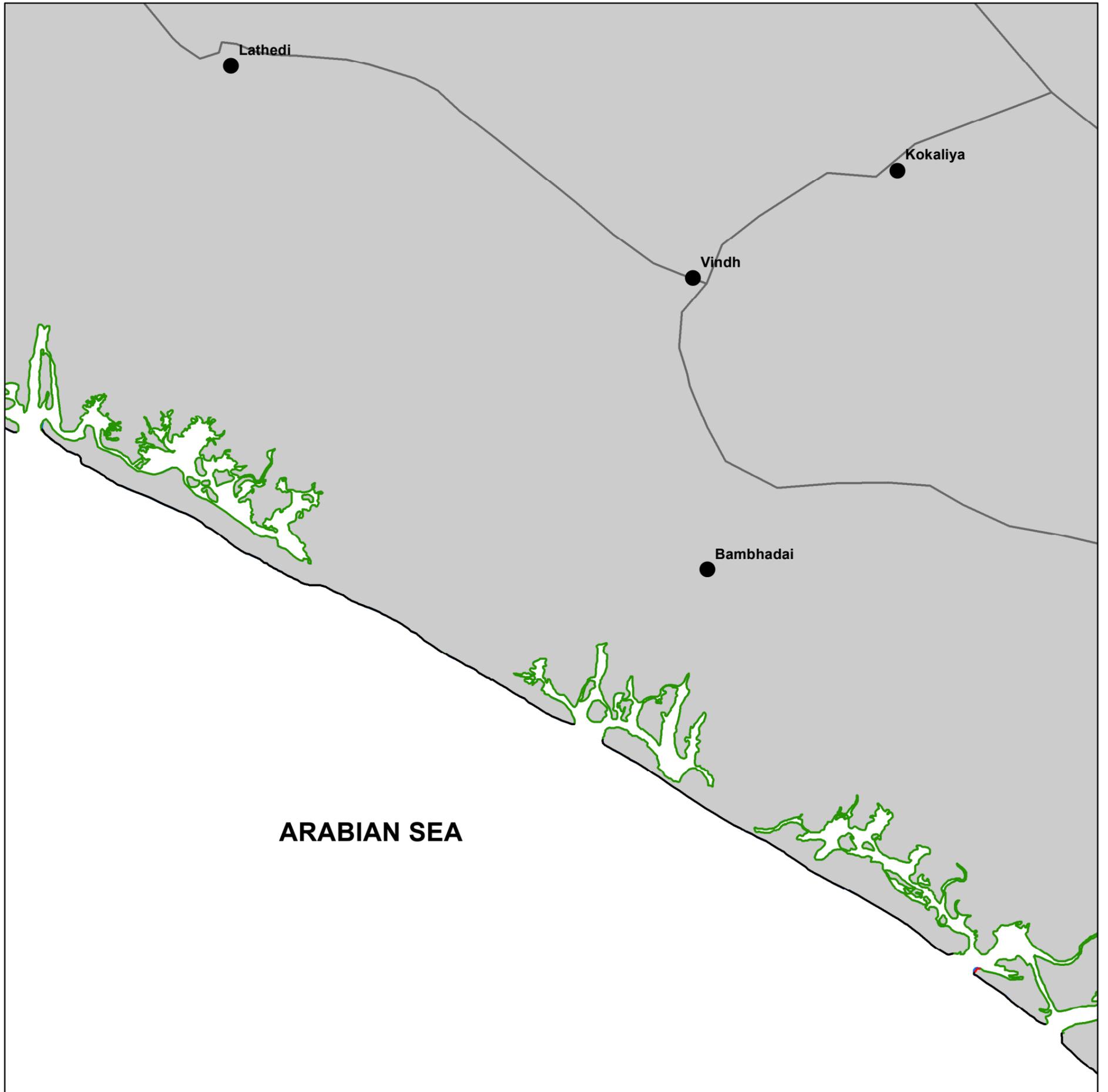
# SHORELINE CHANGE MAP

FOR OFFICIAL USE ONLY

KACHCHH DISTRICT

GUJARAT

SHEET NO. 41F01NW



### Legend

- █ EROSION
- █ HIGH-TIDE LINE 2014-16
- █ HIGH-TIDE LINE 2004-06
- STABLE
- ROAD
- HABITATION

### INDEX TO SHEETS

41A16SE	41E04SW	41E04SE
41B13NE	41F01NW	41F01NE
SEA	SEA	41F01SE



DATA SOURCE:  
IRS LISS4 IMAGES OF 2004-06 & 2014-16

PREPARED BY:  
SPACE APPLICATIONS CENTRE, ISRO, AHMEDABAD  
AND CENTRAL WATER COMMISSION, NEW DELHI



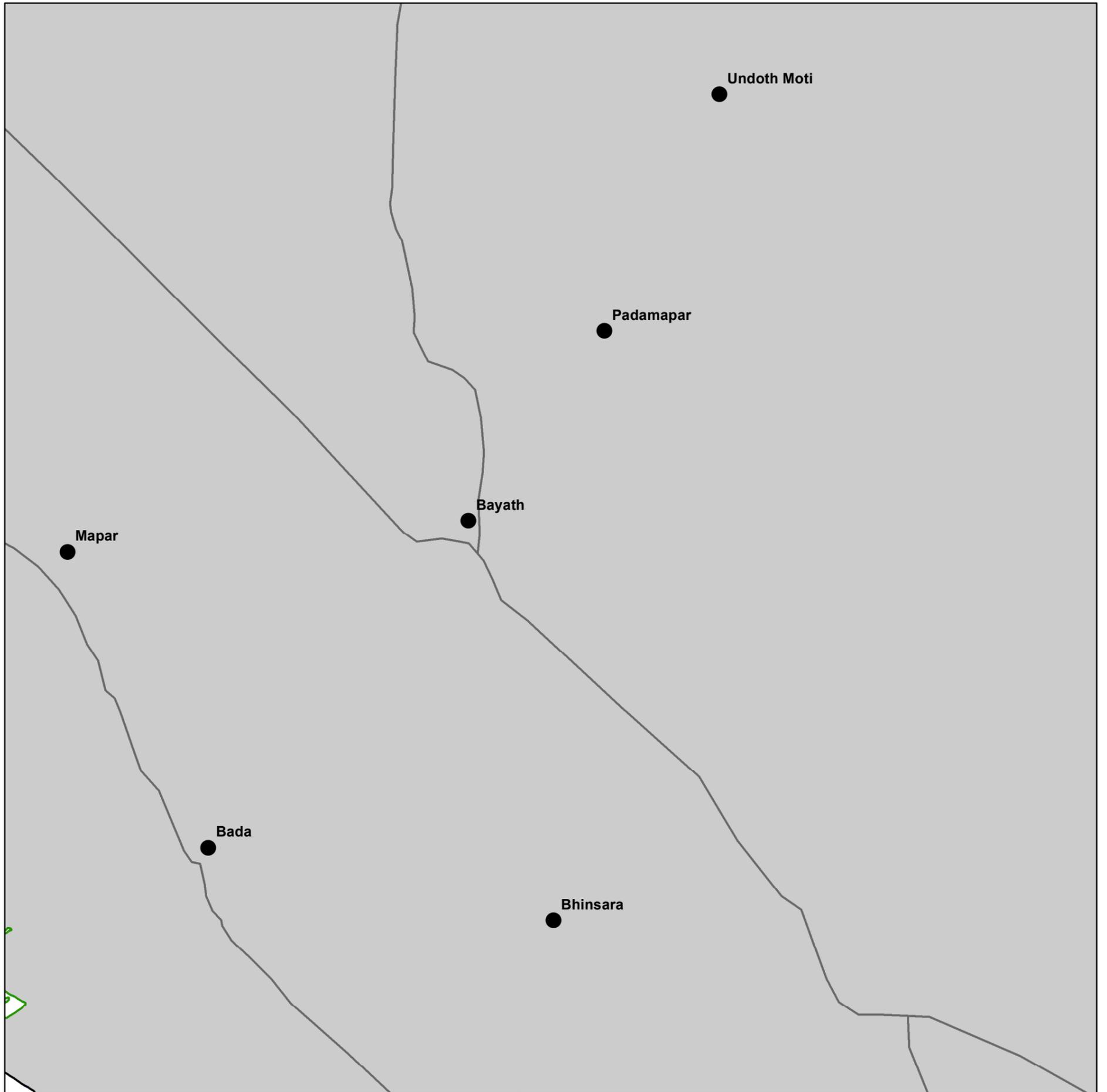
# SHORELINE CHANGE MAP

FOR OFFICIAL USE ONLY

KACHCHH DISTRICT

GUJARAT

SHEET NO. 41F01NE



### Legend

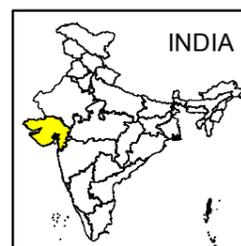
- HIGH-TIDE LINE 2014-16
- HIGH-TIDE LINE 2004-06
- STABLE
- ROAD
- HABITATION

### INDEX TO SHEETS

41E04SW	41E04SE	41E08SW
41F01NW	41F01NE	41F05NW
SEA	41F01SE	41F05SW



0 2 km



DATA SOURCE:  
IRS LISS4 IMAGES OF 2004-06 & 2014-16

PREPARED BY:  
SPACE APPLICATIONS CENTRE, ISRO, AHMEDABAD  
AND CENTRAL WATER COMMISSION, NEW DELHI



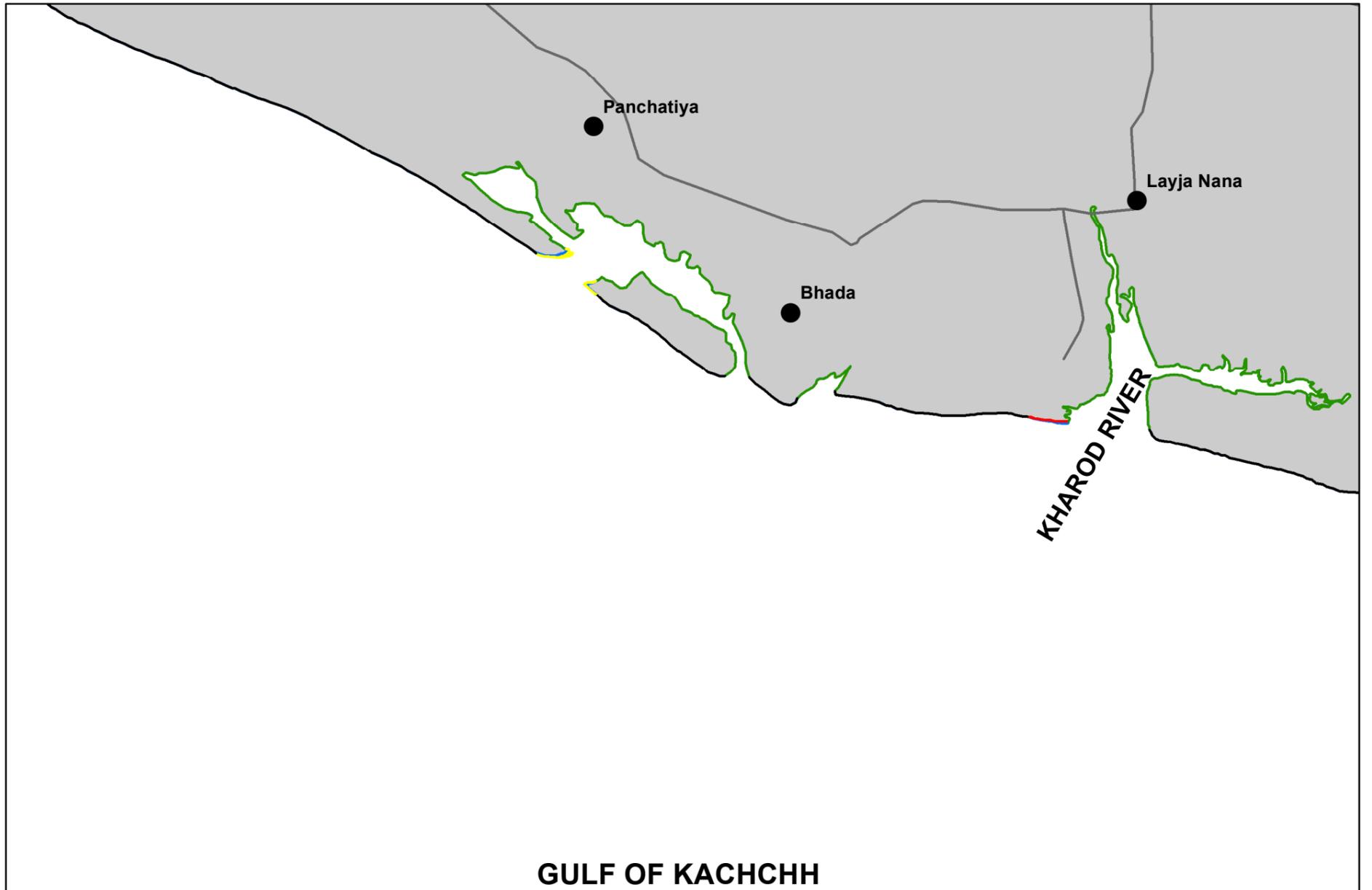
# SHORELINE CHANGE MAP

FOR OFFICIAL USE ONLY

KACHCHH DISTRICT

GUJARAT

SHEET NO. 41F01SE



GULF OF KACHCHH

### Legend

- EROSION
- ACCRETION
- HIGH-TIDE LINE 2014-16
- HIGH-TIDE LINE 2004-06
- STABLE
- ROAD
- HABITATION

### INDEX TO SHEETS

41F01NW	41F01NE	41F05NW
SEA	41F01SE	41F05SW
SEA	SEA	SEA



0 2 km



DATA SOURCE:  
IRS LISS4 IMAGES OF 2004-06 & 2014-16

PREPARED BY:  
SPACE APPLICATIONS CENTRE, ISRO, AHMEDABAD  
AND CENTRAL WATER COMMISSION, NEW DELHI



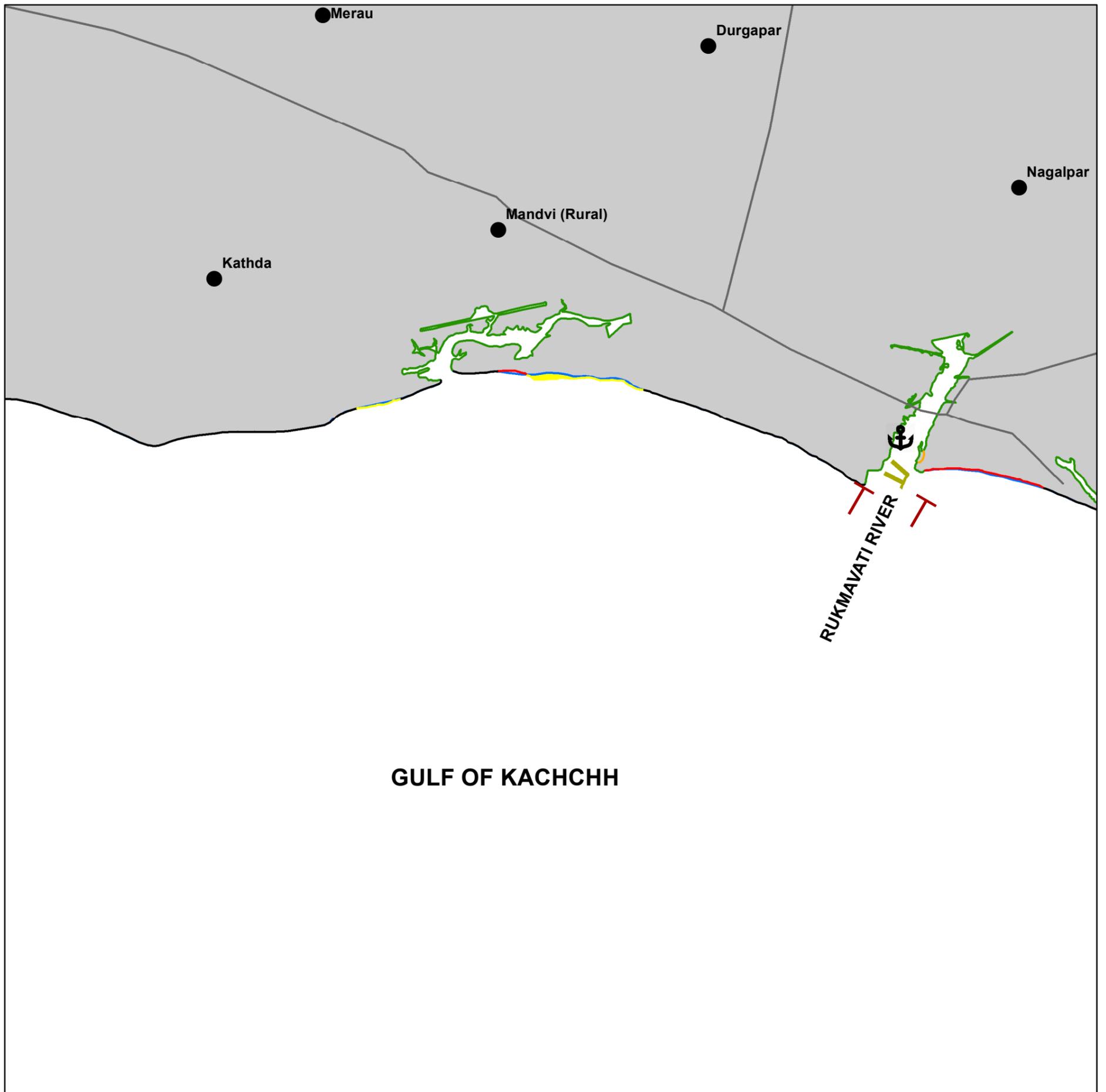
# SHORELINE CHANGE MAP

FOR OFFICIAL USE ONLY

KACHCHH DISTRICT

GUJARAT

SHEET NO. 41F05SW



GULF OF KACHCHH

## Legend

- EROSION
- ACCRETION
- HIGH-TIDE LINE 2014-16
- HIGH-TIDE LINE 2004-06
- STABLE
- ROAD
- SEA WALL
- GROYNES
- BREAKWATER
- PORT/HARBOUR
- HABITATION

## INDEX TO SHEETS

41F01NE	41F05NW	41F05NE
41F01SE	41F05SW	41F05SE
SEA	SEA	SEA



0 2 km



DATA SOURCE:  
IRS LISS4 IMAGES OF 2004-06 & 2014-16

PREPARED BY:  
SPACE APPLICATIONS CENTRE, ISRO, AHMEDABAD  
AND CENTRAL WATER COMMISSION, NEW DELHI



# SHORELINE CHANGE MAP

FOR OFFICIAL USE ONLY

KACHCHH DISTRICT

GUJARAT

SHEET NO. 41F05SE



GULF OF KACHCHH

## Legend

- EROSION
- ACCRETION
- HIGH-TIDE LINE 2014-16
- HIGH-TIDE LINE 2004-06
- STABLE
- ROAD
- HABITATION

## INDEX TO SHEETS

41F05NW	41F05NE	41F09NW
41F05SW	41F05SE	41F09SW
SEA	SEA	41F10NW



0 2 km



DATA SOURCE:  
IRS LISS4 IMAGES OF 2004-06 & 2014-16

PREPARED BY:  
SPACE APPLICATIONS CENTRE, ISRO, AHMEDABAD  
AND CENTRAL WATER COMMISSION, NEW DELHI



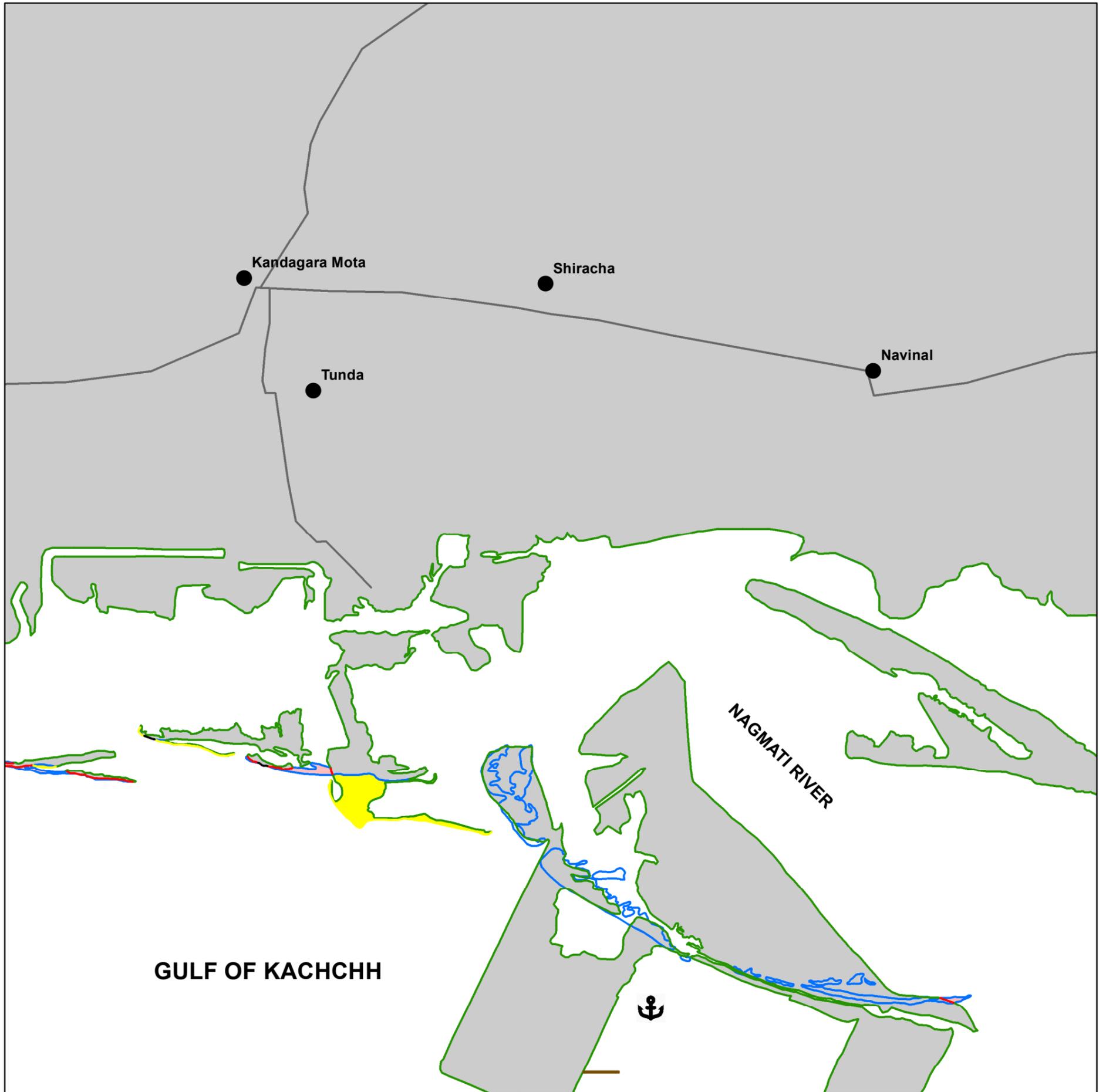
# SHORELINE CHANGE MAP

FOR OFFICIAL USE ONLY

KACHCHH DISTRICT

GUJARAT

SHEET NO. 41F09SW



### Legend

- EROSION
- ACCRETION
- HIGH-TIDE LINE 2014-16
- HIGH-TIDE LINE 2004-06
- STABLE
- ROAD
- JETTY
- PORT/HARBOUR
- HABITATION

### INDEX TO SHEETS

41F05NE	41F09NW	41F09NE
41F05SE	41F09SW	41F09SE
SEA	41F10NW	41F10NE



0 2 km



DATA SOURCE:  
IRS LISS4 IMAGES OF 2004-06 & 2014-16

PREPARED BY:  
SPACE APPLICATIONS CENTRE, ISRO, AHMEDABAD  
AND CENTRAL WATER COMMISSION, NEW DELHI



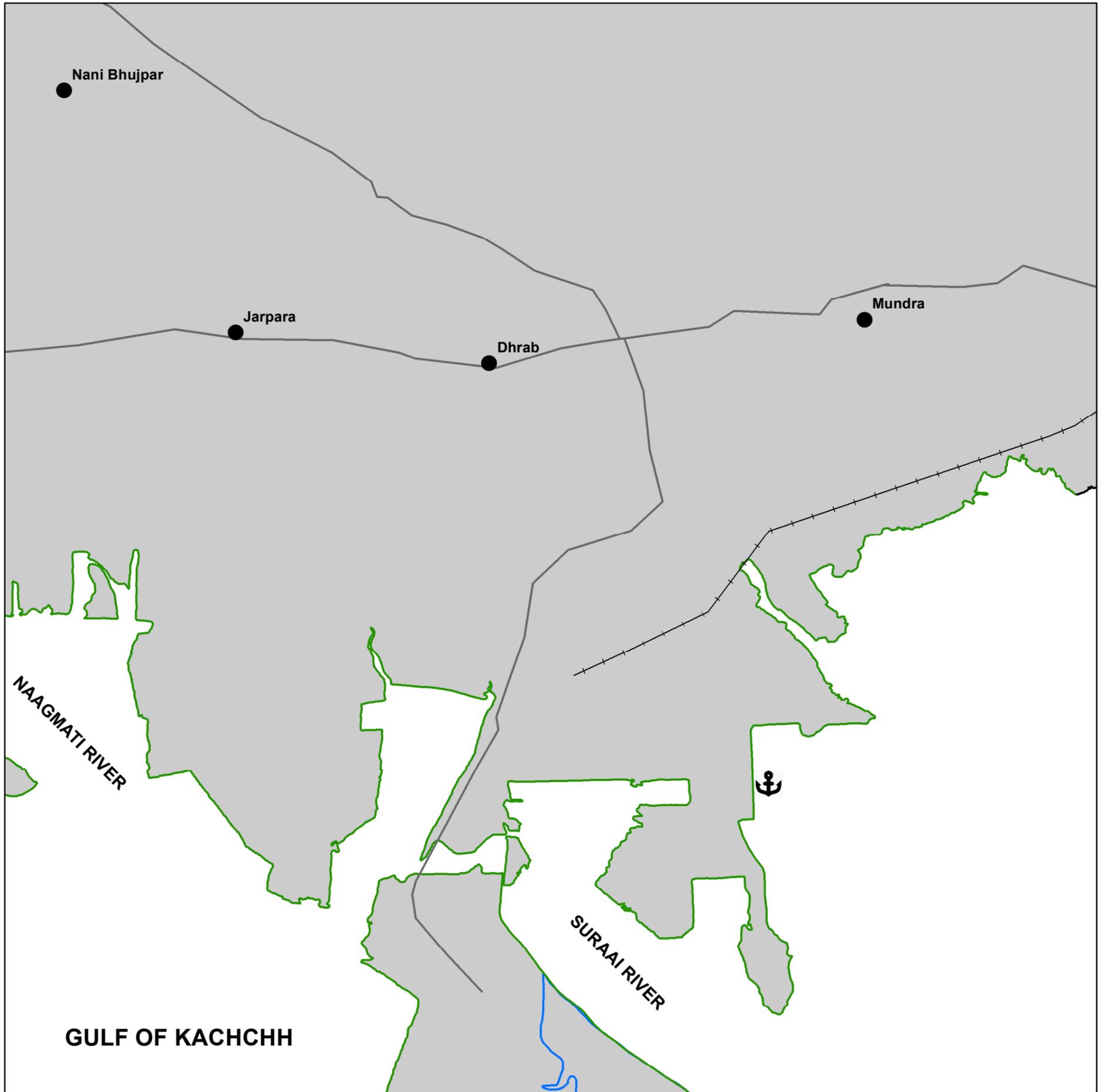
# SHORELINE CHANGE MAP

FOR OFFICIAL USE ONLY

KACHCHH DISTRICT

GUJARAT

SHEET NO. 41F09SE



### Legend

- HIGH-TIDE LINE 2014-16
- HIGH-TIDE LINE 2004-06
- STABLE
- ROAD
- +— RAILWAY
- |— PORT/HARBOUR
- HABITATION

### INDEX TO SHEETS

41F09NW	41F09NE	41F13NW
41F09SW	41F09SE	41F13SW
41F10NW	41F10NE	SEA



0 2 km



DATA SOURCE:  
IRS LISS4 IMAGES OF 2004-06 & 2014-16

PREPARED BY:  
SPACE APPLICATIONS CENTRE, ISRO, AHMEDABAD  
AND CENTRAL WATER COMMISSION, NEW DELHI



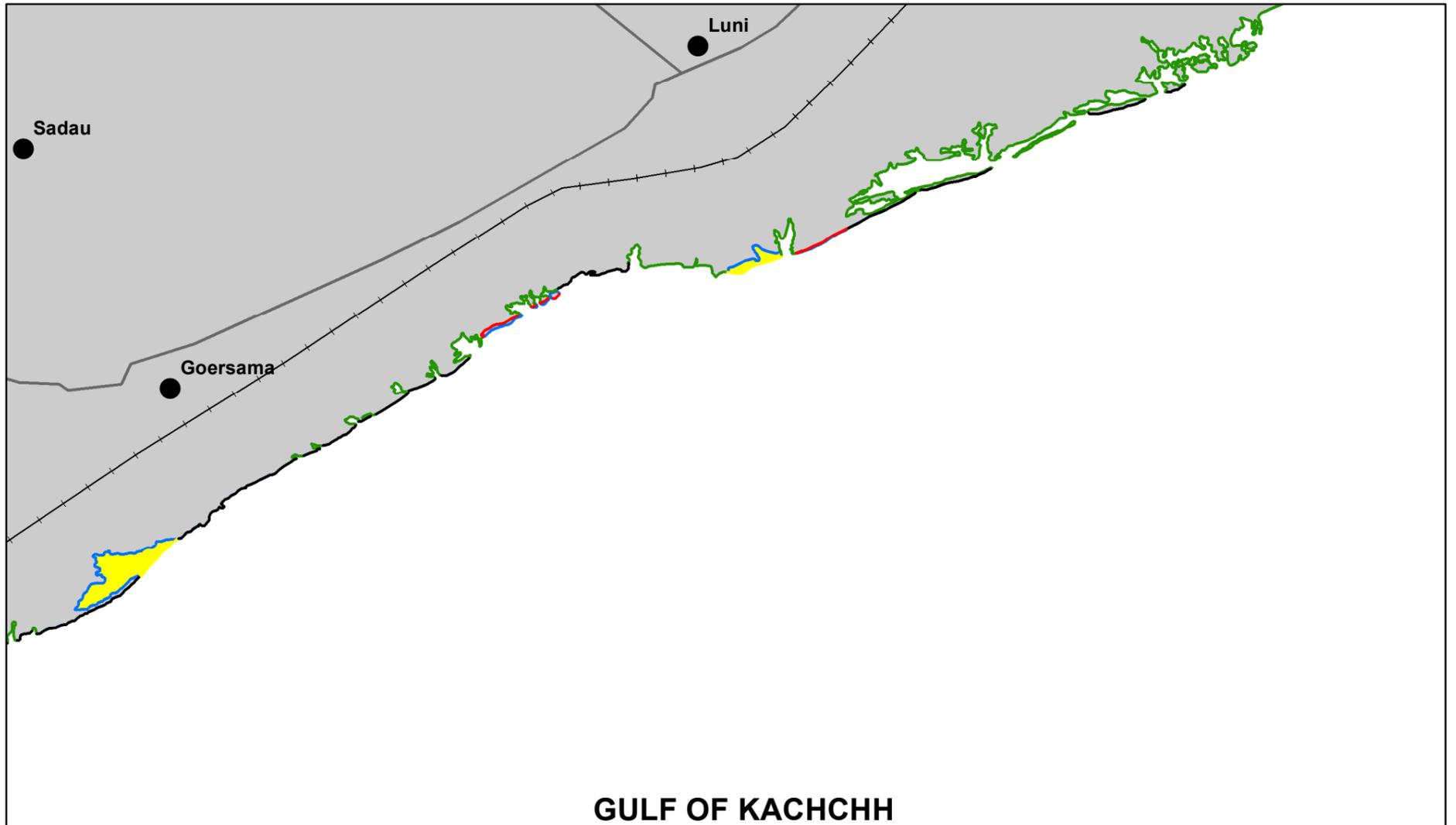
# SHORELINE CHANGE MAP

FOR OFFICIAL USE ONLY

KACHCHH DISTRICT

GUJARAT

SHEET NO. 41F13SW



## Legend

- EROSION
- ACCRETION
- HIGH-TIDE LINE 2014-16
- HIGH-TIDE LINE 2004-06
- STABLE
- ROAD
- RAILWAY
- HABITATION

## INDEX TO SHEETS

41F09NE	41F13NW	41F13NE
41F09SE	41F13SW	41F13SE
41F10NE	SEA	SEA



0 2 km



DATA SOURCE:  
IRS LISS4 IMAGES OF 2004-06 & 2014-16

PREPARED BY:  
SPACE APPLICATIONS CENTRE, ISRO, AHMEDABAD  
AND CENTRAL WATER COMMISSION, NEW DELHI



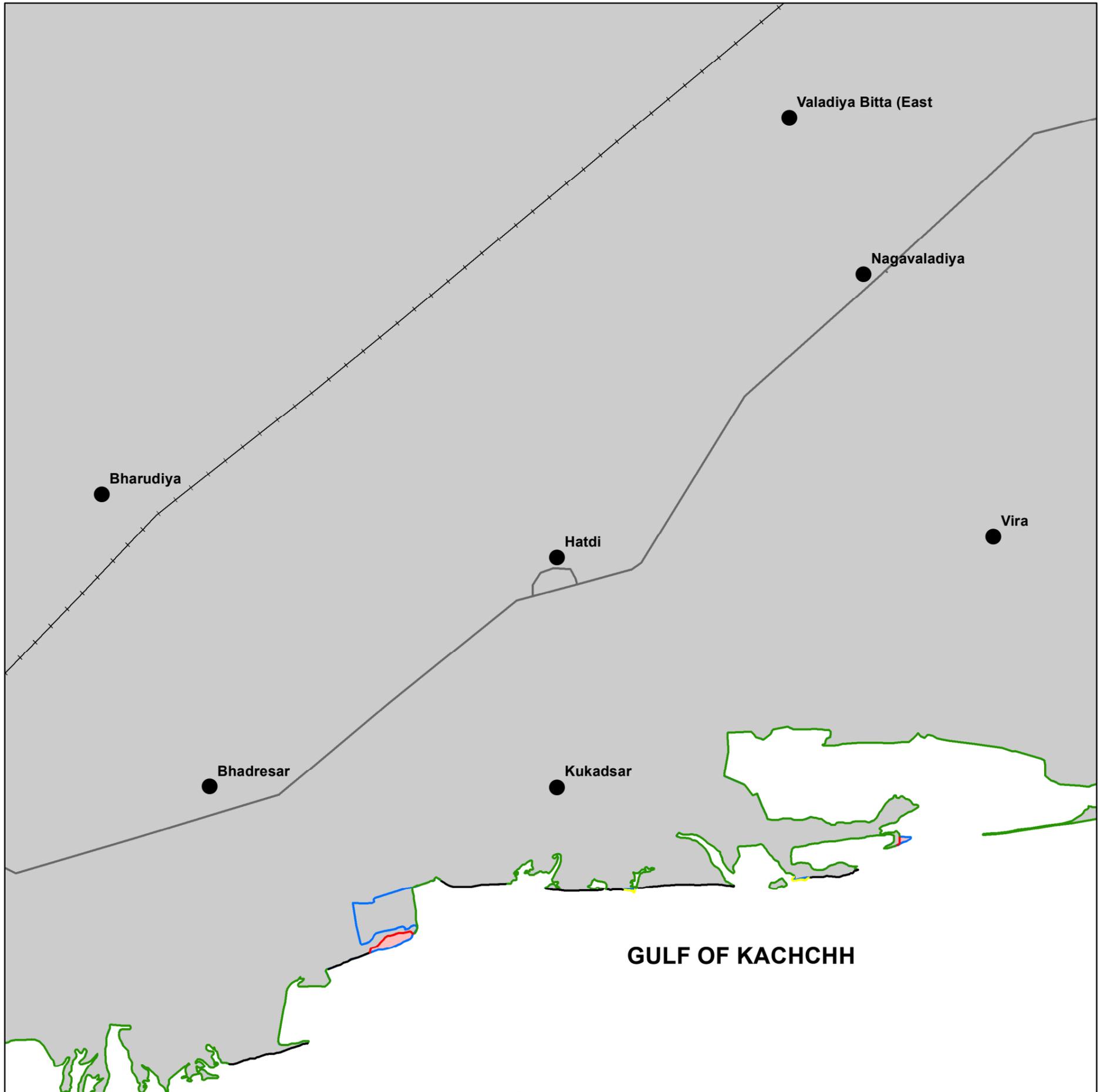
# SHORELINE CHANGE MAP

FOR OFFICIAL USE ONLY

KACHCHH DISTRICT

GUJARAT

SHEET NO. 41F13NE



### Legend

- EROSION
- ACCRETION
- HIGH-TIDE LINE 2014-16
- HIGH-TIDE LINE 2004-06
- STABLE
- ROAD
- RAILWAY
- HABITATION

### INDEX TO SHEETS

41E16SW	41E16SE	41I04SW
41F13NW	41F13NE	41J01NW
41F13SW	41F13SE	SEA



DATA SOURCE:  
IRS LISS4 IMAGES OF 2004-06 & 2014-16

PREPARED BY:  
SPACE APPLICATIONS CENTRE, ISRO, AHMEDABAD  
AND CENTRAL WATER COMMISSION, NEW DELHI



# SHORELINE CHANGE MAP

FOR OFFICIAL USE ONLY

MORBI DISTRICT

GUJARAT

SHEET NO. 41I12SW



GULF OF KACHCHH

Bagasara

Vavaniya

## Legend

- EROSION
- ACCRETION
- HIGH-TIDE LINE 2014-16
- HIGH-TIDE LINE 2004-06
- STABLE
- ROAD
- RAILWAY
- HABITATION

## INDEX TO SHEETS

41I08NE	41I12NW	41I12NE
41I08SE	41I12SW	41I12SE
41J05NE	41J09NW	41J09NE



0 2 km



DATA SOURCE:  
IRS LISS4 IMAGES OF 2004-06 & 2014-16

PREPARED BY:  
SPACE APPLICATIONS CENTRE, ISRO, AHMEDABAD  
AND CENTRAL WATER COMMISSION, NEW DELHI



# SHORELINE CHANGE MAP

JAMNAGAR/  
MORBI DISTRICT

GUJARAT

FOR OFFICIAL USE ONLY  
SHEET NO. 41J09NW



## Legend

- EROSION
- ACCRETION
- HIGH-TIDE LINE 2014-16
- HIGH-TIDE LINE 2004-06
- STABLE
- ROAD
- RAILWAY
- HABITATION

## INDEX TO SHEETS

41I08SE	41I12SW	41I12SE
41J05NE	41J09NW	41J09NE
41J05SE	41J09SW	41J09SE



0 2 km



DATA SOURCE:  
IRS LISS4 IMAGES OF 2004-06 & 2014-16

PREPARED BY:  
SPACE APPLICATIONS CENTRE, ISRO, AHMEDABAD  
AND CENTRAL WATER COMMISSION, NEW DELHI



# SHORELINE CHANGE MAP

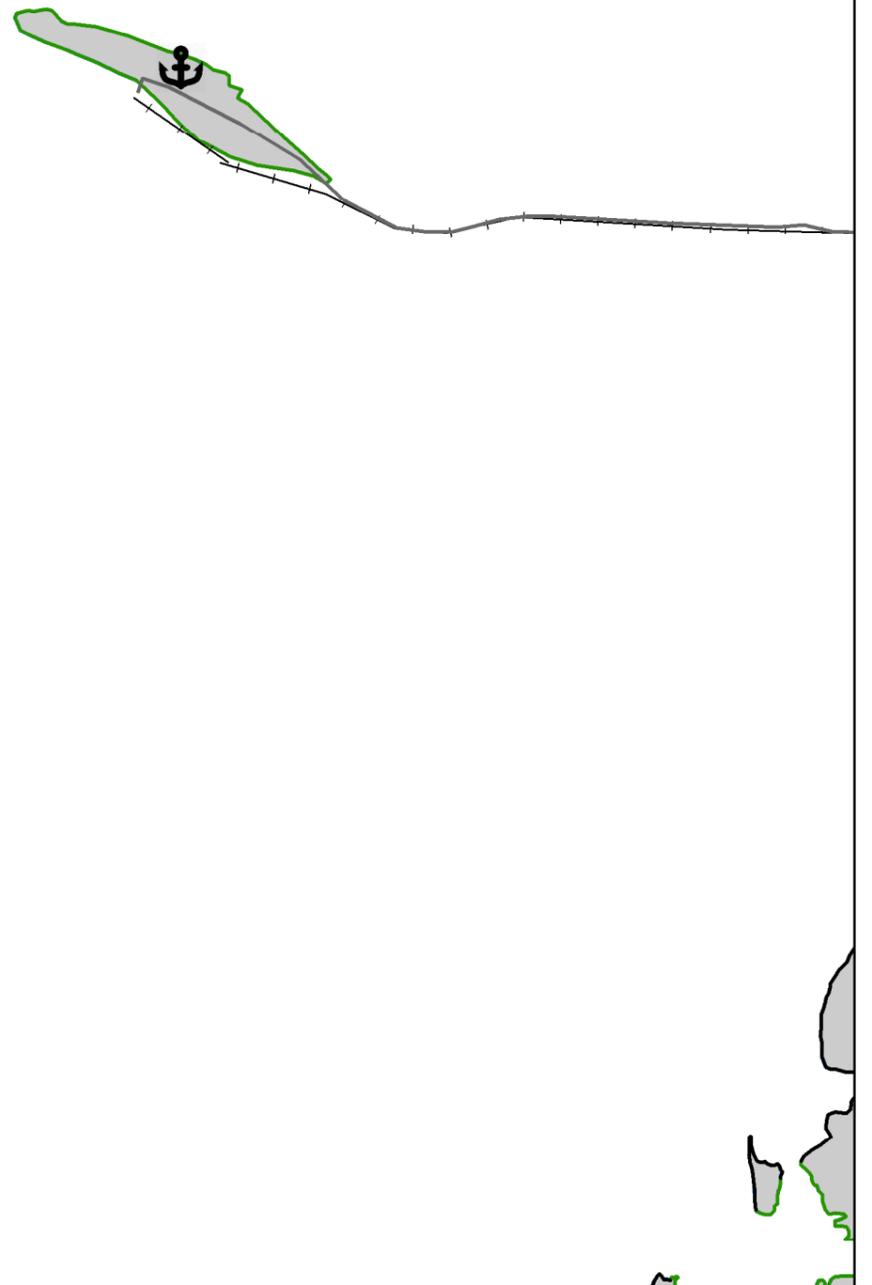
FOR OFFICIAL USE ONLY

JAMNAGAR DISTRICT

GUJARAT

SHEET NO. 41J05NE

GULF OF KACHCHH

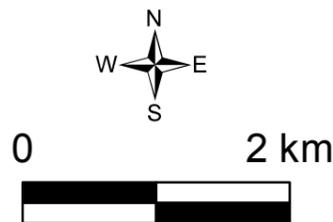


## Legend

-  HIGH-TIDE LINE 2014-16
-  HIGH-TIDE LINE 2004-06
-  STABLE
-  ROAD
-  RAILWAY
-  JETTY
-  PORT/HARBOUR

## INDEX TO SHEETS

41I08SW	41I08SE	41I12SW
41J05NW	41J05NE	41J09NW
41J05SW	41J05SE	41J09SW



DATA SOURCE:  
IRS LISS4 IMAGES OF 2004-06 & 2014-16

PREPARED BY:  
SPACE APPLICATIONS CENTRE, ISRO, AHMEDABAD  
AND CENTRAL WATER COMMISSION, NEW DELHI



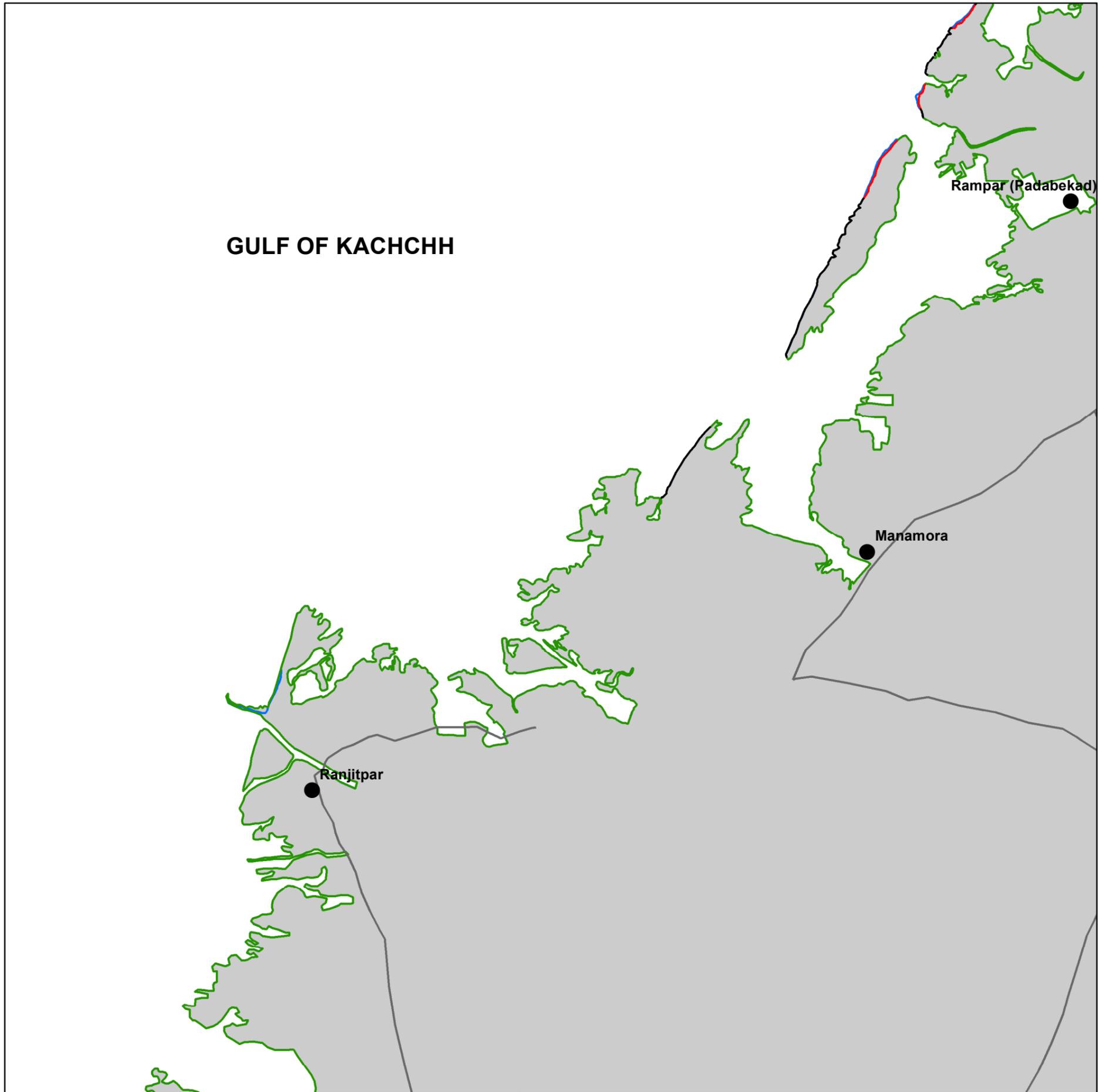
# SHORELINE CHANGE MAP

FOR OFFICIAL USE ONLY

JAMNAGAR DISTRICT

GUJARAT

SHEET NO. 41J05SE



## Legend

- █ EROSION
- █ HIGH-TIDE LINE 2014-16
- █ HIGH-TIDE LINE 2004-06
- STABLE
- ROAD
- HABITATION

## INDEX TO SHEETS

41J05NW	41J05NE	41J09NW
41J05SW	41J05SE	41J09SW
41J06NW	41J06NE	41J10NW



DATA SOURCE:  
IRS LISS4 IMAGES OF 2004-06 & 2014-16

PREPARED BY:  
SPACE APPLICATIONS CENTRE, ISRO, AHMEDABAD  
AND CENTRAL WATER COMMISSION, NEW DELHI



# SHORELINE CHANGE MAP

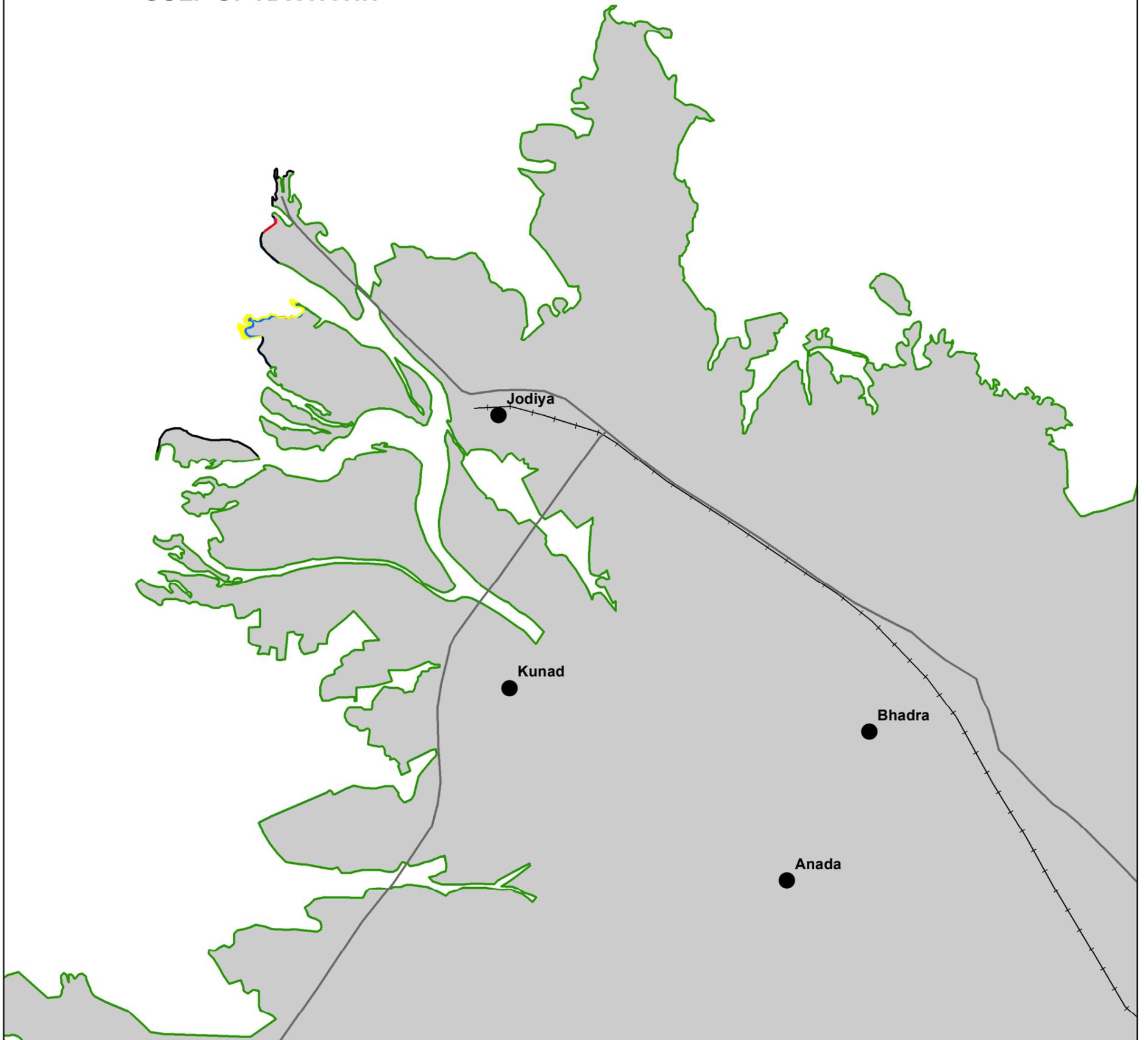
FOR OFFICIAL USE ONLY

JAMNAGAR DISTRICT

GUJARAT

SHEET NO. 41J06NW

GULF OF KACHCHH



## Legend

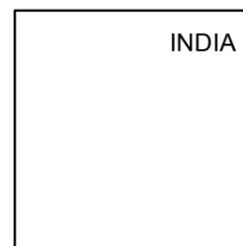
- EROSION
- ACCRETION
- HIGH-TIDE LINE 2014-16
- HIGH-TIDE LINE 2004-06
- STABLE
- ROAD
- RAILWAY
- HABITATION

## INDEX TO SHEETS

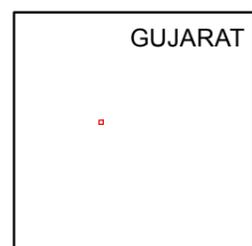
SEA	41J05SW	41J05SE
41J02NE	41J06NW	41J06NE
41J02SE	41J06SW	41J06SE



0 2 km



INDIA



GUJARAT

DATA SOURCE:  
IRS LISS4 IMAGES OF 2004-06 & 2014-16

PREPARED BY:  
SPACE APPLICATIONS CENTRE, ISRO, AHMEDABAD  
AND CENTRAL WATER COMMISSION, NEW DELHI



# SHORELINE CHANGE MAP

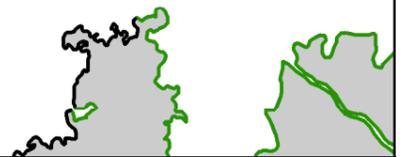
FOR OFFICIAL USE ONLY

JAMNAGAR DISTRICT

GUJARAT

SHEET NO. 41J02NE

GULF OF KACHCHH



### Legend

-  HIGH-TIDE LINE 2014-16
-  HIGH-TIDE LINE 2004-06
-  STABLE

### INDEX TO SHEETS

SEA	SEA	41J05SW
SEA	41J02NE	41J06NW
41J02SW	41J02SE	41J06SW



0 2 km



DATA SOURCE:  
IRS LISS4 IMAGES OF 2004-06 & 2014-16

PREPARED BY:  
SPACE APPLICATIONS CENTRE, ISRO, AHMEDABAD  
AND CENTRAL WATER COMMISSION, NEW DELHI



# SHORELINE CHANGE MAP

FOR OFFICIAL USE ONLY

JAMNAGAR DISTRICT

GUJARAT

SHEET NO. 41J02SE



### Legend

- EROSION
- ACCRETION
- HIGH-TIDE LINE 2014-16
- HIGH-TIDE LINE 2004-06
- STABLE
- ROAD
- JETTY
- HABITATION

### INDEX TO SHEETS

SEA	41J02NE	41J06NW
41J02SW	41J02SE	41J06SW
41J03NW	41J03NE	41J07NW



DATA SOURCE:  
IRS LISS4 IMAGES OF 2004-06 & 2014-16

PREPARED BY:  
SPACE APPLICATIONS CENTRE, ISRO, AHMEDABAD  
AND CENTRAL WATER COMMISSION, NEW DELHI



# SHORELINE CHANGE MAP

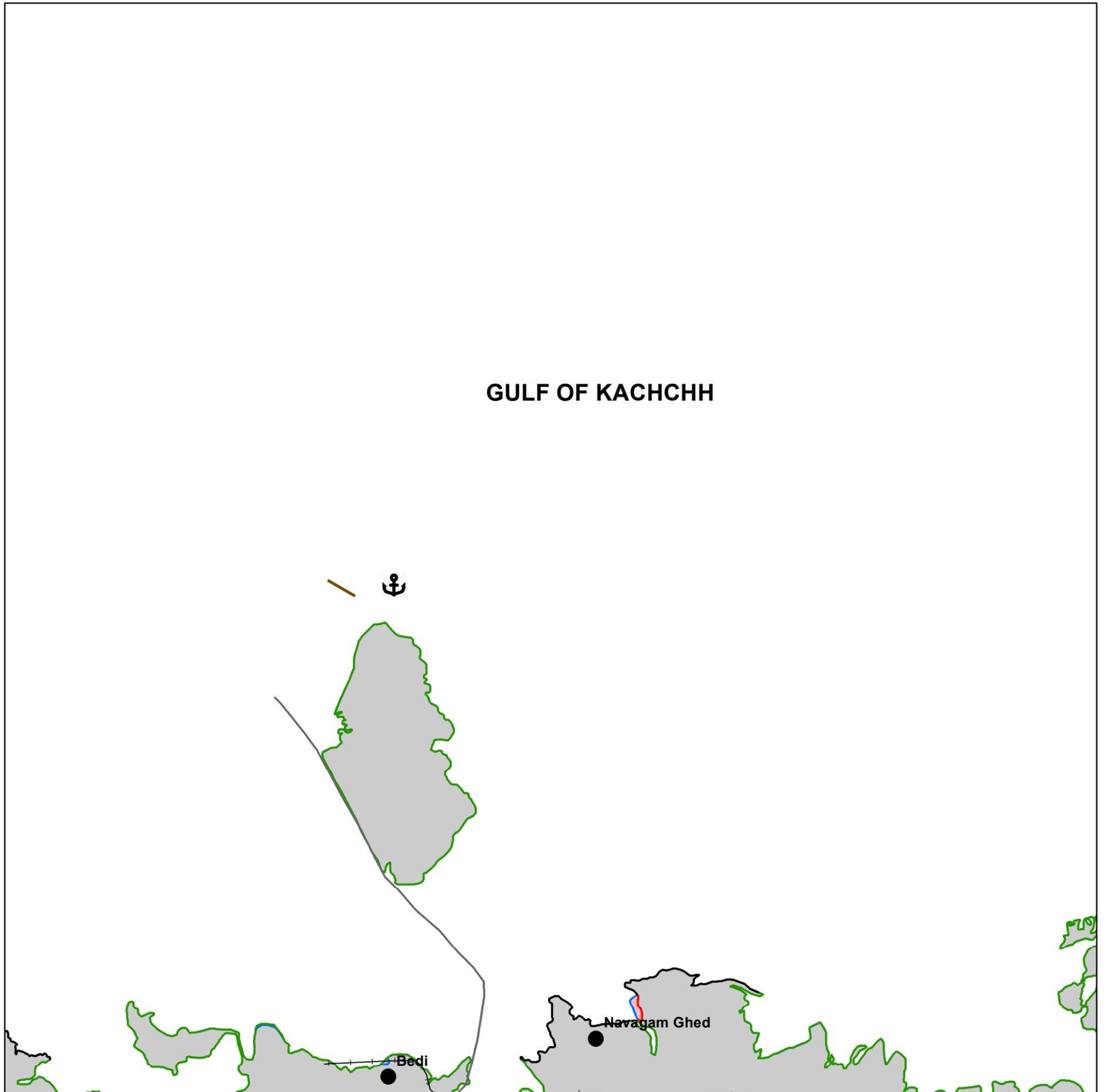
FOR OFFICIAL USE ONLY

JAMNAGAR DISTRICT

GUJARAT

SHEET NO. 41J02SW

GULF OF KACHCHH



## Legend

- EROSION
- HIGH-TIDE LINE 2014-16
- HIGH-TIDE LINE 2004-06
- STABLE
- ROAD
- RAILWAY
- JETTY
- PORT/HARBOUR
- HABITATION

## INDEX TO SHEETS

SEA	SEA	41J02NE
41F14SE	41J02SW	41J02SE
41F15NE	41J03NW	41J03NE



DATA SOURCE:  
IRS LISS4 IMAGES OF 2004-06 & 2014-16

PREPARED BY:  
SPACE APPLICATIONS CENTRE, ISRO, AHMEDABAD  
AND CENTRAL WATER COMMISSION, NEW DELHI



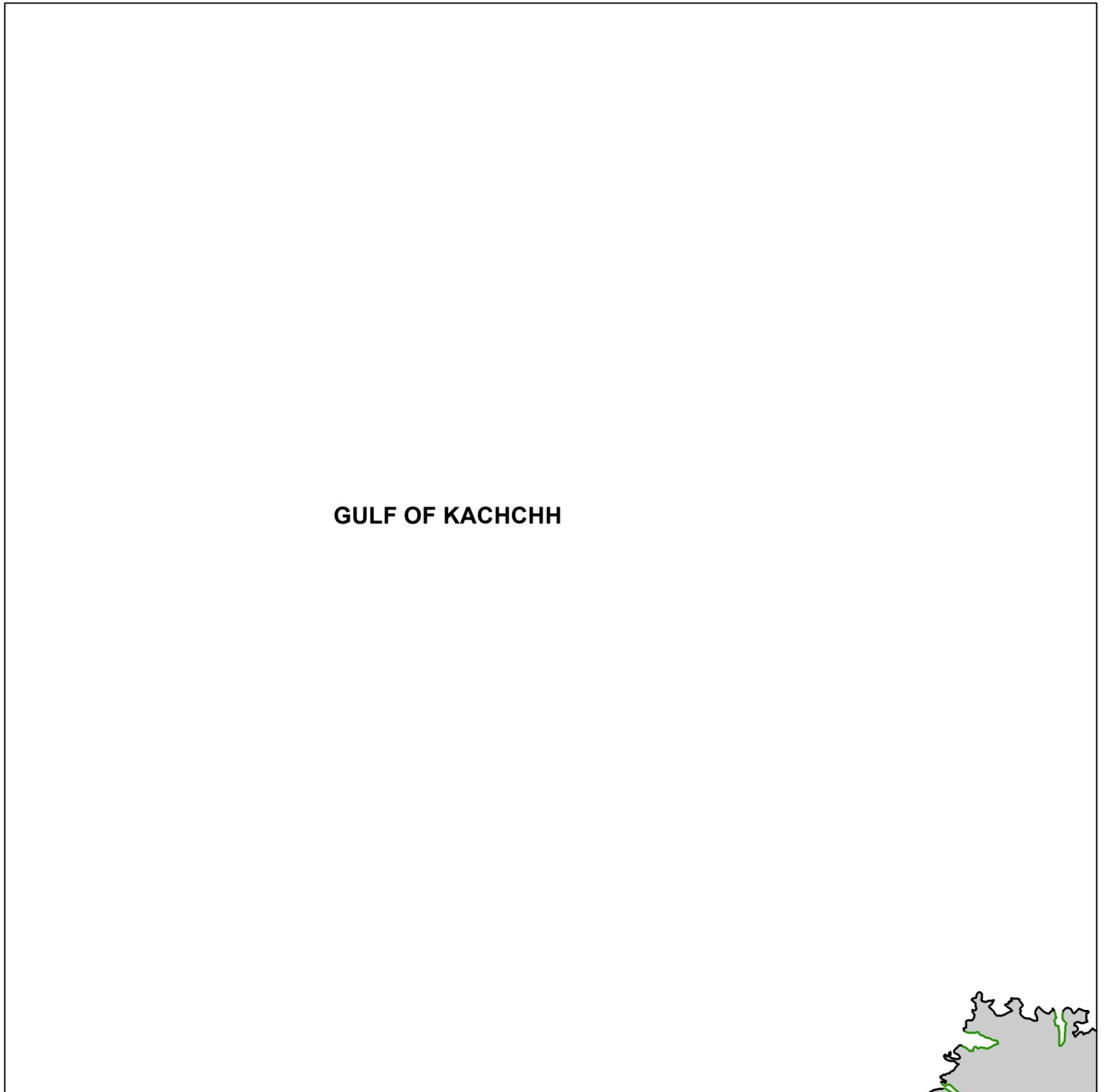
# SHORELINE CHANGE MAP

FOR OFFICIAL USE ONLY

JAMNAGAR DISTRICT

GUJARAT

SHEET NO. 41F14SE



GULF OF KACHCHH

**Legend**

- HIGH-TIDE LINE 2014-16
- HIGH-TIDE LINE 2004-06
- STABLE

INDEX TO SHEETS

SEA	SEA	SEA
41F14SW	41F14SE	41J02SW
41F15NW	41F15NE	41J03NW



DATA SOURCE:  
IRS LISS4 IMAGES OF 2004-06 & 2014-16

PREPARED BY:  
SPACE APPLICATIONS CENTRE, ISRO, AHMEDABAD  
AND CENTRAL WATER COMMISSION, NEW DELHI



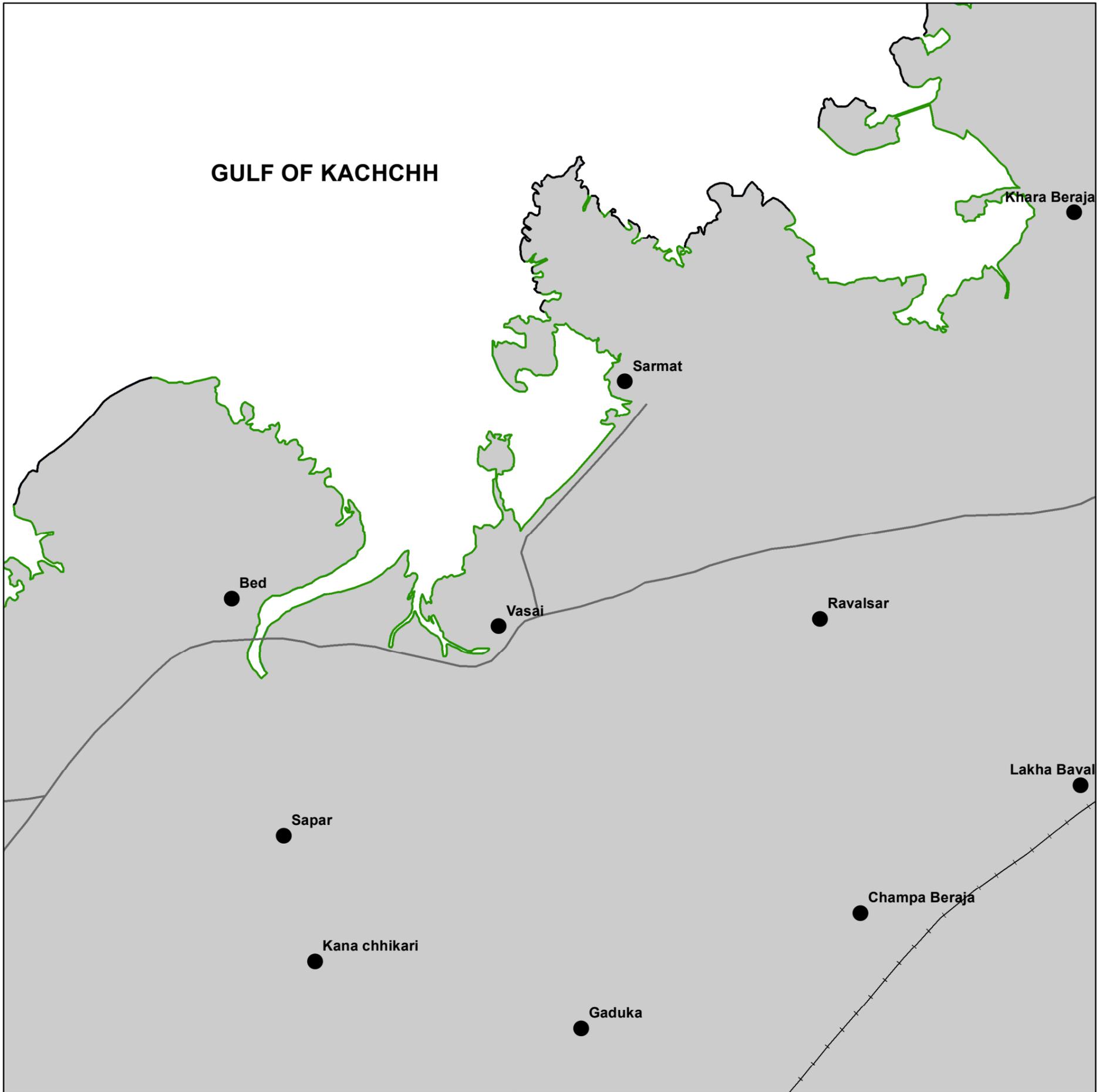
# SHORELINE CHANGE MAP

FOR OFFICIAL USE ONLY

JAMNAGAR DISTRICT

GUJARAT

SHEET NO. 41F15NE



### Legend

- HIGH-TIDE LINE 2014-16
- HIGH-TIDE LINE 2004-06
- STABLE
- ROAD
- +— RAILWAY
- HABITATION

### INDEX TO SHEETS

41F14SW	41F14SE	41J02SW
41F15NW	41F15NE	41J03NW
41F15SW	41F15SE	41J03SW



DATA SOURCE:  
IRS LISS4 IMAGES OF 2004-06 & 2014-16

PREPARED BY:  
SPACE APPLICATIONS CENTRE, ISRO, AHMEDABAD  
AND CENTRAL WATER COMMISSION, NEW DELHI



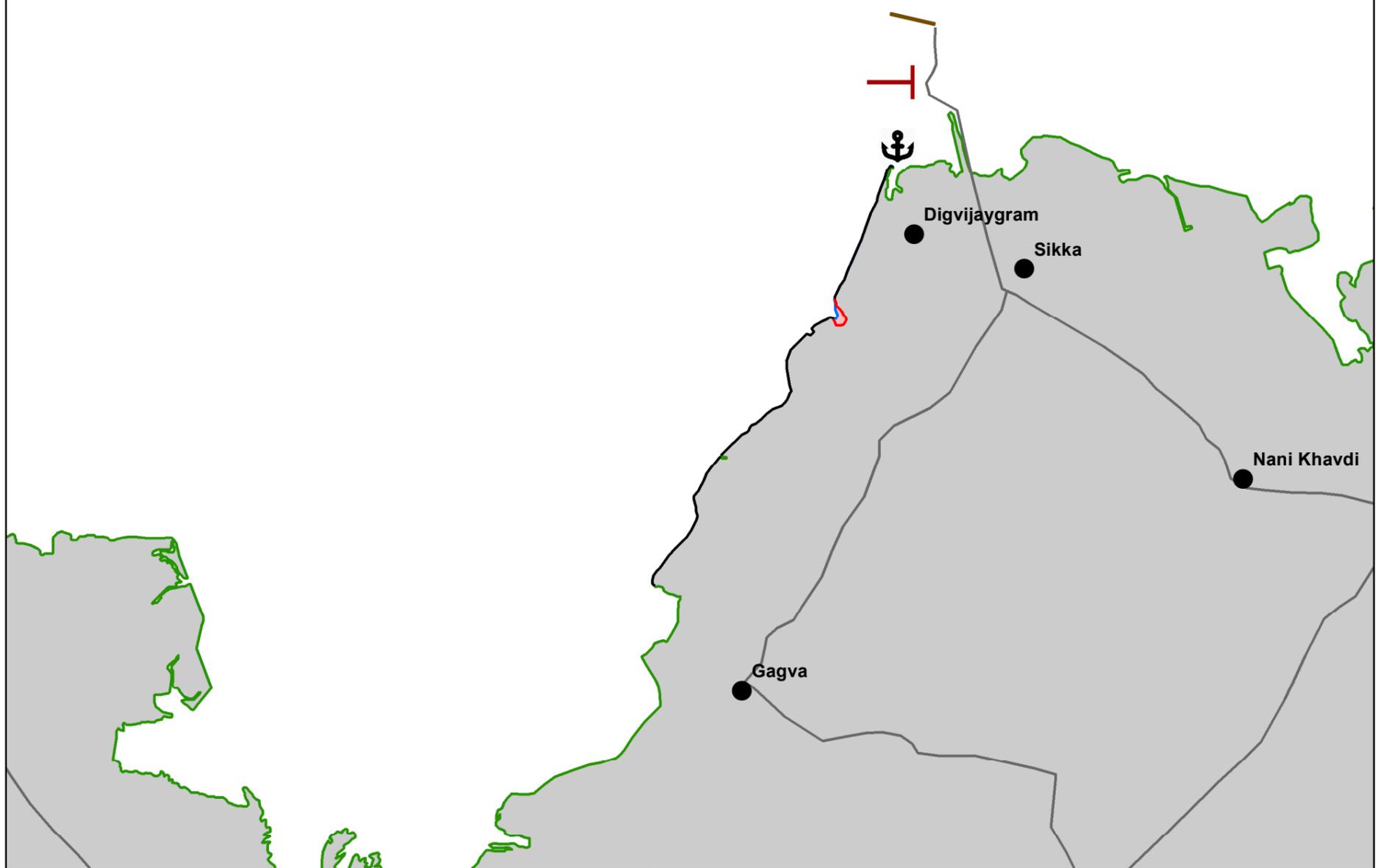
# SHORELINE CHANGE MAP

DEVBHUMI DWARKA/  
JAMNAGAR DISTRICT

GUJARAT

FOR OFFICIAL USE ONLY  
SHEET NO. 41F15NW

GULF OF KACHCHH



### Legend

- █ EROSION
- █ HIGH-TIDE LINE 2014-16
- █ HIGH-TIDE LINE 2004-06
- █ STABLE
- █ ROAD
- ┌┐ BREAKWATER
- █ JETTY
- ┆ PORT/HARBOUR
- HABITATION

### INDEX TO SHEETS

SEA	41F14SW	41F14SE
41F11NE	41F15NW	41F15NE
41F11SE	41F15SW	41F15SE



0 2 km



DATA SOURCE:  
IRS LISS4 IMAGES OF 2004-06 & 2014-16

PREPARED BY:  
SPACE APPLICATIONS CENTRE, ISRO, AHMEDABAD  
AND CENTRAL WATER COMMISSION, NEW DELHI



# SHORELINE CHANGE MAP

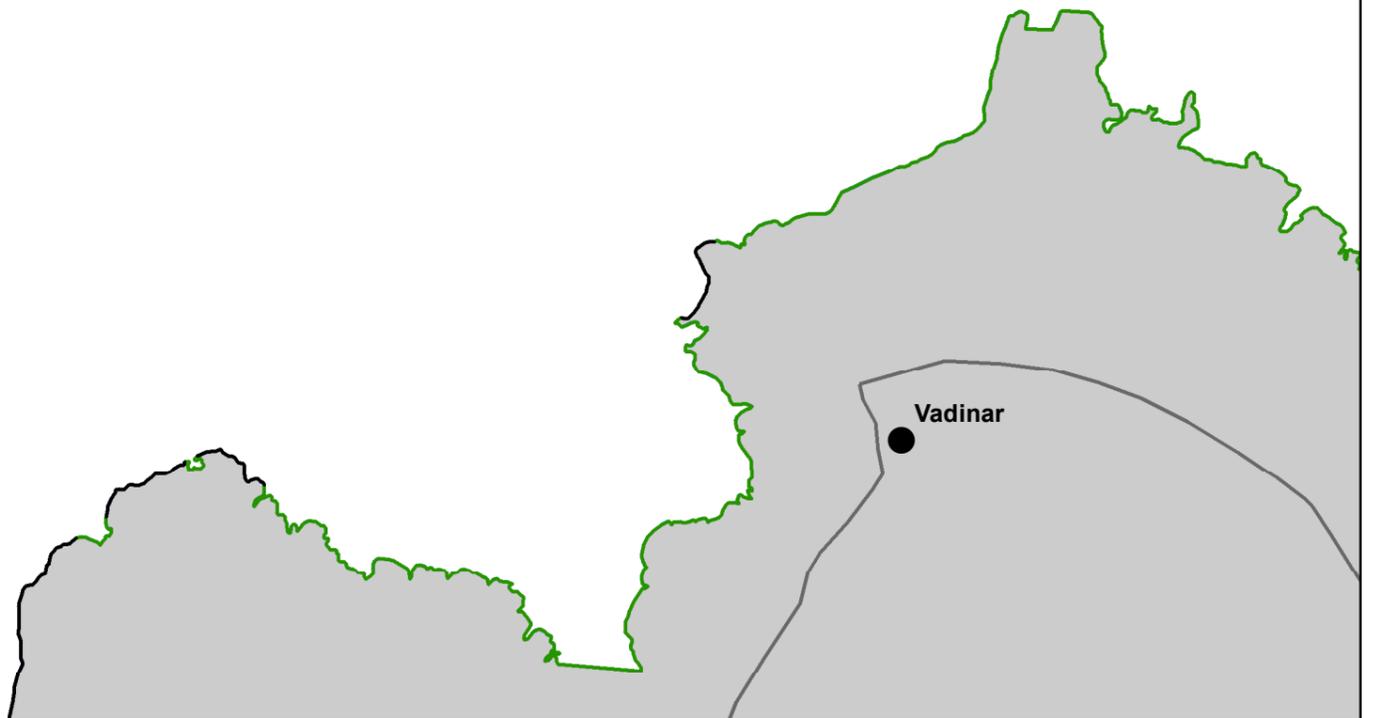
FOR OFFICIAL USE ONLY

DEVBHUMI DWARKA DISTRICT

GUJARAT

SHEET NO. 41F11NE

GULF OF KACHCHH



**Legend**

- HIGH-TIDE LINE 2014-16
- HIGH-TIDE LINE 2004-06
- STABLE
- ROAD
- JETTY
- HABITATION

INDEX TO SHEETS

SEA	SEA	41F14SW
41F11NW	41F11NE	41F15NW
41F11SW	41F11SE	41F15SW



0 2 km



DATA SOURCE:  
IRS LISS4 IMAGES OF 2004-06 & 2014-16

PREPARED BY:  
SPACE APPLICATIONS CENTRE, ISRO, AHMEDABAD  
AND CENTRAL WATER COMMISSION, NEW DELHI



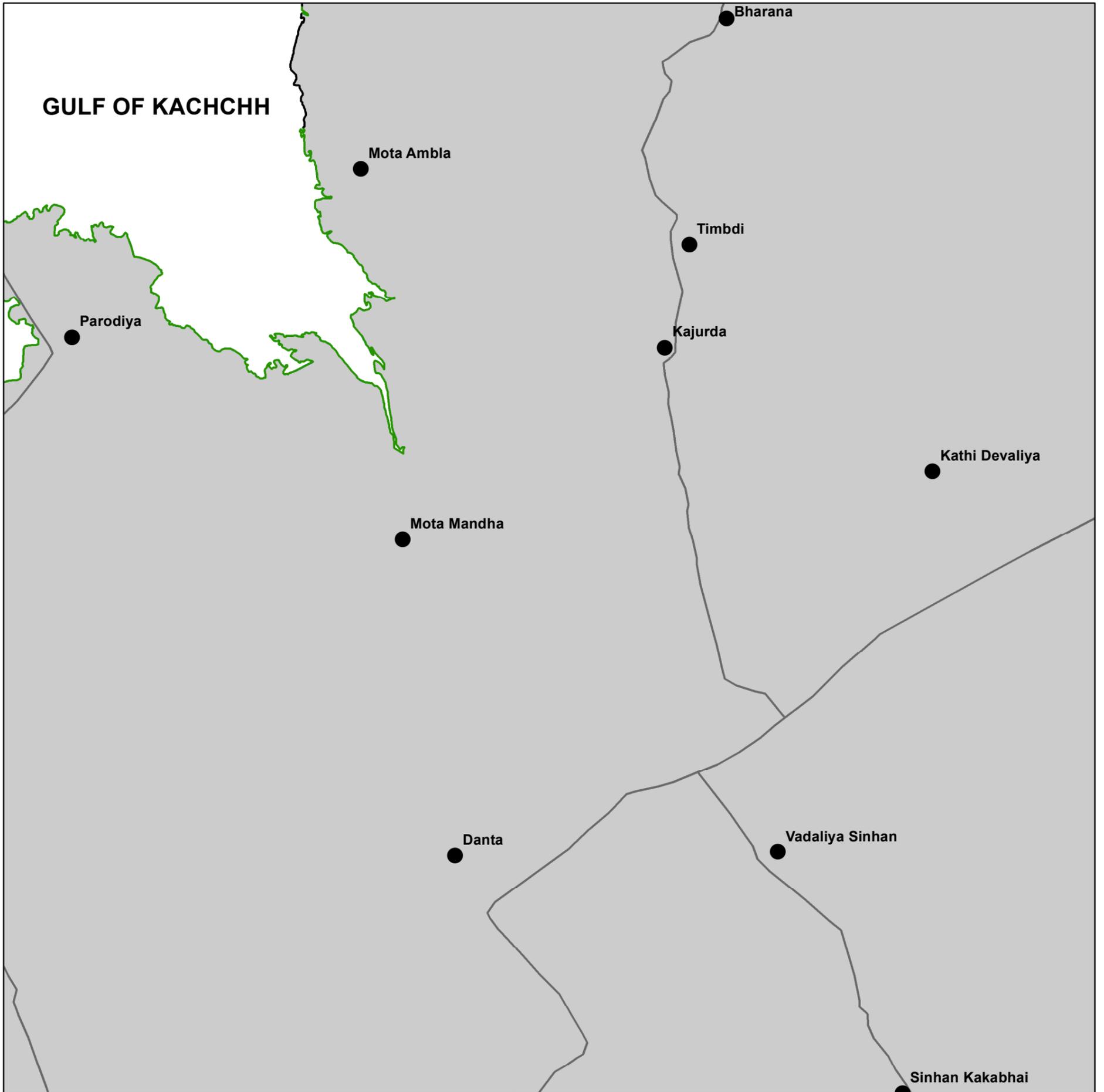
# SHORELINE CHANGE MAP

FOR OFFICIAL USE ONLY

DEVBHUMI DWARKA DISTRICT

GUJARAT

SHEET NO. 41F11SE



### Legend

- HIGH-TIDE LINE 2014-16
- HIGH-TIDE LINE 2004-06
- STABLE
- ROAD
- HABITATION

### INDEX TO SHEETS

41F11NW	41F11NE	41F15NW
41F11SW	41F11SE	41F15SW
41F12NW	41F12NE	41F16NW



0 2 km



DATA SOURCE:  
IRS LISS4 IMAGES OF 2004-06 & 2014-16

PREPARED BY:  
SPACE APPLICATIONS CENTRE, ISRO, AHMEDABAD  
AND CENTRAL WATER COMMISSION, NEW DELHI



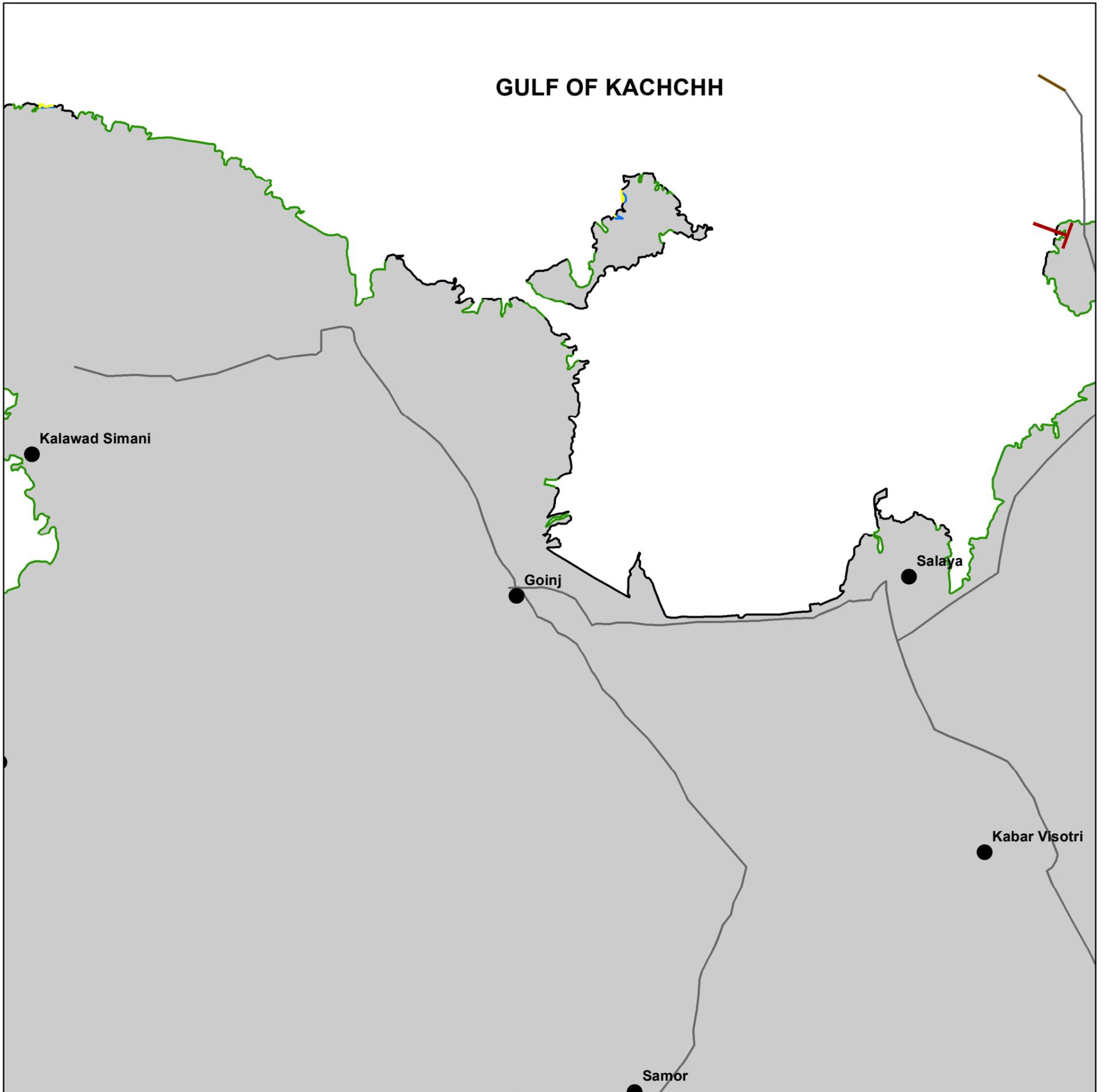
# SHORELINE CHANGE MAP

FOR OFFICIAL USE ONLY

DEVBHUMI DWARKA DISTRICT

GUJARAT

SHEET NO. 41F11SW



### Legend

-  ACCRETION
-  HIGH-TIDE LINE 2014-16
-  HIGH-TIDE LINE 2004-06
-  STABLE
-  ROAD
-  BREAKWATER
-  JETTY
-  HABITATION

### INDEX TO SHEETS

41F07NE	41F11NW	41F11NE
41F07SE	41F11SW	41F11SE
41F08NE	41F12NW	41F12NE



DATA SOURCE:  
IRS LISS4 IMAGES OF 2004-06 & 2014-16

PREPARED BY:  
SPACE APPLICATIONS CENTRE, ISRO, AHMEDABAD  
AND CENTRAL WATER COMMISSION, NEW DELHI



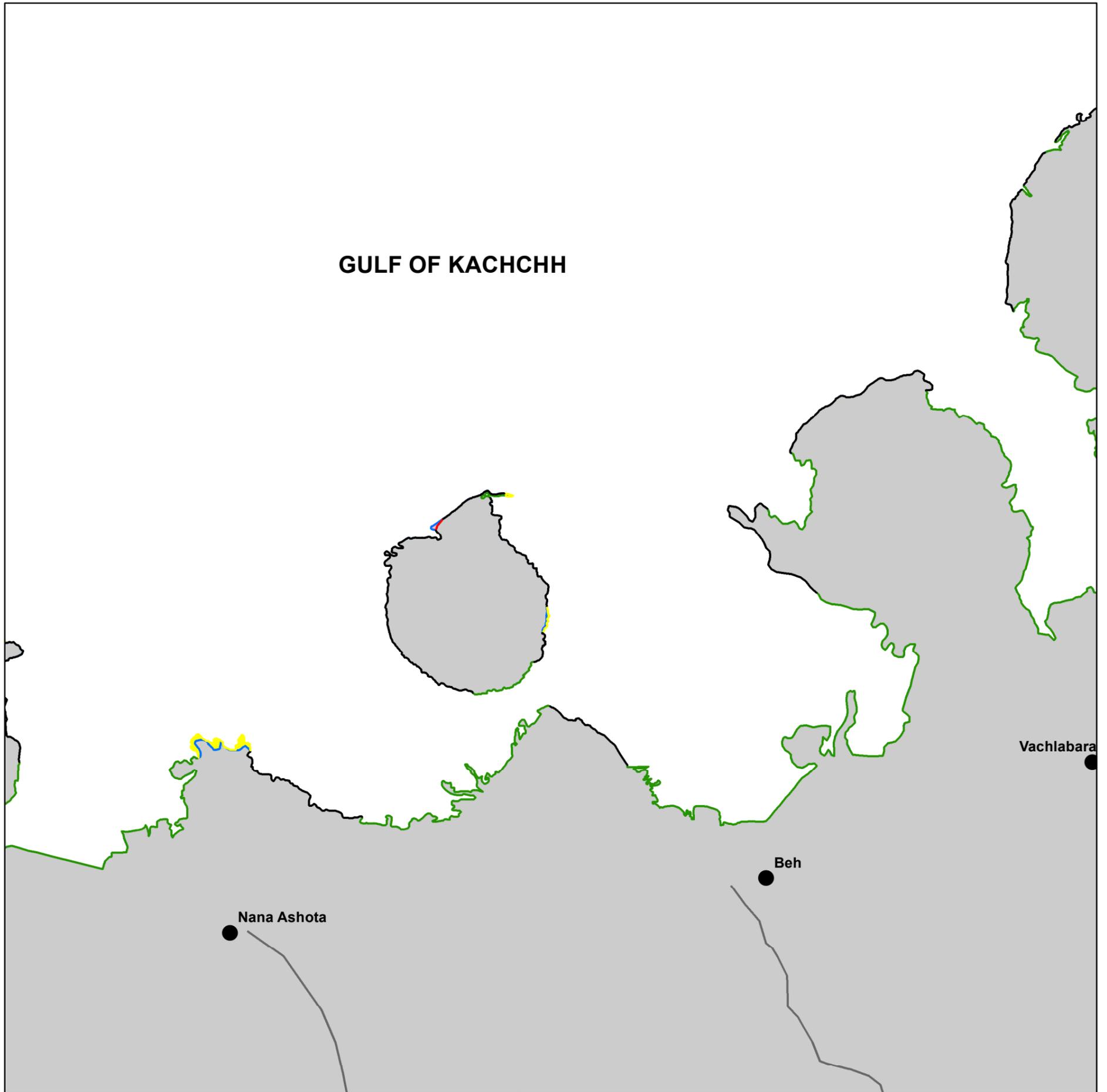
# SHORELINE CHANGE MAP

FOR OFFICIAL USE ONLY

DEVBHUMI DWARKA DISTRICT

GUJARAT

SHEET NO. 41F07SE



## Legend

- EROSION
- ACCRETION
- HIGH-TIDE LINE 2014-16
- HIGH-TIDE LINE 2004-06
- STABLE
- ROAD
- HABITATION

## INDEX TO SHEETS

41F07NW	41F07NE	41F11NW
41F07SW	41F07SE	41F11SW
41F08NW	41F08NE	41F12NW



0 2 km



DATA SOURCE:  
IRS LISS4 IMAGES OF 2004-06 & 2014-16

PREPARED BY:  
SPACE APPLICATIONS CENTRE, ISRO, AHMEDABAD  
AND CENTRAL WATER COMMISSION, NEW DELHI



# SHORELINE CHANGE MAP

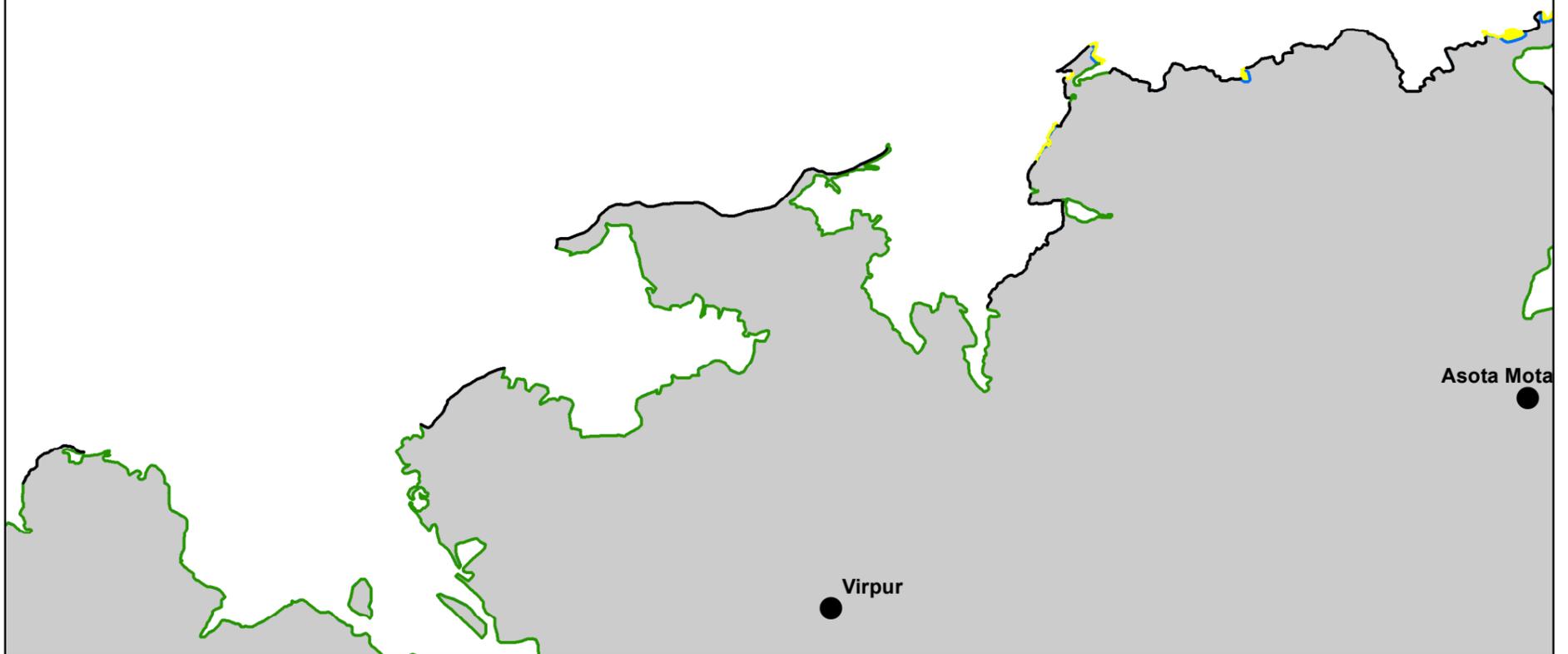
FOR OFFICIAL USE ONLY

DEVBHUMI DWARKA DISTRICT

GUJARAT

SHEET NO. 41F07SW

GULF OF KACHCHH



### Legend

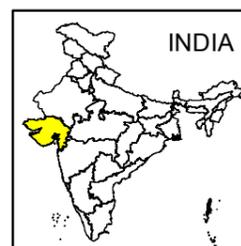
- ACCRETION
- HIGH-TIDE LINE 2014-16
- HIGH-TIDE LINE 2004-06
- STABLE
- HABITATION

### INDEX TO SHEETS

41F03NE	41F07NW	41F07NE
41F03SE	41F07SW	41F07SE
41F04NE	41F08NW	41F08NE



0 2 km



DATA SOURCE:  
IRS LISS4 IMAGES OF 2004-06 & 2014-16

PREPARED BY:  
SPACE APPLICATIONS CENTRE, ISRO, AHMEDABAD  
AND CENTRAL WATER COMMISSION, NEW DELHI



# SHORELINE CHANGE MAP

FOR OFFICIAL USE ONLY

DEVBHUMI DWARKA DISTRICT

GUJARAT

SHEET NO. 41F03SE



## Legend

- HIGH-TIDE LINE 2014-16
- HIGH-TIDE LINE 2004-06
- STABLE
- ROAD
- HABITATION

## INDEX TO SHEETS

41F03NW	41F03NE	41F07NW
41F03SW	41F03SE	41F07SW
41F04NW	41F04NE	41F08NW



DATA SOURCE:  
IRS LISS4 IMAGES OF 2004-06 & 2014-16

PREPARED BY:  
SPACE APPLICATIONS CENTRE, ISRO, AHMEDABAD  
AND CENTRAL WATER COMMISSION, NEW DELHI



# SHORELINE CHANGE MAP

FOR OFFICIAL USE ONLY

DEVBHUMI DWARKA DISTRICT

GUJARAT

SHEET NO. 41F03NE



GULF OF KACHCHH

Positra

### Legend

- EROSION
- ACCRETION
- HIGH-TIDE LINE 2014-16
- HIGH-TIDE LINE 2004-06
- STABLE
- HABITATION

### INDEX TO SHEETS

SEA	SEA	41F06SW
41F03NW	41F03NE	41F07NW
41F03SW	41F03SE	41F07SW



0 2 km



DATA SOURCE:  
IRS LISS4 IMAGES OF 2004-06 & 2014-16

PREPARED BY:  
SPACE APPLICATIONS CENTRE, ISRO, AHMEDABAD  
AND CENTRAL WATER COMMISSION, NEW DELHI



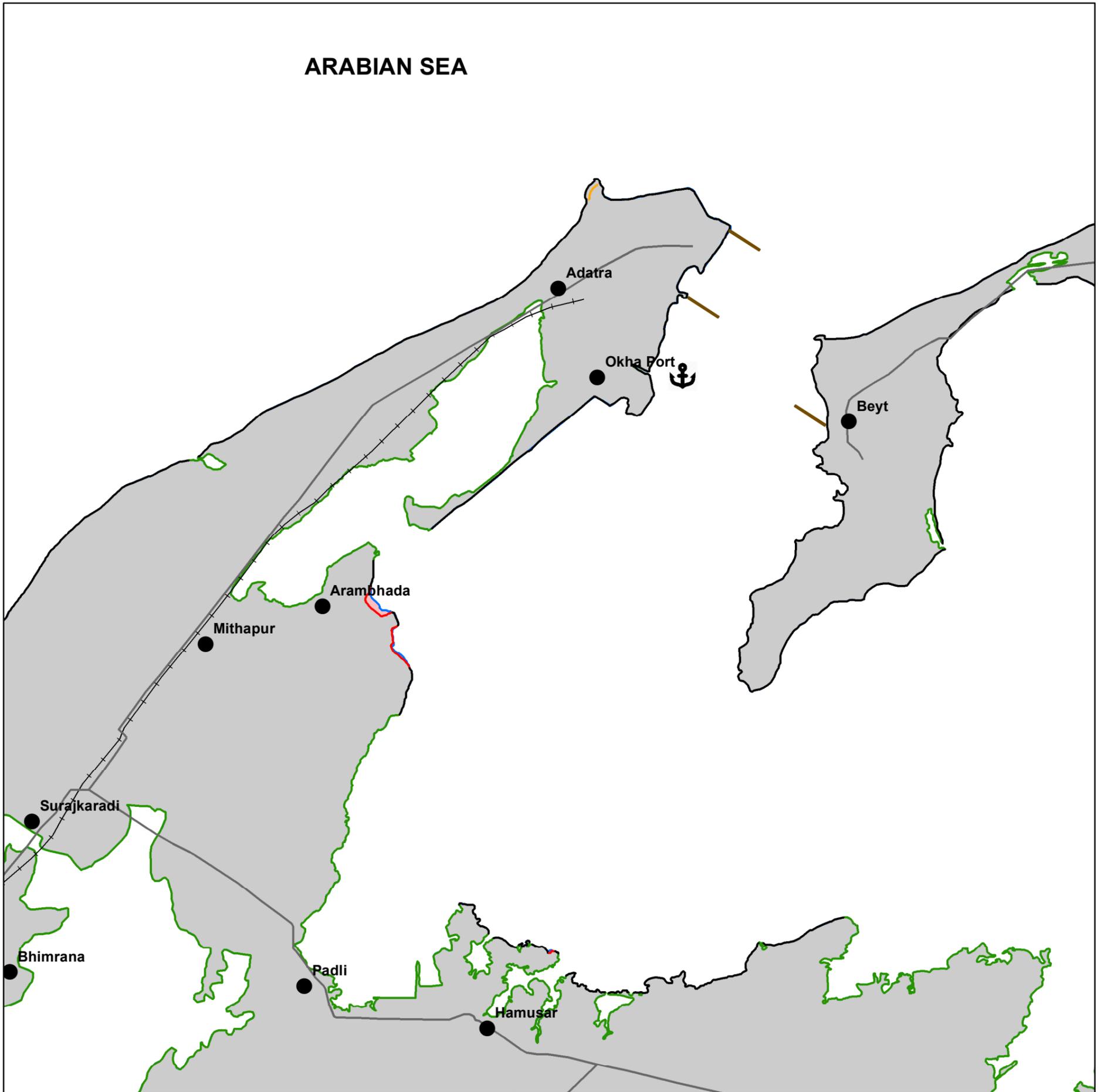
# SHORELINE CHANGE MAP

FOR OFFICIAL USE ONLY

DEVBHUMI DWARKA DISTRICT

GUJARAT

SHEET NO. 41F03NW



## Legend

- █ EROSION
- █ HIGH-TIDE LINE 2014-16
- █ HIGH-TIDE LINE 2004-06
- █ STABLE
- █ ROAD
- + RAILWAY
- █ SEA WALL
- █ JETTY
- ⊙ PORT/HARBOUR
- HABITATION

## INDEX TO SHEETS

SEA	SEA	SEA
41B15NE	41F03NW	41F03NE
41B15SE	41F03SW	41F03SE



0 2 km



DATA SOURCE:  
IRS LISS4 IMAGES OF 2004-06 & 2014-16

PREPARED BY:  
SPACE APPLICATIONS CENTRE, ISRO, AHMEDABAD  
AND CENTRAL WATER COMMISSION, NEW DELHI



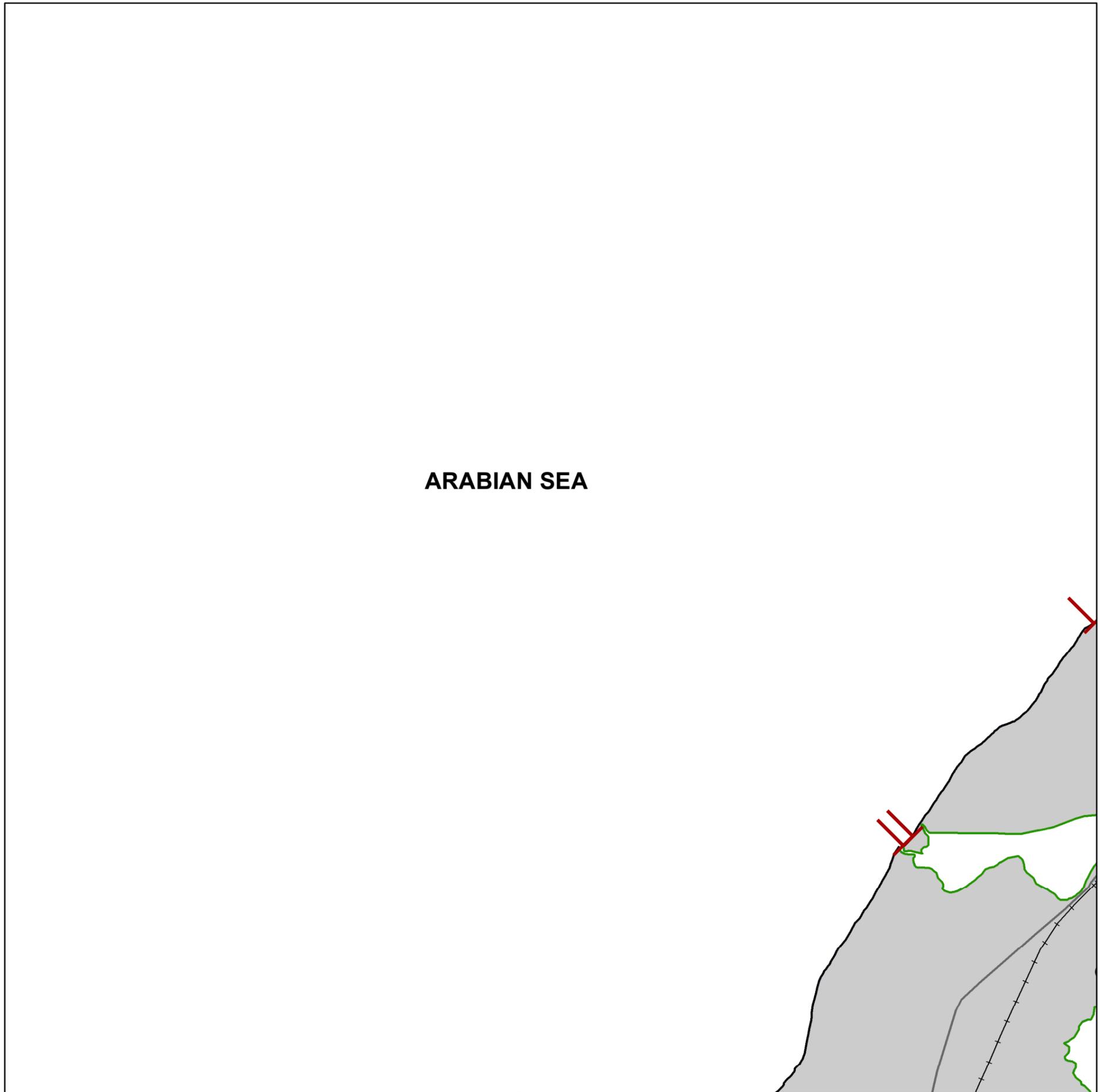
# SHORELINE CHANGE MAP

FOR OFFICIAL USE ONLY

DEVBHUMI DWARKA DISTRICT

GUJARAT

SHEET NO. 41B15NE



## Legend

- HIGH-TIDE LINE 2014-16
- HIGH-TIDE LINE 2004-06
- STABLE
- ROAD
- - - RAILWAY
- ┌ BREAKWATER

## INDEX TO SHEETS

SEA	SEA	SEA
SEA	41B15NE	41F03NW
SEA	41B15SE	41F03SW



DATA SOURCE:  
IRS LISS4 IMAGES OF 2004-06 & 2014-16

PREPARED BY:  
SPACE APPLICATIONS CENTRE, ISRO, AHMEDABAD  
AND CENTRAL WATER COMMISSION, NEW DELHI



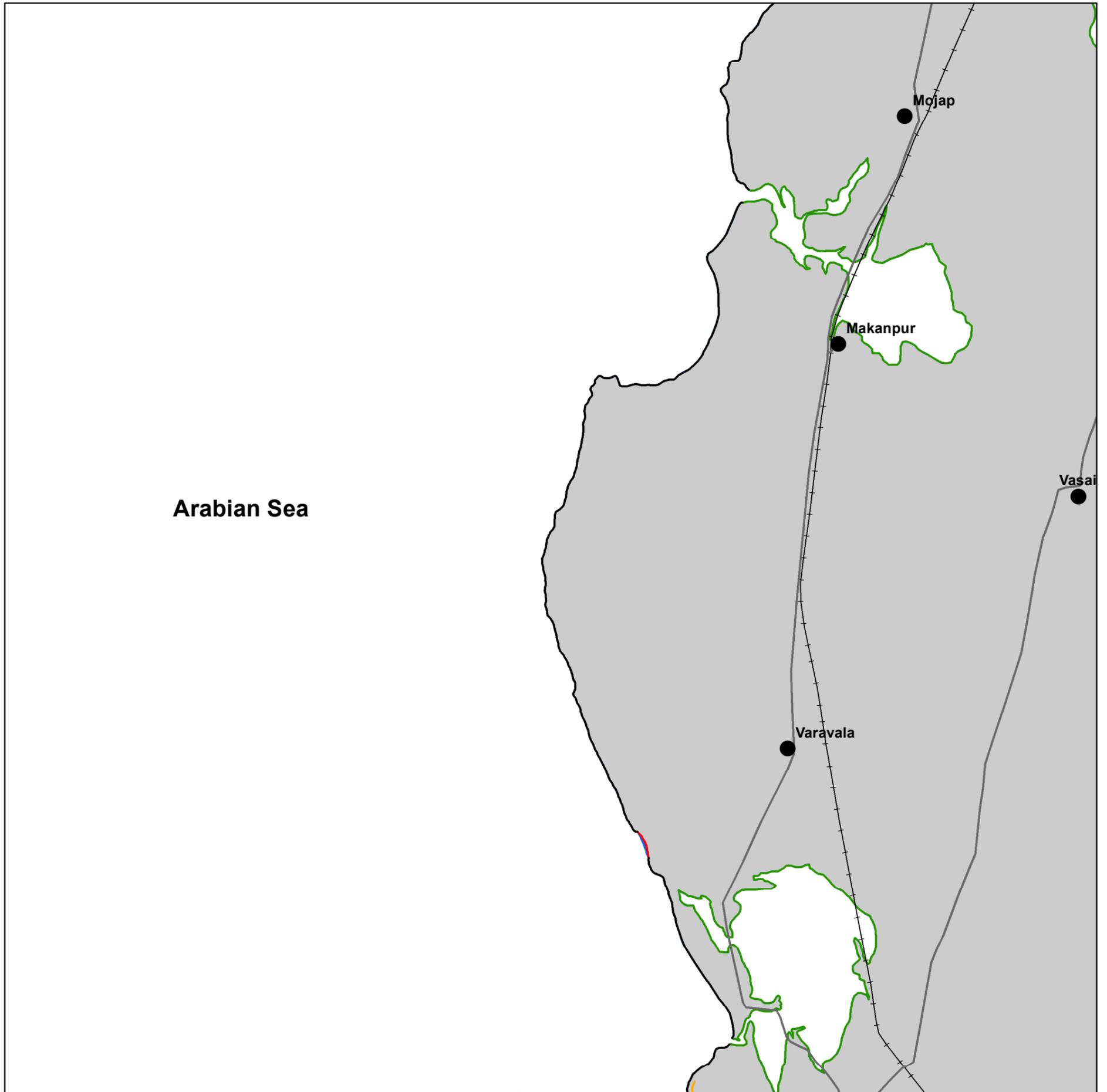
# SHORELINE CHANGE MAP

FOR OFFICIAL USE ONLY

DEVBHUMI DWARKA DISTRICT

GUJARAT

SHEET NO. 41B15SE



### Legend

- EROSION
- HIGH-TIDE LINE 2014-16
- HIGH-TIDE LINE 2004-06
- STABLE
- ROAD
- RAILWAY
- SEA WALL
- HABITATION

### INDEX TO SHEETS

SEA	41B15NE	41F03NW
SEA	41B15SE	41F03SW
SEA	41B16NE	41F04NW



DATA SOURCE:  
IRS LISS4 IMAGES OF 2004-06 & 2014-16

PREPARED BY:  
SPACE APPLICATIONS CENTRE, ISRO, AHMEDABAD  
AND CENTRAL WATER COMMISSION, NEW DELHI



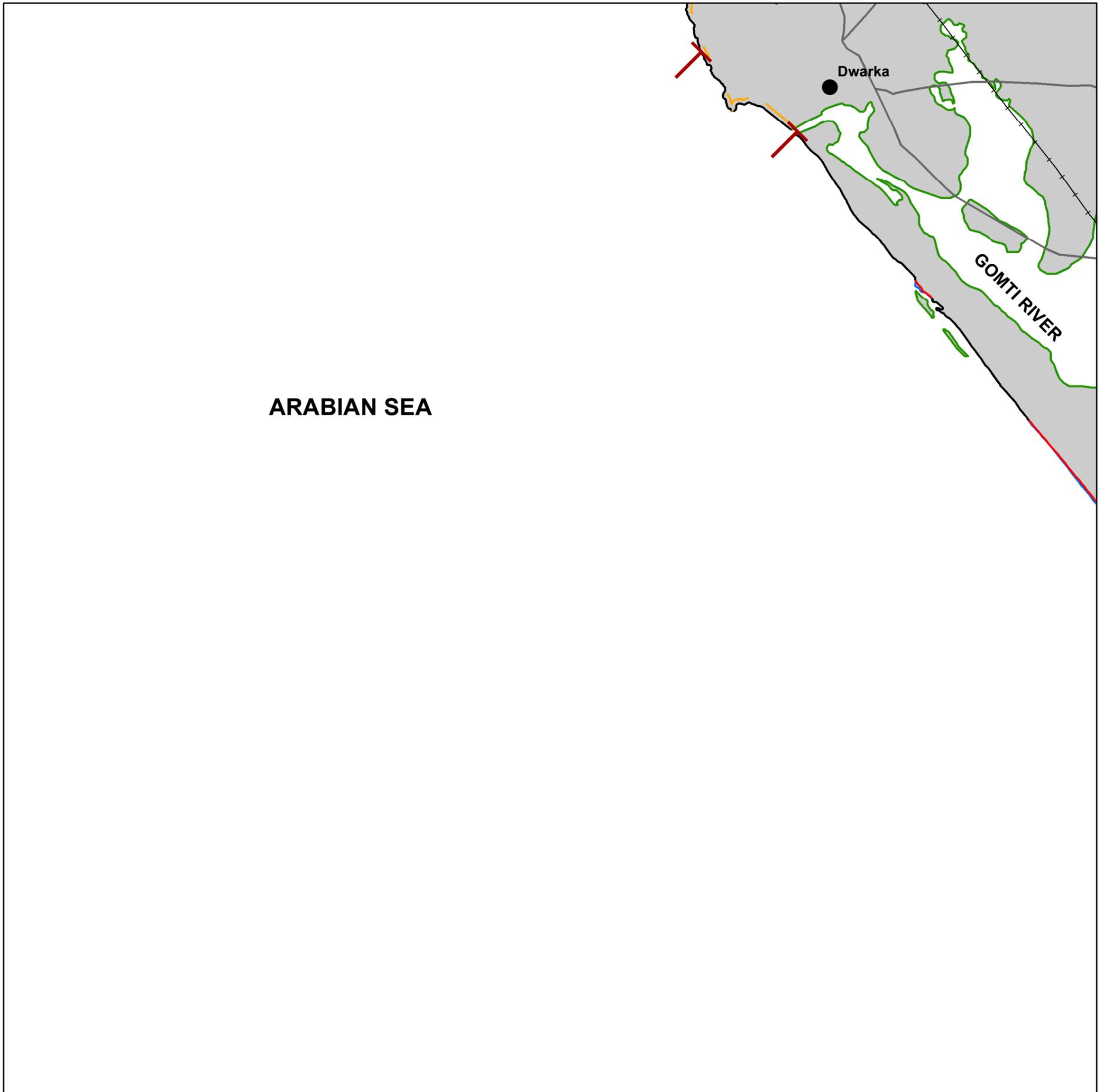
# SHORELINE CHANGE MAP

FOR OFFICIAL USE ONLY

DEVBHUMI DWARKA DISTRICT

GUJARAT

SHEET NO. 41B16NE



ARABIAN SEA

Dwarka

GOMTI RIVER

## Legend

- EROSION
- HIGH-TIDE LINE 2014-16
- HIGH-TIDE LINE 2004-06
- STABLE
- ROAD
- RAILWAY
- SEA WALL
- BREAKWATER
- HABITATION

## INDEX TO SHEETS

SEA	41B15SE	41F03SW
SEA	41B16NE	41F04NW
SEA	SEA	41F04SW



DATA SOURCE:  
IRS LISS4 IMAGES OF 2004-06 & 2014-16

PREPARED BY:  
SPACE APPLICATIONS CENTRE, ISRO, AHMEDABAD  
AND CENTRAL WATER COMMISSION, NEW DELHI



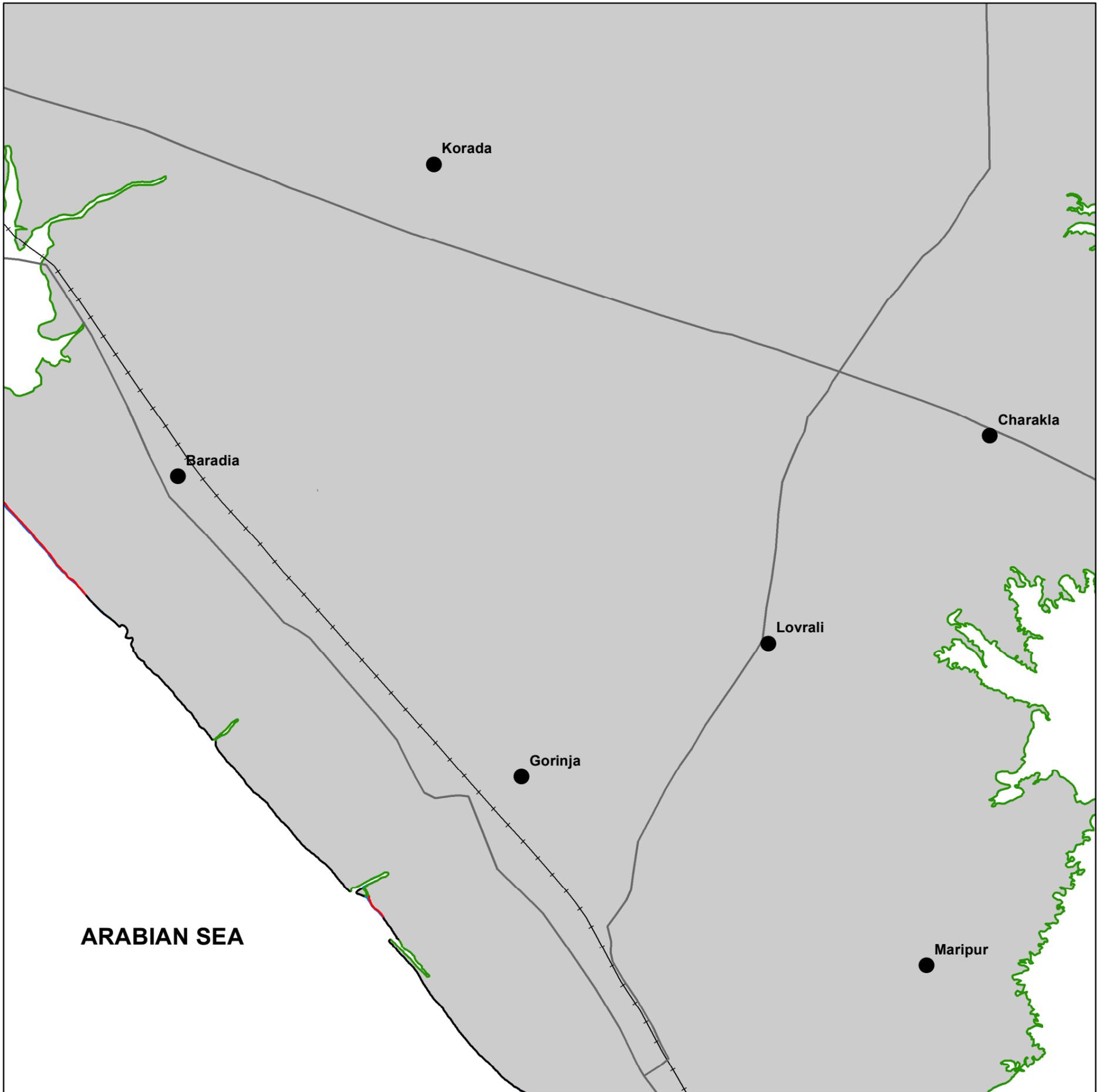
# SHORELINE CHANGE MAP

FOR OFFICIAL USE ONLY

DEVBHUMI DWARKA DISTRICT

GUJARAT

SHEET NO. 41F04NW



ARABIAN SEA

## Legend

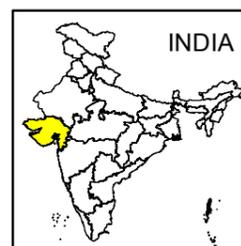
- █ EROSION
- █ HIGH-TIDE LINE 2014-16
- █ HIGH-TIDE LINE 2004-06
- STABLE
- ROAD
- +— RAILWAY
- HABITATION

## INDEX TO SHEETS

41B15SE	41F03SW	41F03SE
41B16NE	41F04NW	41F04NE
SEA	41F04SW	41F04SE



0 2 km



DATA SOURCE:  
IRS LISS4 IMAGES OF 2004-06 & 2014-16

PREPARED BY:  
SPACE APPLICATIONS CENTRE, ISRO, AHMEDABAD  
AND CENTRAL WATER COMMISSION, NEW DELHI



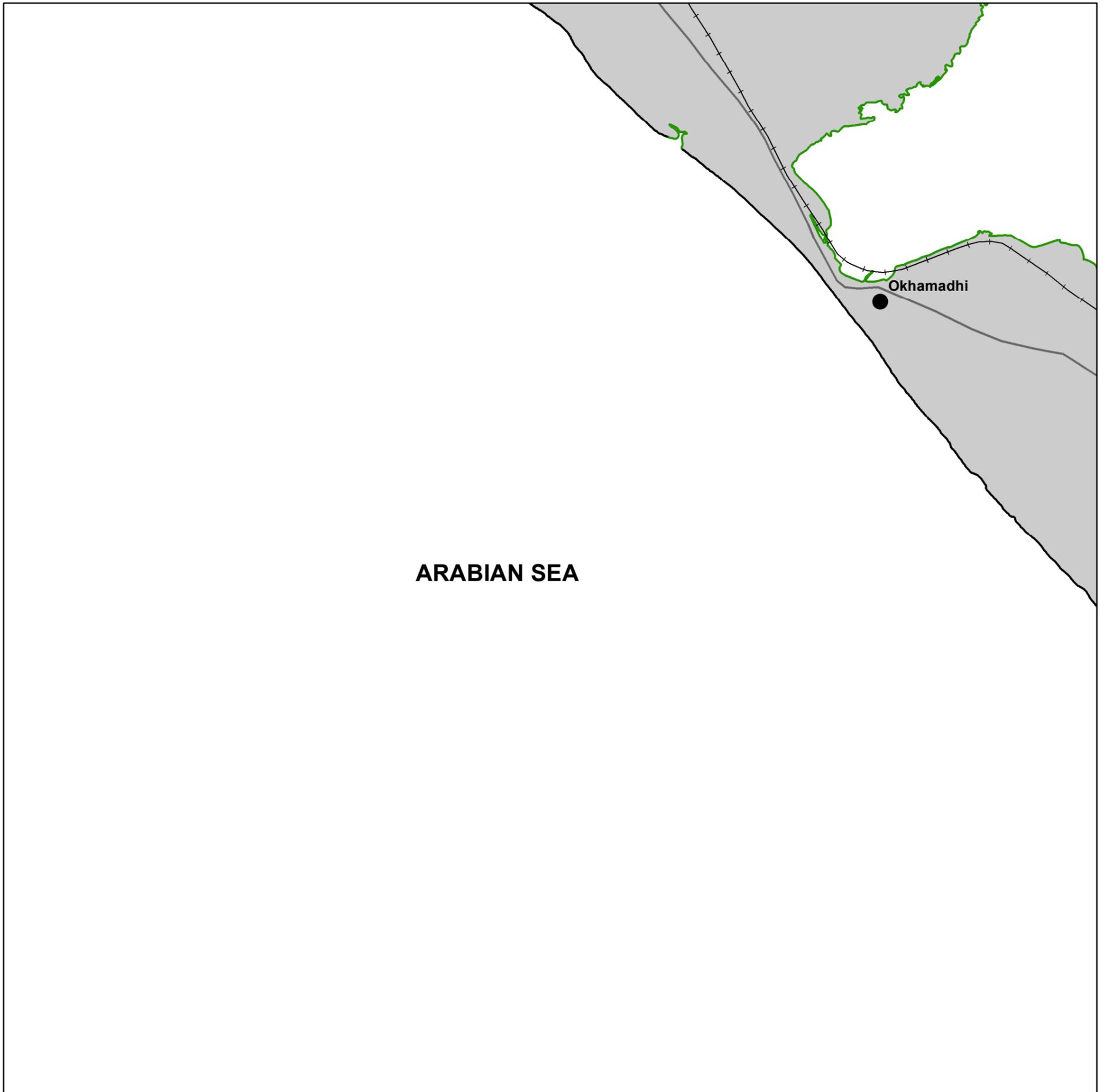
# SHORELINE CHANGE MAP

FOR OFFICIAL USE ONLY

DEVBHUMI DWARKA DISTRICT

GUJARAT

SHEET NO. 41F04SW



### Legend

- HIGH-TIDE LINE 2014-16
- HIGH-TIDE LINE 2004-06
- STABLE
- RAILWAY
- HABITATION

### INDEX TO SHEETS

41B16NE	41F04NW	41F04NE
SEA	41F04SW	41F04SE
SEA	SEA	41G01NE



0 2 km



DATA SOURCE:  
IRS LISS4 IMAGES OF 2004-06 & 2014-16

PREPARED BY:  
SPACE APPLICATIONS CENTRE, ISRO, AHMEDABAD  
AND CENTRAL WATER COMMISSION, NEW DELHI



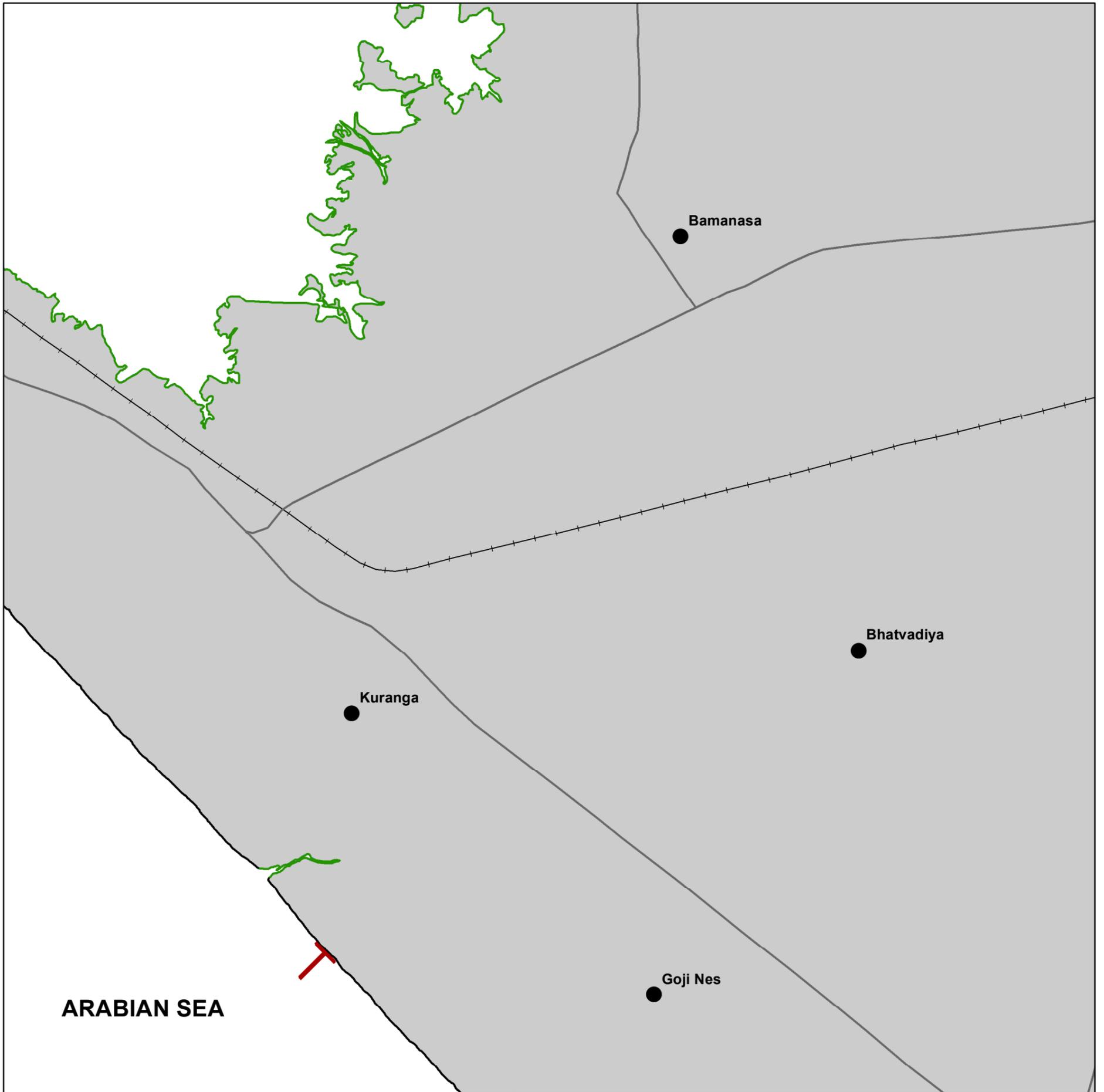
# SHORELINE CHANGE MAP

FOR OFFICIAL USE ONLY

DEVBHUMI DWARKA DISTRICT

GUJARAT

SHEET NO. 41F04SE



### Legend

- HIGH-TIDE LINE 2014-16
- HIGH-TIDE LINE 2004-06
- STABLE
- ROAD
- +— RAILWAY
- ┌ BREAKWATER
- HABITATION

### INDEX TO SHEETS

41F04NW	41F04NE	41F08NW
41F04SW	41F04SE	41F08SW
SEA	41G01NE	41G05NW



0 2 km



DATA SOURCE:  
IRS LISS4 IMAGES OF 2004-06 & 2014-16

PREPARED BY:  
SPACE APPLICATIONS CENTRE, ISRO, AHMEDABAD  
AND CENTRAL WATER COMMISSION, NEW DELHI



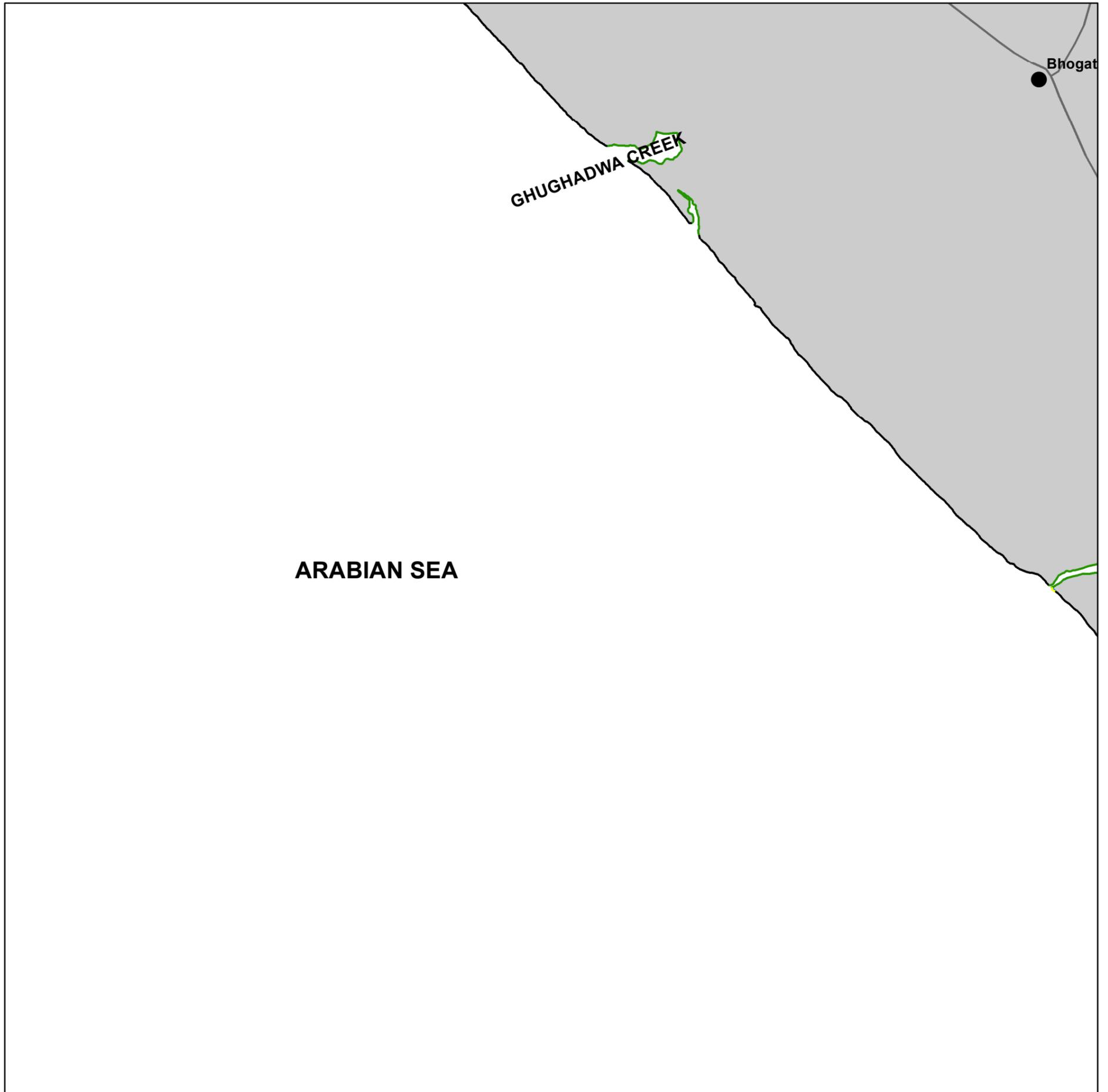
# SHORELINE CHANGE MAP

FOR OFFICIAL USE ONLY

DEVBHUMI DWARKA DISTRICT

GUJARAT

SHEET NO. 41G01NE



ARABIAN SEA

## Legend

- ACCRETION
- HIGH-TIDE LINE 2014-16
- HIGH-TIDE LINE 2004-06
- STABLE
- ROAD
- HABITATION

## INDEX TO SHEETS

41F04SW	41F04SE	41F08SW
SEA	41G01NE	41G05NW
SEA	SEA	41G05SW



DATA SOURCE:  
IRS LISS4 IMAGES OF 2004-06 & 2014-16

PREPARED BY:  
SPACE APPLICATIONS CENTRE, ISRO, AHMEDABAD  
AND CENTRAL WATER COMMISSION, NEW DELHI



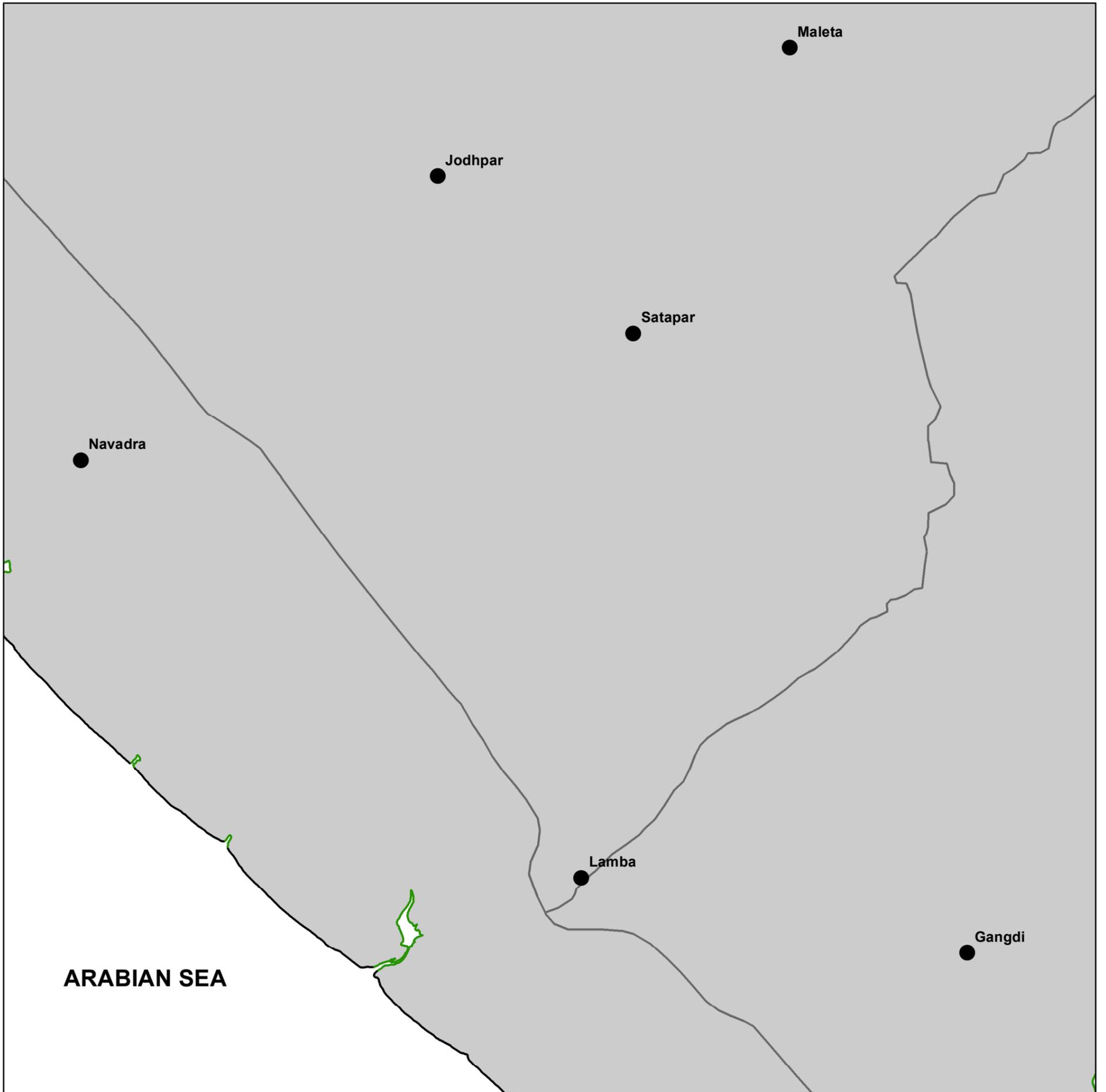
# SHORELINE CHANGE MAP

FOR OFFICIAL USE ONLY

DEVBHUMI DWARKA DISTRICT

GUJARAT

SHEET NO. 41G05NW



ARABIAN SEA

### Legend

- HIGH-TIDE LINE 2014-16
- HIGH-TIDE LINE 2004-06
- STABLE
- ROAD
- HABITATION

### INDEX TO SHEETS

41F04SE	41F08SW	41F08SE
41G01NE	41G05NW	41G05NE
SEA	41G05SW	41G05SE



0 2 km



DATA SOURCE:  
IRS LISS4 IMAGES OF 2004-06 & 2014-16

PREPARED BY:  
SPACE APPLICATIONS CENTRE, ISRO, AHMEDABAD  
AND CENTRAL WATER COMMISSION, NEW DELHI



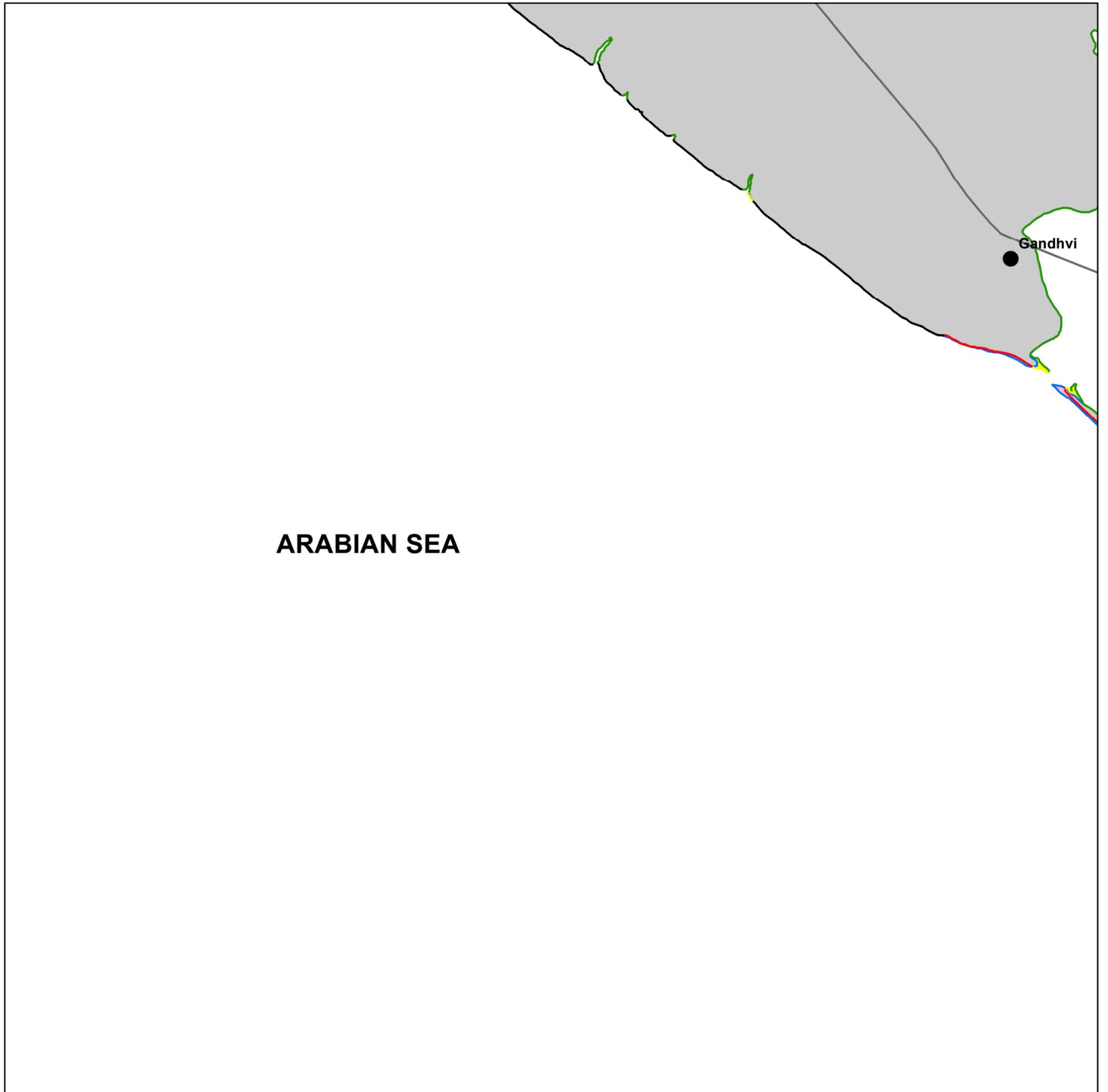
# SHORELINE CHANGE MAP

FOR OFFICIAL USE ONLY

DEVBHUMI DWARKA DISTRICT

GUJARAT

SHEET NO. 41G05SW



ARABIAN SEA

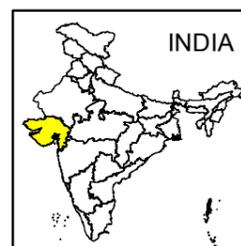
## Legend

-  EROSION
-  ACCRETION
-  HIGH-TIDE LINE 2014-16
-  HIGH-TIDE LINE 2004-06
-  STABLE
-  HABITATION



## INDEX TO SHEETS

41G01NE	41G05NW	41G05NE
SEA	41G05SW	41G05SE
SEA	SEA	41G06NE



DATA SOURCE:  
IRS LISS4 IMAGES OF 2004-06 & 2014-16

PREPARED BY:  
SPACE APPLICATIONS CENTRE, ISRO, AHMEDABAD  
AND CENTRAL WATER COMMISSION, NEW DELHI

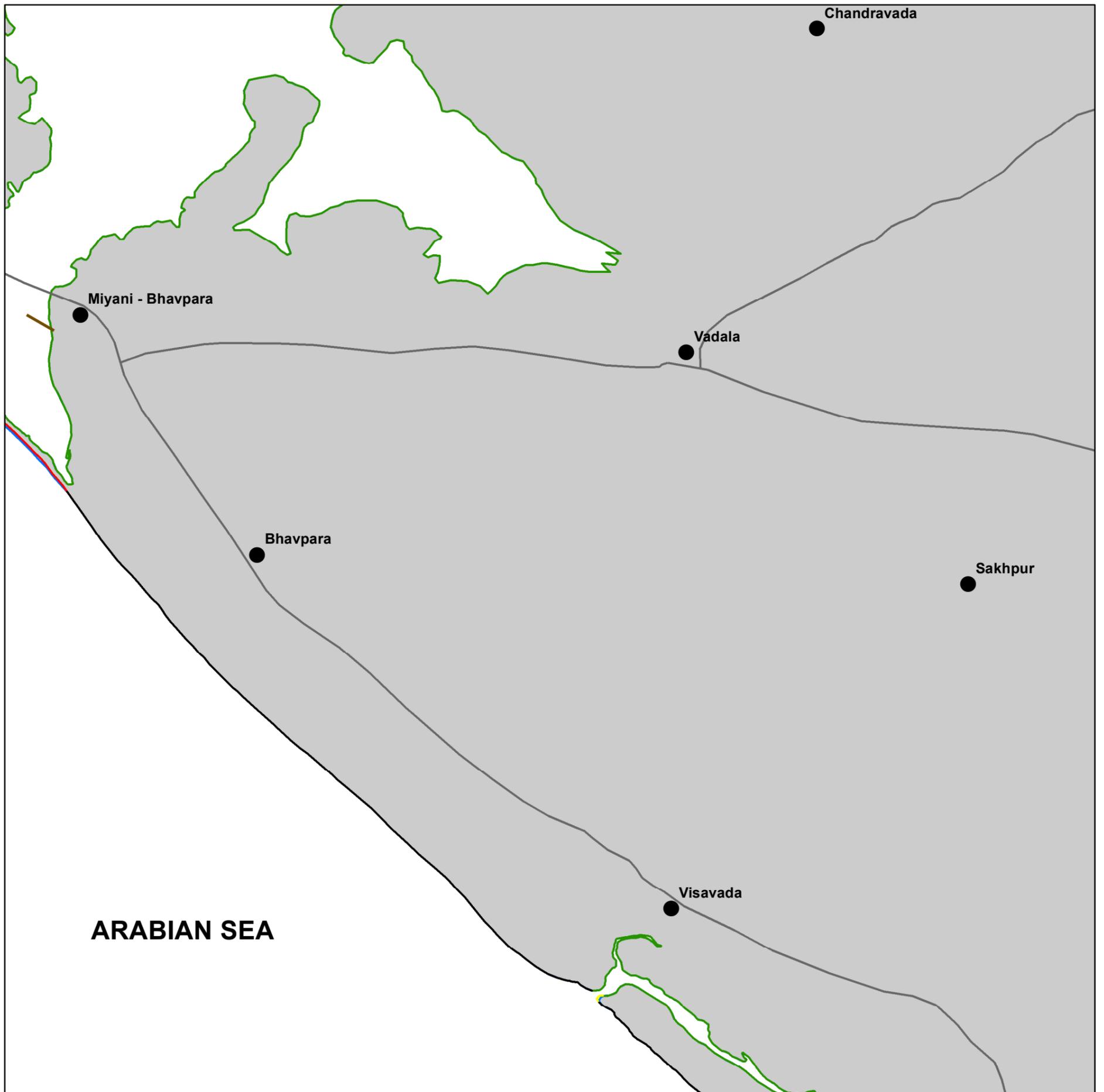


# SHORELINE CHANGE MAP

DEVBHUMI DWARKA/  
PORBANDAR DISTRICT

GUJARAT

FOR OFFICIAL USE ONLY  
SHEET NO. 41G05SE



ARABIAN SEA

## Legend

- EROSION
- ACCRETION
- HIGH-TIDE LINE 2014-16
- HIGH-TIDE LINE 2004-06
- STABLE
- ROAD
- JETTY
- HABITATION

## INDEX TO SHEETS

41G05NW	41G05NE	41G09NW
41G05SW	41G05SE	41G09SW
SEA	41G06NE	41G10NW



DATA SOURCE:  
IRS LISS4 IMAGES OF 2004-06 & 2014-16

PREPARED BY:  
SPACE APPLICATIONS CENTRE, ISRO, AHMEDABAD  
AND CENTRAL WATER COMMISSION, NEW DELHI



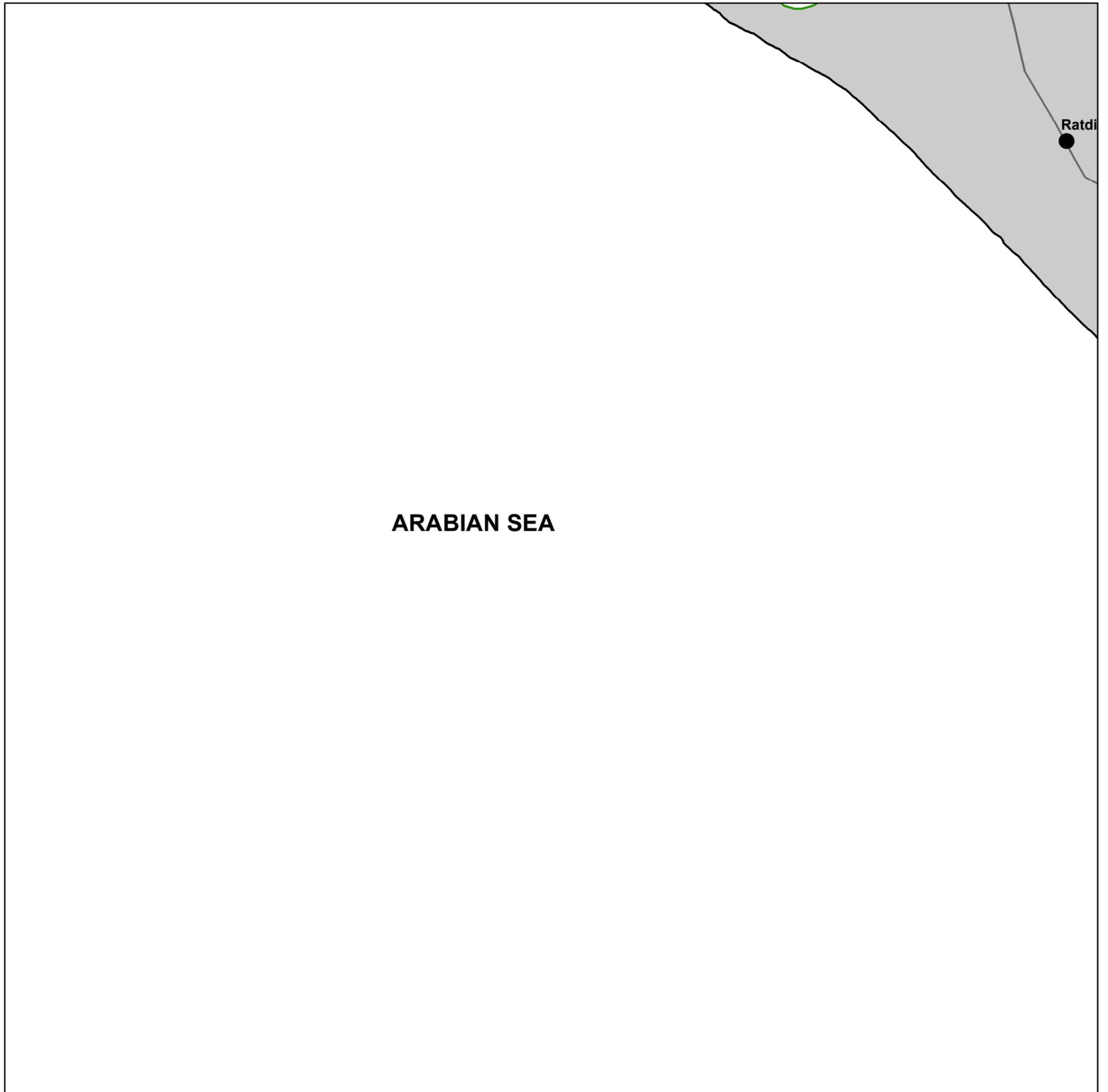
# SHORELINE CHANGE MAP

FOR OFFICIAL USE ONLY

PORBANDAR DISTRICT

GUJARAT

SHEET NO. 41G06NE



### Legend

- HIGH-TIDE LINE 2014-16
- HIGH-TIDE LINE 2004-06
- STABLE
- HABITATION

### INDEX TO SHEETS

41G05SW	41G05SE	41G09SW
SEA	41G06NE	41G10NW
SEA	SEA	41G10SW



DATA SOURCE:  
IRS LISS4 IMAGES OF 2004-06 & 2014-16

PREPARED BY:  
SPACE APPLICATIONS CENTRE, ISRO, AHMEDABAD  
AND CENTRAL WATER COMMISSION, NEW DELHI



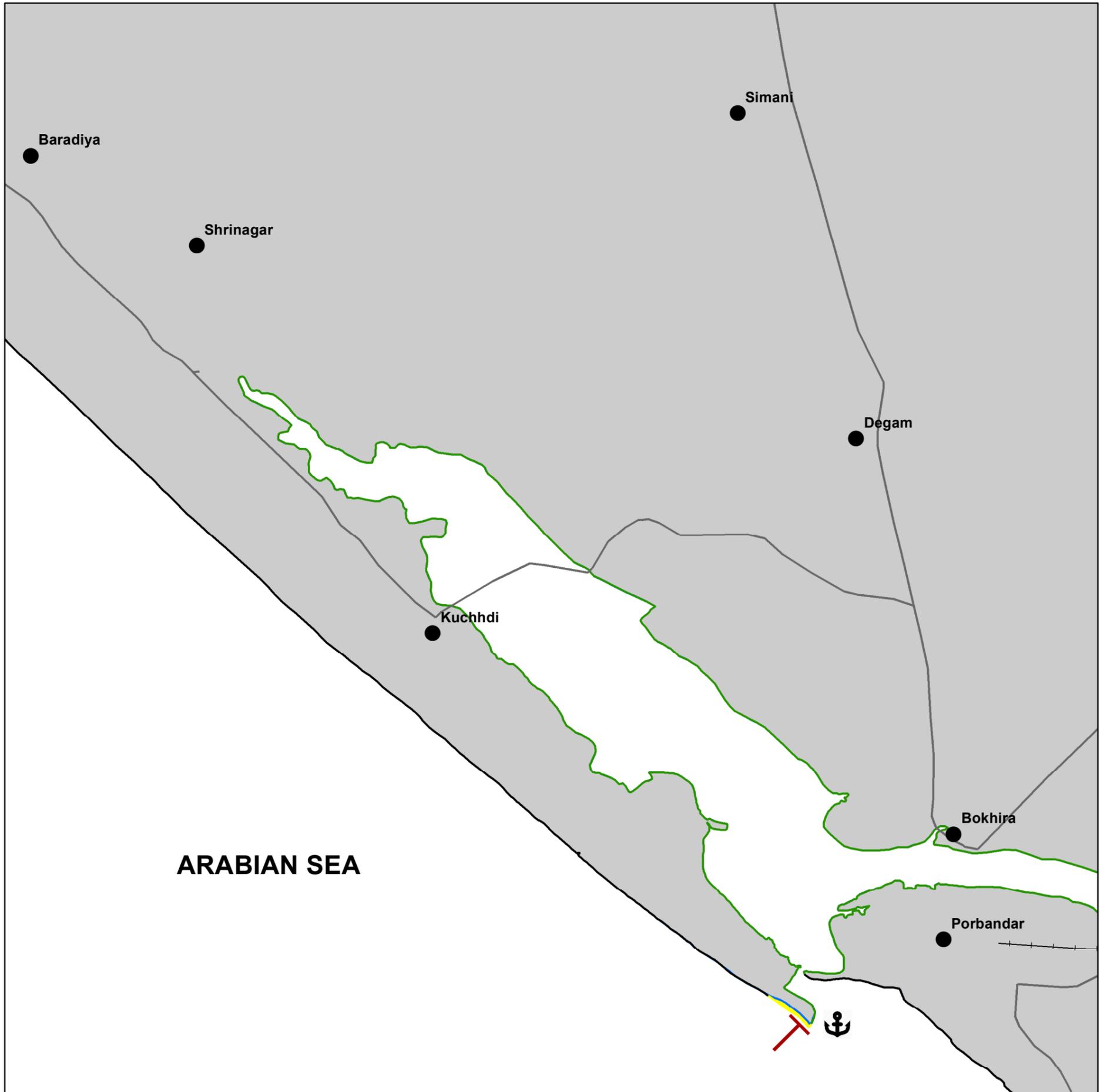
# SHORELINE CHANGE MAP

FOR OFFICIAL USE ONLY

PORBANDAR DISTRICT

GUJARAT

SHEET NO. 41G10NW



## Legend

- EROSION
- ACCRETION
- HIGH-TIDE LINE 2014-16
- HIGH-TIDE LINE 2004-06
- STABLE
- ROAD
- RAILWAY
- BREAKWATER
- PORT/HARBOUR
- HABITATION

## INDEX TO SHEETS

41G05SE	41G09SW	41G09SE
41G06NE	41G10NW	41G10NE
SEA	41G10SW	41G10SE



0 2 km



DATA SOURCE:  
IRS LISS4 IMAGES OF 2004-06 & 2014-16

PREPARED BY:  
SPACE APPLICATIONS CENTRE, ISRO, AHMEDABAD  
AND CENTRAL WATER COMMISSION, NEW DELHI



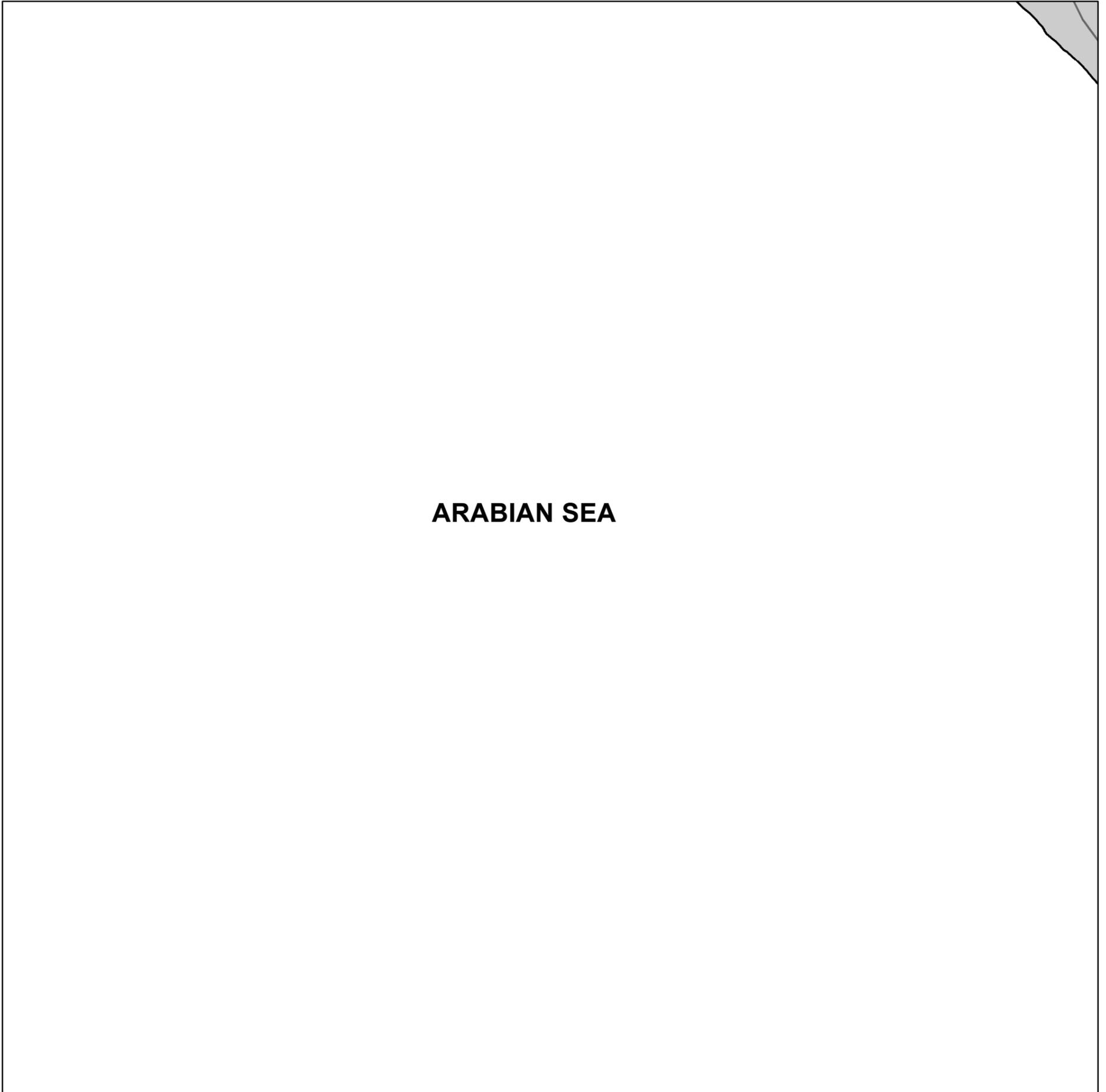
# SHORELINE CHANGE MAP

FOR OFFICIAL USE ONLY

PORBANDAR DISTRICT

GUJARAT

SHEET NO. 41G10SW



ARABIAN SEA

### Legend

-  HIGH-TIDE LINE 2014-16
-  HIGH-TIDE LINE 2004-06
-  STABLE
-  ROAD



0 2 km



### INDEX TO SHEETS

41G06NE	41G10NW	41G10NE
SEA	41G10SW	41G10SE
41G07NE	SEA	41G11NE



DATA SOURCE:  
IRS LISS4 IMAGES OF 2004-06 & 2014-16

PREPARED BY:  
SPACE APPLICATIONS CENTRE, ISRO, AHMEDABAD  
AND CENTRAL WATER COMMISSION, NEW DELHI



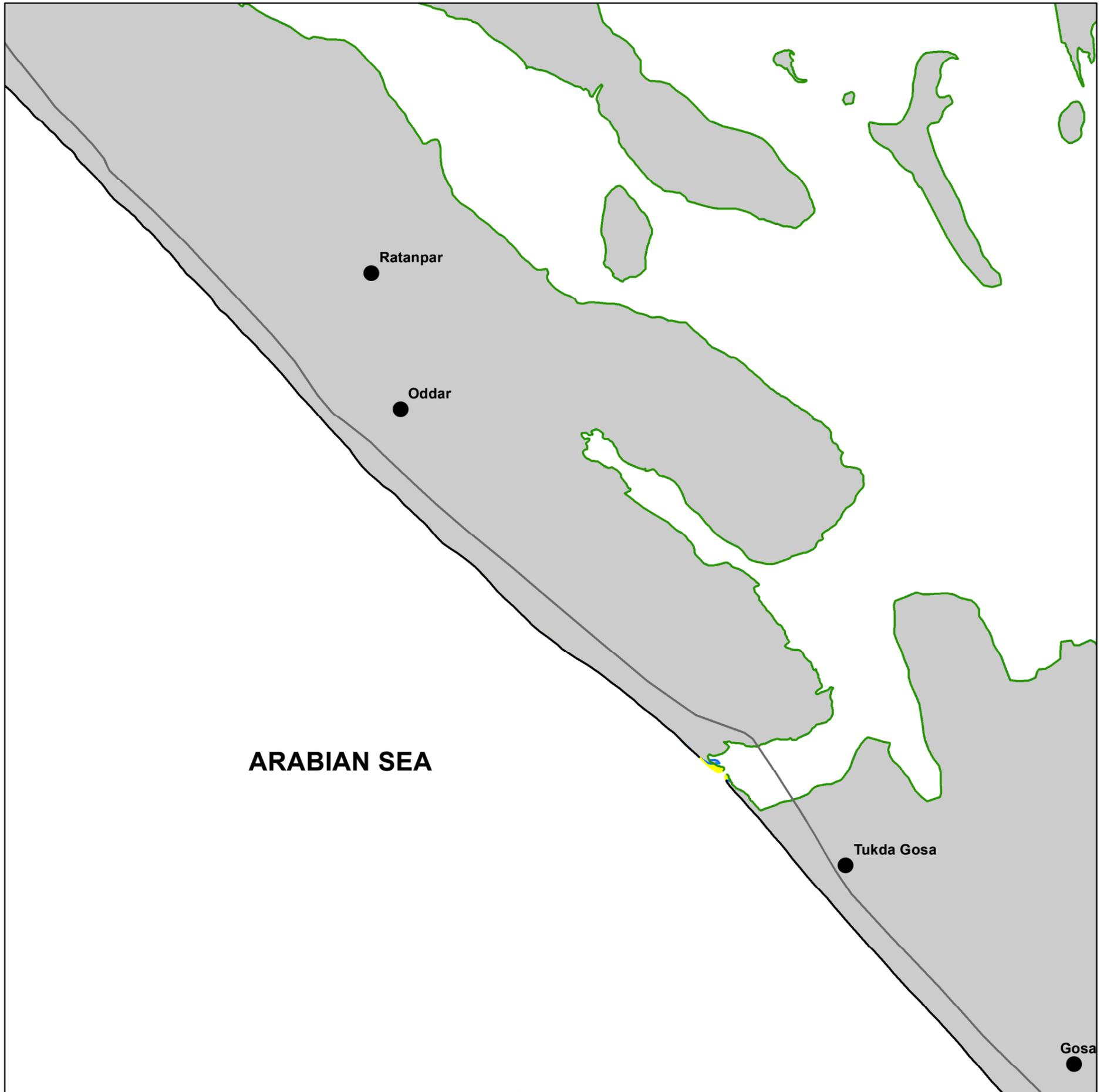
# SHORELINE CHANGE MAP

FOR OFFICIAL USE ONLY

PORBANDAR DISTRICT

GUJARAT

SHEET NO. 41G10SE



ARABIAN SEA

### Legend

- EROSION
- ACCRETION
- HIGH-TIDE LINE 2014-16
- HIGH-TIDE LINE 2004-06
- STABLE
- ROAD
- HABITATION

### INDEX TO SHEETS

41G10NW	41G10NE	41G14NW
41G10SW	41G10SE	41G14SW
SEA	41G11NE	41G15NW



0 2 km



DATA SOURCE:  
IRS LISS4 IMAGES OF 2004-06 & 2014-16

PREPARED BY:  
SPACE APPLICATIONS CENTRE, ISRO, AHMEDABAD  
AND CENTRAL WATER COMMISSION, NEW DELHI



# SHORELINE CHANGE MAP

FOR OFFICIAL USE ONLY

PORBANDAR DISTRICT

GUJARAT

SHEET NO. 41G11NE

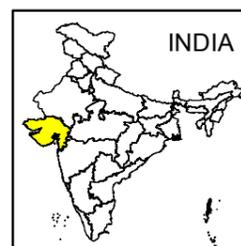
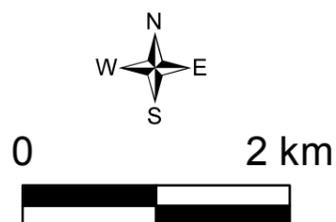
ARABIAN SEA

### Legend

-  HIGH-TIDE LINE 2014-16
-  HIGH-TIDE LINE 2004-06
-  STABLE

### INDEX TO SHEETS

41G10SW	41G10SE	41G14SW
SEA	41G11NE	41G15NW
SEA	SEA	41G15SW



DATA SOURCE:  
IRS LISS4 IMAGES OF 2004-06 & 2014-16

PREPARED BY:  
SPACE APPLICATIONS CENTRE, ISRO, AHMEDABAD  
AND CENTRAL WATER COMMISSION, NEW DELHI



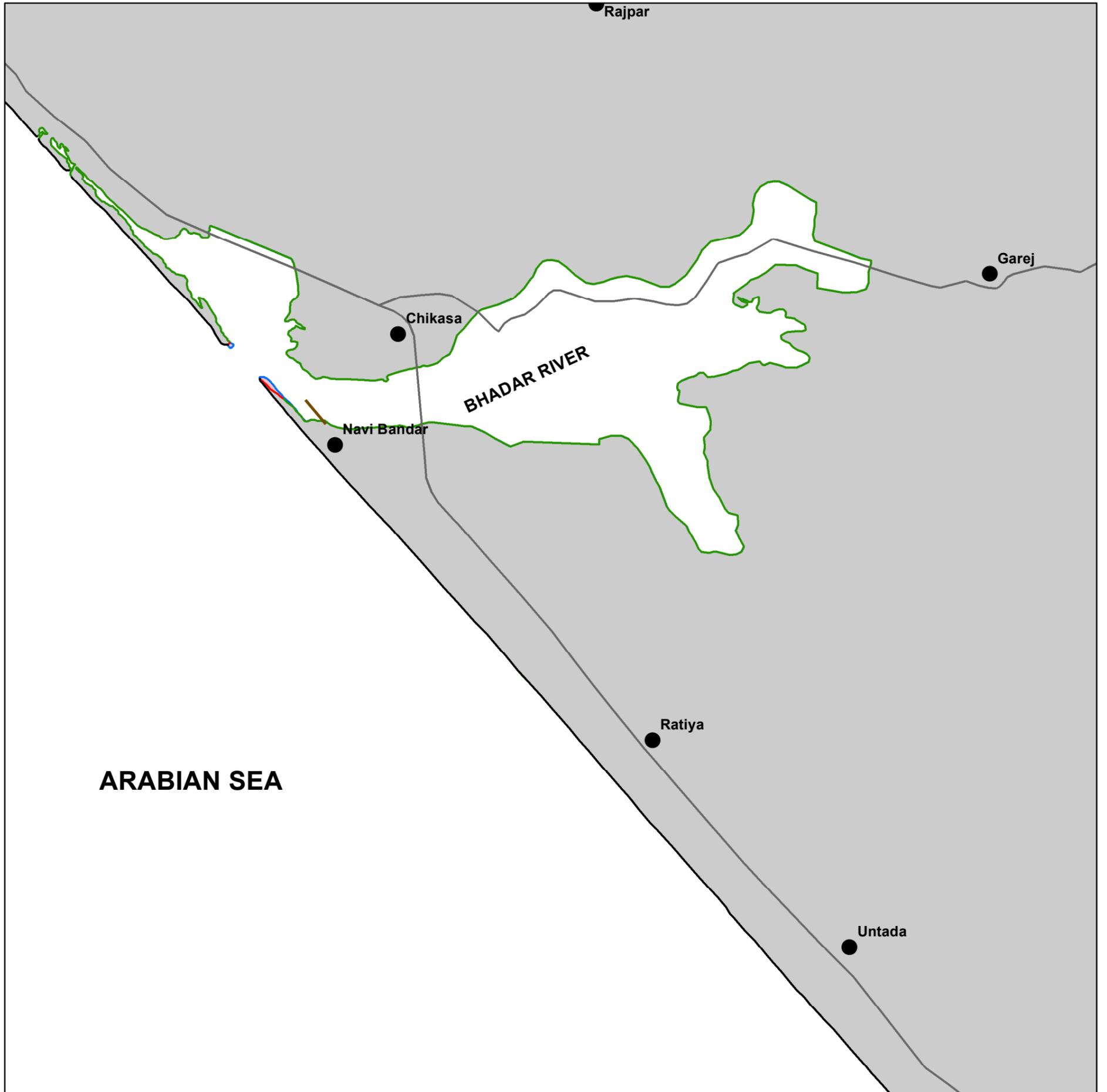
# SHORELINE CHANGE MAP

FOR OFFICIAL USE ONLY

PORBANDAR DISTRICT

GUJARAT

SHEET NO. 41G15NW



### Legend

- EROSION
- HIGH-TIDE LINE 2014-16
- HIGH-TIDE LINE 2004-06
- STABLE
- ROAD
- JETTY
- HABITATION

### INDEX TO SHEETS

41G10SE	41G14SW	41G14SE
41G11NE	41G15NW	41G15NE
SEA	41G15SW	41G15SE



0 2 km



DATA SOURCE:  
IRS LISS4 IMAGES OF 2004-06 & 2014-16

PREPARED BY:  
SPACE APPLICATIONS CENTRE, ISRO, AHMEDABAD  
AND CENTRAL WATER COMMISSION, NEW DELHI



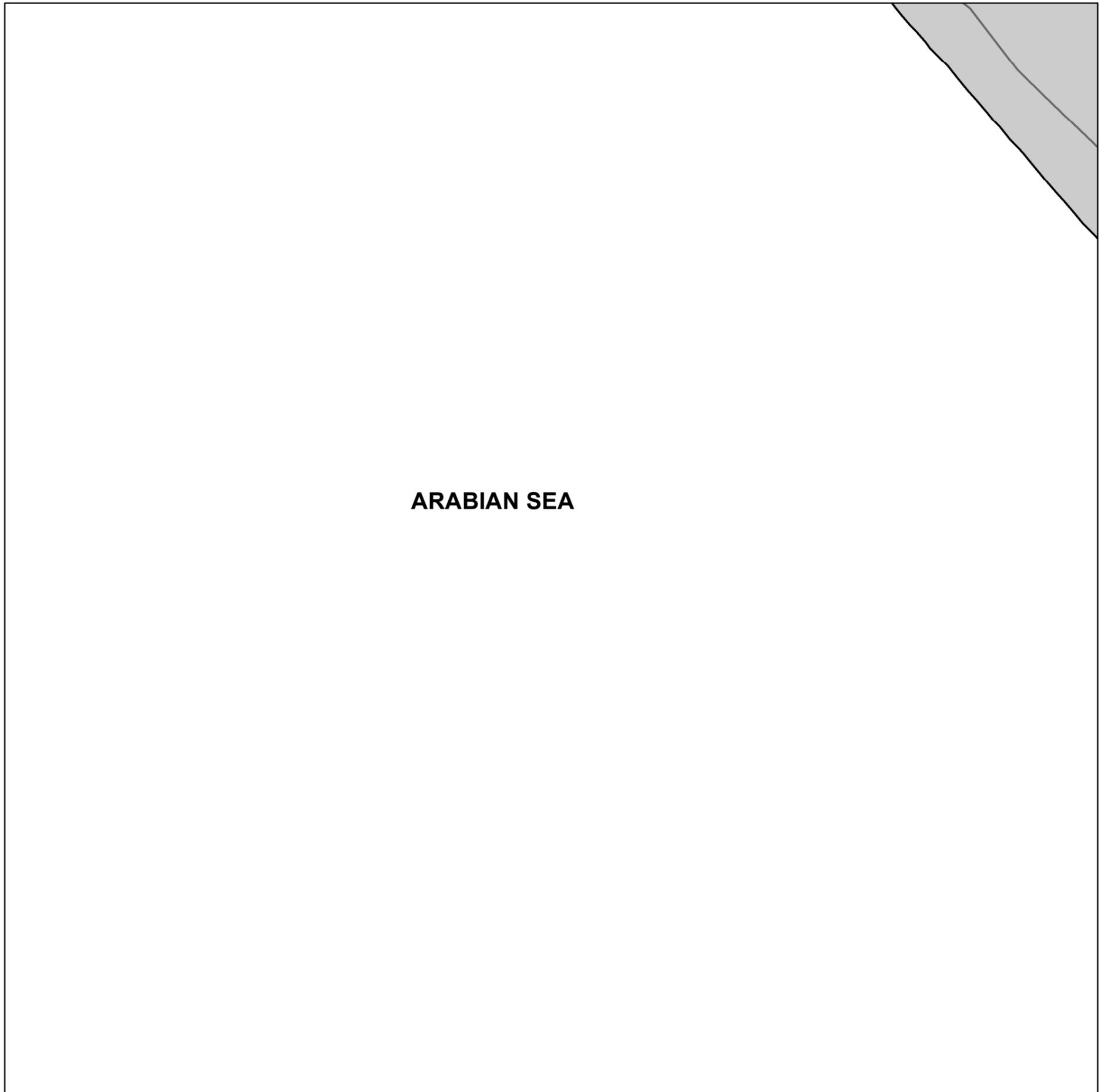
# SHORELINE CHANGE MAP

FOR OFFICIAL USE ONLY

PORBANDAR DISTRICT

GUJARAT

SHEET NO. 41G15SW



ARABIAN SEA

### Legend

- HIGH-TIDE LINE 2014-16
- HIGH-TIDE LINE 2004-06
- STABLE
- ROAD

### INDEX TO SHEETS

41G11NE	41G15NW	41G15NE
SEA	41G15SW	41G15SE
SEA	SEA	41G16NE



0 2 km



DATA SOURCE:  
IRS LISS4 IMAGES OF 2004-06 & 2014-16

PREPARED BY:  
SPACE APPLICATIONS CENTRE, ISRO, AHMEDABAD  
AND CENTRAL WATER COMMISSION, NEW DELHI



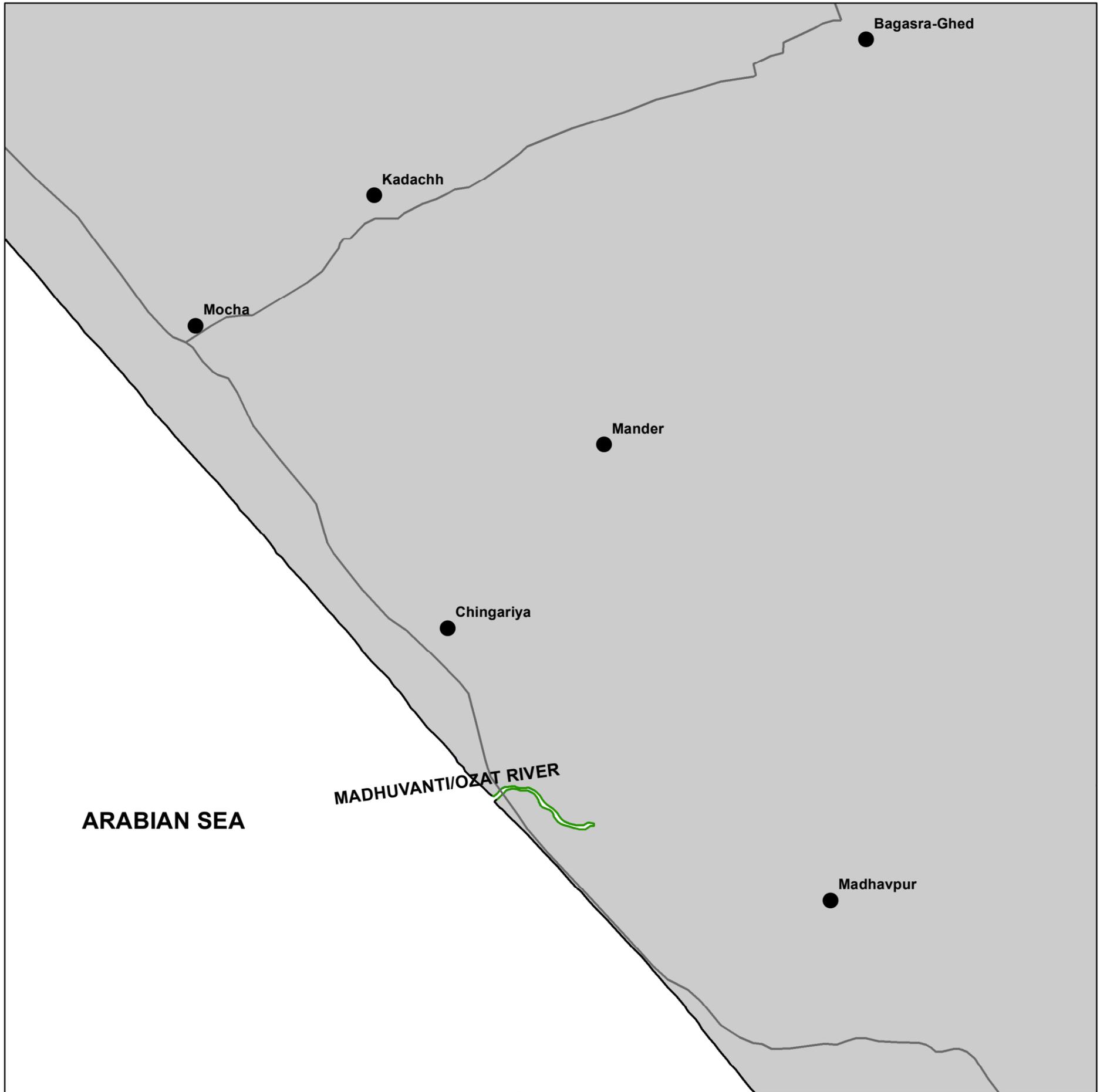
# SHORELINE CHANGE MAP

FOR OFFICIAL USE ONLY

PORBANDAR DISTRICT

GUJARAT

SHEET NO. 41G15SE



### Legend

- HIGH-TIDE LINE 2014-16
- HIGH-TIDE LINE 2004-06
- STABLE
- ROAD
- HABITATION

### INDEX TO SHEETS

41G15NW	41G15NE	41K03NW
41G15SW	41G15SE	41K03SW
SEA	41G16NE	41K04NW



0 2 km



DATA SOURCE:  
IRS LISS4 IMAGES OF 2004-06 & 2014-16

PREPARED BY:  
SPACE APPLICATIONS CENTRE, ISRO, AHMEDABAD  
AND CENTRAL WATER COMMISSION, NEW DELHI



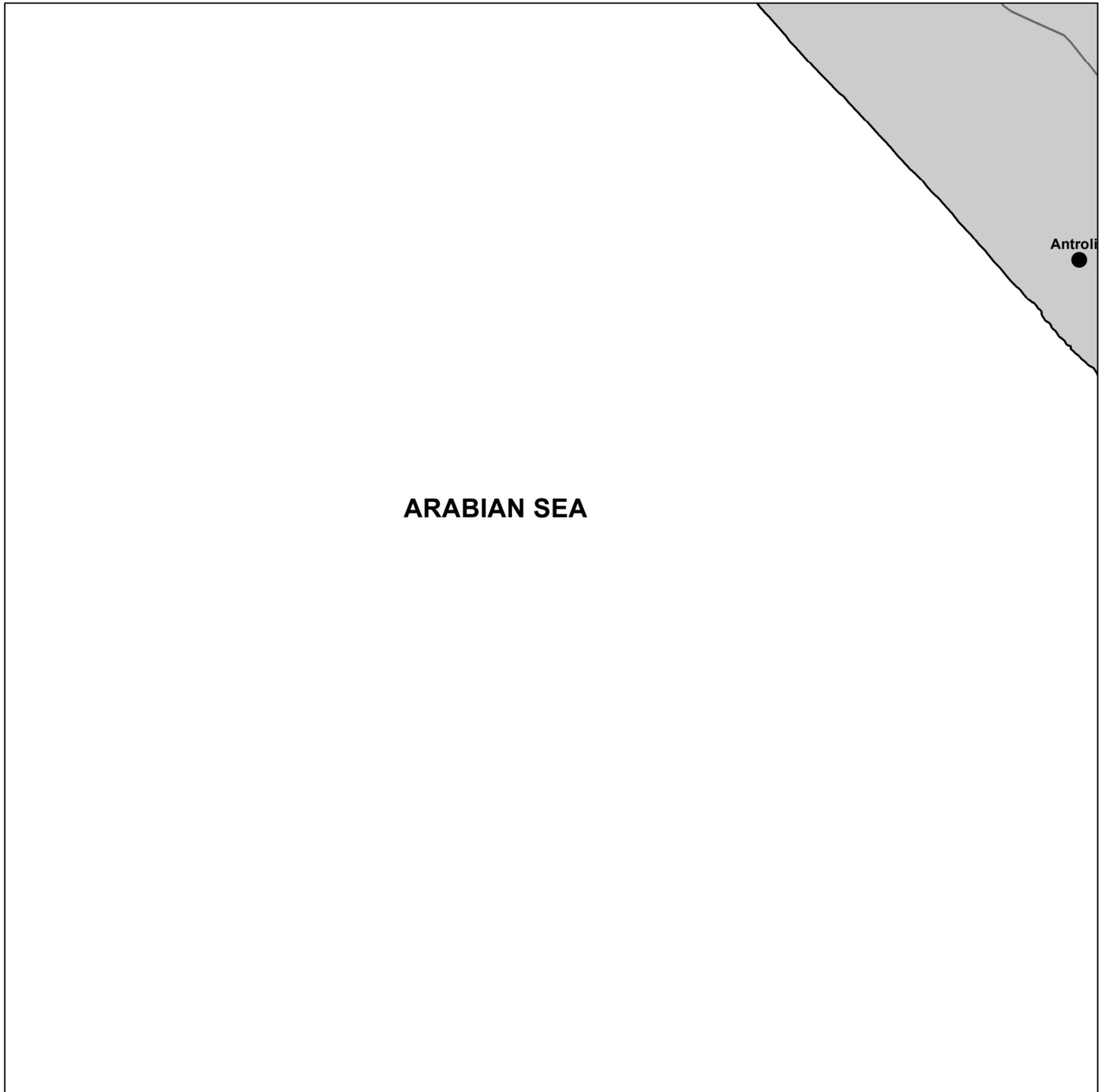
# SHORELINE CHANGE MAP

FOR OFFICIAL USE ONLY

PORBANDAR DISTRICT

GUJARAT

SHEET NO. 41G16NE



ARABIAN SEA

Antroli

### Legend

- HIGH-TIDE LINE 2014-16
- HIGH-TIDE LINE 2004-06
- STABLE
- HABITATION

### INDEX TO SHEETS

41G15SW	41G15SE	41K03SW
SEA	41G16NE	41K04NW
SEA	SEA	41K04SW



0 2 km



DATA SOURCE:  
IRS LISS4 IMAGES OF 2004-06 & 2014-16

PREPARED BY:  
SPACE APPLICATIONS CENTRE, ISRO, AHMEDABAD  
AND CENTRAL WATER COMMISSION, NEW DELHI



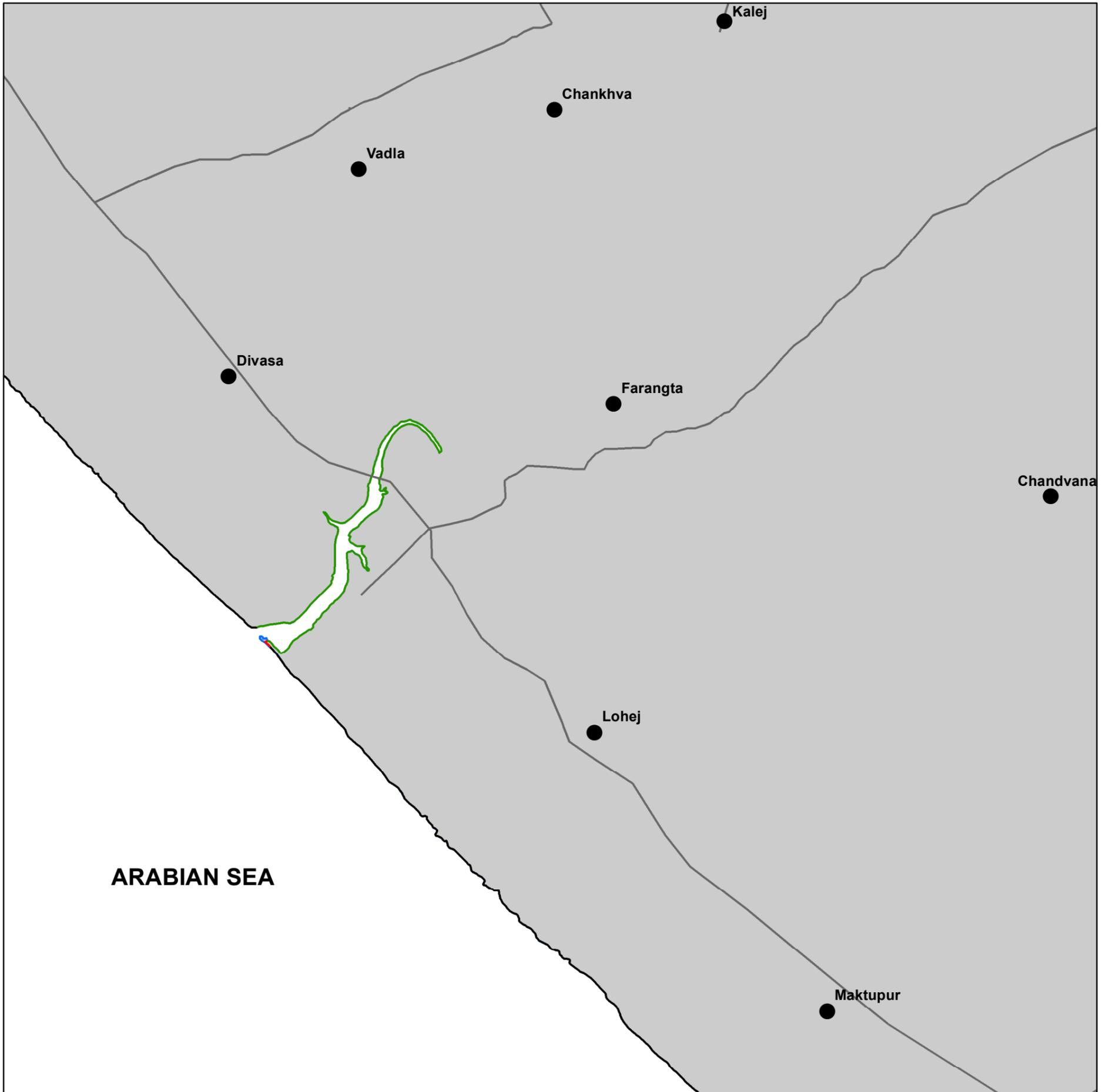
# SHORELINE CHANGE MAP

FOR OFFICIAL USE ONLY

JUNAGADH DISTRICT

GUJARAT

SHEET NO. 41K04NW



### Legend

- EROSION
- HIGH-TIDE LINE 2014-16
- HIGH-TIDE LINE 2004-06
- STABLE
- HABITATION

### INDEX TO SHEETS

41G15SE	41K03SW	41K03SE
41G16NE	41K04NW	41K04NE
SEA	41K04SW	41K04SE



0 2 km



DATA SOURCE:  
IRS LISS4 IMAGES OF 2004-06 & 2014-16

PREPARED BY:  
SPACE APPLICATIONS CENTRE, ISRO, AHMEDABAD  
AND CENTRAL WATER COMMISSION, NEW DELHI



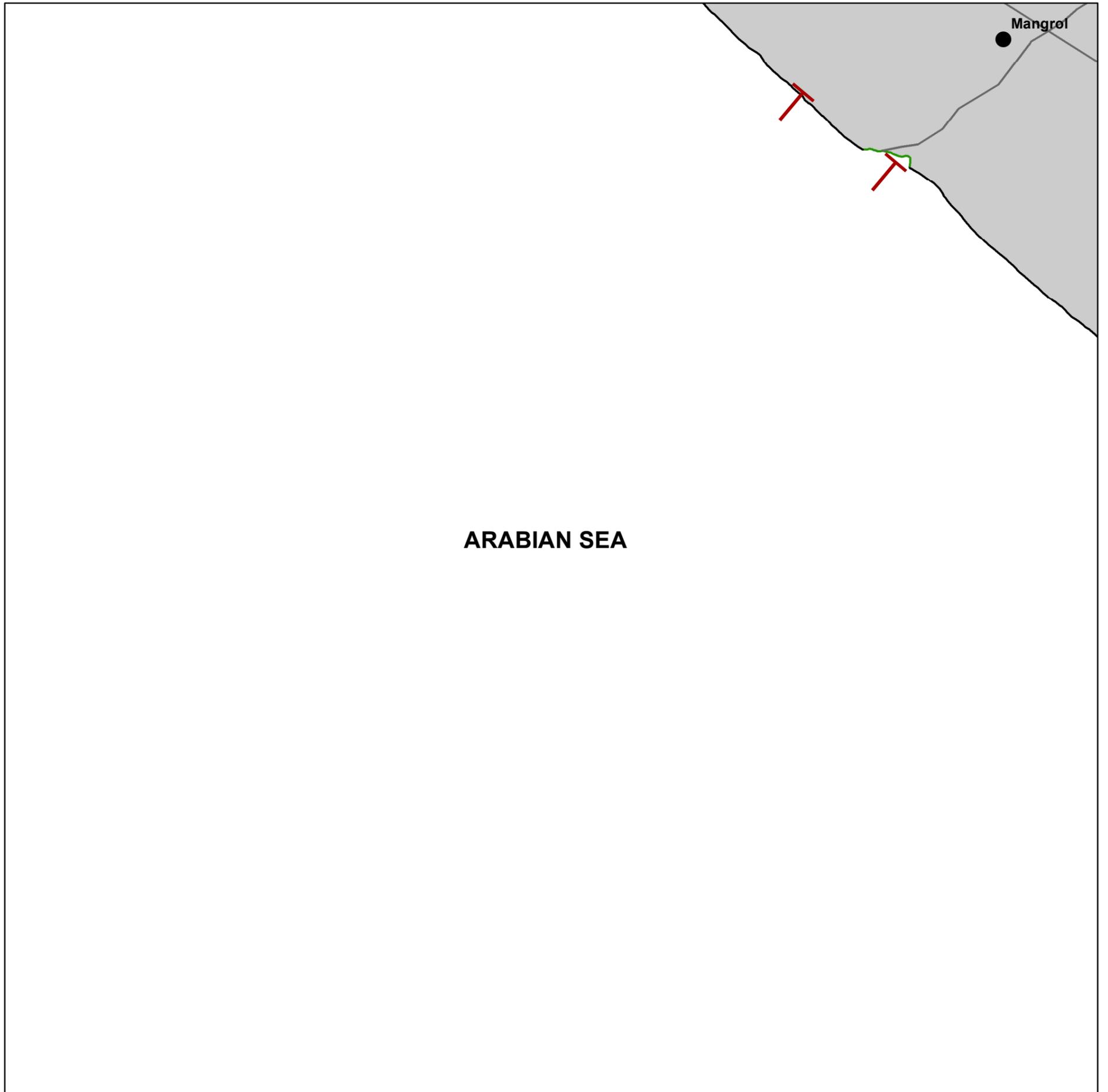
# SHORELINE CHANGE MAP

FOR OFFICIAL USE ONLY

JUNAGADH DISTRICT

GUJARAT

SHEET NO. 41K04SW



### Legend

- HIGH-TIDE LINE 2014-16
- HIGH-TIDE LINE 2004-06
- STABLE
- ROAD
- ┌ BREAKWATER
- HABITATION

### INDEX TO SHEETS

41G16NE	41K04NW	41K04NE
SEA	41K04SW	41K04SE
SEA	SEA	41L01NE



0 2 km



DATA SOURCE:  
IRS LISS4 IMAGES OF 2004-06 & 2014-16

PREPARED BY:  
SPACE APPLICATIONS CENTRE, ISRO, AHMEDABAD  
AND CENTRAL WATER COMMISSION, NEW DELHI



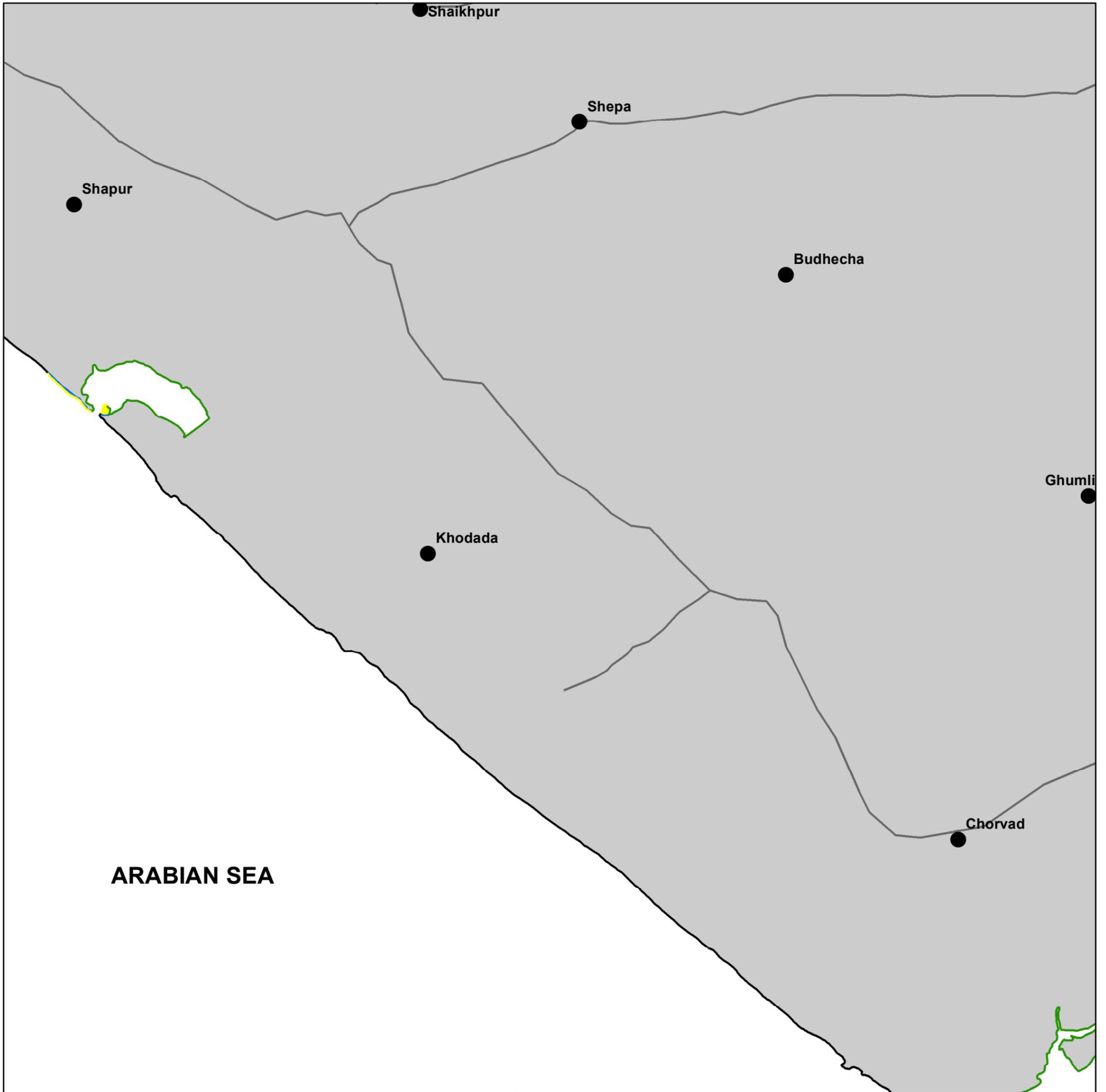
# SHORELINE CHANGE MAP

FOR OFFICIAL USE ONLY

JUNAGADH DISTRICT

GUJARAT

SHEET NO. 41K04SE



ARABIAN SEA

### Legend

- ACCRETION
- HIGH-TIDE LINE 2014-16
- HIGH-TIDE LINE 2004-06
- STABLE
- ROAD
- HABITATION

### INDEX TO SHEETS

41K04NW	41K04NE	41K08NW
41K04SW	41K04SE	41K08SW
SEA	41L01NE	41L05NW



0 2 km



DATA SOURCE:  
IRS LISS4 IMAGES OF 2004-06 & 2014-16

PREPARED BY:  
SPACE APPLICATIONS CENTRE, ISRO, AHMEDABAD  
AND CENTRAL WATER COMMISSION, NEW DELHI



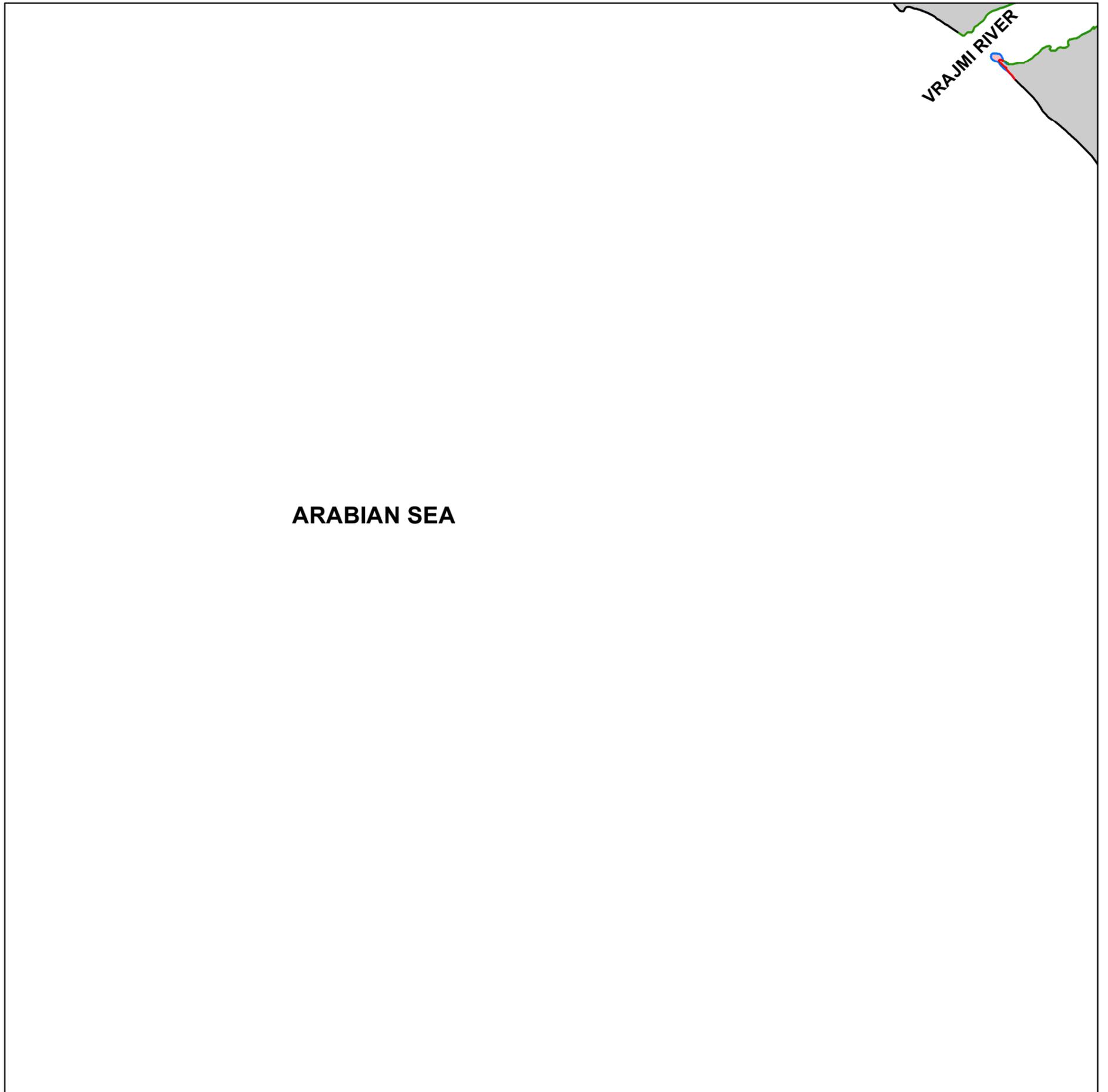
# SHORELINE CHANGE MAP

FOR OFFICIAL USE ONLY

JUNAGADH DISTRICT

GUJARAT

SHEET NO. 41L01NE



ARABIAN SEA

VRAJMI RIVER

## Legend

- EROSION
- HIGH-TIDE LINE 2014-16
- HIGH-TIDE LINE 2004-06
- STABLE
- HABITATION



## INDEX TO SHEETS

41K04SW	41K04SE	41K08SW
SEA	41L01NE	41L05NW
SEA	SEA	SEA



DATA SOURCE:  
IRS LISS4 IMAGES OF 2004-06 & 2014-16

PREPARED BY:  
SPACE APPLICATIONS CENTRE, ISRO, AHMEDABAD  
AND CENTRAL WATER COMMISSION, NEW DELHI



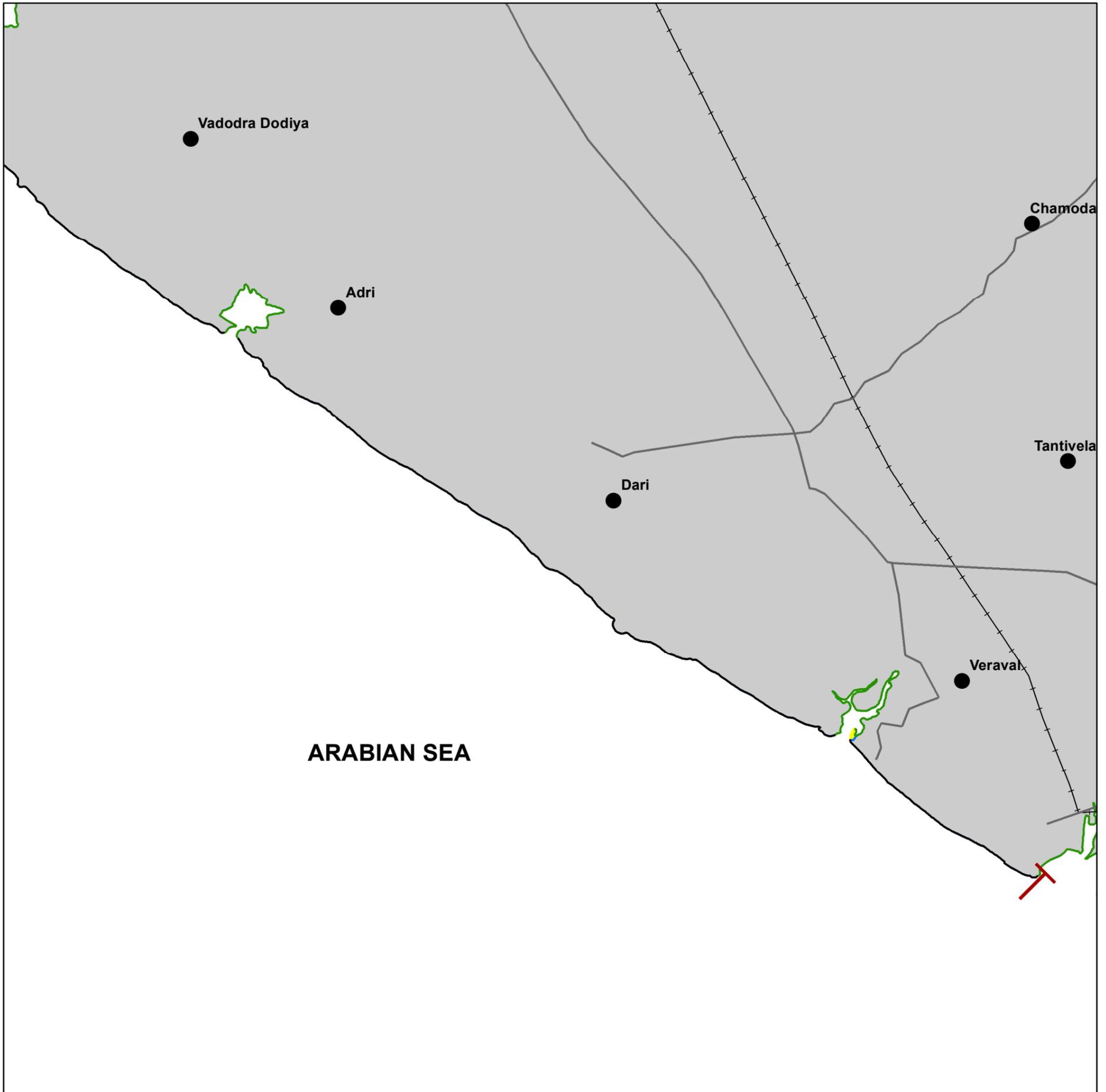
# SHORELINE CHANGE MAP

FOR OFFICIAL USE ONLY

GIR SOMNATH DISTRICT

GUJARAT

SHEET NO. 41L05NW



## Legend

- ACCRETION
- HIGH-TIDE LINE 2014-16
- HIGH-TIDE LINE 2004-06
- STABLE
- ROAD
- RAILWAY
- BREAKWATER
- HABITATION

## INDEX TO SHEETS

41K04SE	41K08SW	41K08SE
41L01NE	41L05NW	41L05NE
SEA	SEA	41L05SE



0 2 km



DATA SOURCE:  
IRS LISS4 IMAGES OF 2004-06 & 2014-16

PREPARED BY:  
SPACE APPLICATIONS CENTRE, ISRO, AHMEDABAD  
AND CENTRAL WATER COMMISSION, NEW DELHI



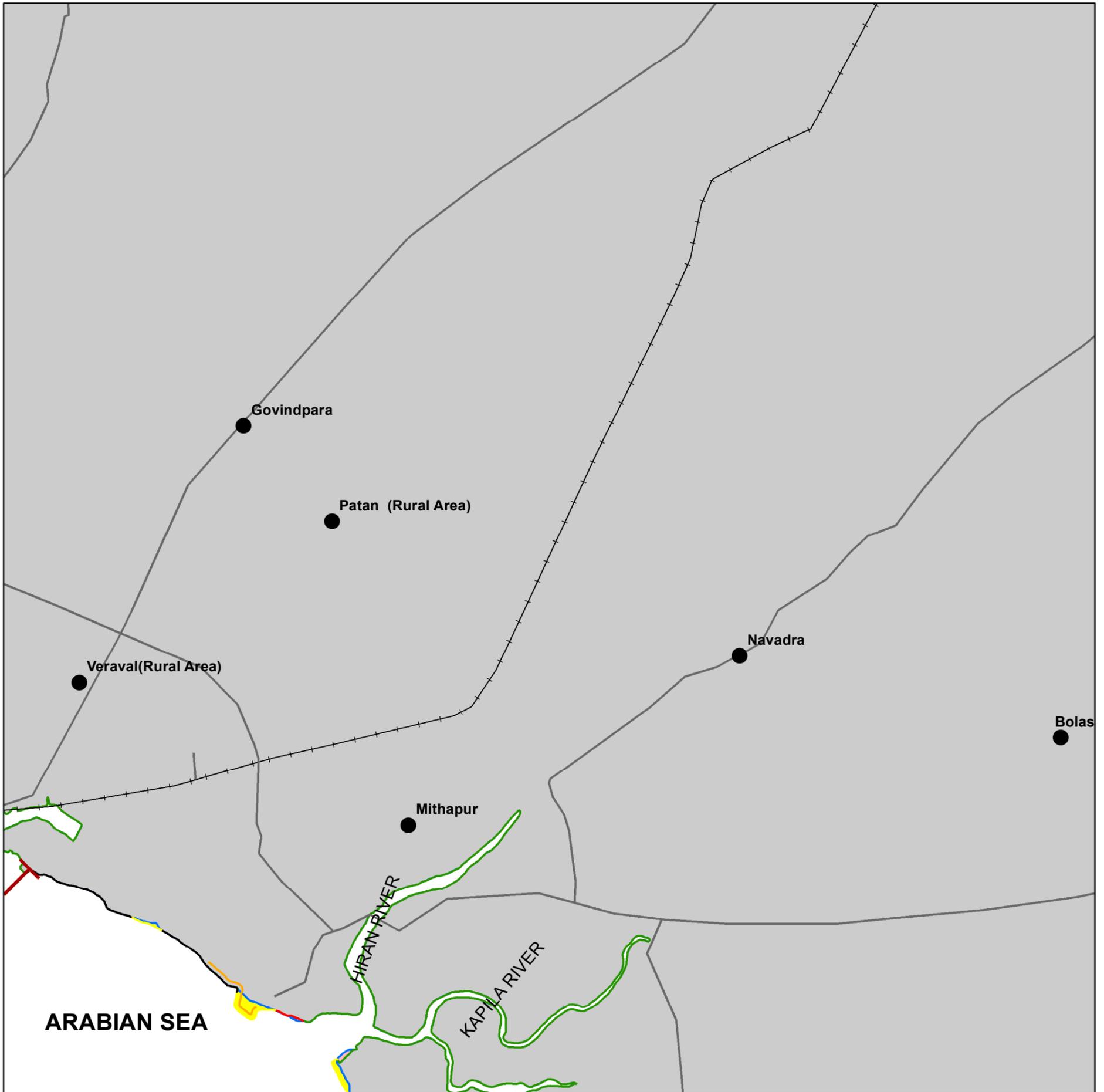
# SHORELINE CHANGE MAP

FOR OFFICIAL USE ONLY

GIR SOMNATH DISTRICT

GUJARAT

SHEET NO. 41L05NE



### Legend

- EROSION
- ACCRETION
- HIGH-TIDE LINE 2014-16
- HIGH-TIDE LINE 2004-06
- STABLE
- ROAD
- RAILWAY
- SEA WALL
- BREAKWATER
- HABITATION

### INDEX TO SHEETS

41K08SW	41K08SE	41K12SW
41L05NW	41L05NE	41L09NW
SEA	41L05SE	41L09SW



0 2 km



DATA SOURCE:  
IRS LISS4 IMAGES OF 2004-06 & 2014-16

PREPARED BY:  
SPACE APPLICATIONS CENTRE, ISRO, AHMEDABAD  
AND CENTRAL WATER COMMISSION, NEW DELHI



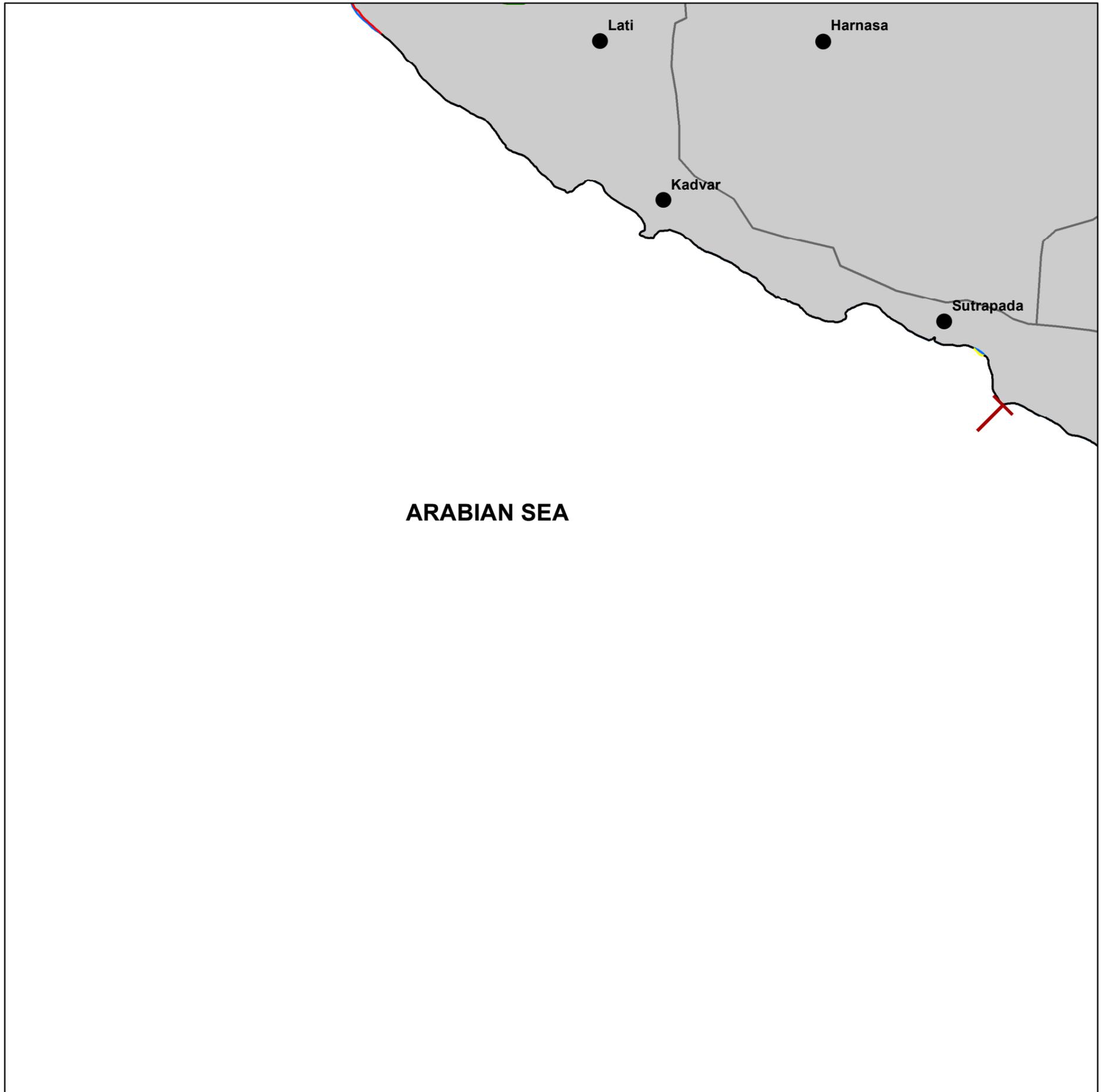
# SHORELINE CHANGE MAP

FOR OFFICIAL USE ONLY

GIR SOMNATH DISTRICT

GUJARAT

SHEET NO. 41L05SE

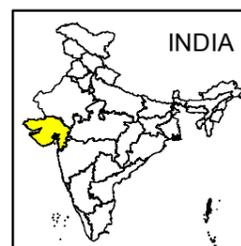


## Legend

- EROSION
- ACCRETION
- HIGH-TIDE LINE 2014-16
- HIGH-TIDE LINE 2004-06
- STABLE
- ROAD
- BREAKWATER
- HABITATION

## INDEX TO SHEETS

41L05NW	41L05NE	41L09NW
SEA	41L05SE	41L09SW
SEA	SEA	SEA



DATA SOURCE:  
IRS LISS4 IMAGES OF 2004-06 & 2014-16

PREPARED BY:  
SPACE APPLICATIONS CENTRE, ISRO, AHMEDABAD  
AND CENTRAL WATER COMMISSION, NEW DELHI



# SHORELINE CHANGE MAP

FOR OFFICIAL USE ONLY

GIR SOMNATH DISTRICT

GUJARAT

SHEET NO. 41L09SW



ARABIAN SEA

## Legend

- EROSION
- ACCRETION
- HIGH-TIDE LINE 2014-16
- HIGH-TIDE LINE 2004-06
- STABLE
- ROAD
- HABITATION

## INDEX TO SHEETS

41L05NE	41L09NW	41L09NE
41L05SE	41L09SW	41L09SE
SEA	SEA	41L10NE



0 2 km



DATA SOURCE:  
IRS LISS4 IMAGES OF 2004-06 & 2014-16

PREPARED BY:  
SPACE APPLICATIONS CENTRE, ISRO, AHMEDABAD  
AND CENTRAL WATER COMMISSION, NEW DELHI



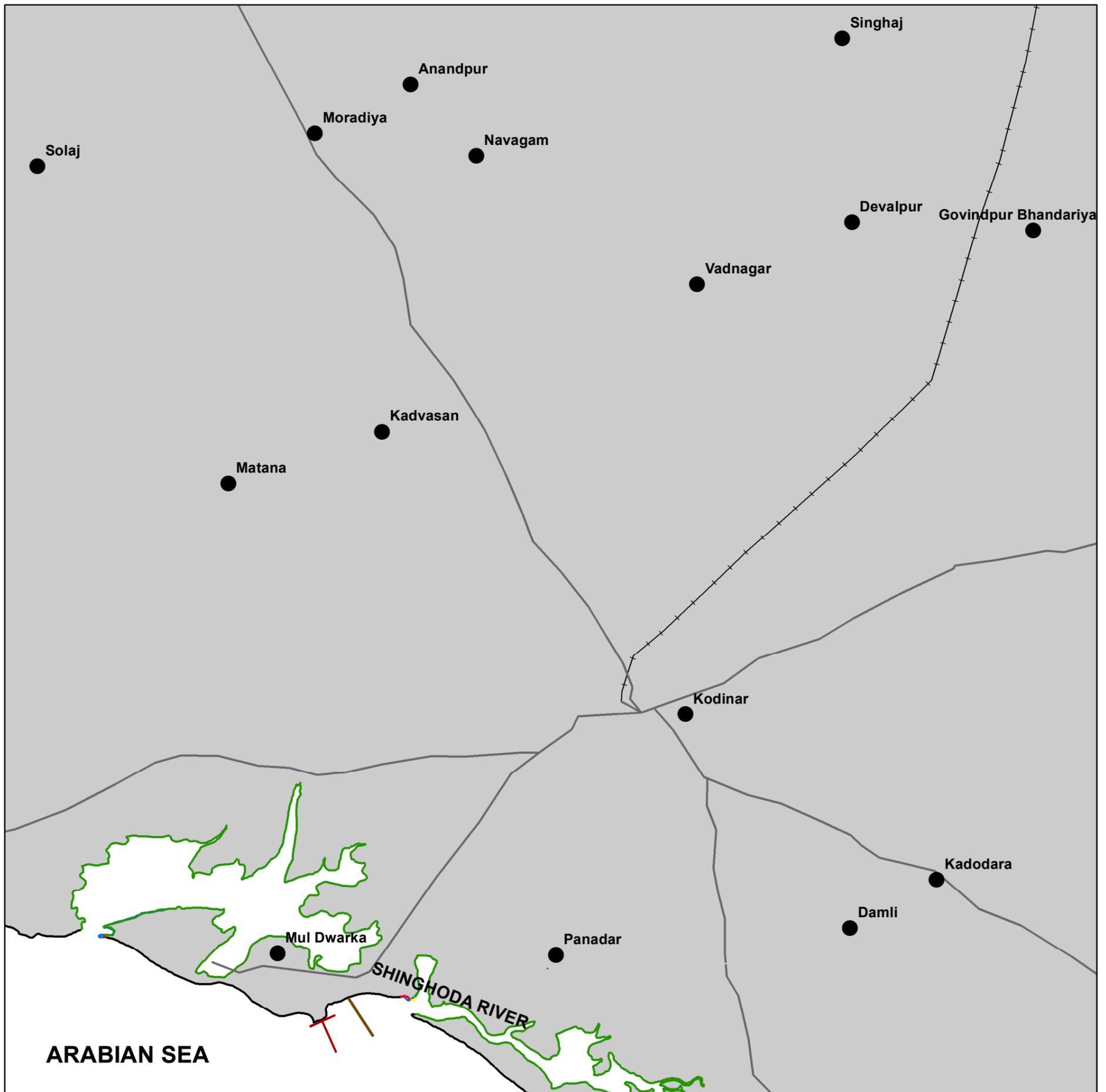
# SHORELINE CHANGE MAP

FOR OFFICIAL USE ONLY

GIR SOMNATH DISTRICT

GUJARAT

SHEET NO. 41L09SE



**Legend**

- EROSION
- ACCRETION
- HIGH-TIDE LINE 2014-16
- HIGH-TIDE LINE 2004-06
- STABLE
- RAILWAY
- ROAD
- BREAKWATER
- JETTY
- HABITATION

INDEX TO SHEETS

41L09NW	41L09NE	41L13NW
41L09SW	41L09SE	41L13SW
SEA	41L10NE	41L14NW

INDIA

GUJARAT

DATA SOURCE:  
IRS LISS4 IMAGES OF 2004-06 & 2014-16

PREPARED BY:  
SPACE APPLICATIONS CENTRE, ISRO, AHMEDABAD  
AND CENTRAL WATER COMMISSION, NEW DELHI

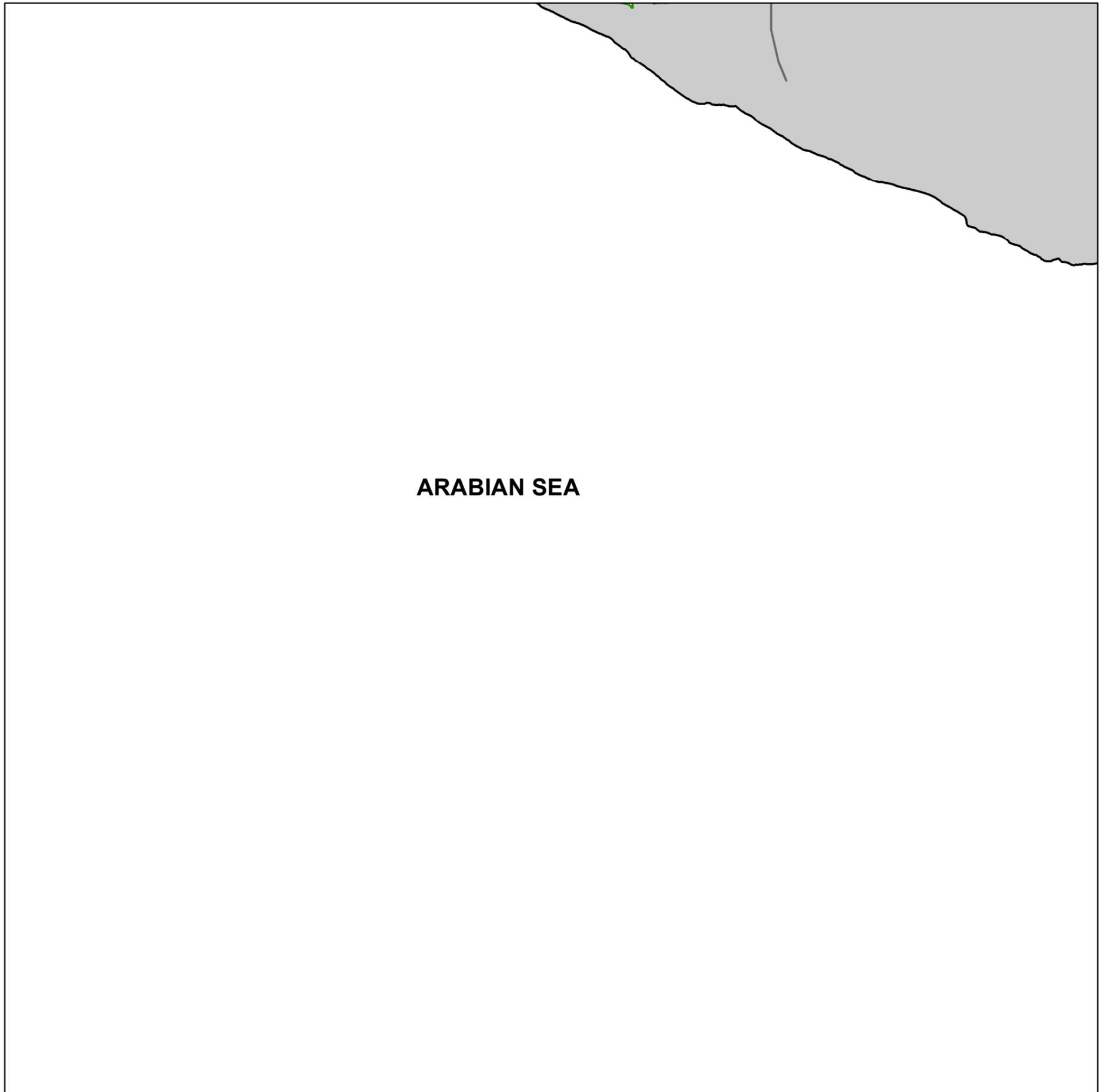
# SHORELINE CHANGE MAP

FOR OFFICIAL USE ONLY

GIR SOMNATH DISTRICT

GUJARAT

SHEET NO. 41L10NE

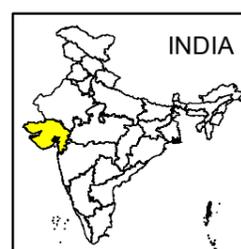
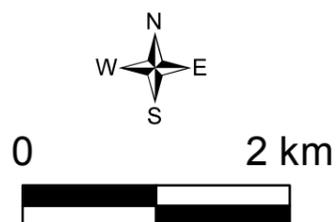


## Legend

- HIGH-TIDE LINE 2014-16
- HIGH-TIDE LINE 2004-06
- STABLE
- ROAD

## INDEX TO SHEETS

41L09SW	41L09SE	41L13SW
SEA	41L10NE	41L14NW
SEA	SEA	SEA



DATA SOURCE:  
IRS LISS4 IMAGES OF 2004-06 & 2014-16

PREPARED BY:  
SPACE APPLICATIONS CENTRE, ISRO, AHMEDABAD  
AND CENTRAL WATER COMMISSION, NEW DELHI



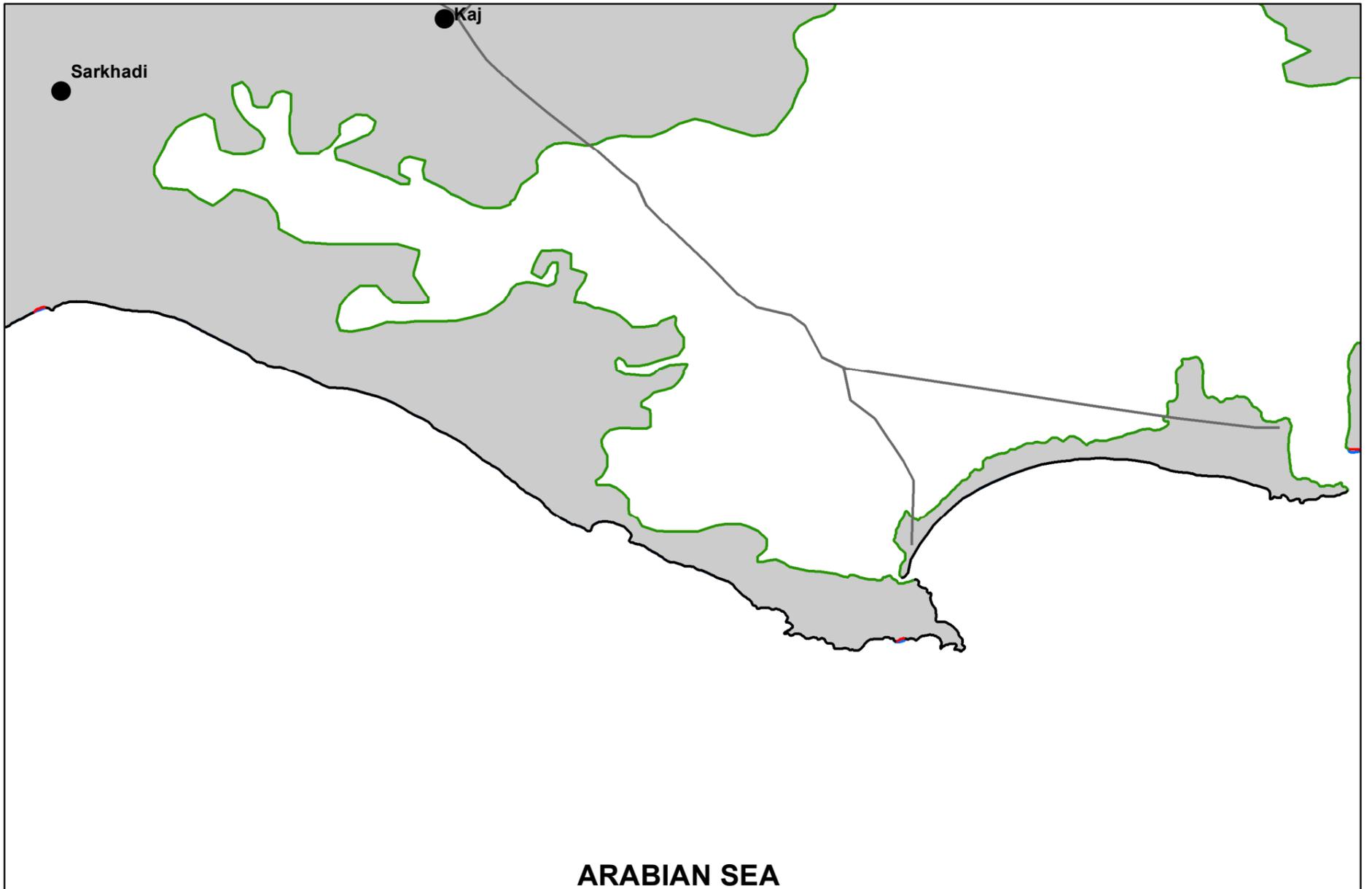
# SHORELINE CHANGE MAP

FOR OFFICIAL USE ONLY

GIR SOMNATH DISTRICT

GUJARAT

SHEET NO. 41L14NW

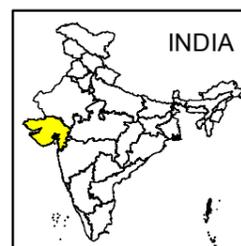


## Legend

- █ EROSION
- HIGH-TIDE LINE 2014-16
- HIGH-TIDE LINE 2004-06
- STABLE
- ROAD
- HABITATION

## INDEX TO SHEETS

41L09SE	41L13SW	41L13SE
41L10NE	41L14NW	41L14NE
SEA	SEA	SEA



DATA SOURCE:  
IRS LISS4 IMAGES OF 2004-06 & 2014-16

PREPARED BY:  
SPACE APPLICATIONS CENTRE, ISRO, AHMEDABAD  
AND CENTRAL WATER COMMISSION, NEW DELHI

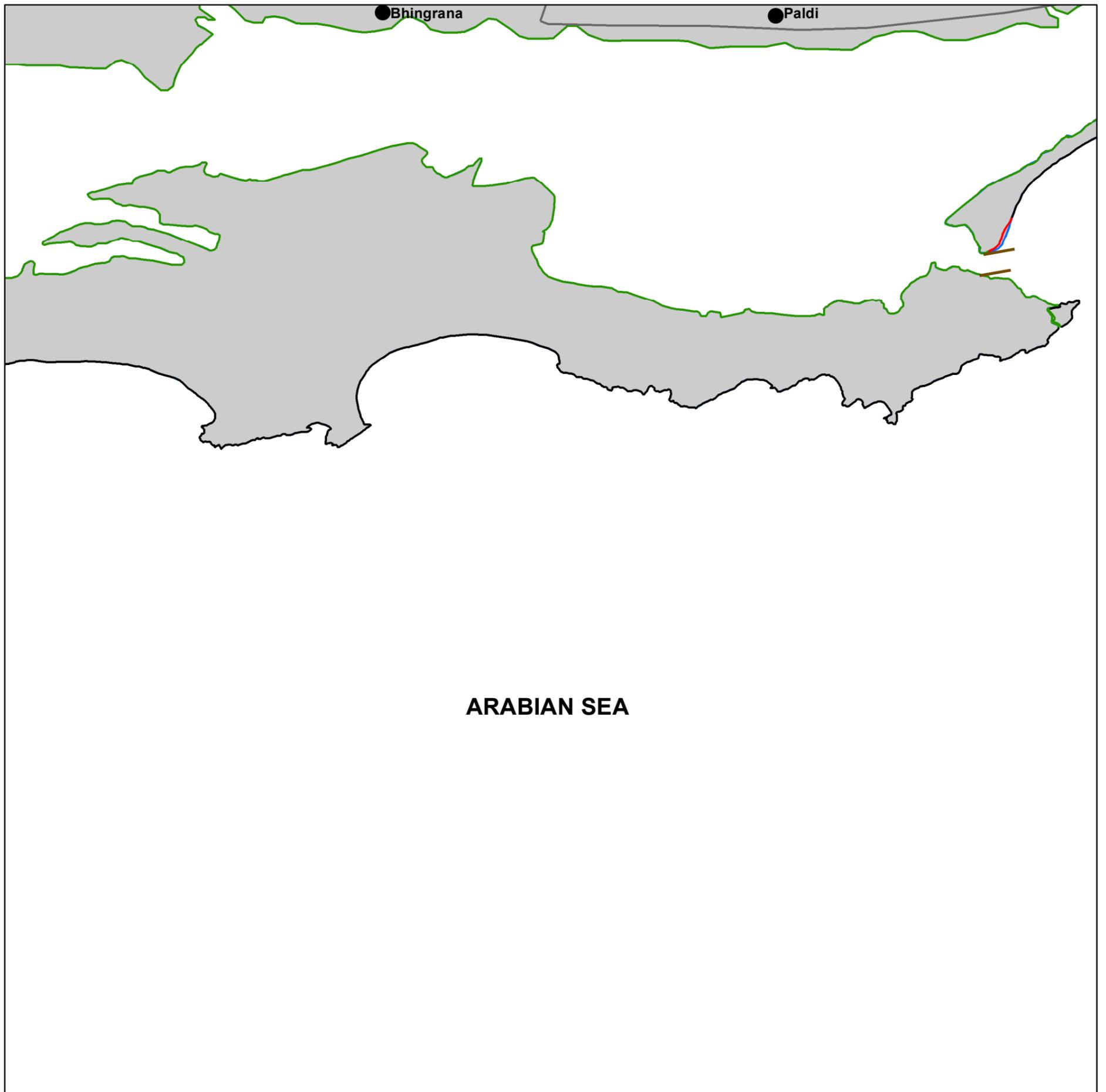


# SHORELINE CHANGE MAP

DAMAN/  
JUNAGADH DISTRICT

GUJARAT AND DAMAN & DIU

FOR OFFICIAL USE ONLY  
SHEET NO. 41L14NE

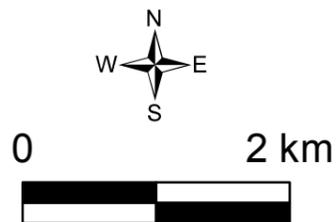


## Legend

- EROSION
- HIGH-TIDE LINE 2014-16
- HIGH-TIDE LINE 2004-06
- STABLE
- ROAD
- JETTY
- HABITATION

## INDEX TO SHEETS

41L13SW	41L13SE	41P01SW
41L14NW	41L14NE	41P02NW
SEA	SEA	SEA



DATA SOURCE:  
IRS LISS4 IMAGES OF 2004-06 & 2014-16

PREPARED BY:  
SPACE APPLICATIONS CENTRE, ISRO, AHMEDABAD  
AND CENTRAL WATER COMMISSION, NEW DELHI



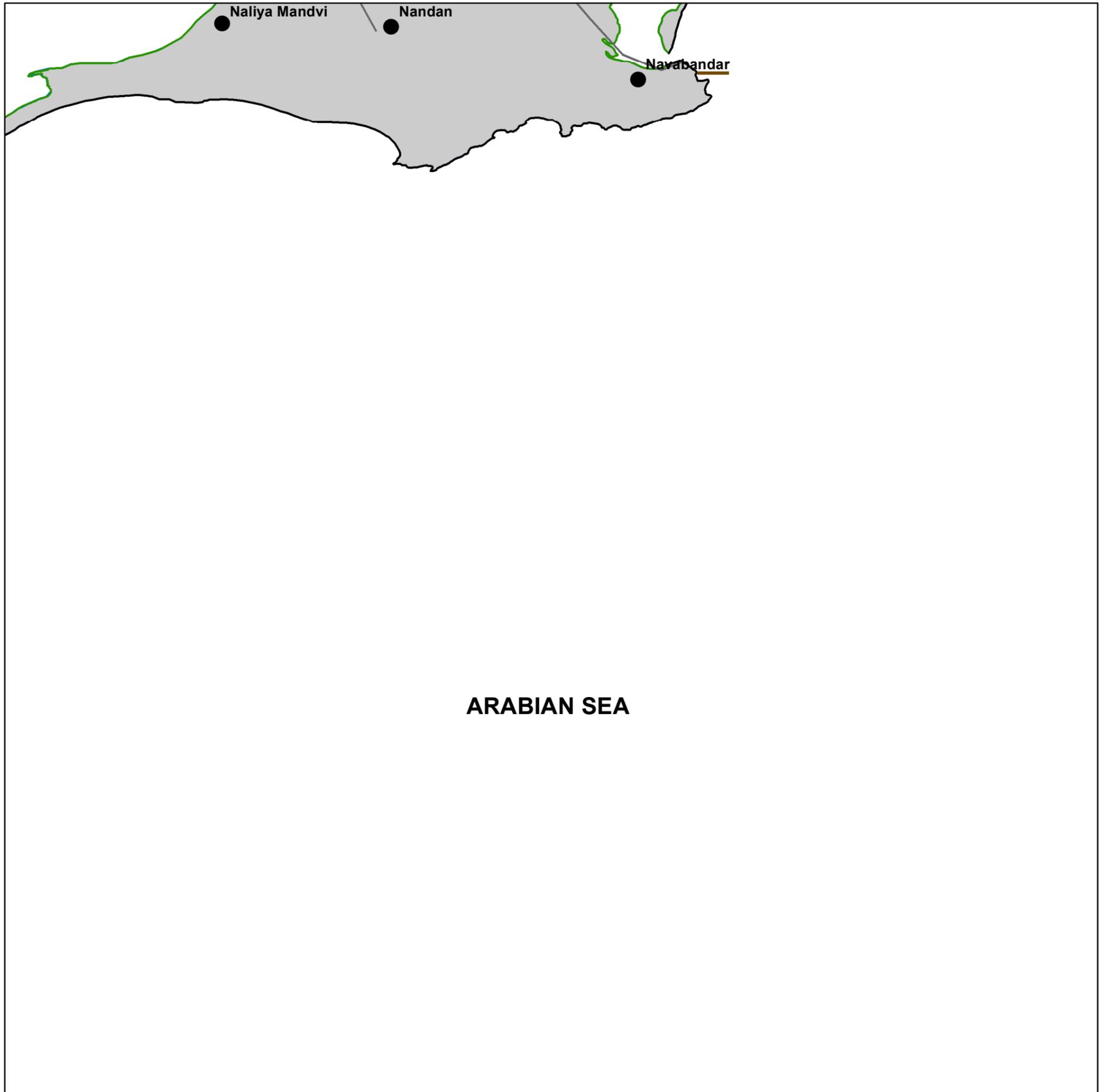
# SHORELINE CHANGE MAP

FOR OFFICIAL USE ONLY

JUNAGADH DISTRICT

GUJARAT

SHEET NO. 41P02NW



ARABIAN SEA

### Legend

- HIGH-TIDE LINE 2014-16
- HIGH-TIDE LINE 2004-06
- STABLE
- ROAD
- JETTY
- HABITATION

### INDEX TO SHEETS

41L13SE	41P01SW	41P01SE
41L14NE	41P02NW	41P02NE
SEA	SEA	SEA



DATA SOURCE:  
IRS LISS4 IMAGES OF 2004-06 & 2014-16

PREPARED BY:  
SPACE APPLICATIONS CENTRE, ISRO, AHMEDABAD  
AND CENTRAL WATER COMMISSION, NEW DELHI



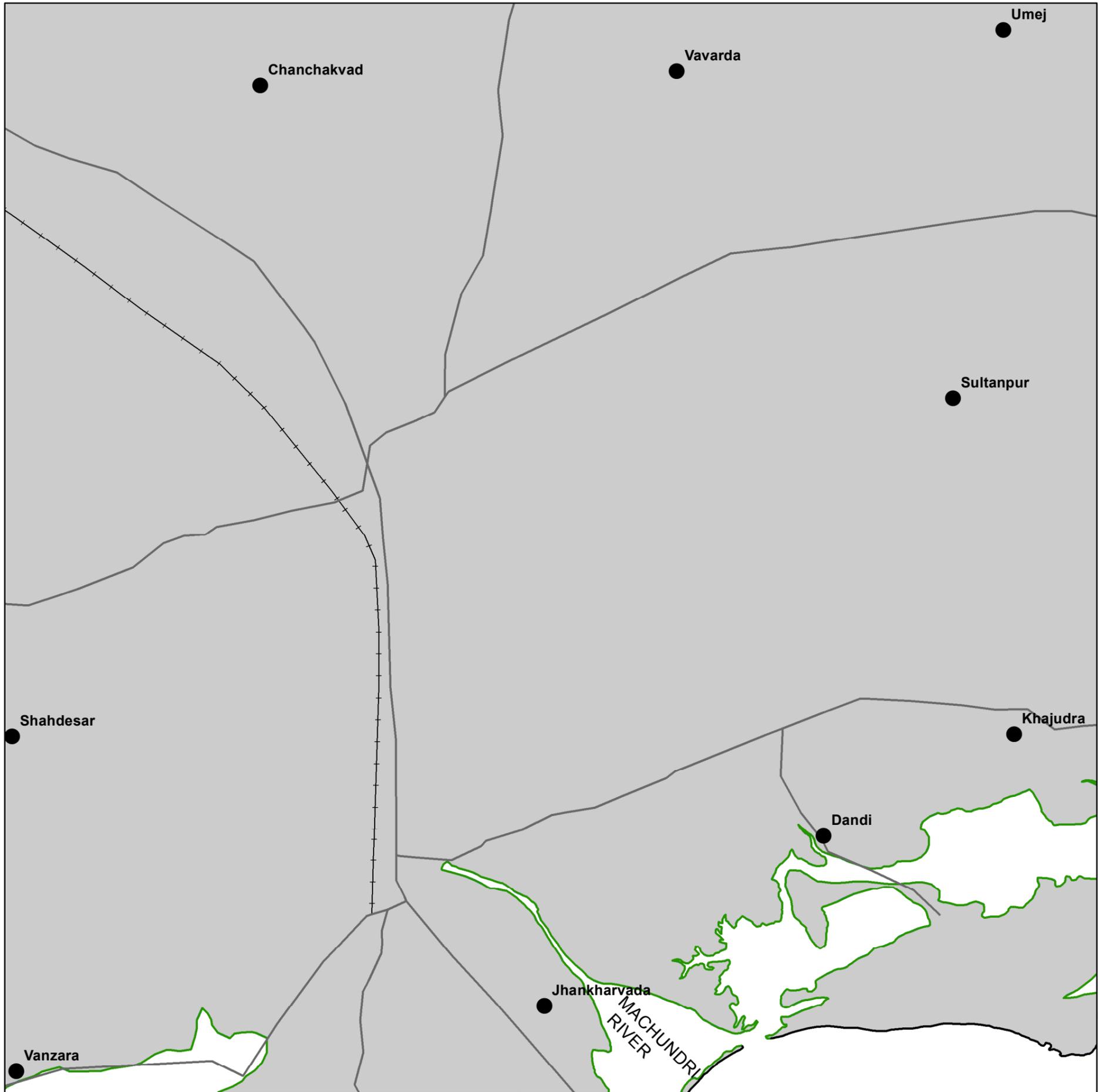
# SHORELINE CHANGE MAP

FOR OFFICIAL USE ONLY

JUNAGADH DISTRICT

GUJARAT

SHEET NO. 41P01SW



### Legend

- HIGH-TIDE LINE 2014-16
- HIGH-TIDE LINE 2004-06
- STABLE
- ROAD
- +— RAILWAY
- HABITATION

### INDEX TO SHEETS

41L13NE	41P01NW	41P01NE
41L13SE	41P01SW	41P01SE
41L14NE	41P02NW	41P02NE



DATA SOURCE:  
IRS LISS4 IMAGES OF 2004-06 & 2014-16

PREPARED BY:  
SPACE APPLICATIONS CENTRE, ISRO, AHMEDABAD  
AND CENTRAL WATER COMMISSION, NEW DELHI



# SHORELINE CHANGE MAP

FOR OFFICIAL USE ONLY

JUNAGADH DISTRICT

GUJARAT

SHEET NO. 41P01SE



## Legend

- EROSION
- ACCRETION
- HIGH-TIDE LINE 2014-16
- HIGH-TIDE LINE 2004-06
- STABLE ROAD
- ROAD
- HABITATION

## INDEX TO SHEETS

41P01NW	41P01NE	41P05NW
41P01SW	41P01SE	41P05SW
41P02NW	41P02NE	SEA



DATA SOURCE:  
IRS LISS4 IMAGES OF 2004-06 & 2014-16

PREPARED BY:  
SPACE APPLICATIONS CENTRE, ISRO, AHMEDABAD  
AND CENTRAL WATER COMMISSION, NEW DELHI



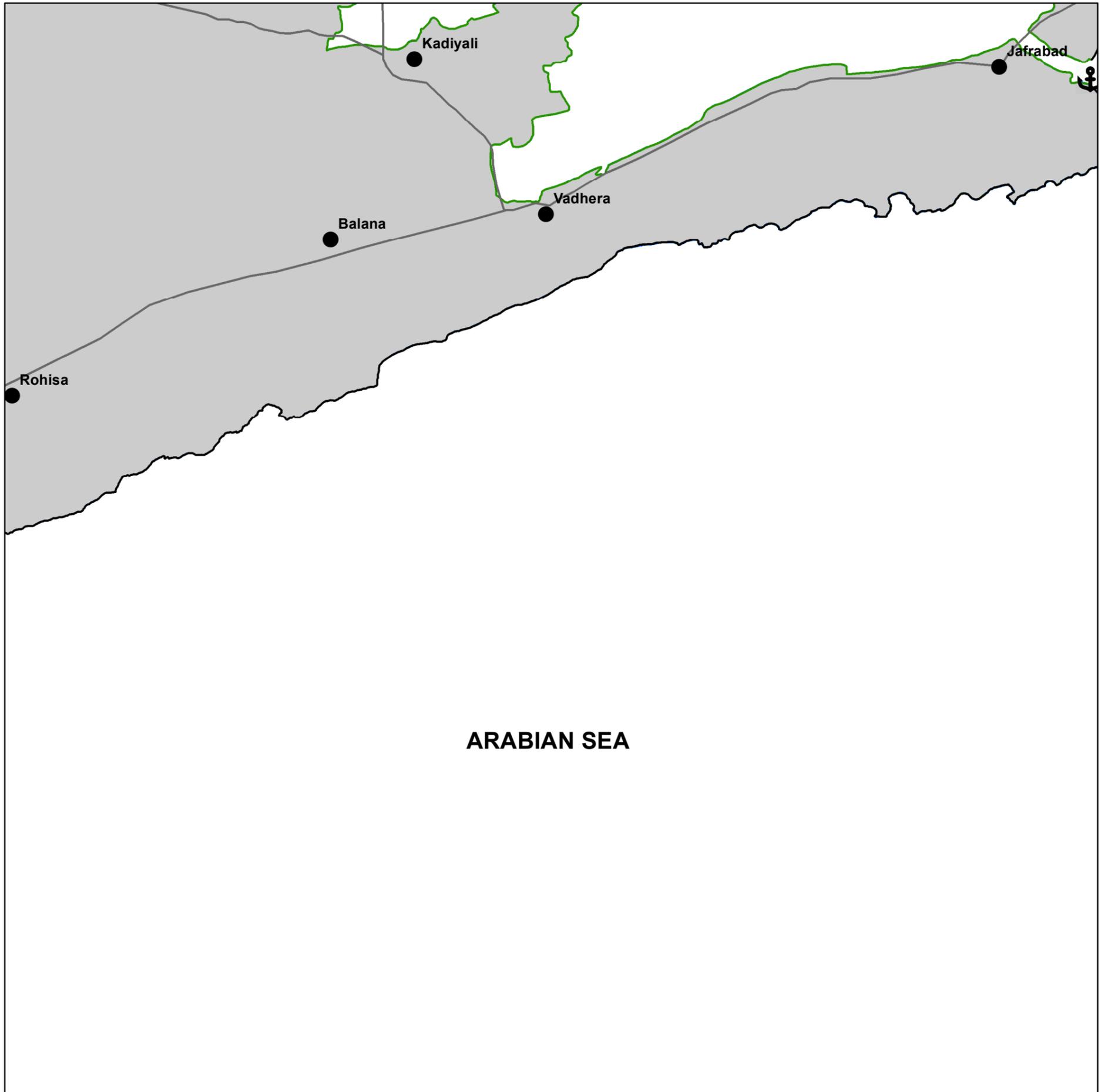
# SHORELINE CHANGE MAP

FOR OFFICIAL USE ONLY

AMRELI DISTRICT

GUJARAT

SHEET NO. 41P05SW



ARABIAN SEA

### Legend

- HIGH-TIDE LINE 2014-16
- HIGH-TIDE LINE 2004-06
- STABLE
- ROAD
- PORT/HARBOUR
- HABITATION

### INDEX TO SHEETS

41P01NE	41P05NW	41P05NE
41P01SE	41P05SW	41P05SE
41P02NE	SEA	SEA



DATA SOURCE:  
IRS LISS4 IMAGES OF 2004-06 & 2014-16

PREPARED BY:  
SPACE APPLICATIONS CENTRE, ISRO, AHMEDABAD  
AND CENTRAL WATER COMMISSION, NEW DELHI



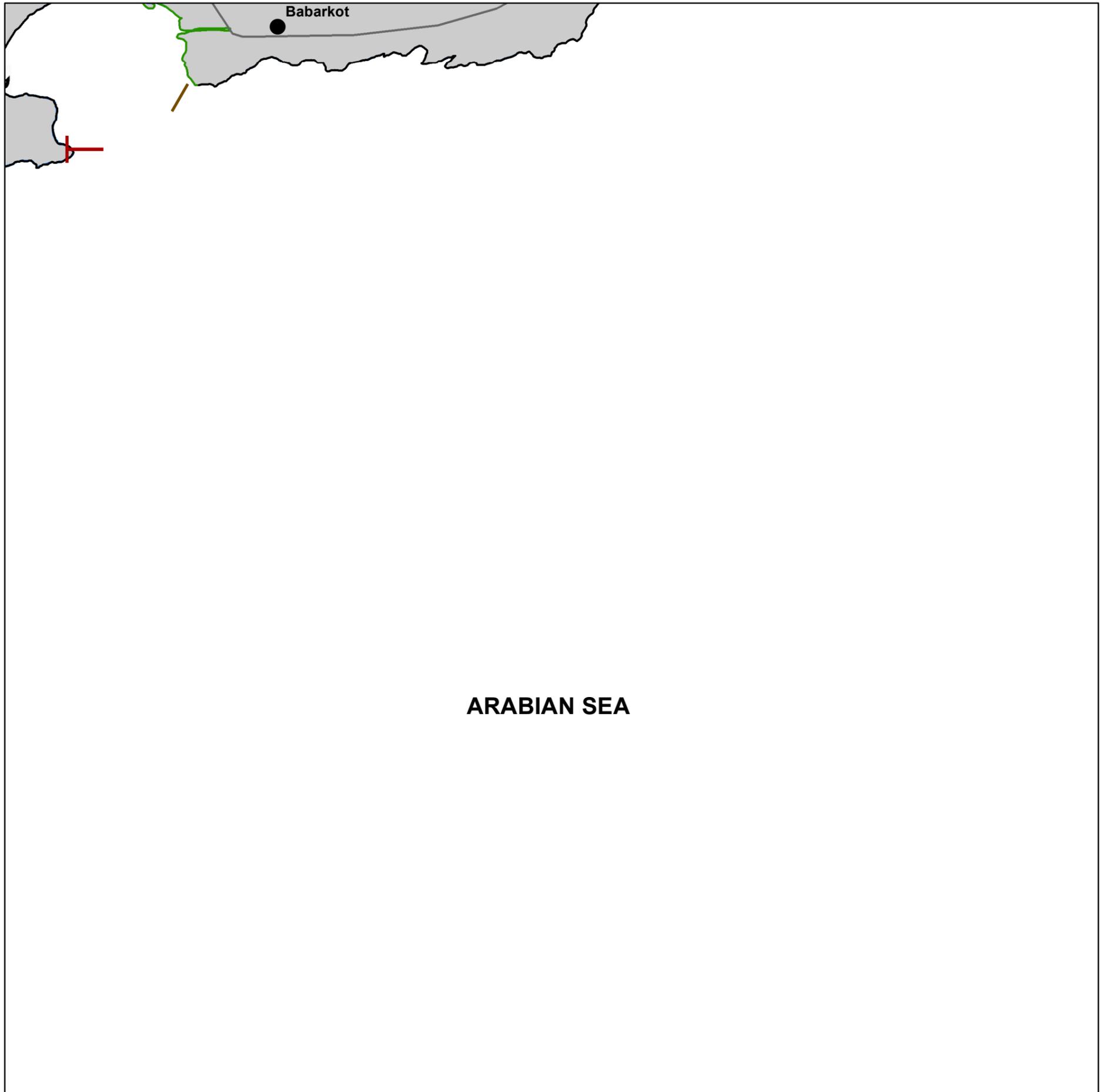
# SHORELINE CHANGE MAP

FOR OFFICIAL USE ONLY

AMRELI DISTRICT

GUJARAT

SHEET NO. 41P05SE



### Legend

- HIGH-TIDE LINE 2014-16
- HIGH-TIDE LINE 2004-06
- STABLE
- ROAD
- BREAKWATER
- JETTY
- HABITATION

### INDEX TO SHEETS

41P05NW	41P05NE	41P09NW
41P05SW	41P05SE	SEA
SEA	SEA	SEA



DATA SOURCE:  
IRS LISS4 IMAGES OF 2004-06 & 2014-16

PREPARED BY:  
SPACE APPLICATIONS CENTRE, ISRO, AHMEDABAD  
AND CENTRAL WATER COMMISSION, NEW DELHI



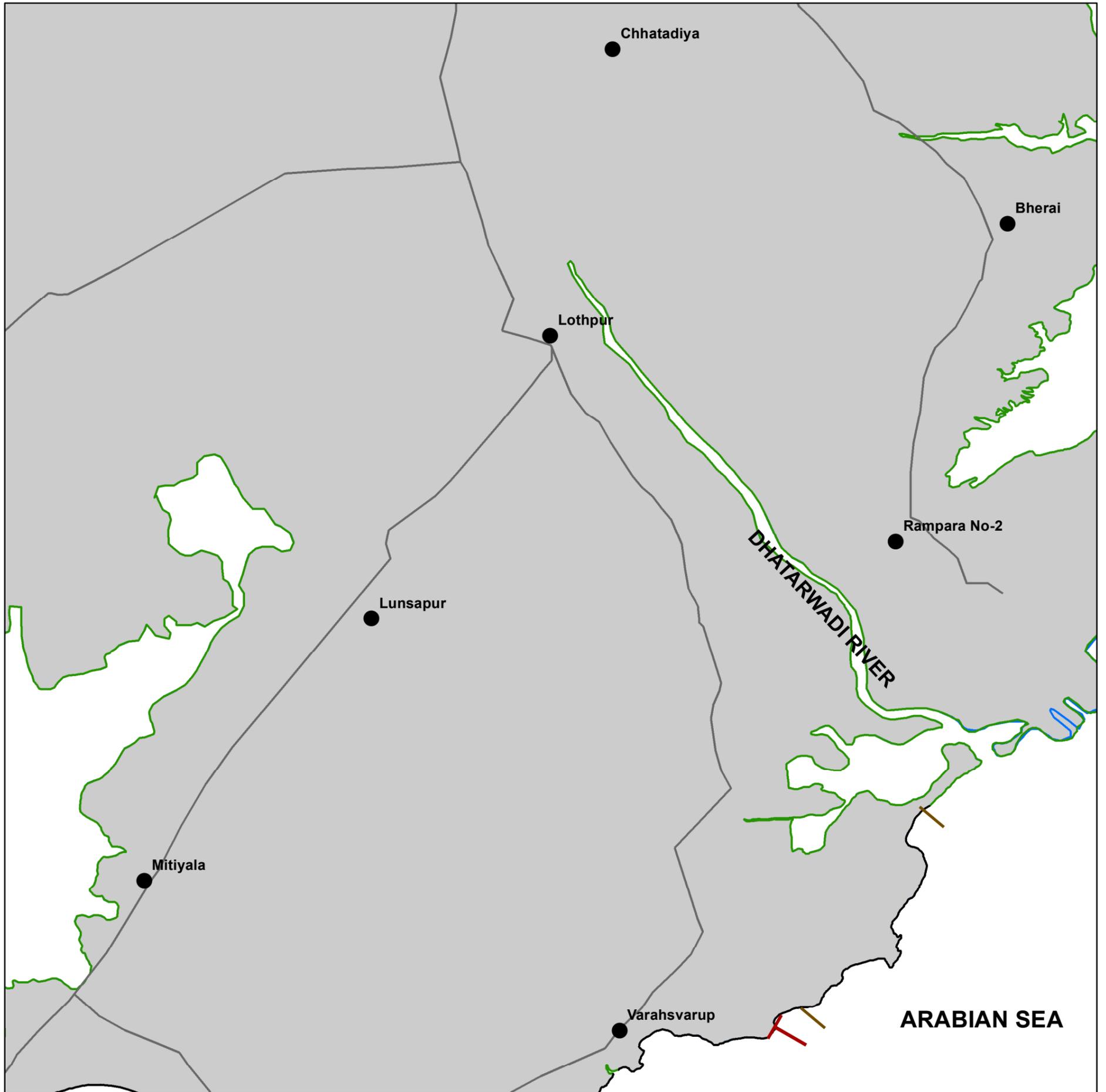
# SHORELINE CHANGE MAP

FOR OFFICIAL USE ONLY

AMRELI DISTRICT

GUJARAT

SHEET NO. 41P05NE



### Legend

- HIGH-TIDE LINE 2014-16
- HIGH-TIDE LINE 2004-06
- STABLE
- BREAKWATER
- JETTY
- ROAD
- HABITATION

### INDEX TO SHEETS

41O08SW	41O08SE	41O12SW
41P05NW	41P05NE	41P09NW
41P05SW	41P05SE	SEA



0 2 km



DATA SOURCE:  
IRS LISS4 IMAGES OF 2004-06 & 2014-16

PREPARED BY:  
SPACE APPLICATIONS CENTRE, ISRO, AHMEDABAD  
AND CENTRAL WATER COMMISSION, NEW DELHI



# SHORELINE CHANGE MAP

FOR OFFICIAL USE ONLY

AMRELI DISTRICT

GUJARAT

SHEET NO. 41P09NW

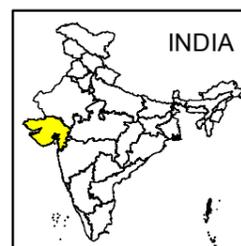


## Legend

- EROSION
- ACCRETION
- HIGH-TIDE LINE 2014-16
- HIGH-TIDE LINE 2004-06
- STABLE
- ⚓ PORT/HARBOUR
- HABITATION

## INDEX TO SHEETS

41O08SE	41O12SW	41O12SE
41P05NE	41P09NW	41P09NE
41P05SE	SEA	SEA



DATA SOURCE:  
IRS LISS4 IMAGES OF 2004-06 & 2014-16

PREPARED BY:  
SPACE APPLICATIONS CENTRE, ISRO, AHMEDABAD  
AND CENTRAL WATER COMMISSION, NEW DELHI



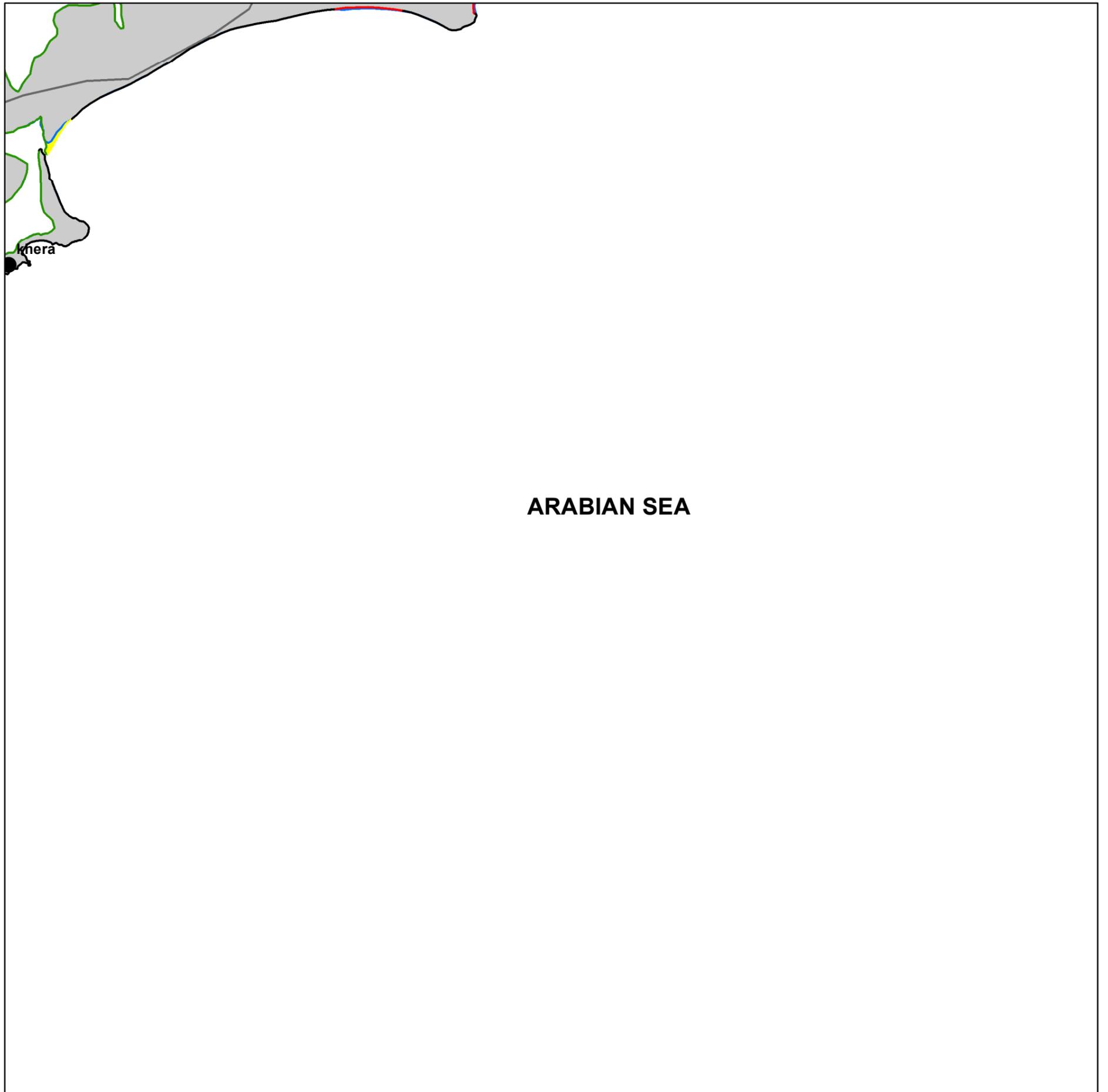
# SHORELINE CHANGE MAP

FOR OFFICIAL USE ONLY

AMRELI DISTRICT

GUJARAT

SHEET NO. 41P09NE



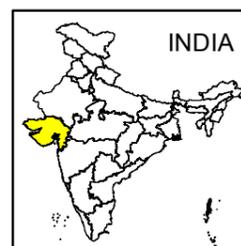
### Legend

- EROSION
- ACCRETION
- HIGH-TIDE LINE 2014-16
- HIGH-TIDE LINE 2004-06
- STABLE
- HABITATION



### INDEX TO SHEETS

41O12SW	41O12SE	41O16SW
41P09NW	41P09NE	41P13NW
SEA	SEA	SEA



DATA SOURCE:  
IRS LISS4 IMAGES OF 2004-06 & 2014-16

PREPARED BY:  
SPACE APPLICATIONS CENTRE, ISRO, AHMEDABAD  
AND CENTRAL WATER COMMISSION, NEW DELHI

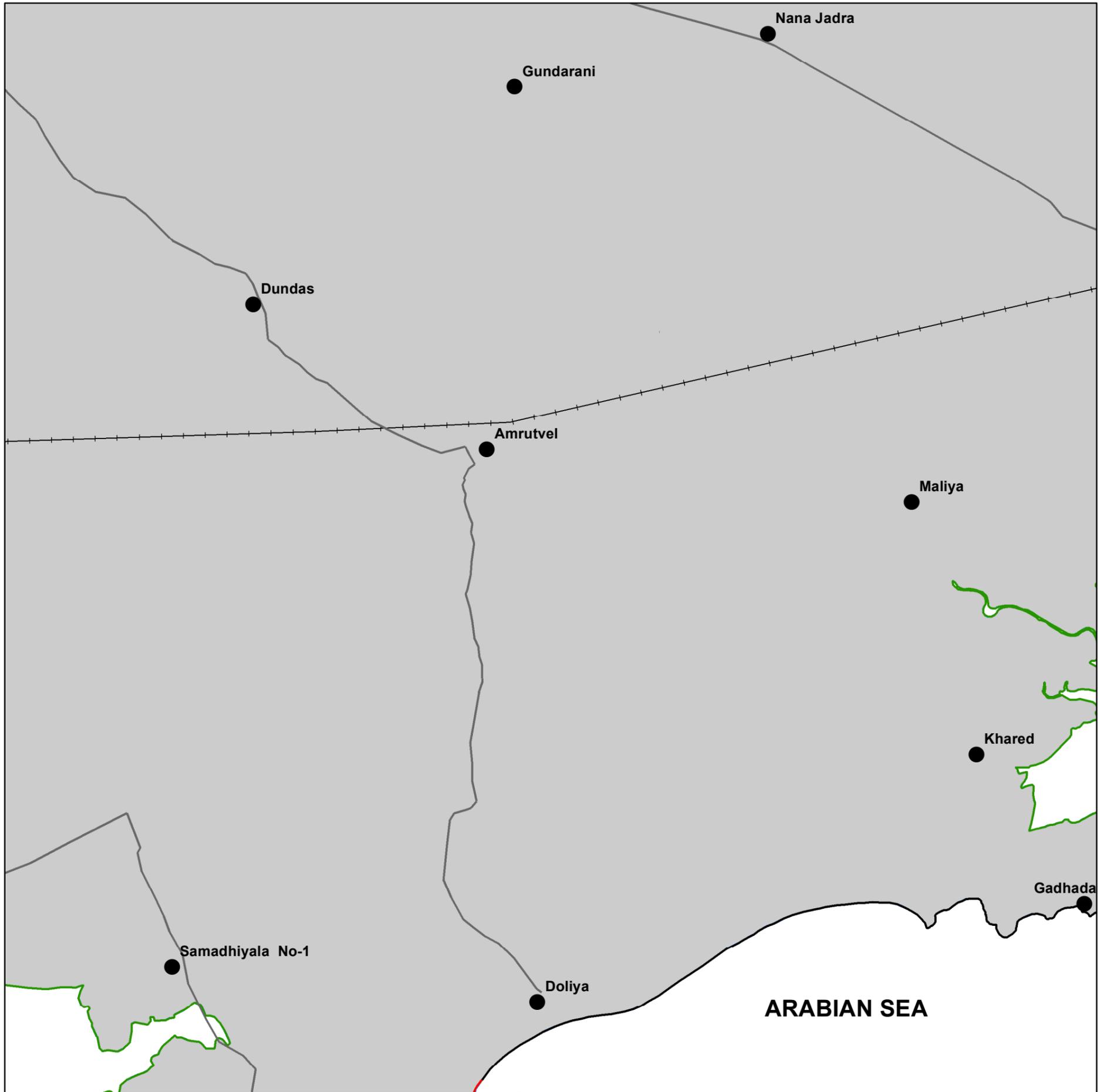


# SHORELINE CHANGE MAP

AMRELI/  
BHAVNAGAR DISTRICT

GUJARAT

FOR OFFICIAL USE ONLY  
SHEET NO. 41O12SE



### Legend

- █ EROSION
- █ HIGH-TIDE LINE 2014-16
- █ HIGH-TIDE LINE 2004-06
- STABLE ROAD
- +— RAILWAY
- HABITATION

### INDEX TO SHEETS

41O12NW	41O12NE	41O16NW
41O12SW	41O12SE	41O16SW
41P09NW	41P09NE	41P13NW



0 2 km



DATA SOURCE:  
IRS LISS4 IMAGES OF 2004-06 & 2014-16

PREPARED BY:  
SPACE APPLICATIONS CENTRE, ISRO, AHMEDABAD  
AND CENTRAL WATER COMMISSION, NEW DELHI



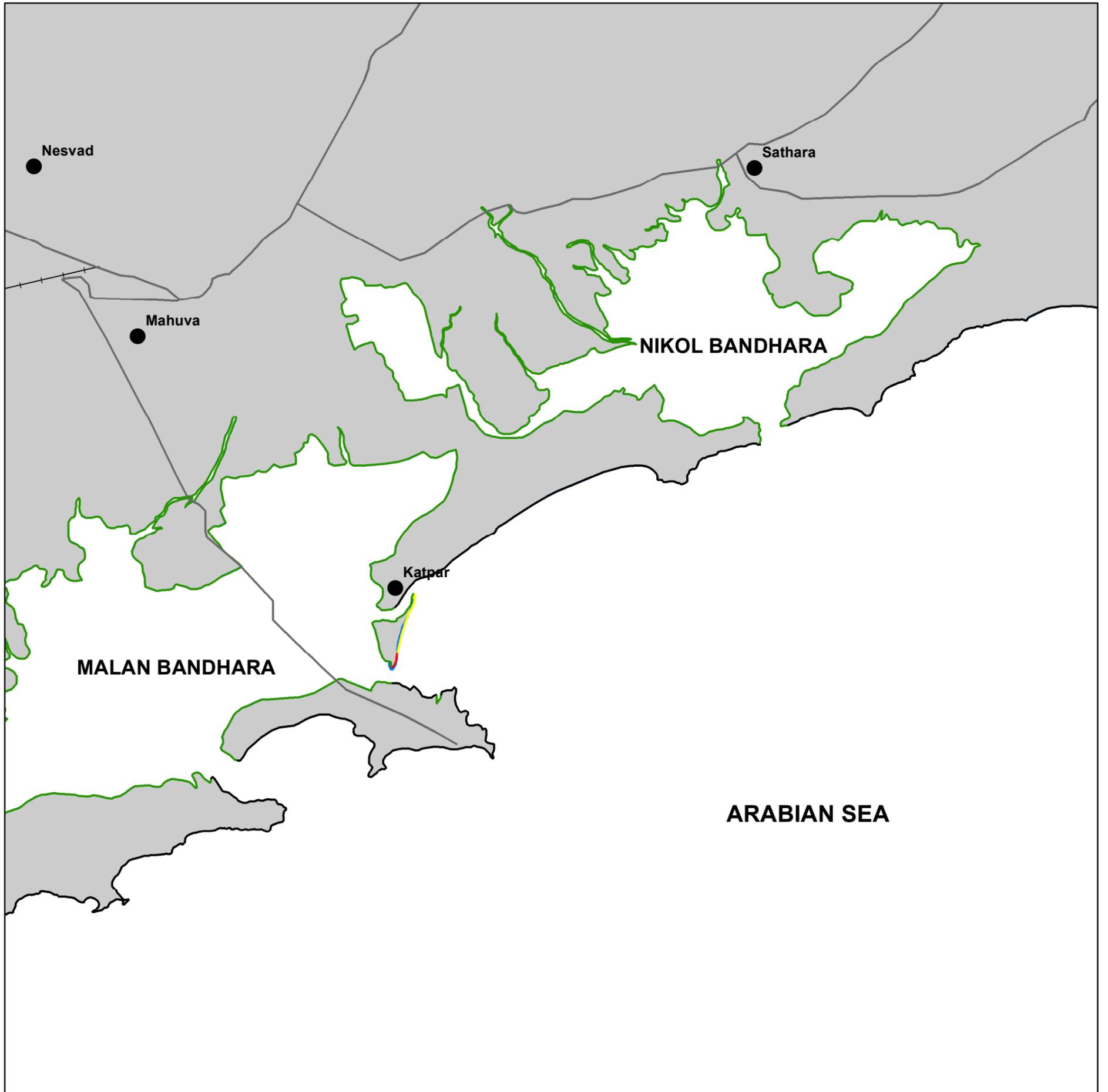
# SHORELINE CHANGE MAP

FOR OFFICIAL USE ONLY

BHAVNAGAR DISTRICT

GUJARAT

SHEET NO. 41O16SW



### Legend

- EROSION
- ACCRETION
- HIGH-TIDE LINE 2014-16
- HIGH-TIDE LINE 2004-06
- STABLE
- ROAD
- RAILWAY
- HABITATION

### INDEX TO SHEETS

41O12NE	41O16NW	41O16NE
41O12SE	41O16SW	41O16SE
41P09NE	41P13NW	SEA



DATA SOURCE:  
IRS LISS4 IMAGES OF 2004-06 & 2014-16

PREPARED BY:  
SPACE APPLICATIONS CENTRE, ISRO, AHMEDABAD  
AND CENTRAL WATER COMMISSION, NEW DELHI



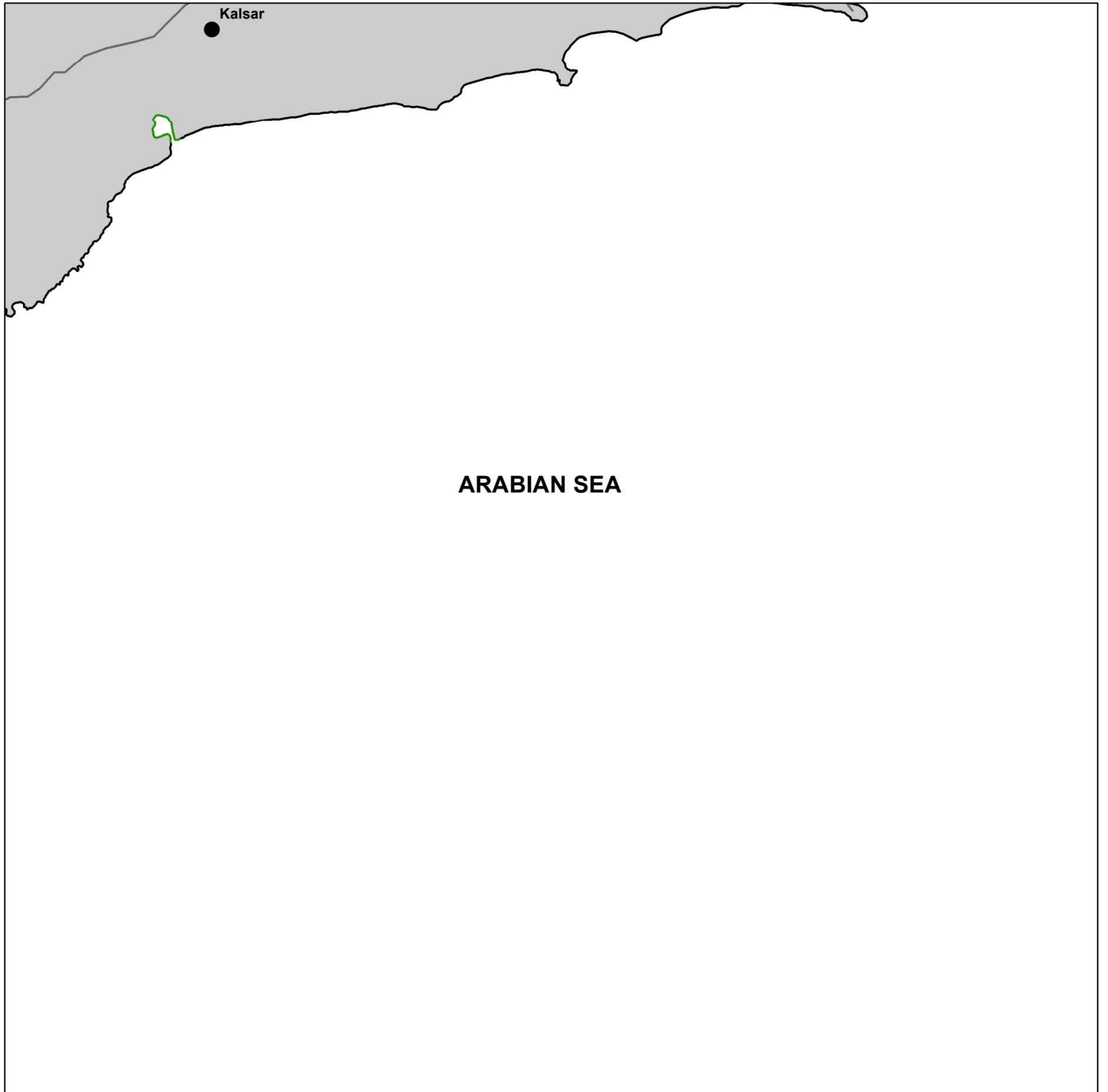
# SHORELINE CHANGE MAP

FOR OFFICIAL USE ONLY

BHAVNAGAR DISTRICT

GUJARAT

SHEET NO. 41O16SE



ARABIAN SEA

### Legend

- HIGH-TIDE LINE 2014-16
- HIGH-TIDE LINE 2004-06
- STABLE
- ROAD
- HABITATION

### INDEX TO SHEETS

41O16NW	41O16NE	46C04NW
41O16SW	41O16SE	SEA
41P13NW	SEA	46D01NW



0 2 km



DATA SOURCE:  
IRS LISS4 IMAGES OF 2004-06 & 2014-16

PREPARED BY:  
SPACE APPLICATIONS CENTRE, ISRO, AHMEDABAD  
AND CENTRAL WATER COMMISSION, NEW DELHI



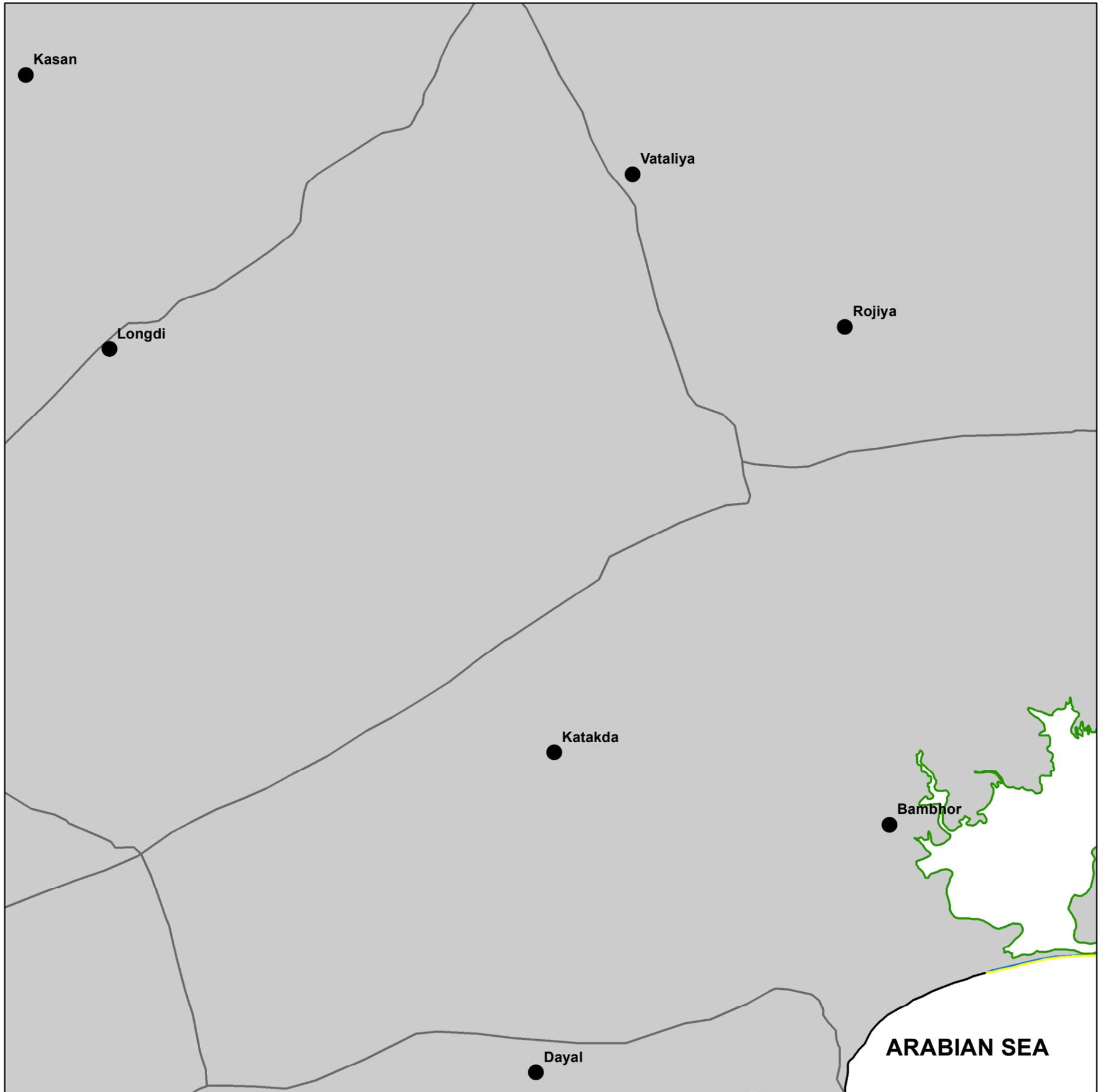
# SHORELINE CHANGE MAP

FOR OFFICIAL USE ONLY

BHAVNAGAR DISTRICT

GUJARAT

SHEET NO. 41O16NE

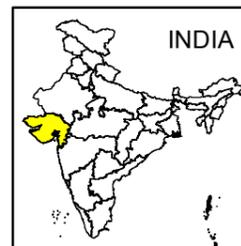


### Legend

- ACCRETION
- HIGH-TIDE LINE 2014-16
- HIGH-TIDE LINE 2004-06
- STABLE
- ROAD
- HABITATION

### INDEX TO SHEETS

41O15SW	41O15SE	46C03SW
41O16NW	41O16NE	46C04NW
41O16SW	41O16SE	SEA



DATA SOURCE:  
IRS LISS4 IMAGES OF 2004-06 & 2014-16

PREPARED BY:  
SPACE APPLICATIONS CENTRE, ISRO, AHMEDABAD  
AND CENTRAL WATER COMMISSION, NEW DELHI



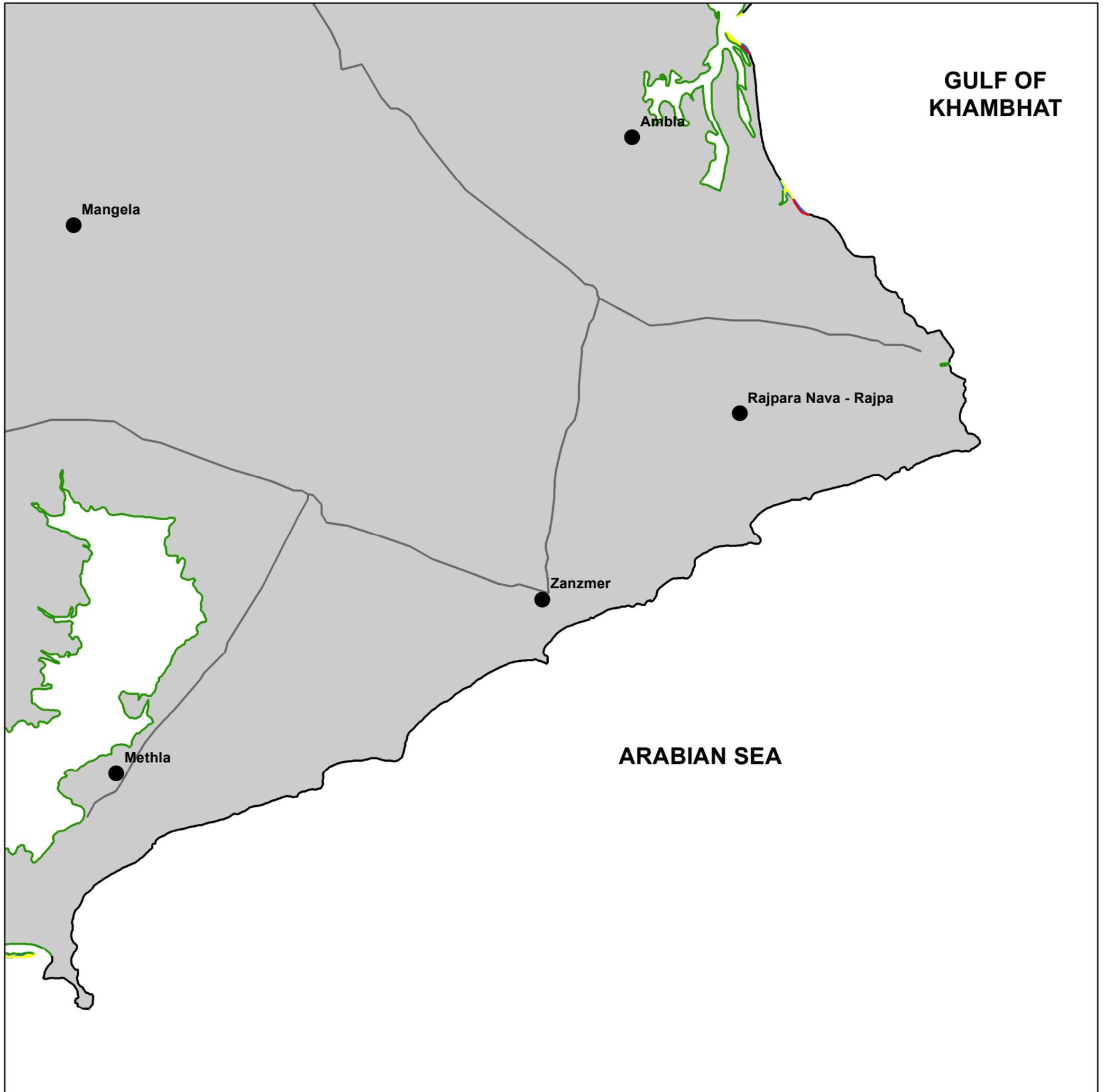
# SHORELINE CHANGE MAP

FOR OFFICIAL USE ONLY

BHAVNAGAR DISTRICT

GUJARAT

SHEET NO. 46C04NW



## Legend

- EROSION
- ACCRETION
- HIGH-TIDE LINE 2014-16
- HIGH-TIDE LINE 2004-06
- STABLE
- ROAD
- HABITATION

## INDEX TO SHEETS

41O15SE	46C03SW	46C03SE
41O16NE	46C04NW	SEA
41O16SE	SEA	46C04SE



0 2 km



DATA SOURCE:  
IRS LISS4 IMAGES OF 2004-06 & 2014-16

PREPARED BY:  
SPACE APPLICATIONS CENTRE, ISRO, AHMEDABAD  
AND CENTRAL WATER COMMISSION, NEW DELHI



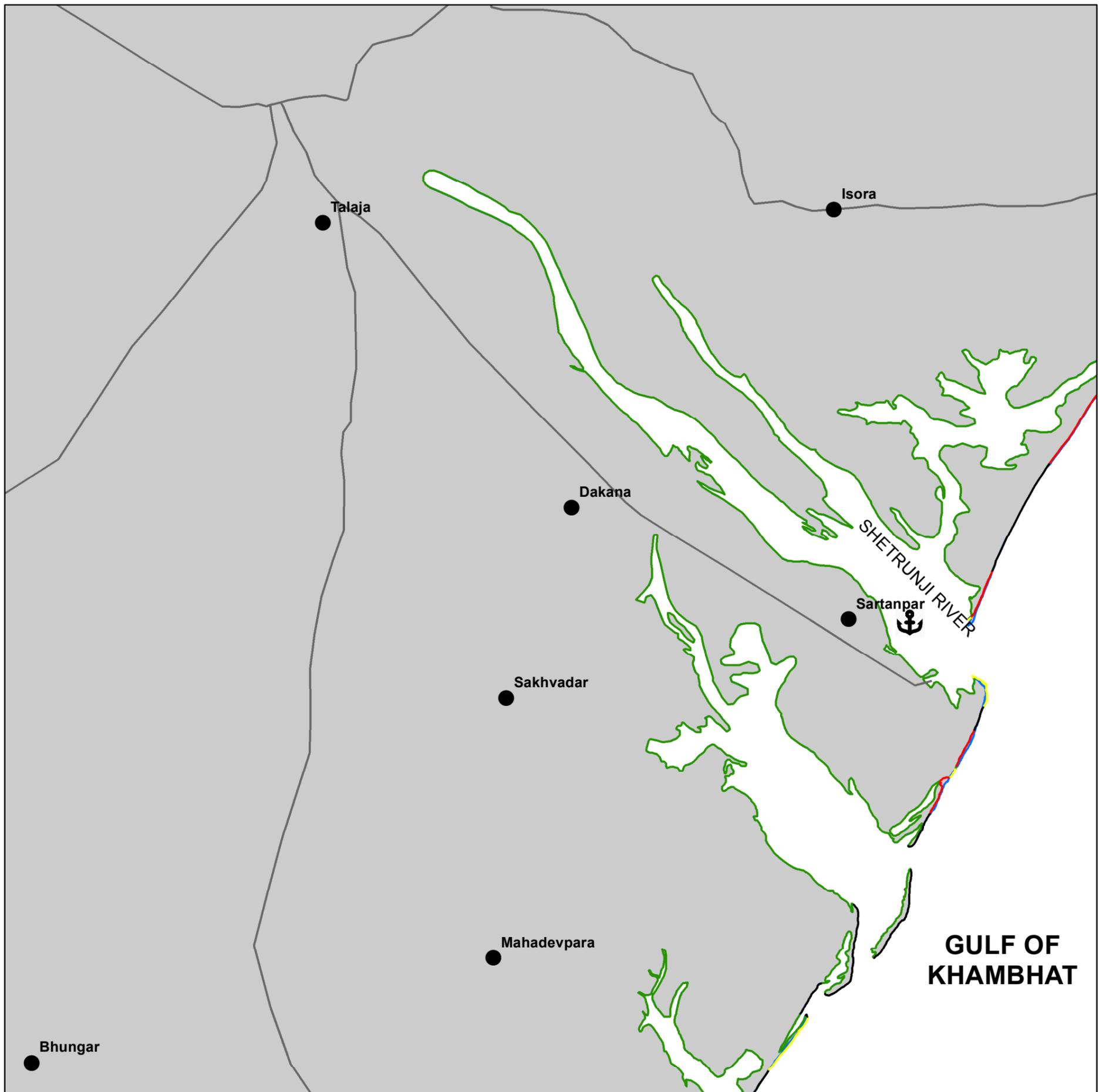
# SHORELINE CHANGE MAP

FOR OFFICIAL USE ONLY

BHAVNAGAR DISTRICT

GUJARAT

SHEET NO. 46C03SW



## Legend

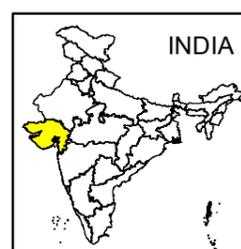
- EROSION
- ACCRETION
- HIGH-TIDE LINE 2014-16
- HIGH-TIDE LINE 2004-06
- STABLE
- ROAD
- ⚓ PORT/HARBOUR
- HABITATION

## INDEX TO SHEETS

41O15NE	46C03NW	46C03NE
41O15SE	46C03SW	46C03SE
41O16NE	46C04NW	SEA



0 2 km



DATA SOURCE:  
IRS LISS4 IMAGES OF 2004-06 & 2014-16

PREPARED BY:  
SPACE APPLICATIONS CENTRE, ISRO, AHMEDABAD  
AND CENTRAL WATER COMMISSION, NEW DELHI



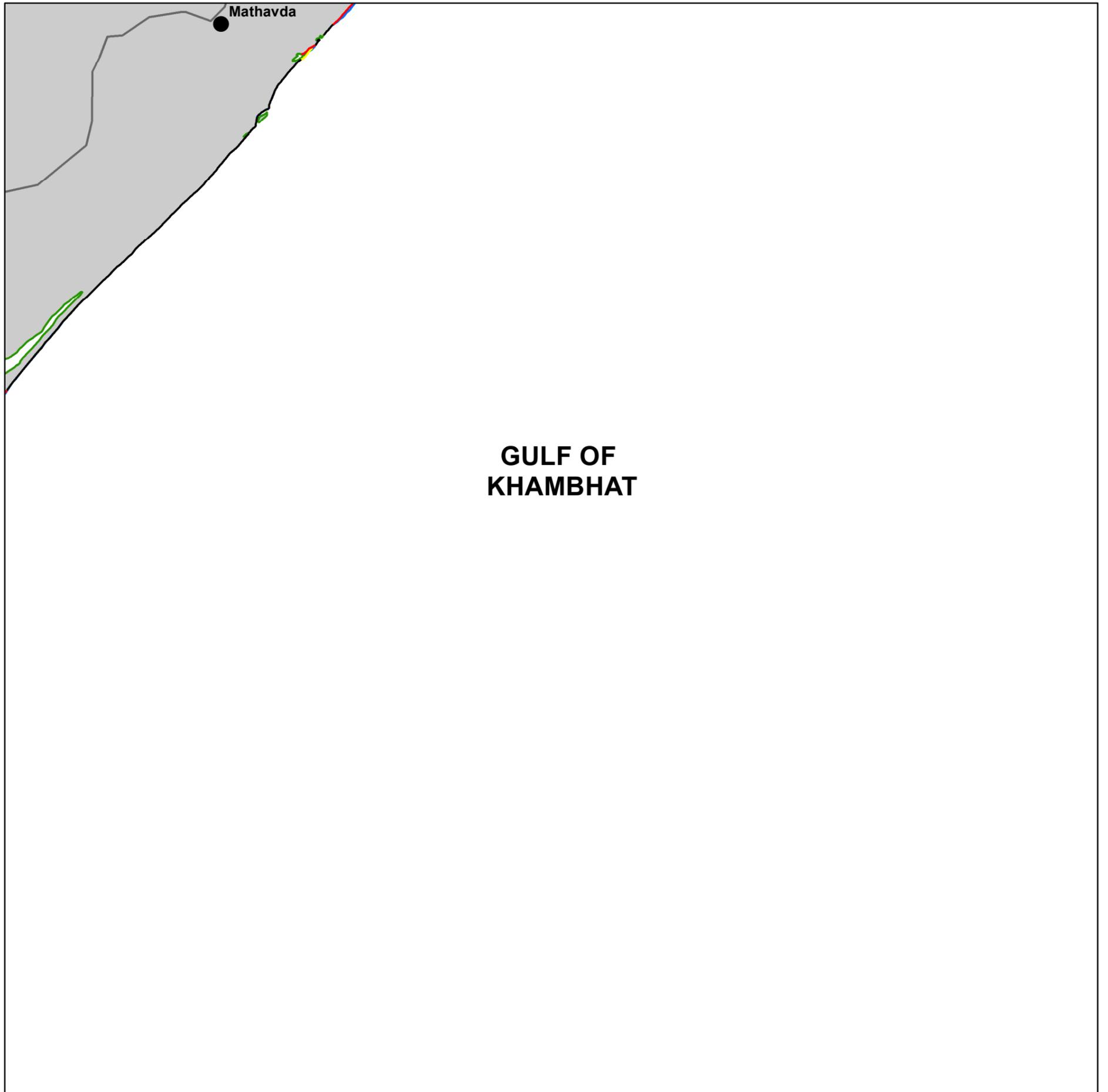
# SHORELINE CHANGE MAP

FOR OFFICIAL USE ONLY

BHAVNAGAR DISTRICT

GUJARAT

SHEET NO. 46C03SE



## Legend

- EROSION
- ACCRETION
- HIGH-TIDE LINE 2014-16
- HIGH-TIDE LINE 2004-06
- STABLE
- HABITATION

## INDEX TO SHEETS

46C03NW	46C03NE	46C07NW
46C03SW	46C03SE	SEA
46C04NW	SEA	46C08NW



DATA SOURCE:  
IRS LISS4 IMAGES OF 2004-06 & 2014-16

PREPARED BY:  
SPACE APPLICATIONS CENTRE, ISRO, AHMEDABAD  
AND CENTRAL WATER COMMISSION, NEW DELHI



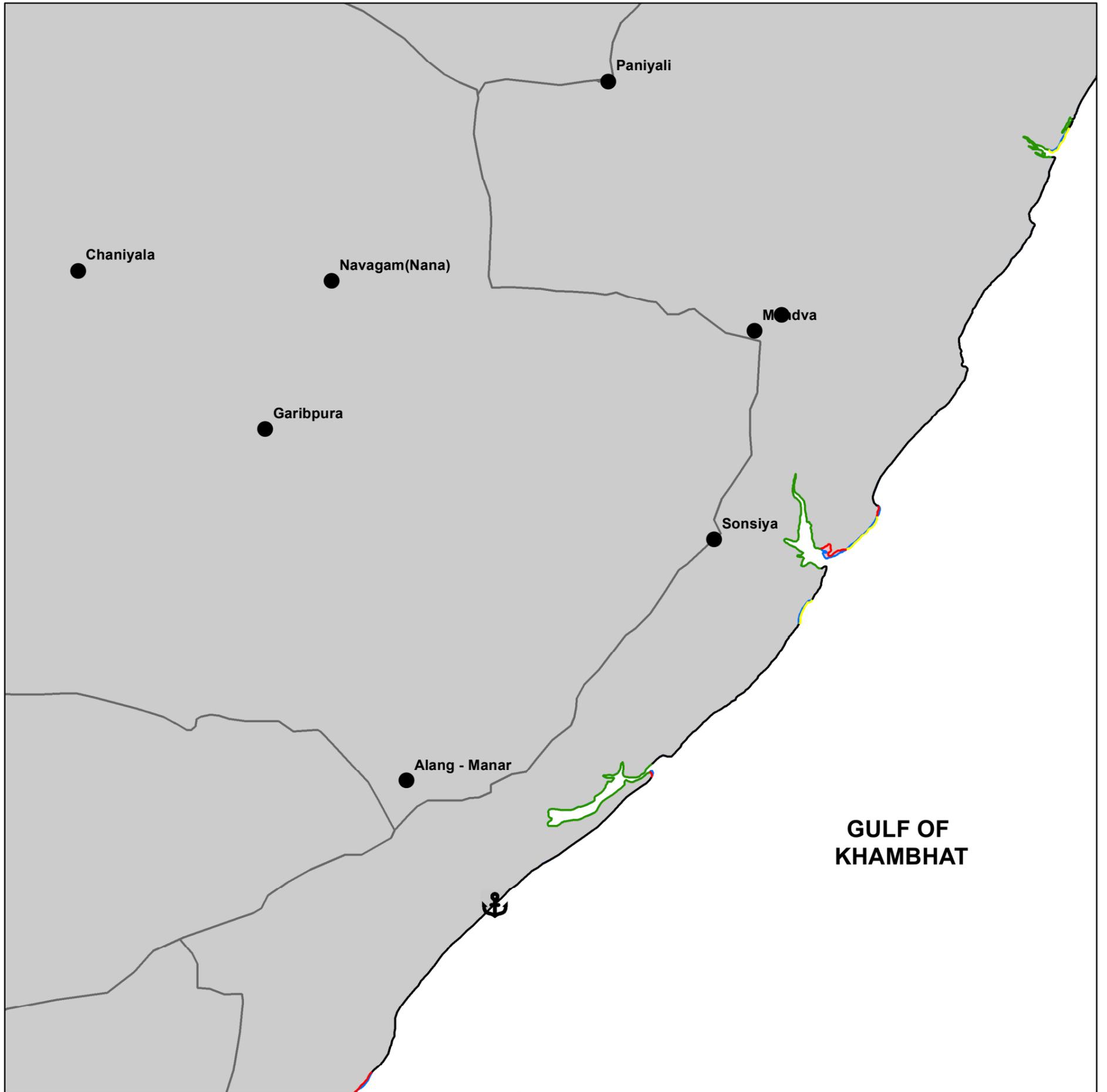
# SHORELINE CHANGE MAP

FOR OFFICIAL USE ONLY

BHAVNAGAR DISTRICT

GUJARAT

SHEET NO. 46C03NE



## Legend

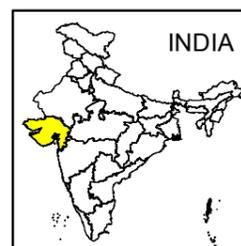
- EROSION
- ACCRETION
- HIGH-TIDE LINE 2014-16
- HIGH-TIDE LINE 2004-06
- STABLE
- ROAD
- ⚓ PORT/HARBOUR
- HABITATION

## INDEX TO SHEETS

46C02SW	46C02SE	46C06SW
46C03NW	46C03NE	46C07NW
46C03SW	46C03SE	SEA



0 2 km



DATA SOURCE:  
IRS LISS4 IMAGES OF 2004-06 & 2014-16

PREPARED BY:  
SPACE APPLICATIONS CENTRE, ISRO, AHMEDABAD  
AND CENTRAL WATER COMMISSION, NEW DELHI



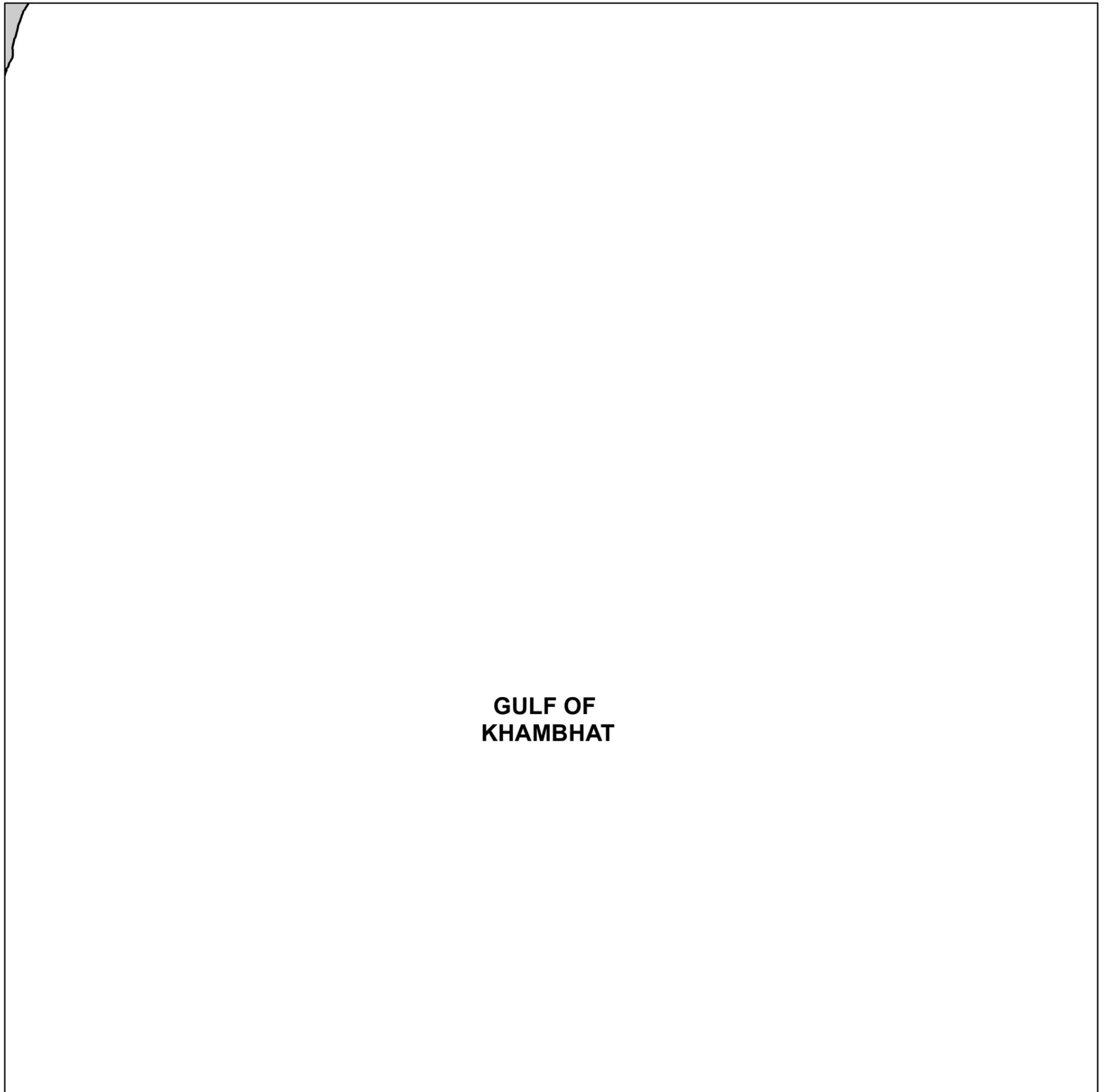
# SHORELINE CHANGE MAP

FOR OFFICIAL USE ONLY

BHAVNAGAR DISTRICT

GUJARAT

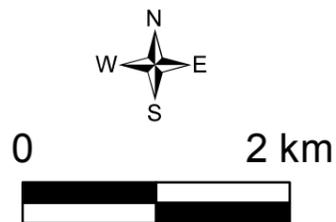
SHEET NO. 46C07NW



GULF OF  
KHAMBHAT

### Legend

-  HIGH-TIDE LINE 2014-16
-  HIGH-TIDE LINE 2004-06
-  STABLE



### INDEX TO SHEETS

46C02SE	46C06SW	SEA
46C03NE	46C07NW	SEA
46C03SE	SEA	SEA



DATA SOURCE:  
IRS LISS4 IMAGES OF 2004-06 & 2014-16

PREPARED BY:  
SPACE APPLICATIONS CENTRE, ISRO, AHMEDABAD  
AND CENTRAL WATER COMMISSION, NEW DELHI



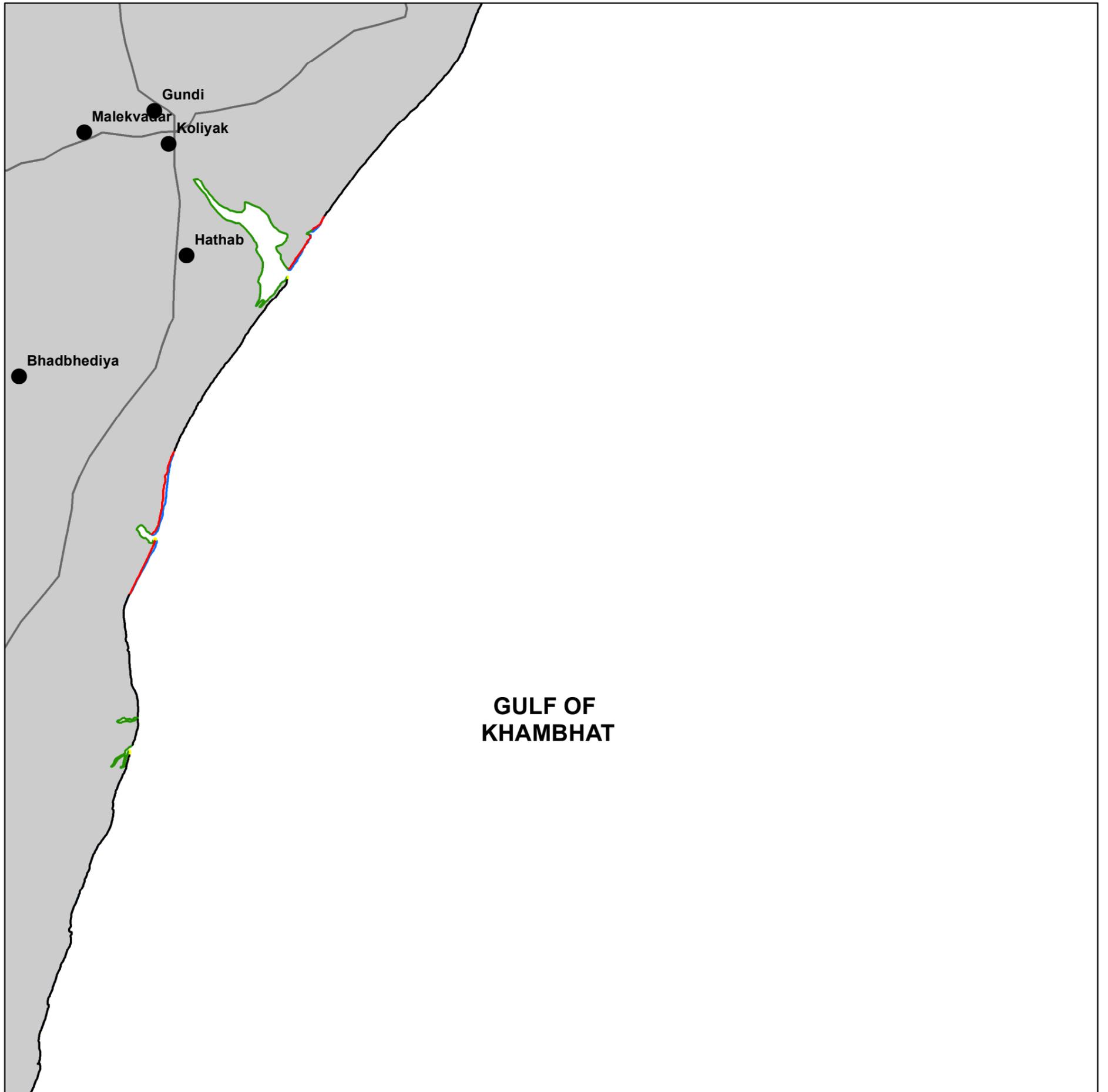
# SHORELINE CHANGE MAP

FOR OFFICIAL USE ONLY

BHAVNAGAR DISTRICT

GUJARAT

SHEET NO. 46C06SW



GULF OF  
KHAMBHAT

### Legend

- EROSION
- ACCRETION
- HIGH-TIDE LINE 2014-16
- HIGH-TIDE LINE 2004-06
- STABLE
- ROAD
- HABITATION

### INDEX TO SHEETS

46C02NE	46C06NW	SEA
46C02SE	46C06SW	SEA
46C03NE	46C07NW	SEA



DATA SOURCE:  
IRS LISS4 IMAGES OF 2004-06 & 2014-16

PREPARED BY:  
SPACE APPLICATIONS CENTRE, ISRO, AHMEDABAD  
AND CENTRAL WATER COMMISSION, NEW DELHI



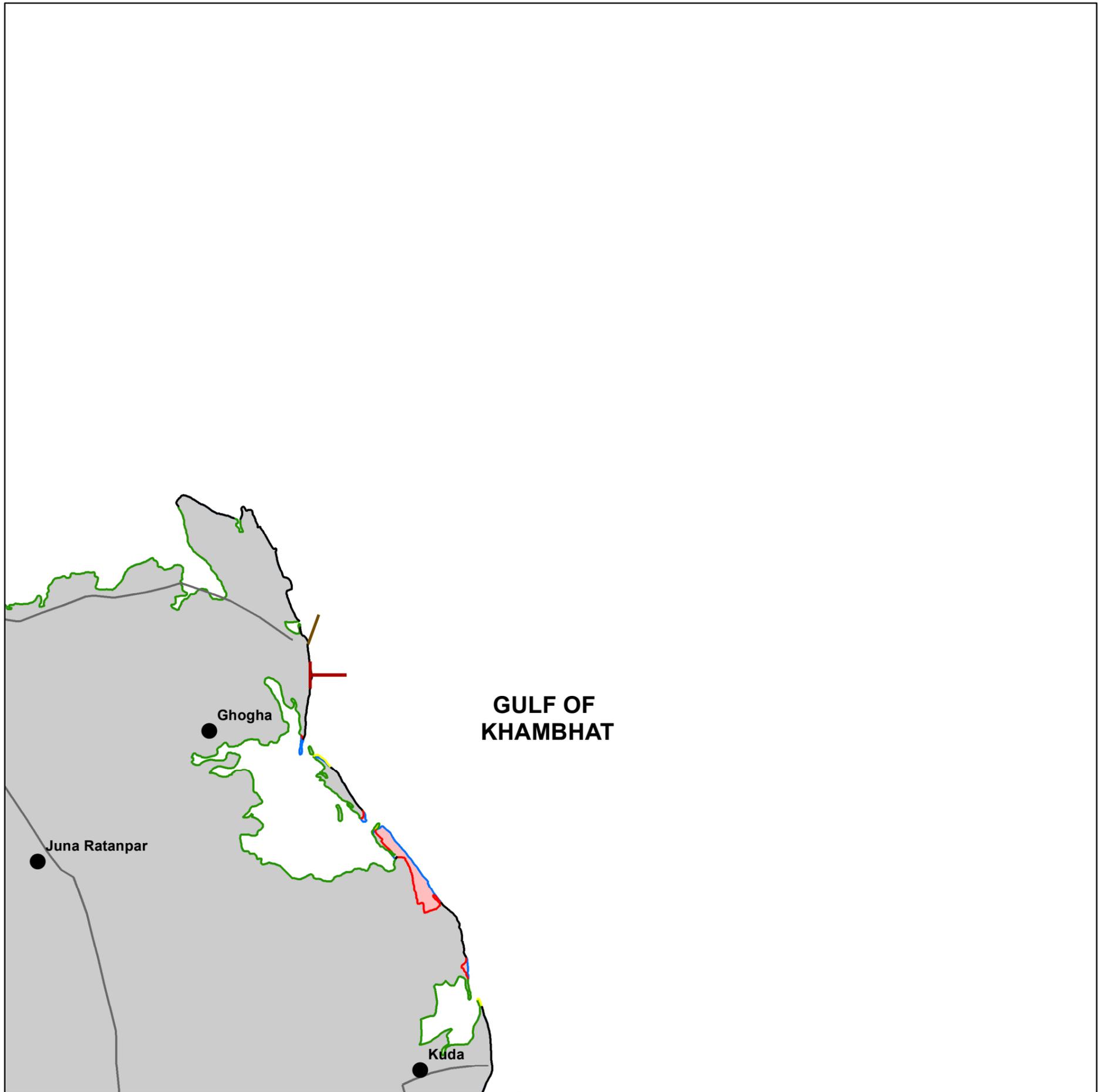
# SHORELINE CHANGE MAP

FOR OFFICIAL USE ONLY

BHAVNAGAR DISTRICT

GUJARAT

SHEET NO. 46C06NW



### Legend

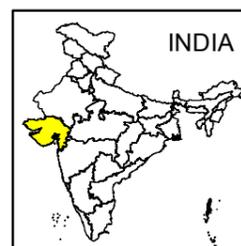
- EROSION
- ACCRETION
- HIGH-TIDE LINE 2014-16
- HIGH-TIDE LINE 2004-06
- STABLE
- ROAD
- BREAKWATER
- JETTY
- HABITATION

### INDEX TO SHEETS

46C01SE	46C05SW	SEA
46C02NE	46C06NW	SEA
46C02SE	46C06SW	SEA



0 2 km



DATA SOURCE:  
IRS LISS4 IMAGES OF 2004-06 & 2014-16

PREPARED BY:  
SPACE APPLICATIONS CENTRE, ISRO, AHMEDABAD  
AND CENTRAL WATER COMMISSION, NEW DELHI



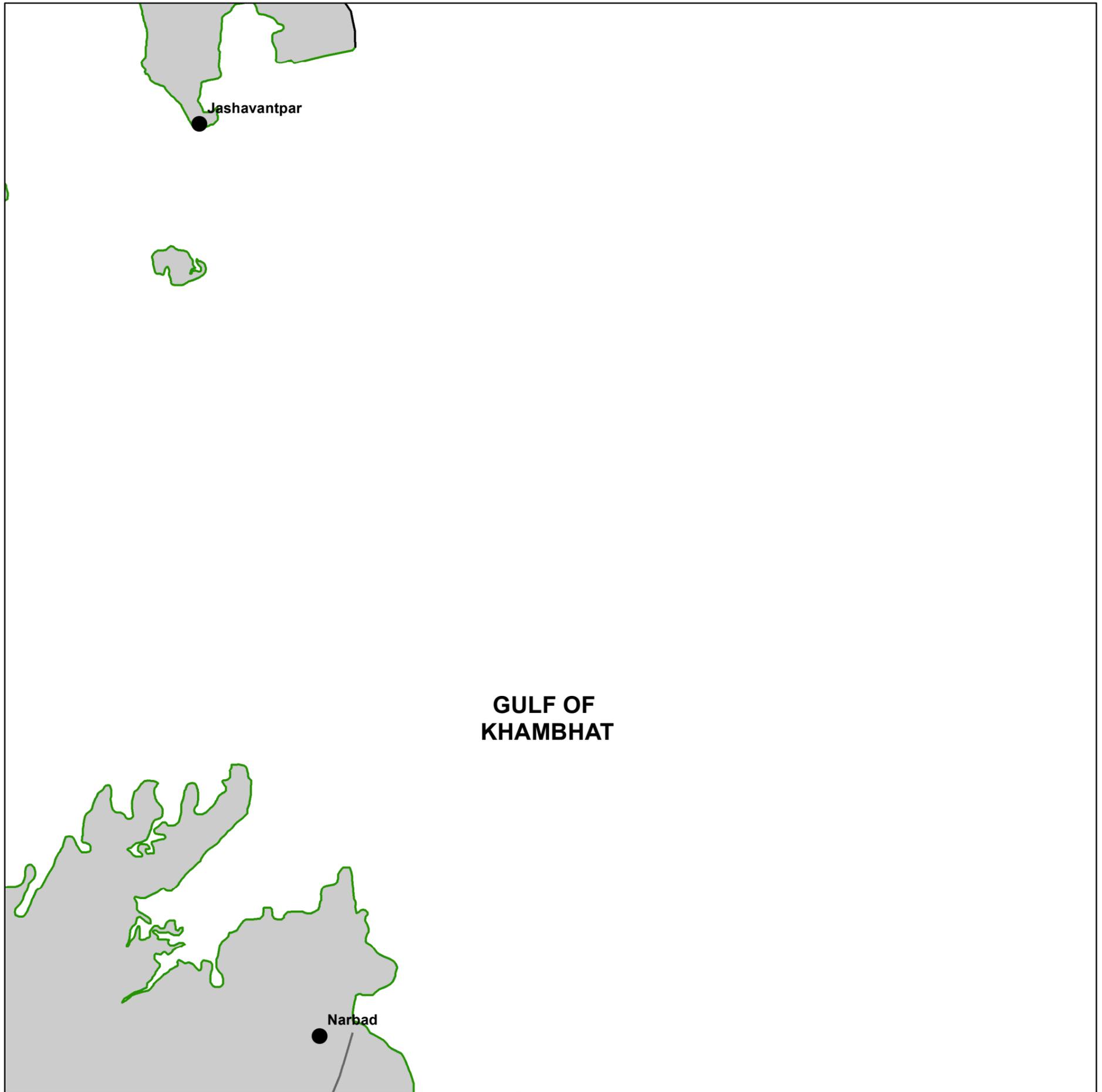
# SHORELINE CHANGE MAP

FOR OFFICIAL USE ONLY

BHAVNAGAR DISTRICT

GUJARAT

SHEET NO. 46C01NE



## Legend

- HIGH-TIDE LINE 2014-16
- HIGH-TIDE LINE 2004-06
- STABLE
- ROAD
- HABITATION

## INDEX TO SHEETS

46B04SW	46B04SE	46B08SW
46C01NW	46C01NE	46C05NW
46C01SW	46C01SE	46C05SW



DATA SOURCE:  
IRS LISS4 IMAGES OF 2004-06 & 2014-16

PREPARED BY:  
SPACE APPLICATIONS CENTRE, ISRO, AHMEDABAD  
AND CENTRAL WATER COMMISSION, NEW DELHI

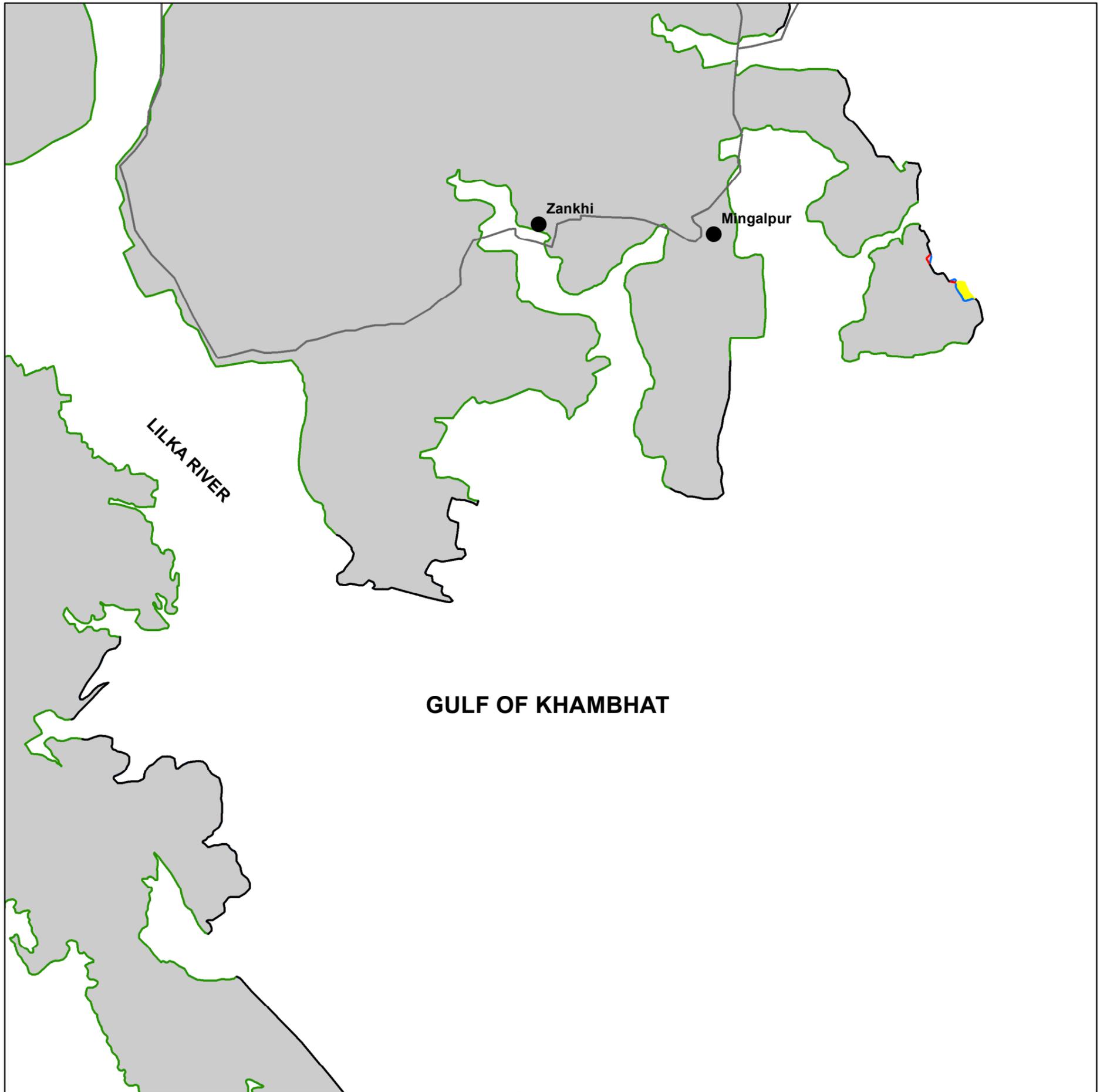


# SHORELINE CHANGE MAP

BHAVNAGAR/  
AHMEDABAD DISTRICT

GUJARAT

FOR OFFICIAL USE ONLY  
SHEET NO. 46B04SE



## Legend

- EROSION
- ACCRETION
- HIGH-TIDE LINE 2014-16
- HIGH-TIDE LINE 2004-06
- STABLE
- ROAD
- HABITATION



## INDEX TO SHEETS

46B04NW	46B04NE	46B08NW
46B04SW	46B04SE	46B08SW
46C01NW	46C01NE	46C05NW



DATA SOURCE:  
IRS LISS4 IMAGES OF 2004-06 & 2014-16

PREPARED BY:  
SPACE APPLICATIONS CENTRE, ISRO, AHMEDABAD  
AND CENTRAL WATER COMMISSION, NEW DELHI



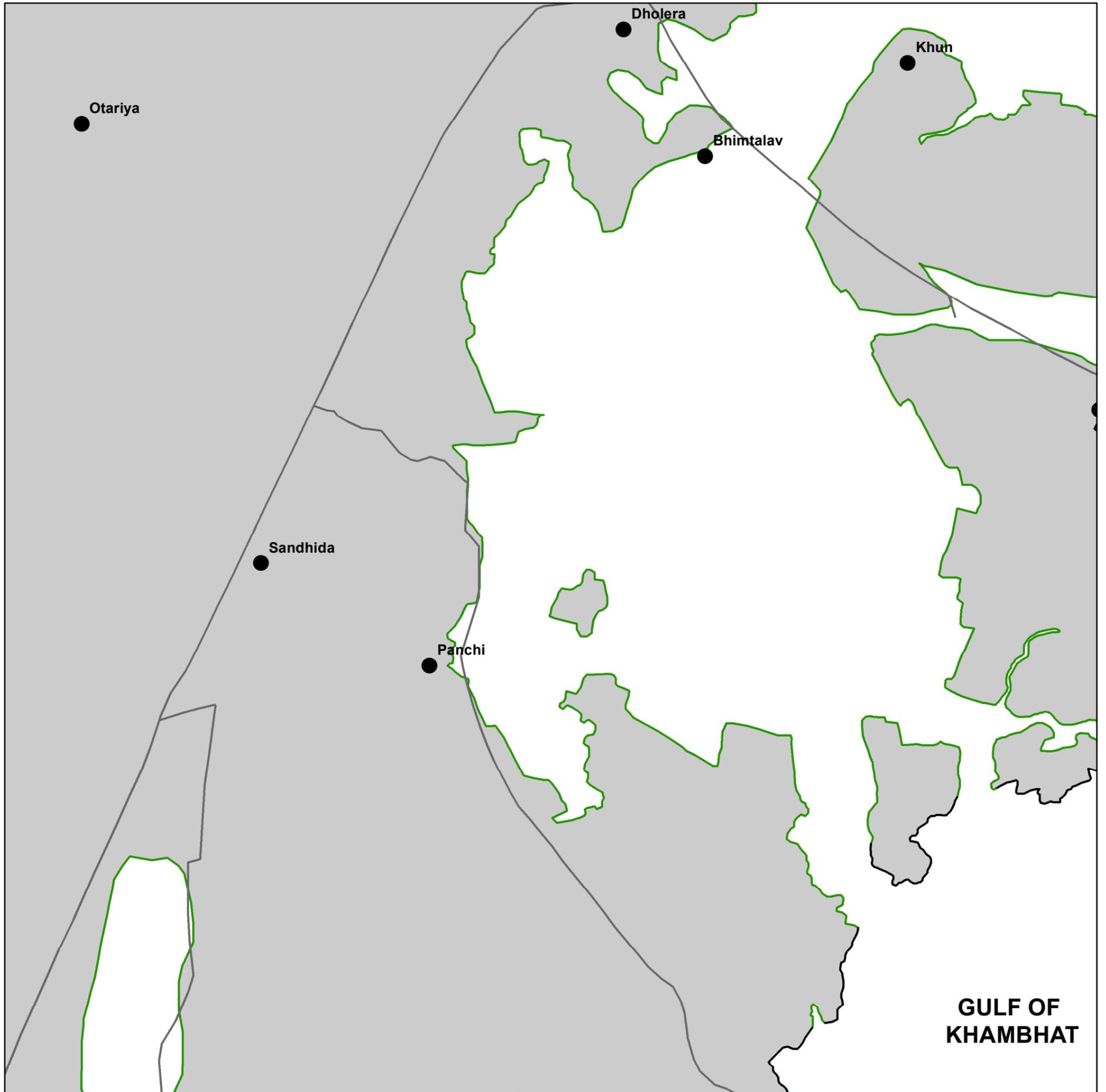
# SHORELINE CHANGE MAP

FOR OFFICIAL USE ONLY

AHMEDABAD DISTRICT

GUJARAT

SHEET NO. 46B04NE



## Legend

- HIGH-TIDE LINE 2014-16
- HIGH-TIDE LINE 2004-06
- STABLE
- ROAD
- HABITATION

## INDEX TO SHEETS

46B03SW	46B03SE	46B07SW
46B04NW	46B04NE	46B08NW
46B04SW	46B04SE	46B08SW



DATA SOURCE:  
IRS LISS4 IMAGES OF 2004-06 & 2014-16

PREPARED BY:  
SPACE APPLICATIONS CENTRE, ISRO, AHMEDABAD  
AND CENTRAL WATER COMMISSION, NEW DELHI



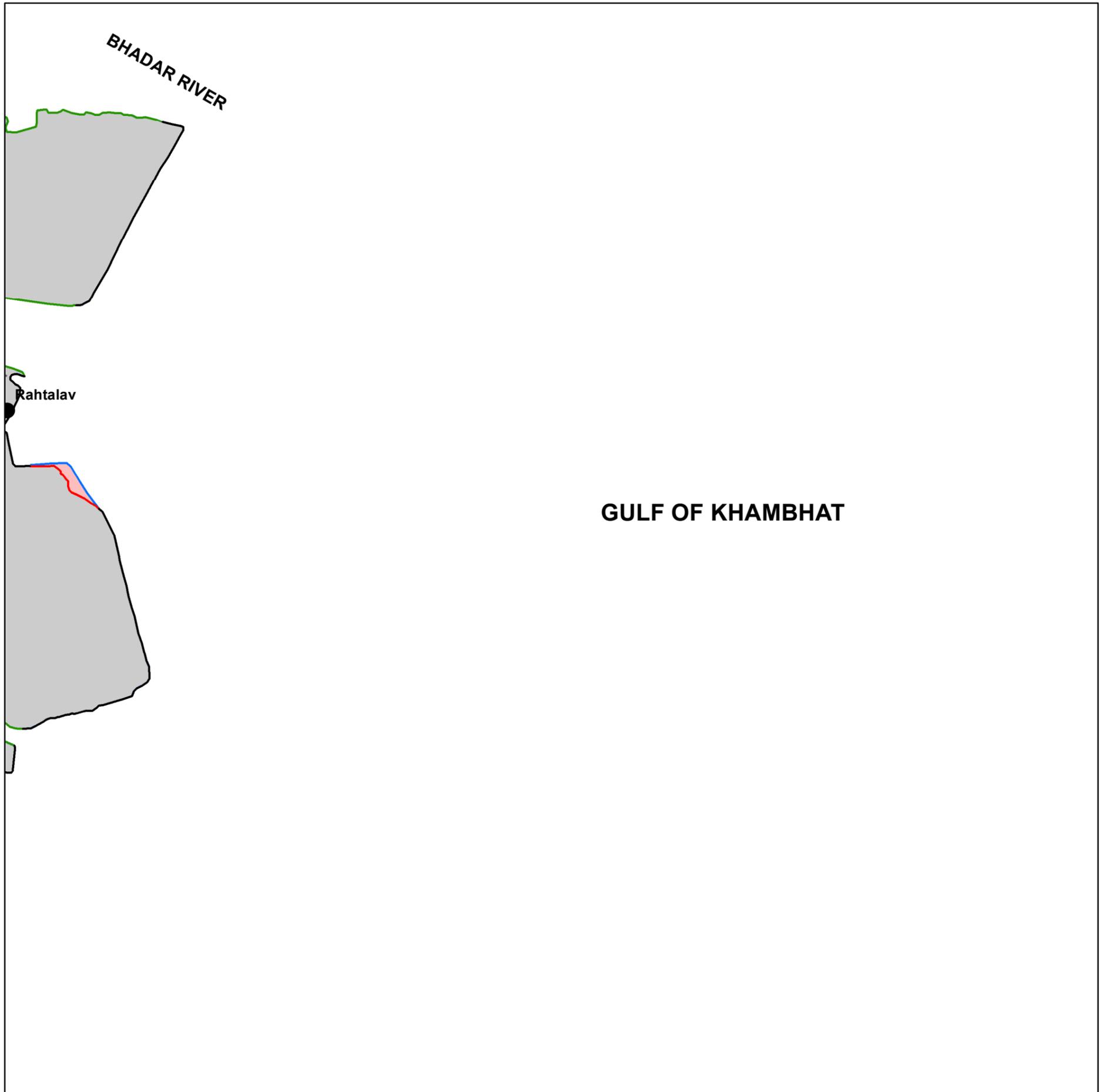
# SHORELINE CHANGE MAP

FOR OFFICIAL USE ONLY

AHMEDABAD DISTRICT

GUJARAT

SHEET NO. 46B08NW



### Legend

- EROSION
- HIGH-TIDE LINE 2014-16
- HIGH-TIDE LINE 2004-06
- STABLE
- ROAD
- HABITATION



0 2 km



### INDEX TO SHEETS

46B03SE	46B07SW	46B07SE
46B04NE	46B08NW	46B08NE
46B04SE	46B08SW	SEA



DATA SOURCE:  
IRS LISS4 IMAGES OF 2004-06 & 2014-16

PREPARED BY:  
SPACE APPLICATIONS CENTRE, ISRO, AHMEDABAD  
AND CENTRAL WATER COMMISSION, NEW DELHI



# SHORELINE CHANGE MAP

FOR OFFICIAL USE ONLY

AHMEDABAD DISTRICT

GUJARAT

SHEET NO. 46B07SW



### Legend

- HIGH-TIDE LINE 2014-16
- HIGH-TIDE LINE 2004-06
- STABLE
- ROAD
- HABITATION

### INDEX TO SHEETS

46B03NE	46B07NW	46B07NE
46B03SE	46B07SW	46B07SE
46B04NE	46B08NW	46B08NE



0 2 km



DATA SOURCE:  
IRS LISS4 IMAGES OF 2004-06 & 2014-16

PREPARED BY:  
SPACE APPLICATIONS CENTRE, ISRO, AHMEDABAD  
AND CENTRAL WATER COMMISSION, NEW DELHI



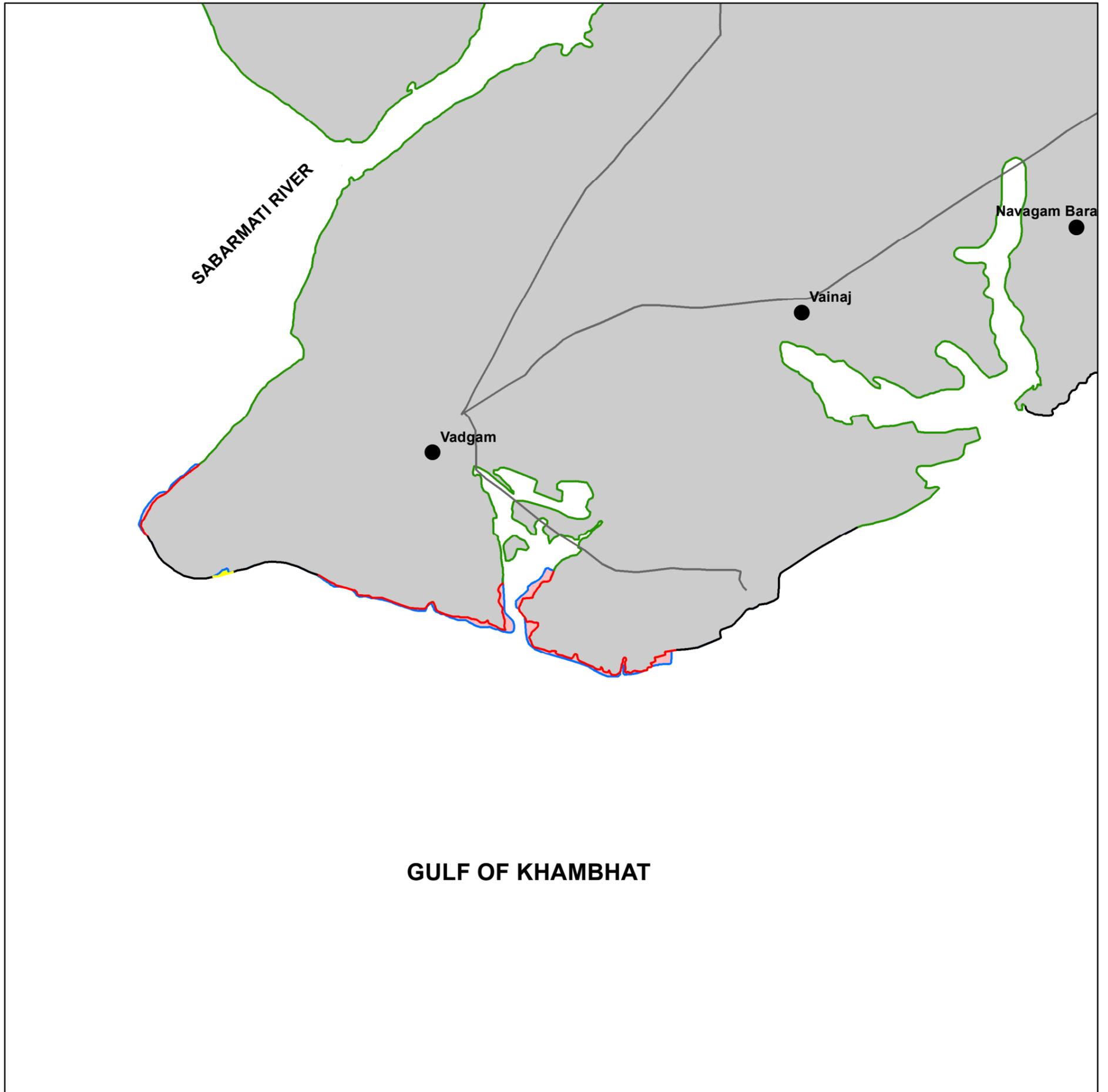
# SHORELINE CHANGE MAP

FOR OFFICIAL USE ONLY

ANAND DISTRICT

GUJARAT

SHEET NO. 46B07SE



GULF OF KHAMBHAT

## Legend

- EROSION
- ACCRETION
- HIGH-TIDE LINE 2014-16
- HIGH-TIDE LINE 2004-06
- STABLE
- ROAD
- HABITATION

## INDEX TO SHEETS

46B07NW	46B07NE	46B11NW
46B07SW	46B07SE	46B11SW
46B08NW	46B08NE	46B12NW



0 2 km



DATA SOURCE:  
IRS LISS4 IMAGES OF 2004-06 & 2014-16

PREPARED BY:  
SPACE APPLICATIONS CENTRE, ISRO, AHMEDABAD  
AND CENTRAL WATER COMMISSION, NEW DELHI



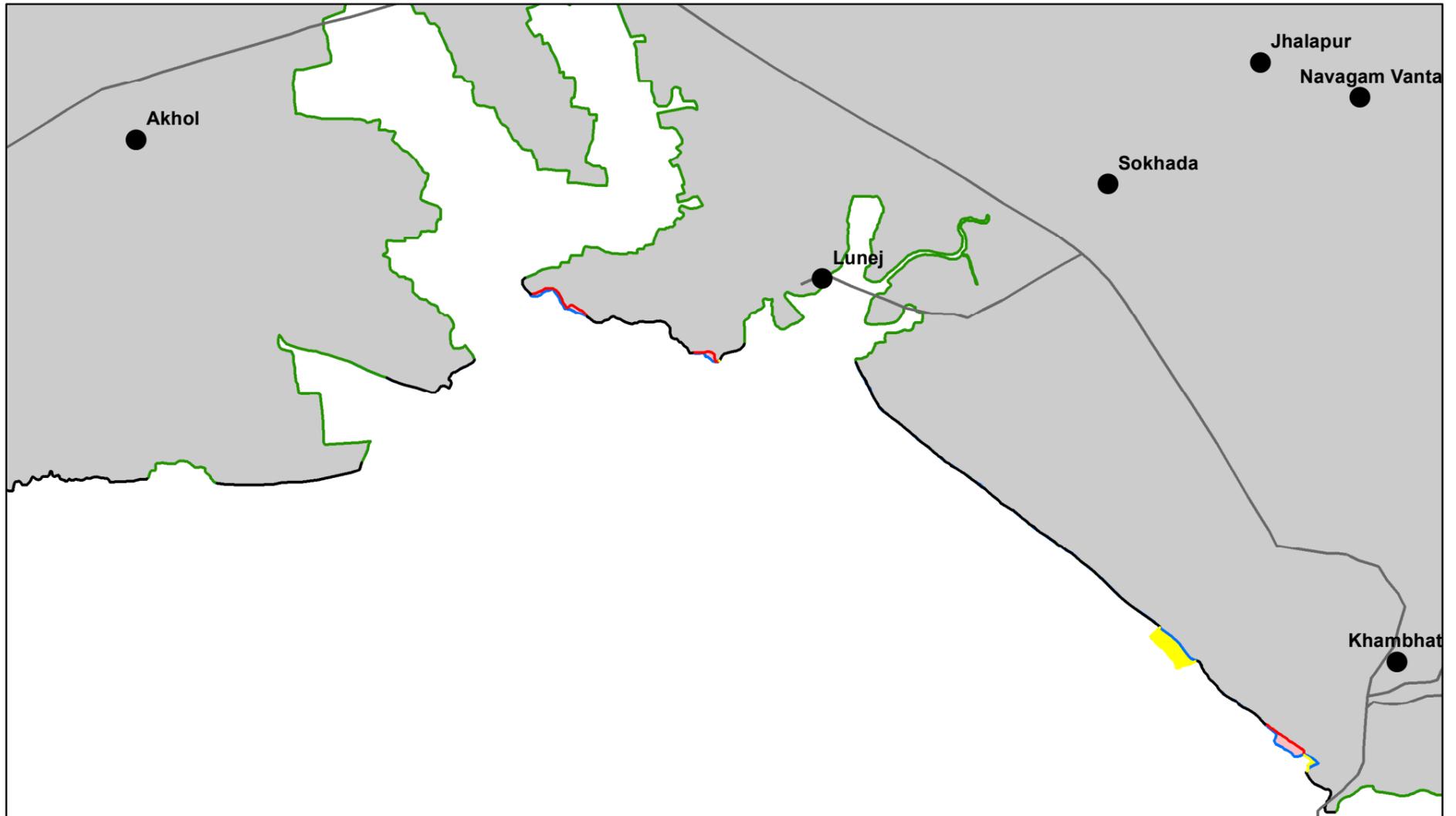
# SHORELINE CHANGE MAP

FOR OFFICIAL USE ONLY

ANAND DISTRICT

GUJARAT

SHEET NO. 46B11SW



GULF OF  
KHAMBHAT

## Legend

- EROSION
- ACCRETION
- HIGH-TIDE LINE 2014-16
- HIGH-TIDE LINE 2004-06
- STABLE
- ROAD
- HABITATION

## INDEX TO SHEETS

46B07NE	46B11NW	46B11NE
46B07SE	46B11SW	46B11SE
46B08NE	46B12NW	46B12NE



0 2 km



DATA SOURCE:  
IRS LISS4 IMAGES OF 2004-06 & 2014-16

PREPARED BY:  
SPACE APPLICATIONS CENTRE, ISRO, AHMEDABAD  
AND CENTRAL WATER COMMISSION, NEW DELHI



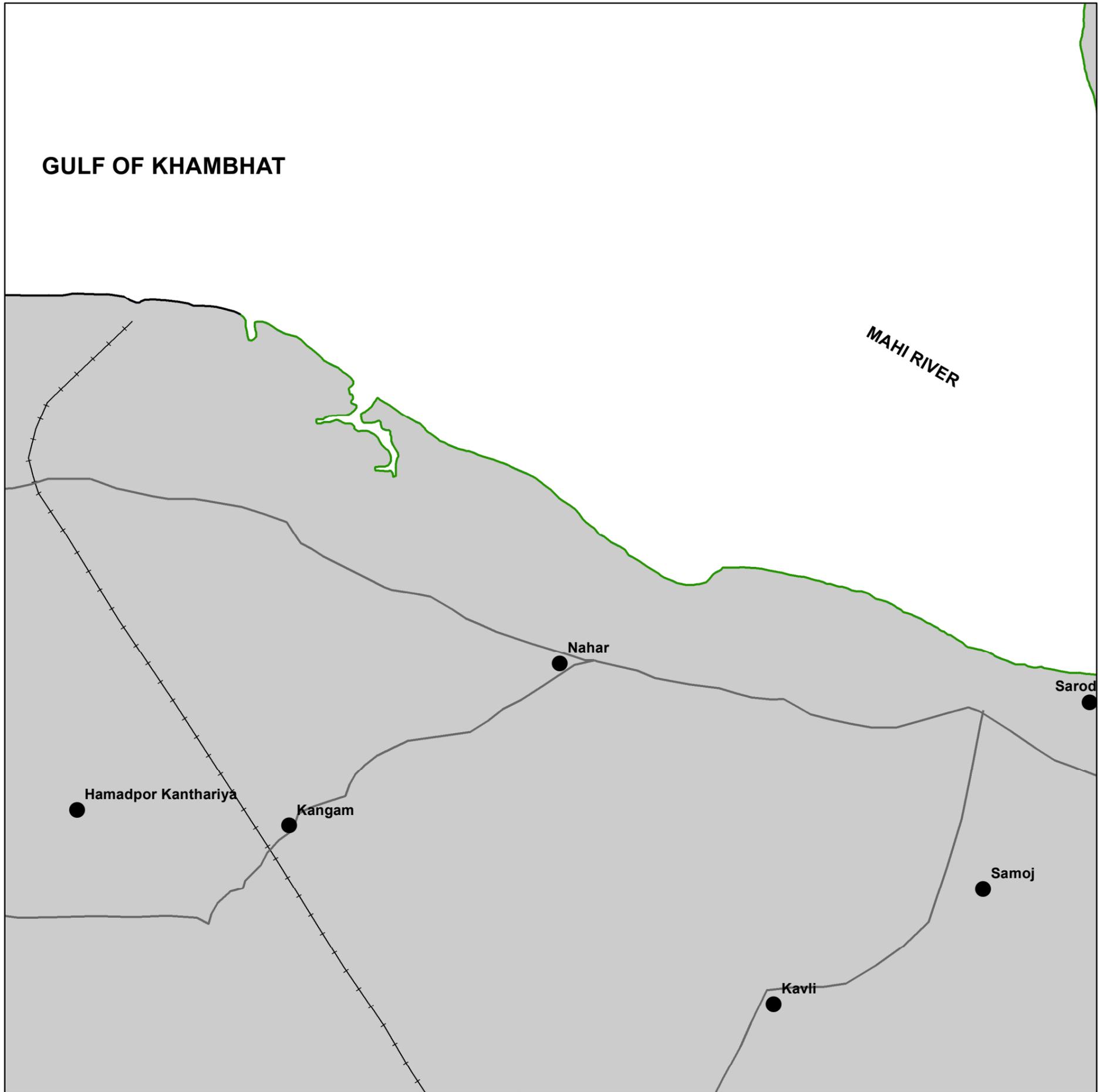
# SHORELINE CHANGE MAP

FOR OFFICIAL USE ONLY

BHARUCH DISTRICT

GUJARAT

SHEET NO. 46B12NE



### Legend

- HIGH-TIDE LINE 2014-16
- HIGH-TIDE LINE 2004-06
- STABLE
- ROAD
- HABITATION

### INDEX TO SHEETS

46B11SW	46B11SE	46B15SW
46B12NW	46B12NE	46B16NW
46B12SW	46B12SE	46B16SW



0 2 km



DATA SOURCE:  
IRS LISS4 IMAGES OF 2004-06 & 2014-16

PREPARED BY:  
SPACE APPLICATIONS CENTRE, ISRO, AHMEDABAD  
AND CENTRAL WATER COMMISSION, NEW DELHI



# SHORELINE CHANGE MAP

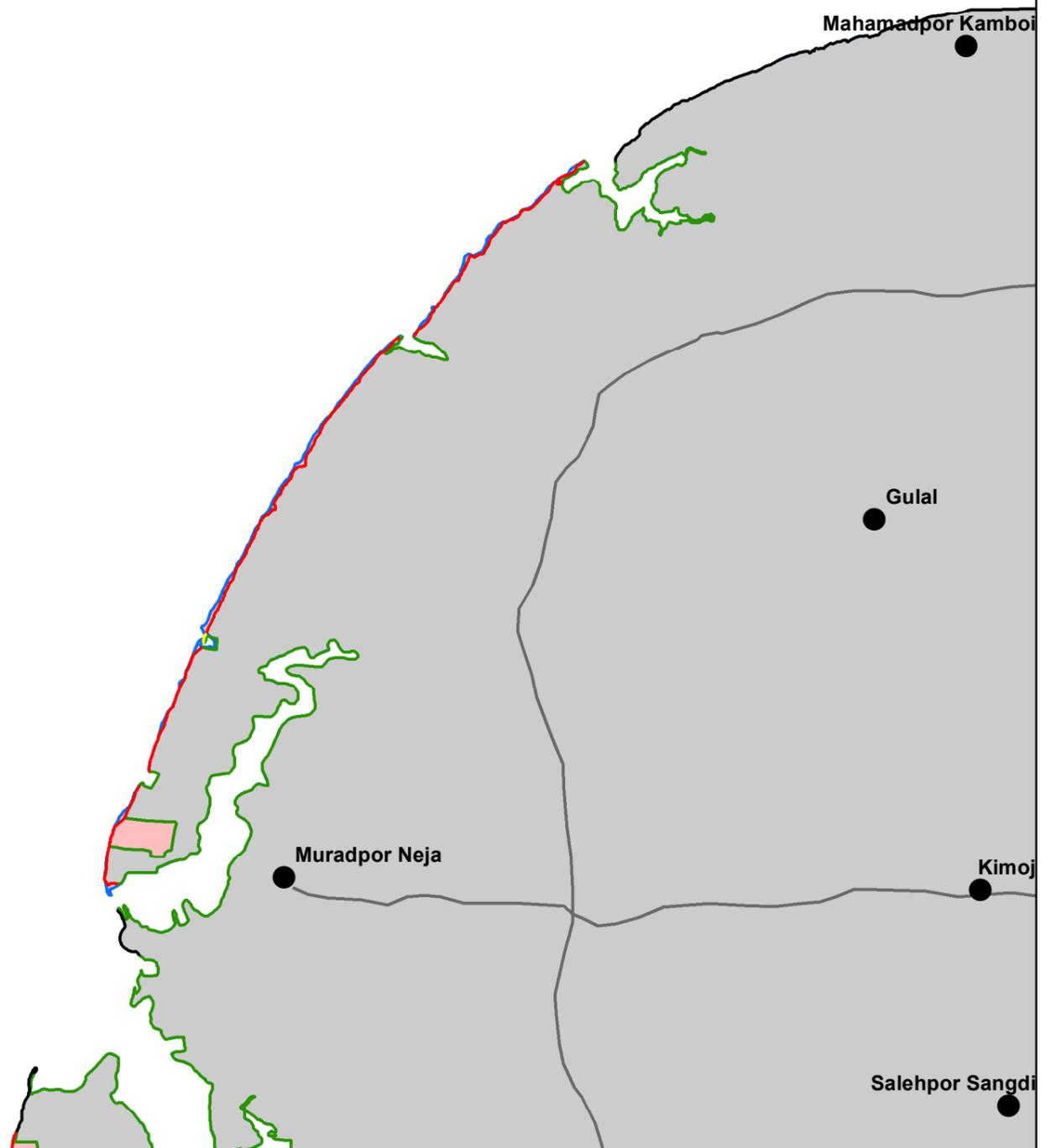
FOR OFFICIAL USE ONLY

BHARUCH DISTRICT

GUJARAT

SHEET NO. 46B12NW

GULF OF  
KHAMBHAT



## Legend

- EROSION
- ACCRETION
- HIGH-TIDE LINE 2014-16
- HIGH-TIDE LINE 2004-06
- STABLE
- ROAD
- HABITATION

## INDEX TO SHEETS

46B07SE	46B11SW	46B11SE
46B08NE	46B12NW	46B12NE
SEA	46B12SW	46B12SE



0 2 km



DATA SOURCE:  
IRS LISS4 IMAGES OF 2004-06 & 2014-16

PREPARED BY:  
SPACE APPLICATIONS CENTRE, ISRO, AHMEDABAD  
AND CENTRAL WATER COMMISSION, NEW DELHI



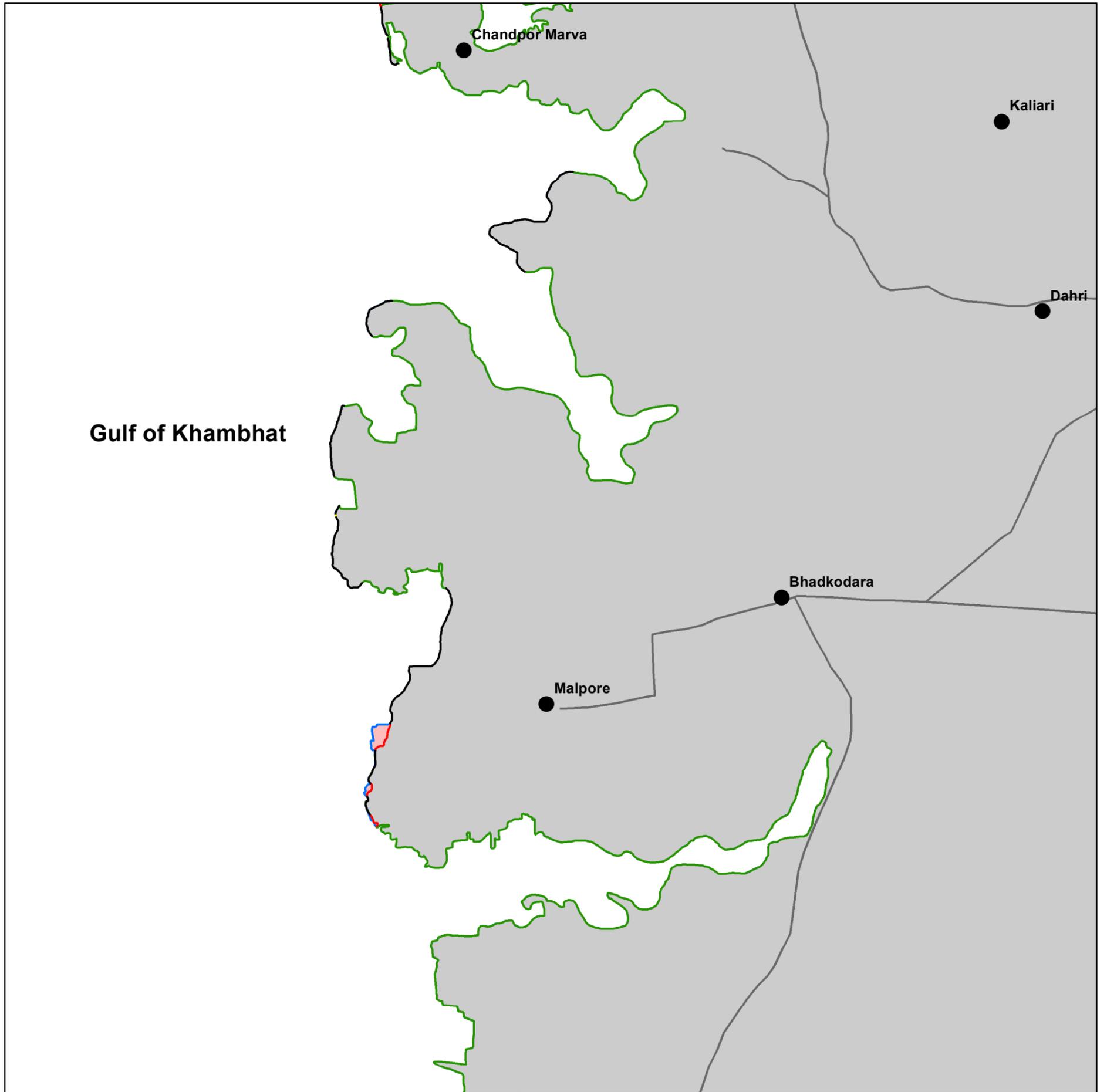
# SHORELINE CHANGE MAP

FOR OFFICIAL USE ONLY

BHARUCH DISTRICT

GUJARAT

SHEET NO. 46B12SW



## Legend

- EROSION
- ACCRETION
- HIGH-TIDE LINE 2014-16
- HIGH-TIDE LINE 2004-06
- STABLE
- ROAD
- HABITATION

## INDEX TO SHEETS

46B08NE	46B12NW	46B12NE
SEA	46B12SW	46B12SE
SEA	46C09NW	46C09NE



DATA SOURCE:  
IRS LISS4 IMAGES OF 2004-06 & 2014-16

PREPARED BY:  
SPACE APPLICATIONS CENTRE, ISRO, AHMEDABAD  
AND CENTRAL WATER COMMISSION, NEW DELHI



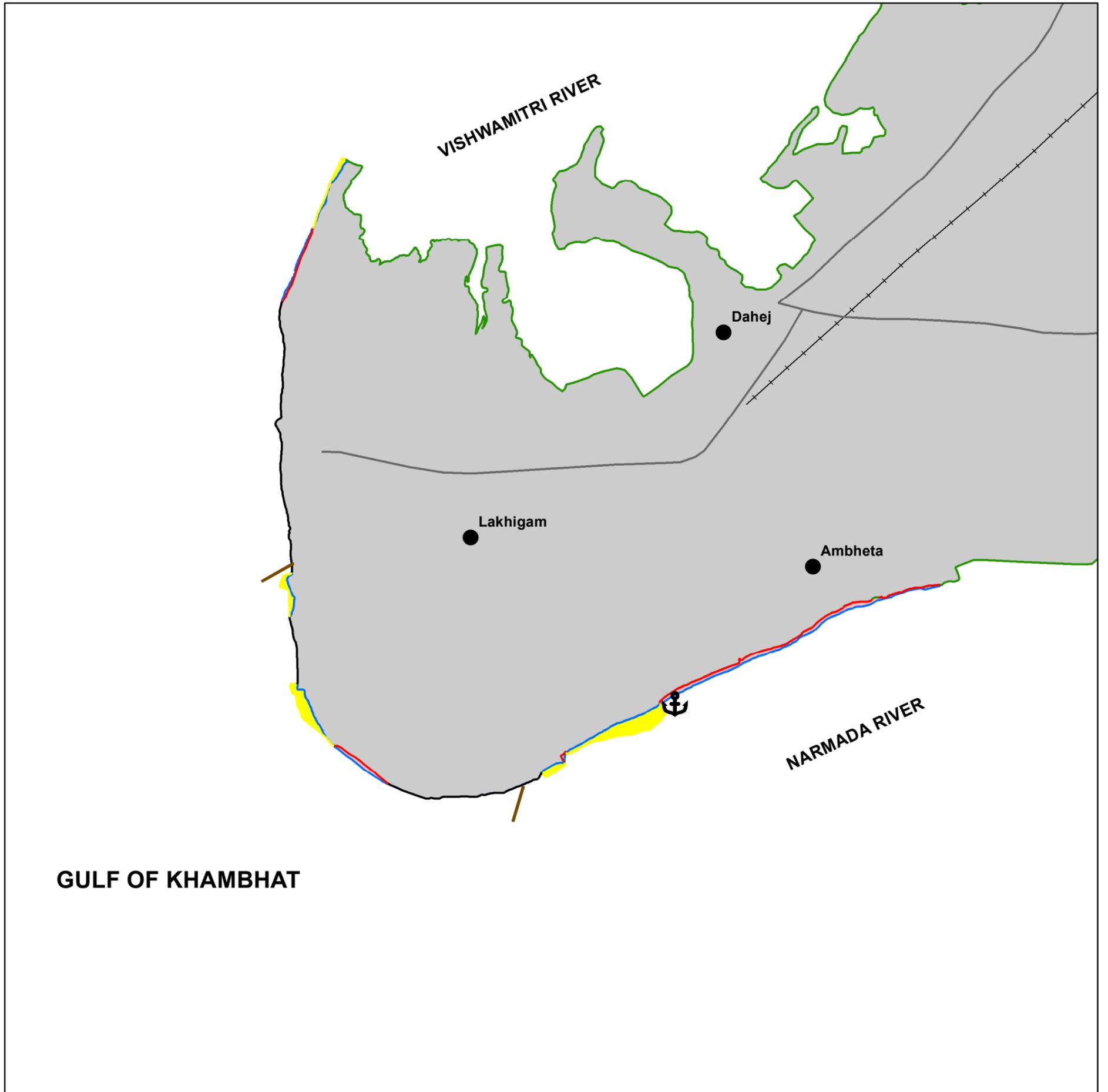
# SHORELINE CHANGE MAP

FOR OFFICIAL USE ONLY

BHARUCH DISTRICT

GUJARAT

SHEET NO. 46C10NW



GULF OF KHAMBHAT

## Legend

- EROSION
- ACCRETION
- HIGH-TIDE LINE 2014-16
- HIGH-TIDE LINE 2004-06
- STABLE
- ROAD
- RAILWAY
- JETTY
- ⚓ PORT/HARBOUR
- HABITATION



## INDEX TO SHEETS

SEA	46C09NW	46C09NE
SEA	46C09SW	46C09SE
SEA	46C10NW	46C10NE
SEA	46C10SW	46C10SE
SEA	46C11NW	46C11NE



DATA SOURCE:  
IRS LISS4 IMAGES OF 2004-06 & 2014-16

PREPARED BY:  
SPACE APPLICATIONS CENTRE, ISRO, AHMEDABAD  
AND CENTRAL WATER COMMISSION, NEW DELHI



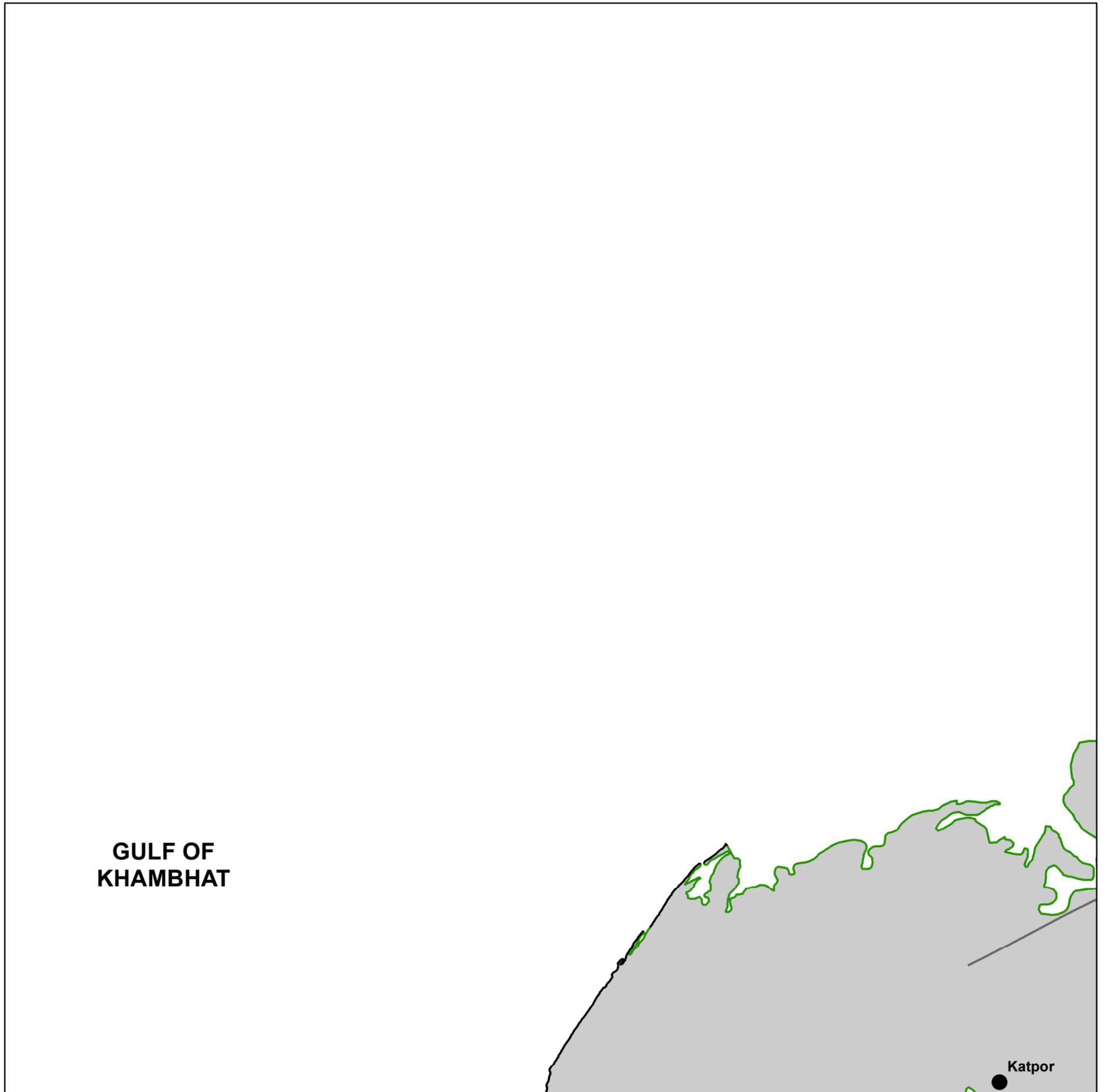
# SHORELINE CHANGE MAP

FOR OFFICIAL USE ONLY

BHARUCH DISTRICT

GUJARAT

SHEET NO. 46C10SE



## Legend

- HIGH-TIDE LINE 2014-16
- HIGH-TIDE LINE 2004-06
- STABLE
- ROAD
- HABITATION

## INDEX TO SHEETS

46C10NW	46C10NE	46C14NW
46C10SW	46C10SE	46C14SW
46C11NW	46C11NE	46C15NW



0 2 km



DATA SOURCE:  
IRS LISS4 IMAGES OF 2004-06 & 2014-16

PREPARED BY:  
SPACE APPLICATIONS CENTRE, ISRO, AHMEDABAD  
AND CENTRAL WATER COMMISSION, NEW DELHI

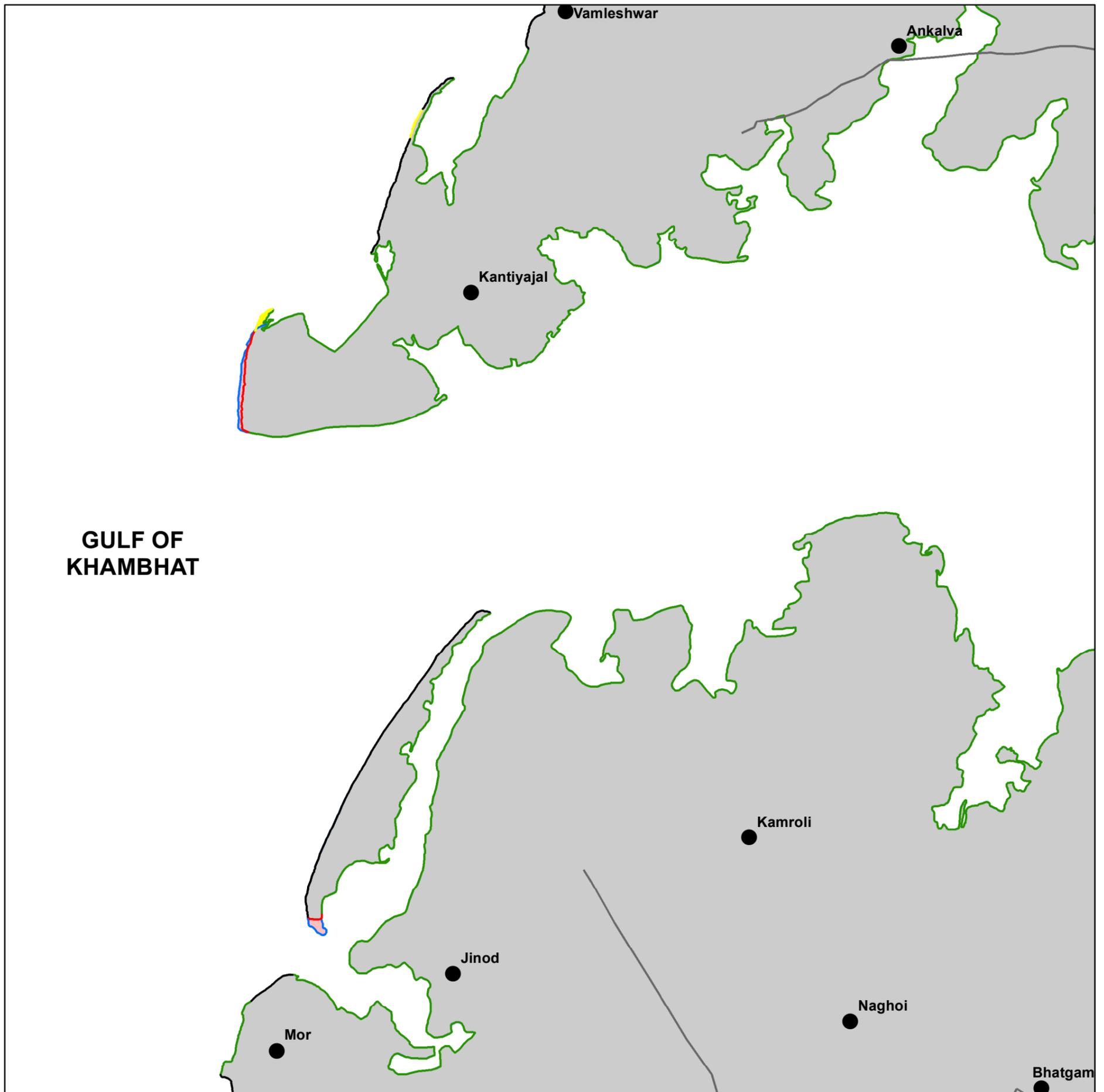


# SHORELINE CHANGE MAP

BHARUCH/  
SURAT DISTRICT

GUJARAT

FOR OFFICIAL USE ONLY  
SHEET NO. 46C11NE



GULF OF  
KHAMBHAT

### Legend

- EROSION
- ACCRETION
- HIGH-TIDE LINE 2014-16
- HIGH-TIDE LINE 2004-06
- STABLE
- ROAD
- HABITATION

### INDEX TO SHEETS

46C10SW	46C10SE	46C14SW
46C11NW	46C11NE	46C15NW
46C11SW	46C11SE	46C15SW



0 2 km



DATA SOURCE:  
IRS LISS4 IMAGES OF 2004-06 & 2014-16

PREPARED BY:  
SPACE APPLICATIONS CENTRE, ISRO, AHMEDABAD  
AND CENTRAL WATER COMMISSION, NEW DELHI



# SHORELINE CHANGE MAP

FOR OFFICIAL USE ONLY

SURAT DISTRICT

GUJARAT

SHEET NO. 46C11SE



## Legend

- EROSION
- ACCRETION
- HIGH-TIDE LINE 2014-16
- HIGH-TIDE LINE 2004-06
- STABLE
- ROAD
- HABITATION

## INDEX TO SHEETS

46C11NW	46C11NE	46C15NW
46C11SW	46C11SE	46C15SW
46C12NW	46C12NE	46C16NW



0 2 km



DATA SOURCE:  
IRS LISS4 IMAGES OF 2004-06 & 2014-16

PREPARED BY:  
SPACE APPLICATIONS CENTRE, ISRO, AHMEDABAD  
AND CENTRAL WATER COMMISSION, NEW DELHI



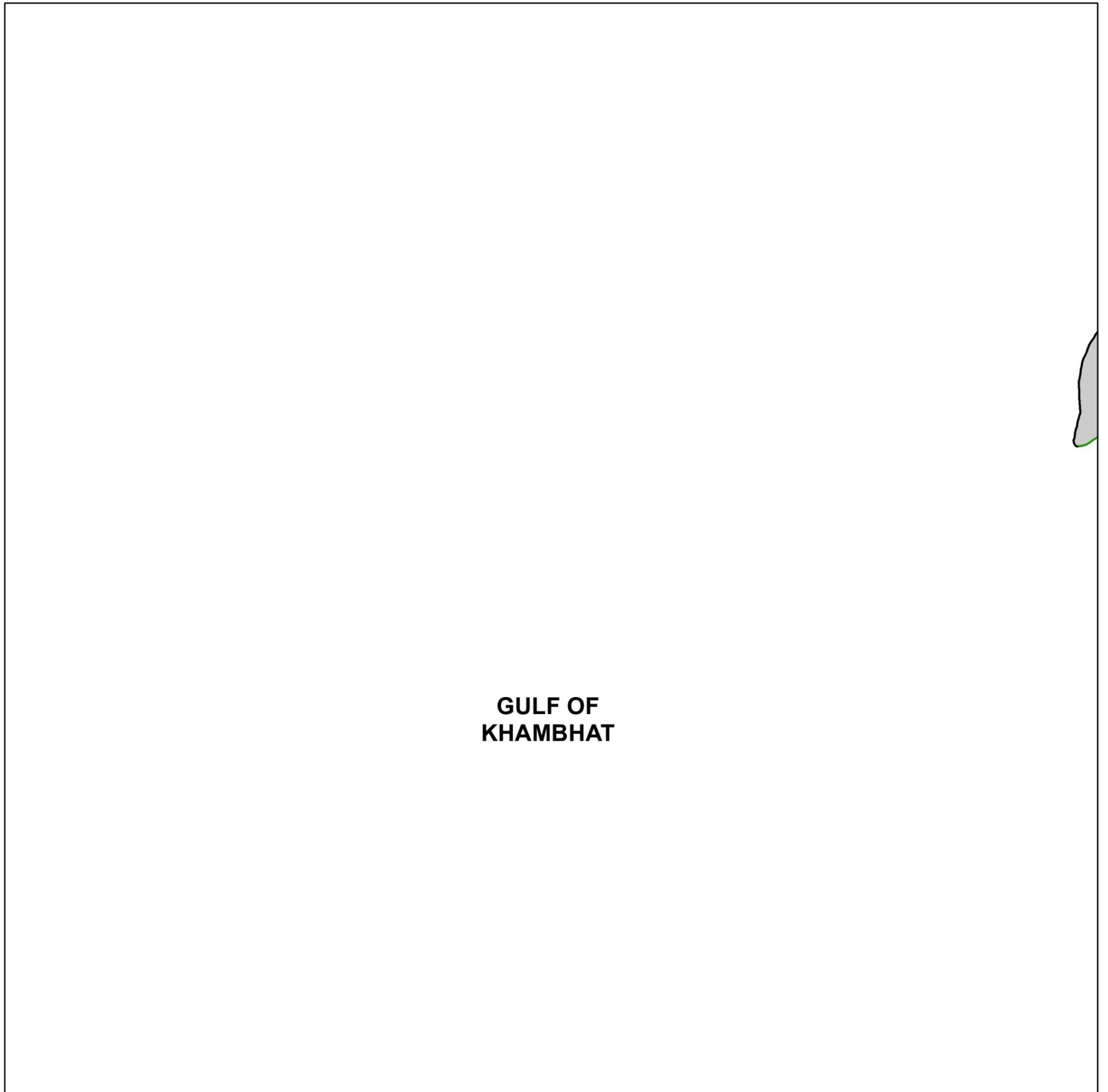
# SHORELINE CHANGE MAP

FOR OFFICIAL USE ONLY

SURAT DISTRICT

GUJARAT

SHEET NO. 46C11SW



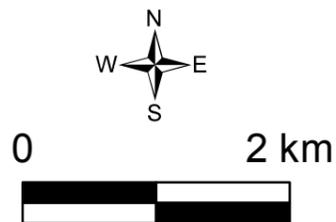
GULF OF  
KHAMBHAT

### Legend

-  HIGH-TIDE LINE 2014-16
-  HIGH-TIDE LINE 2004-06
-  STABLE

### INDEX TO SHEETS

SEA	46C11NW	46C11NE
SEA	46C11SW	46C11SE
SEA	46C12NW	46C12NE



DATA SOURCE:  
IRS LISS4 IMAGES OF 2004-06 & 2014-16

PREPARED BY:  
SPACE APPLICATIONS CENTRE, ISRO, AHMEDABAD  
AND CENTRAL WATER COMMISSION, NEW DELHI



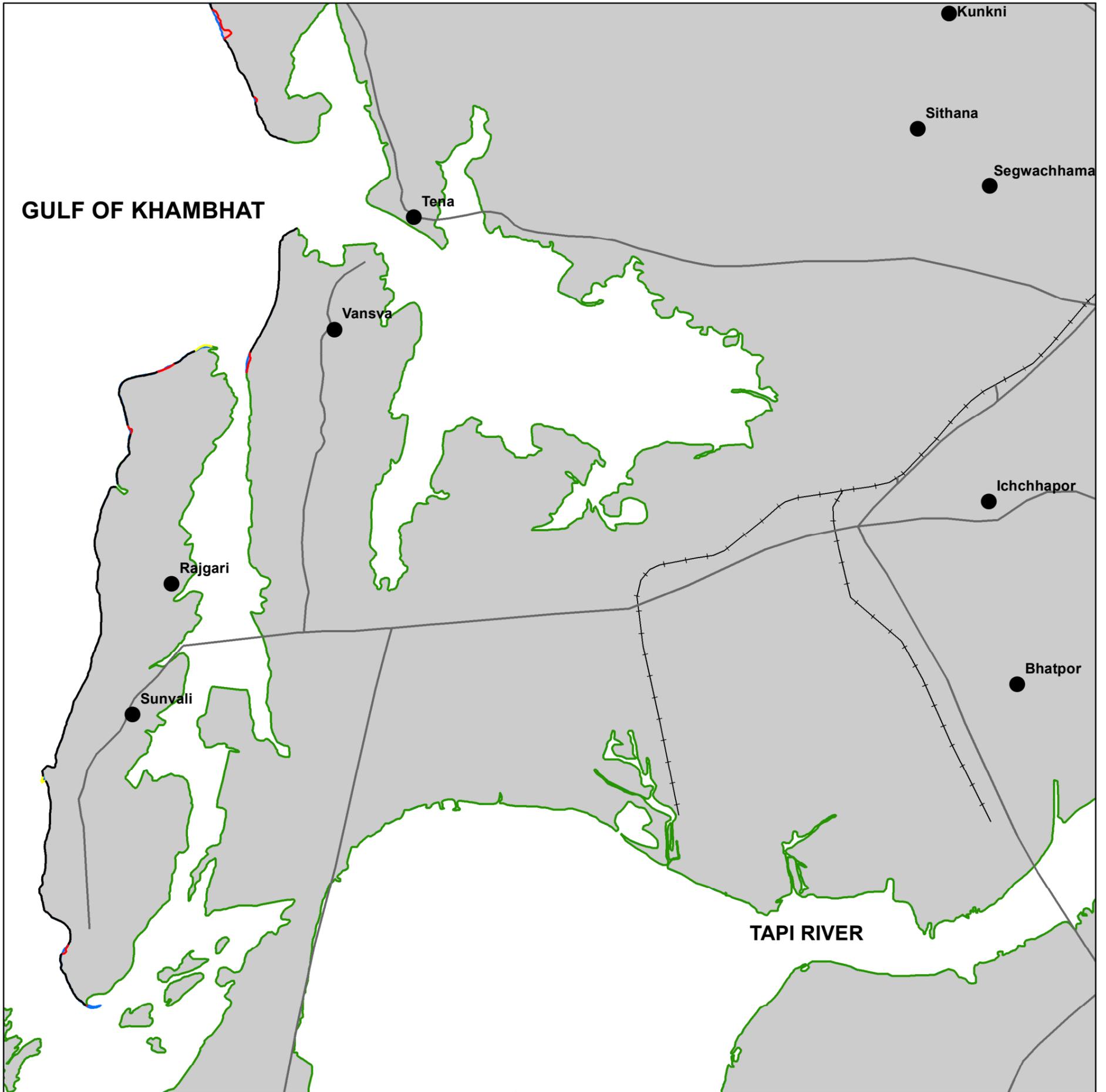
# SHORELINE CHANGE MAP

FOR OFFICIAL USE ONLY

SURAT DISTRICT

GUJARAT

SHEET NO. 46C12NE



### Legend

- EROSION
- ACCRETION
- HIGH-TIDE LINE 2014-16
- HIGH-TIDE LINE 2004-06
- STABLE
- ROAD
- RAILWAY
- HABITATION

### INDEX TO SHEETS

46C11SW	46C11SE	46C15SW
46C12NW	46C12NE	46C16NW
46C12SW	46C12SE	46C16SW



0 2 km



DATA SOURCE:  
IRS LISS4 IMAGES OF 2004-06 & 2014-16

PREPARED BY:  
SPACE APPLICATIONS CENTRE, ISRO, AHMEDABAD  
AND CENTRAL WATER COMMISSION, NEW DELHI

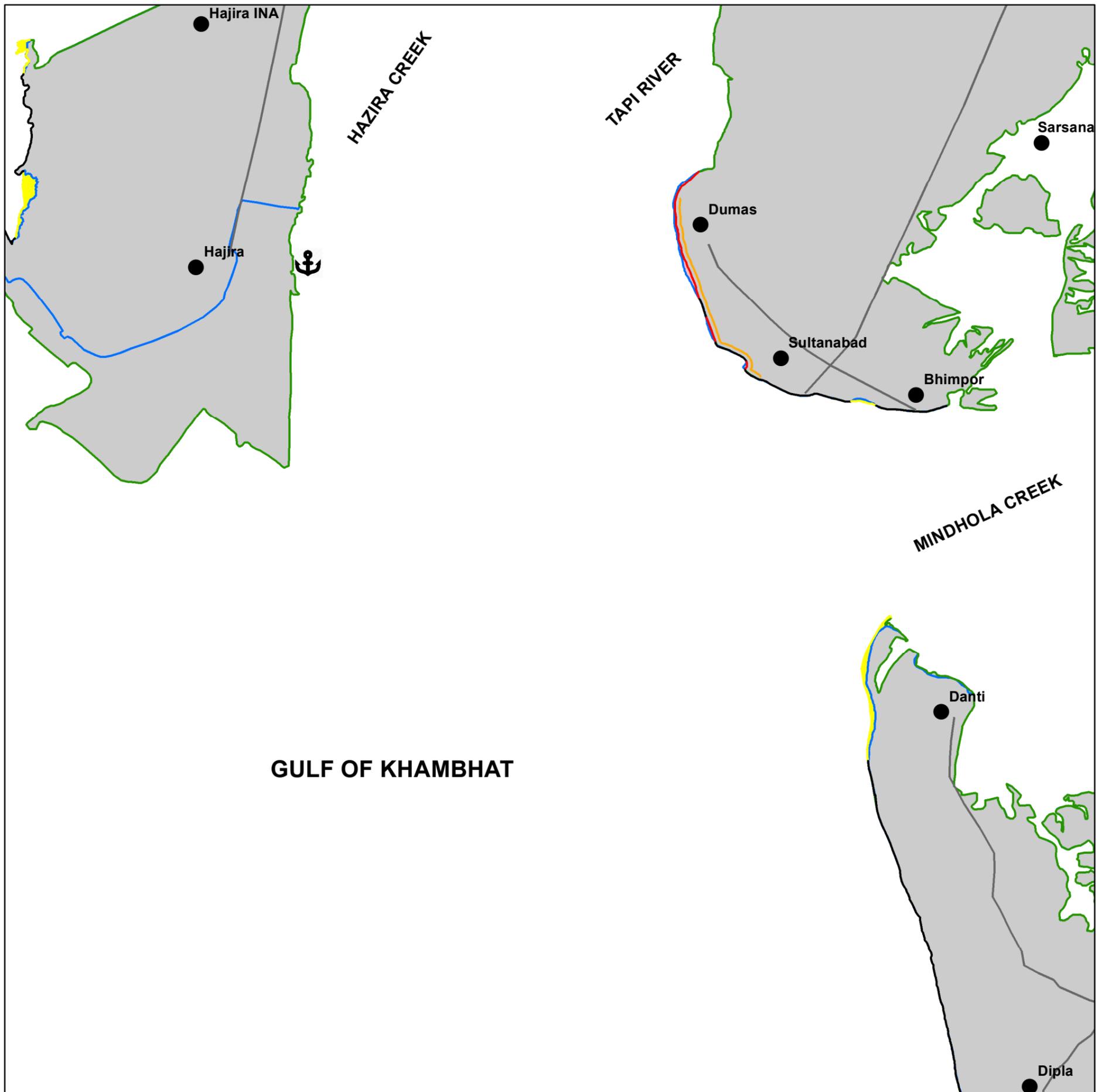


# SHORELINE CHANGE MAP

SURAT/  
NAVSARI DISTRICT

GUJARAT

FOR OFFICIAL USE ONLY  
SHEET NO. 46C12SE



GULF OF KHAMBHAT

### Legend

- EROSION
- ACCRETION
- HIGH-TIDE LINE 2014-16
- HIGH-TIDE LINE 2004-06
- STABLE
- ROAD
- RAILWAY
- PORT/HARBOUR
- HABITATION



### INDEX TO SHEETS

46C12NW	46C12NE	46C16NW
46C12SW	46C12SE	46C16SW
SEA	46D09NE	46D13NW



DATA SOURCE:  
IRS LISS4 IMAGES OF 2004-06 & 2014-16

PREPARED BY:  
SPACE APPLICATIONS CENTRE, ISRO, AHMEDABAD  
AND CENTRAL WATER COMMISSION, NEW DELHI



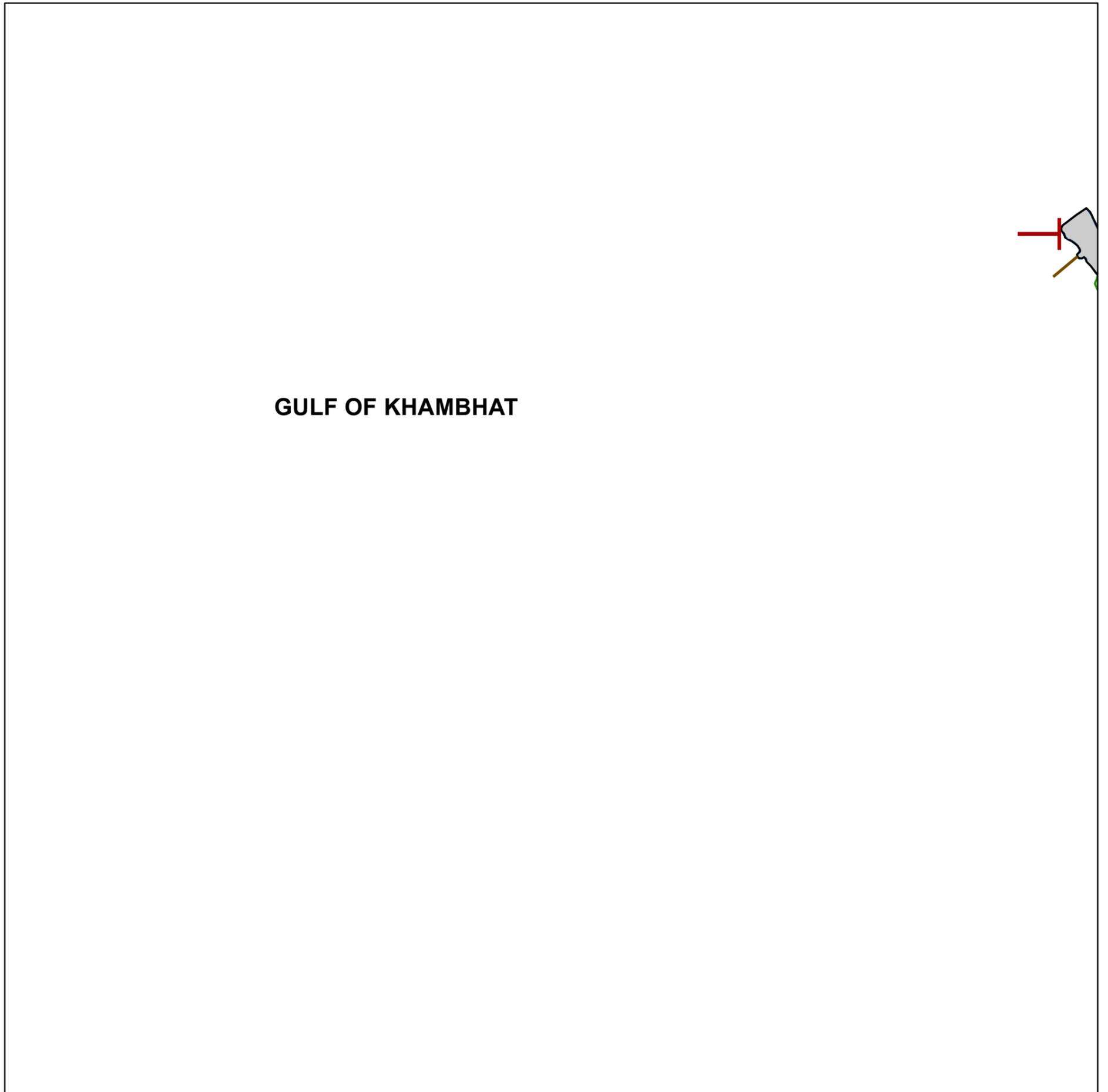
# SHORELINE CHANGE MAP

FOR OFFICIAL USE ONLY

SURAT DISTRICT

GUJARAT

SHEET NO. 46C12SW



GULF OF KHAMBHAT

### Legend

- HIGH-TIDE LINE 2014-16
- HIGH-TIDE LINE 2004-06
- STABLE
- BREAKWATER
- JETTY

### INDEX TO SHEETS

SEA	46C12NW	46C12NE
SEA	46C12SW	46C12SE
SEA	SEA	46D09NE



0 2 km



DATA SOURCE:  
IRS LISS4 IMAGES OF 2004-06 & 2014-16

PREPARED BY:  
SPACE APPLICATIONS CENTRE, ISRO, AHMEDABAD  
AND CENTRAL WATER COMMISSION, NEW DELHI



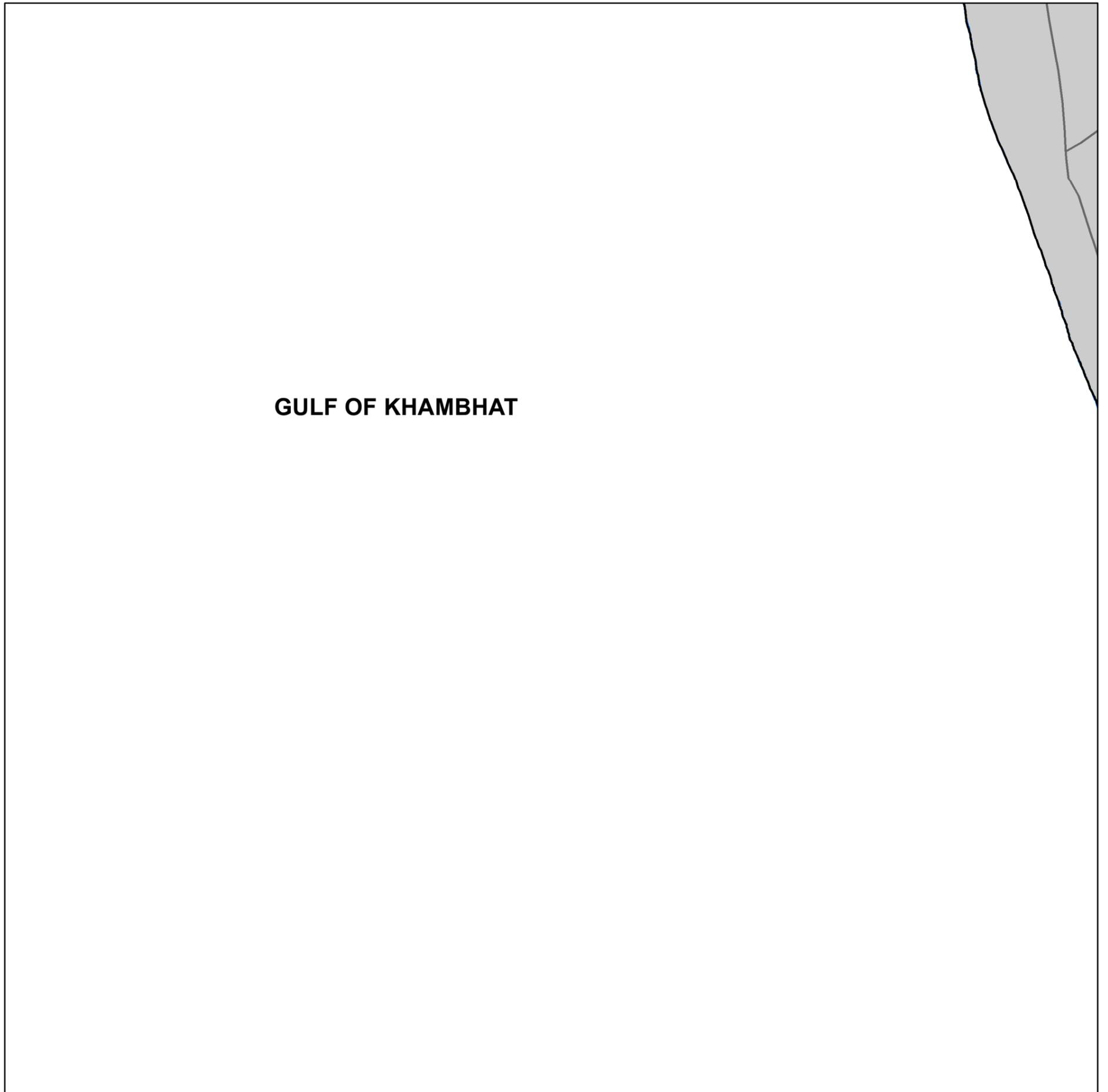
# SHORELINE CHANGE MAP

FOR OFFICIAL USE ONLY

NAVSARI DISTRICT

GUJARAT

SHEET NO. 46D09NE



GULF OF KHAMBHAT

### Legend

-  HIGH-TIDE LINE 2014-16
-  HIGH-TIDE LINE 2004-06
-  STABLE

### INDEX TO SHEETS

46C12SW	46C12SE	46C16SW
SEA	46D09NE	46D13NW
SEA	SEA	46D13SW



0 2 km



DATA SOURCE:  
IRS LISS4 IMAGES OF 2004-06 & 2014-16

PREPARED BY:  
SPACE APPLICATIONS CENTRE, ISRO, AHMEDABAD  
AND CENTRAL WATER COMMISSION, NEW DELHI



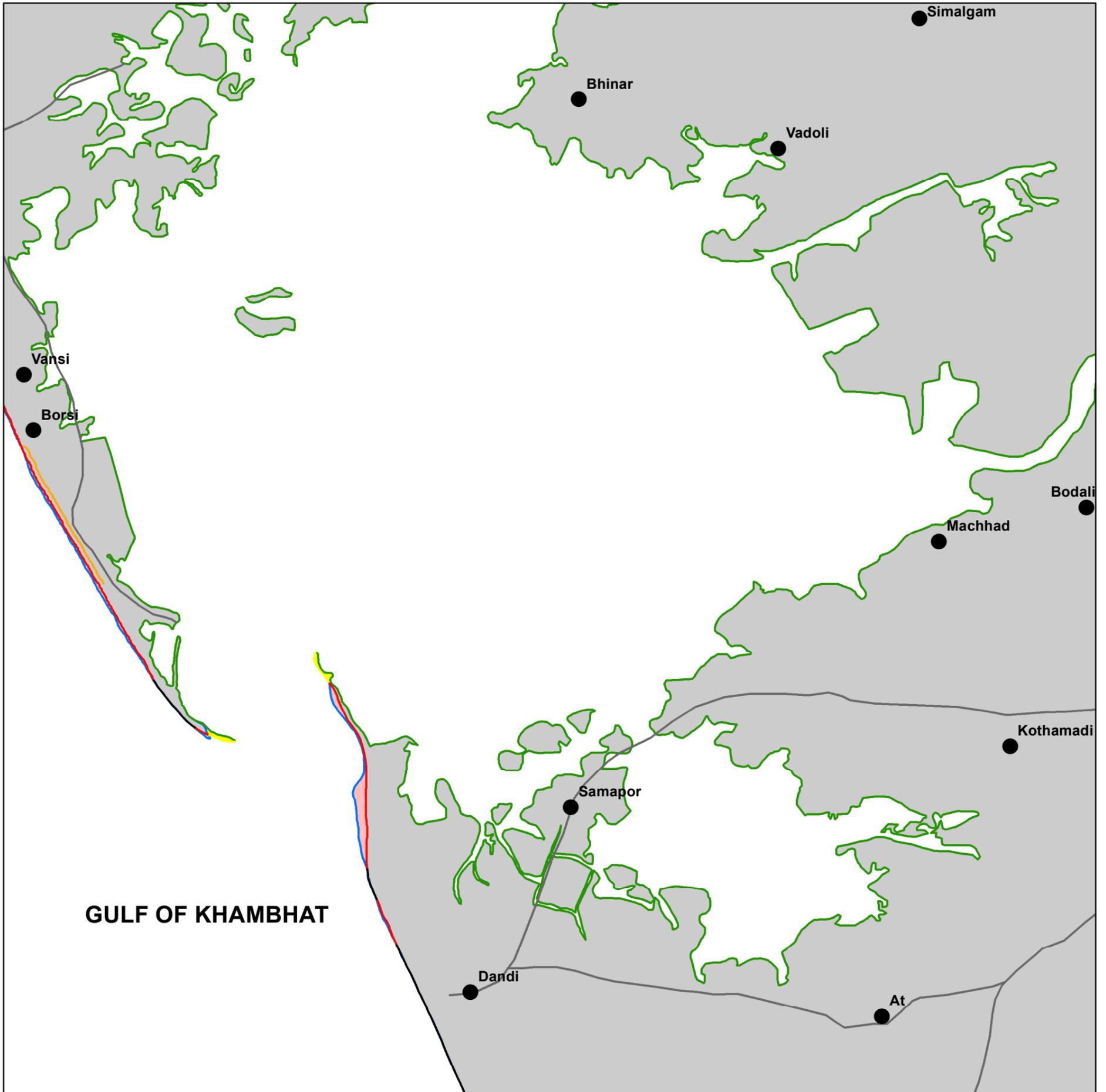
# SHORELINE CHANGE MAP

FOR OFFICIAL USE ONLY

NAVSARI DISTRICT

GUJARAT

SHEET NO. 46D13NW



## Legend

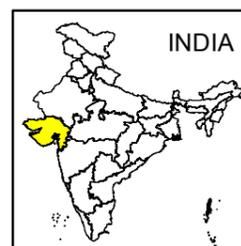
- EROSION
- ACCRETION
- HIGH-TIDE LINE 2014-16
- HIGH-TIDE LINE 2004-06
- STABLE
- ROAD
- SEA WALL
- HABITATION

## INDEX TO SHEETS

46C12SE	46C16SW	46C16SE
46D09NE	46D13NW	46D13NE
SEA	46D13SW	46D13SE



0 2 km



DATA SOURCE:  
IRS LISS4 IMAGES OF 2004-06 & 2014-16

PREPARED BY:  
SPACE APPLICATIONS CENTRE, ISRO, AHMEDABAD  
AND CENTRAL WATER COMMISSION, NEW DELHI



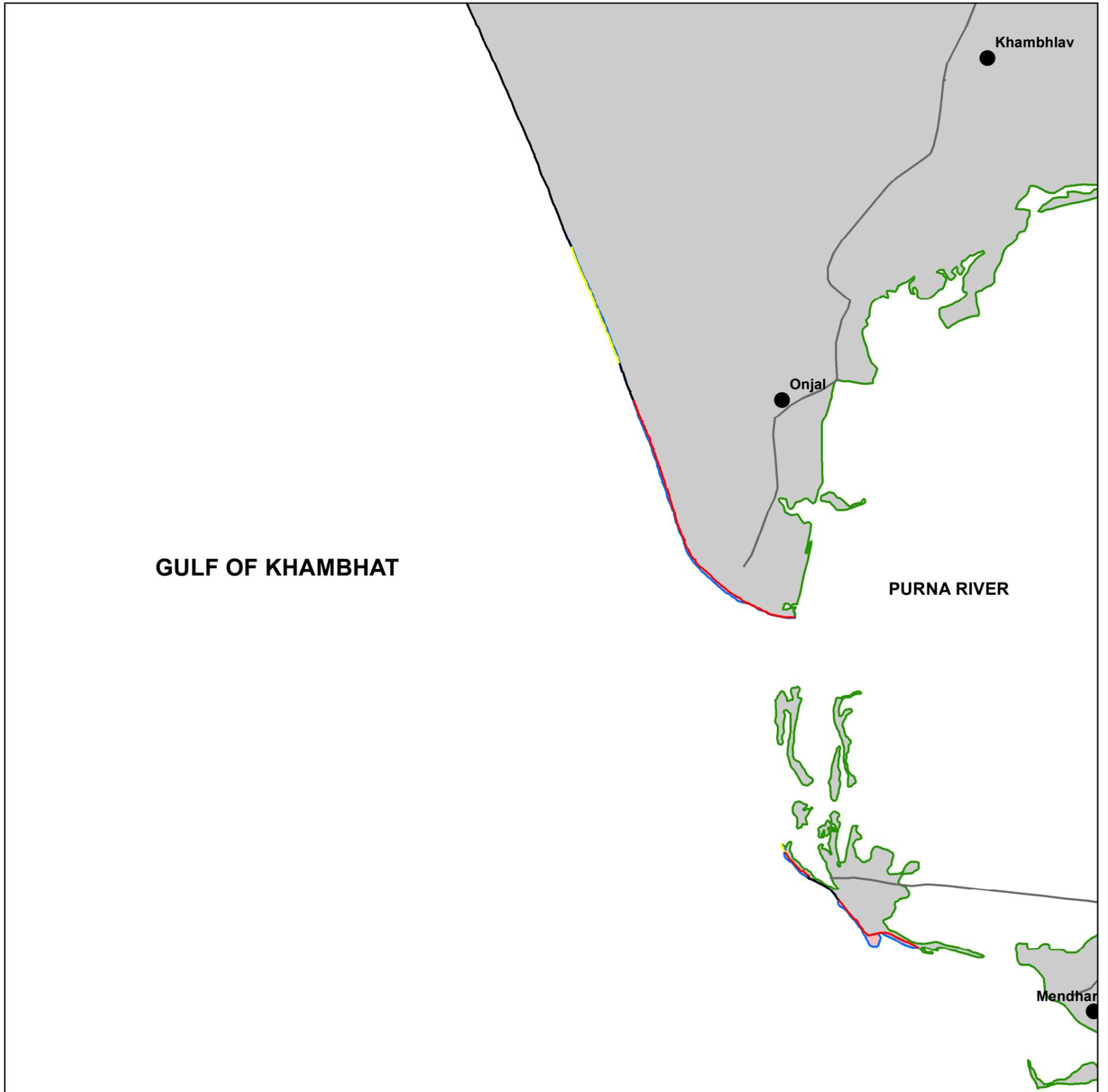
# SHORELINE CHANGE MAP

FOR OFFICIAL USE ONLY

NAVSARI DISTRICT

GUJARAT

SHEET NO. 46D13SW



### Legend

- EROSION
- ACCRETION
- HIGH-TIDE LINE 2014-16
- HIGH-TIDE LINE 2004-06
- STABLE
- ROAD
- HABITATION

### INDEX TO SHEETS

46D09NE	46D13NW	46D13NE
SEA	46D13SW	46D13SE
SEA	46D14NW	46D14NE



0 2 km



DATA SOURCE:  
IRS LISS4 IMAGES OF 2004-06 & 2014-16

PREPARED BY:  
SPACE APPLICATIONS CENTRE, ISRO, AHMEDABAD  
AND CENTRAL WATER COMMISSION, NEW DELHI



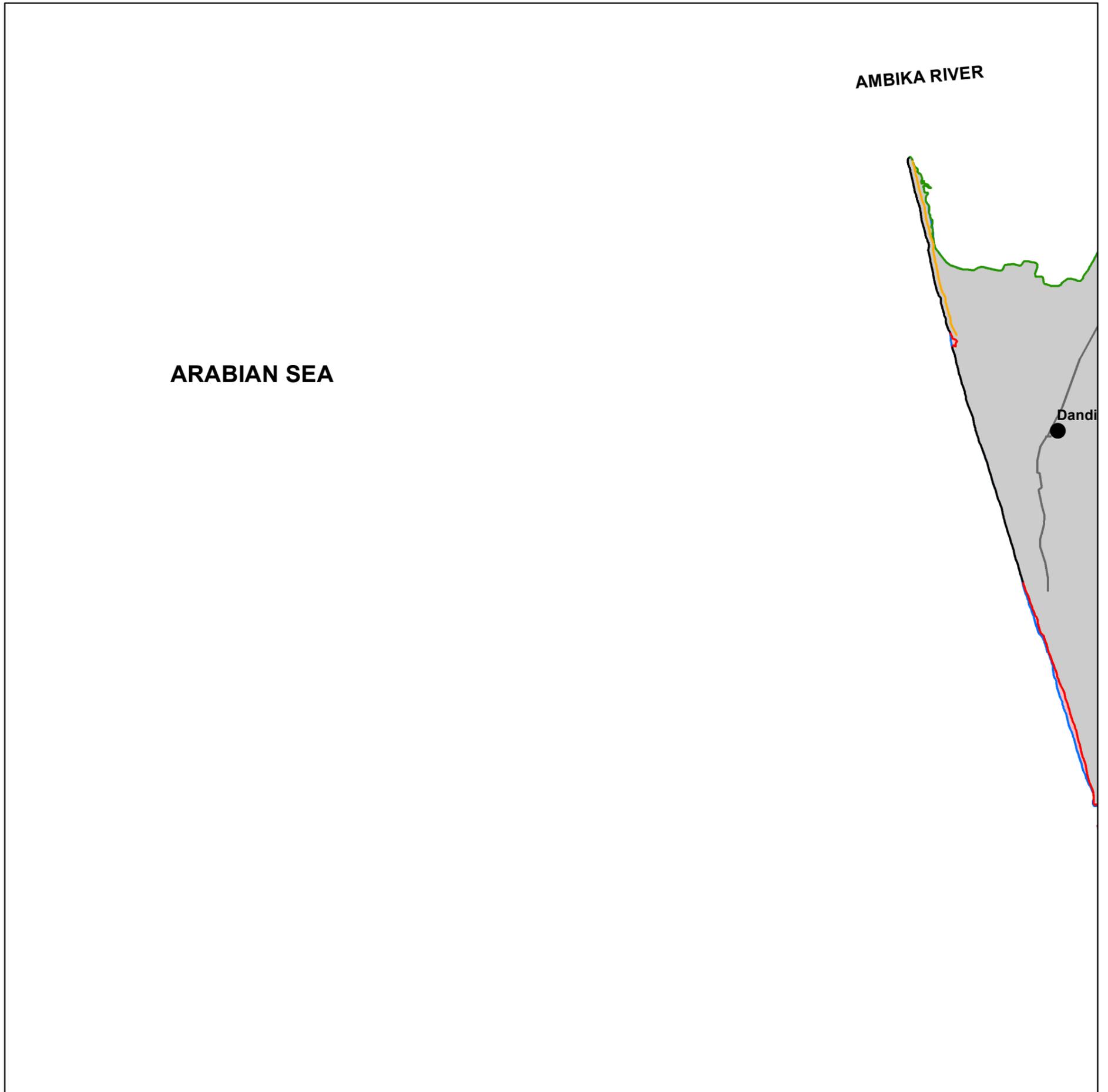
# SHORELINE CHANGE MAP

FOR OFFICIAL USE ONLY

VALSAD DISTRICT

GUJARAT

SHEET NO. 46D14NW

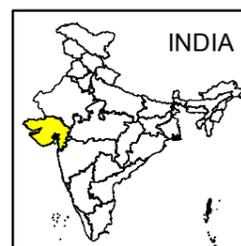


## Legend

-  EROSION
-  HIGH-TIDE LINE 2014-16
-  HIGH-TIDE LINE 2004-06
-  STABLE
-  ROAD
-  SEA WALL
-  HABITATION

## INDEX TO SHEETS

SEA	46D13SW	46D13SE
SEA	46D14NW	46D14NE
SEA	SEA	46D14SE



DATA SOURCE:  
IRS LISS4 IMAGES OF 2004-06 & 2014-16

PREPARED BY:  
SPACE APPLICATIONS CENTRE, ISRO, AHMEDABAD  
AND CENTRAL WATER COMMISSION, NEW DELHI



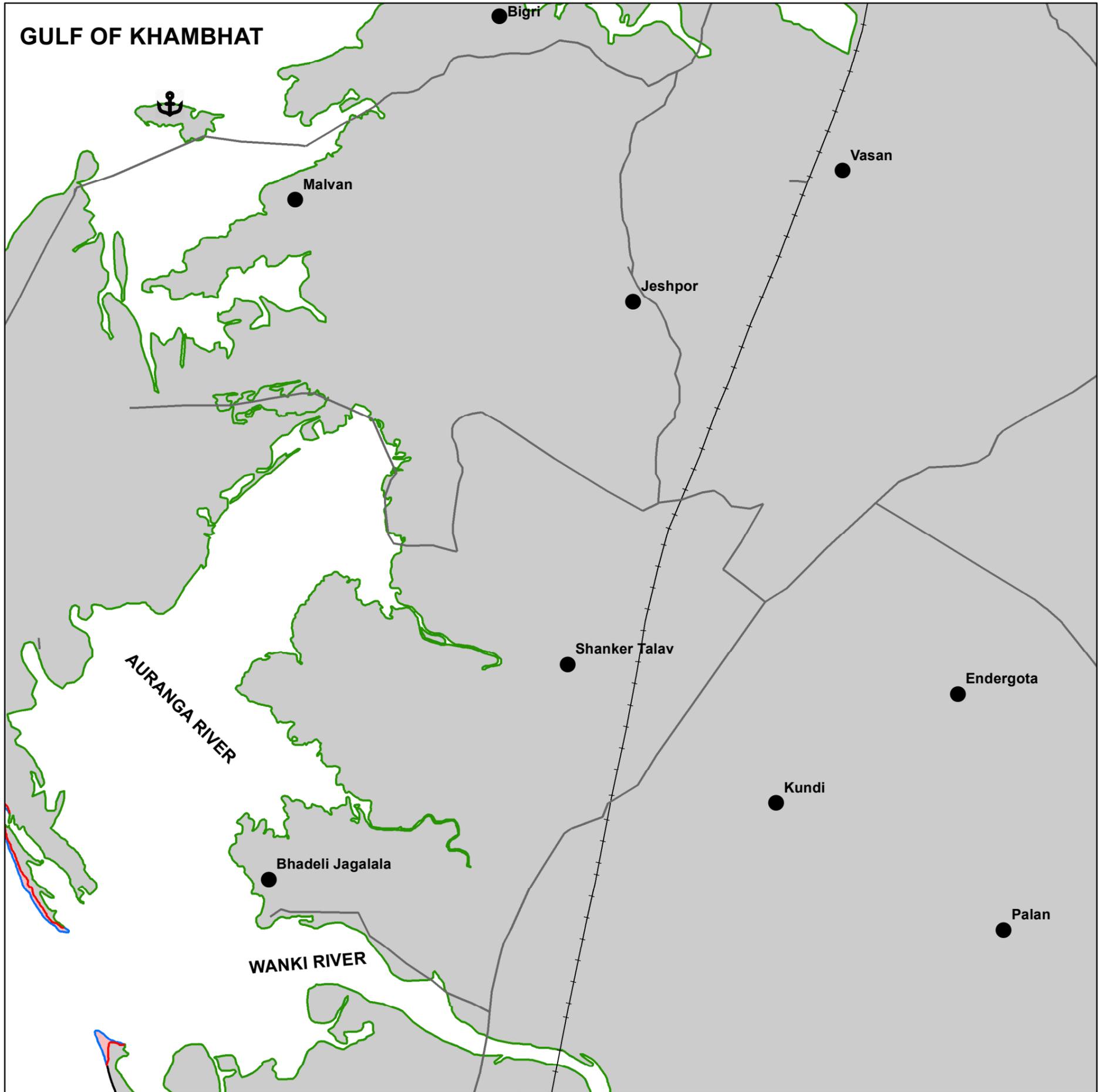
# SHORELINE CHANGE MAP

FOR OFFICIAL USE ONLY

VALSAD DISTRICT

GUJARAT

SHEET NO. 46D14NE



### Legend

-  EROSION
-  HIGH-TIDE LINE 2014-16
-  HIGH-TIDE LINE 2004-06
-  STABLE
-  ROAD
-  RAILWAY
-  PORT/HARBOUR
-  HABITATION

### INDEX TO SHEETS

46D13SW	46D13SE	46H01SW
46D14NW	46D14NE	46H02NW
SEA	46D14SE	46H02SW



DATA SOURCE:  
IRS LISS4 IMAGES OF 2004-06 & 2014-16

PREPARED BY:  
SPACE APPLICATIONS CENTRE, ISRO, AHMEDABAD  
AND CENTRAL WATER COMMISSION, NEW DELHI



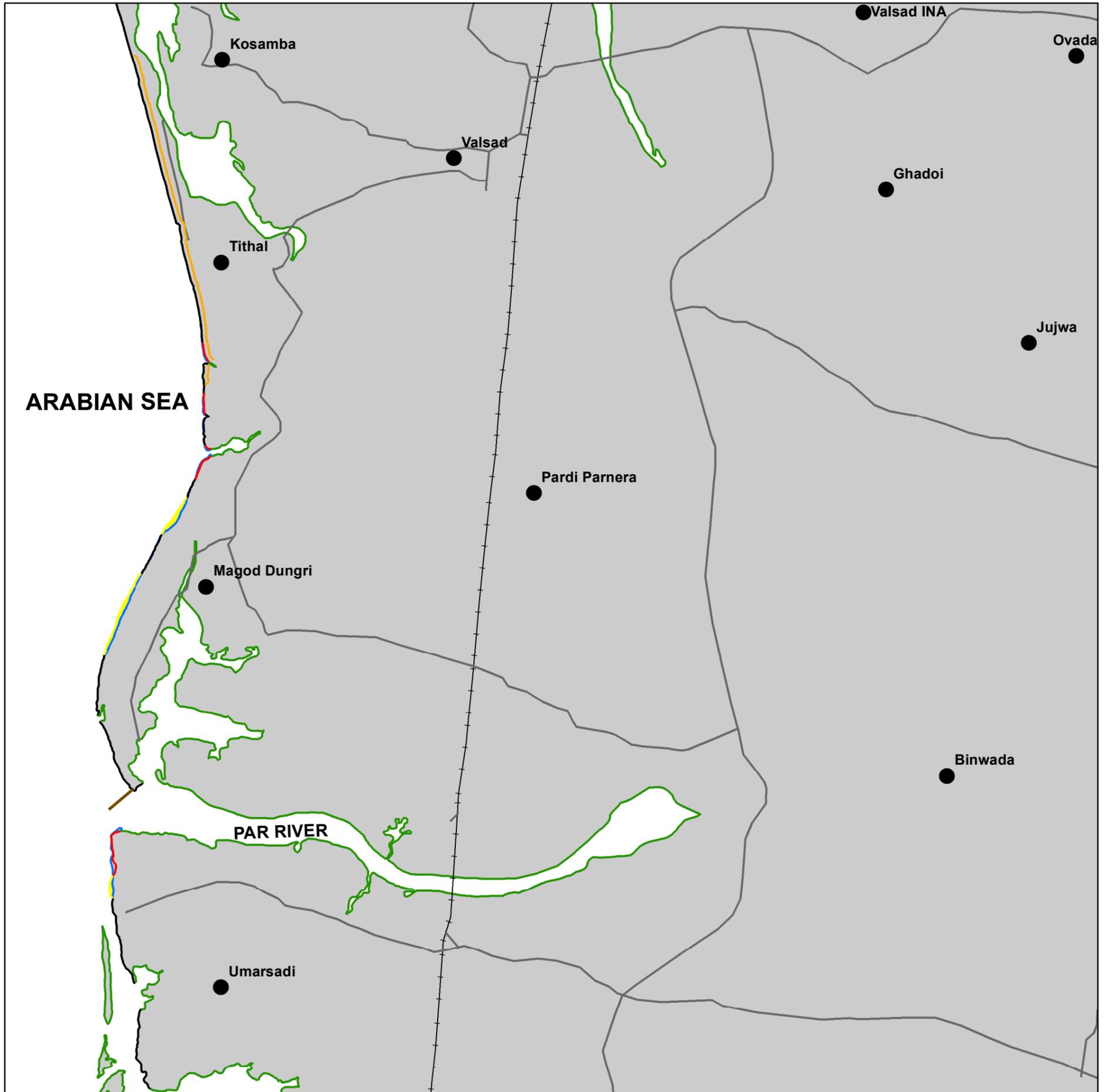
# SHORELINE CHANGE MAP

FOR OFFICIAL USE ONLY

VALSAD DISTRICT

GUJARAT

SHEET NO. 46D14SE



### Legend

- EROSION
- ACCRETION
- HIGH-TIDE LINE 2014-16
- HIGH-TIDE LINE 2004-06
- STABLE
- ROAD
- RAILWAY
- JETTY
- SEA WALL
- HABITATION

### INDEX TO SHEETS

46D14NW	46D14NE	46H02NW
SEA	46D14SE	46H02SW
46D15NW	46D15NE	46H03NW



0 2 km



DATA SOURCE:  
IRS LISS4 IMAGES OF 2004-06 & 2014-16

PREPARED BY:  
SPACE APPLICATIONS CENTRE, ISRO, AHMEDABAD  
AND CENTRAL WATER COMMISSION, NEW DELHI



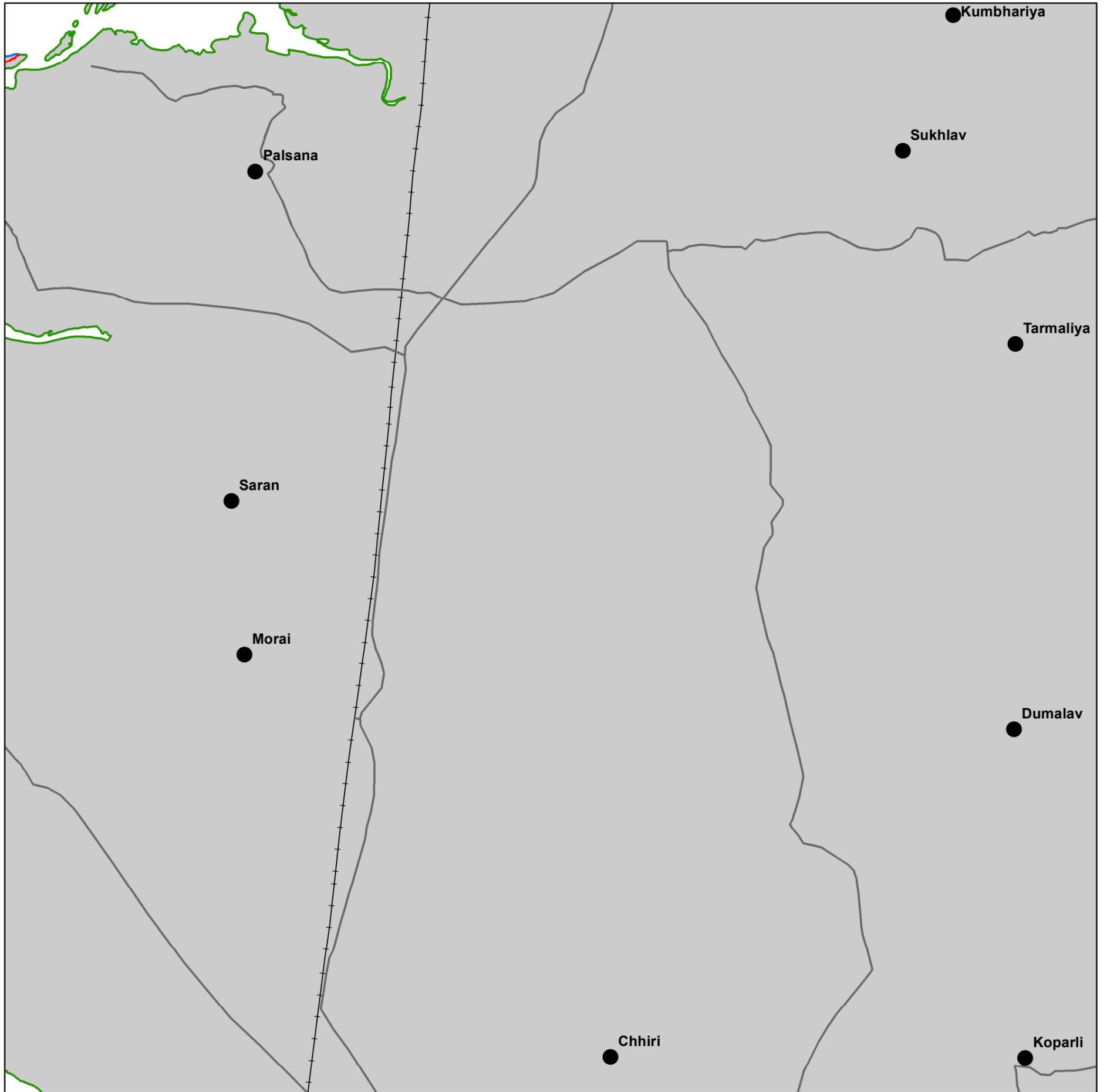
# SHORELINE CHANGE MAP

FOR OFFICIAL USE ONLY

VALSAD DISTRICT

GUJARAT

SHEET NO. 46D15NE



### Legend

- EROSION
- HIGH-TIDE LINE 2014-16
- HIGH-TIDE LINE 2004-06
- STABLE
- ROAD
- RAILWAY
- HABITATION

### INDEX TO SHEETS

SEA	46D14SE	46H02SW
46D15NW	46D15NE	46H03NW
46D15SW	46D15SE	46H03SW



DATA SOURCE:  
IRS LISS4 IMAGES OF 2004-06 & 2014-16

PREPARED BY:  
SPACE APPLICATIONS CENTRE, ISRO, AHMEDABAD  
AND CENTRAL WATER COMMISSION, NEW DELHI

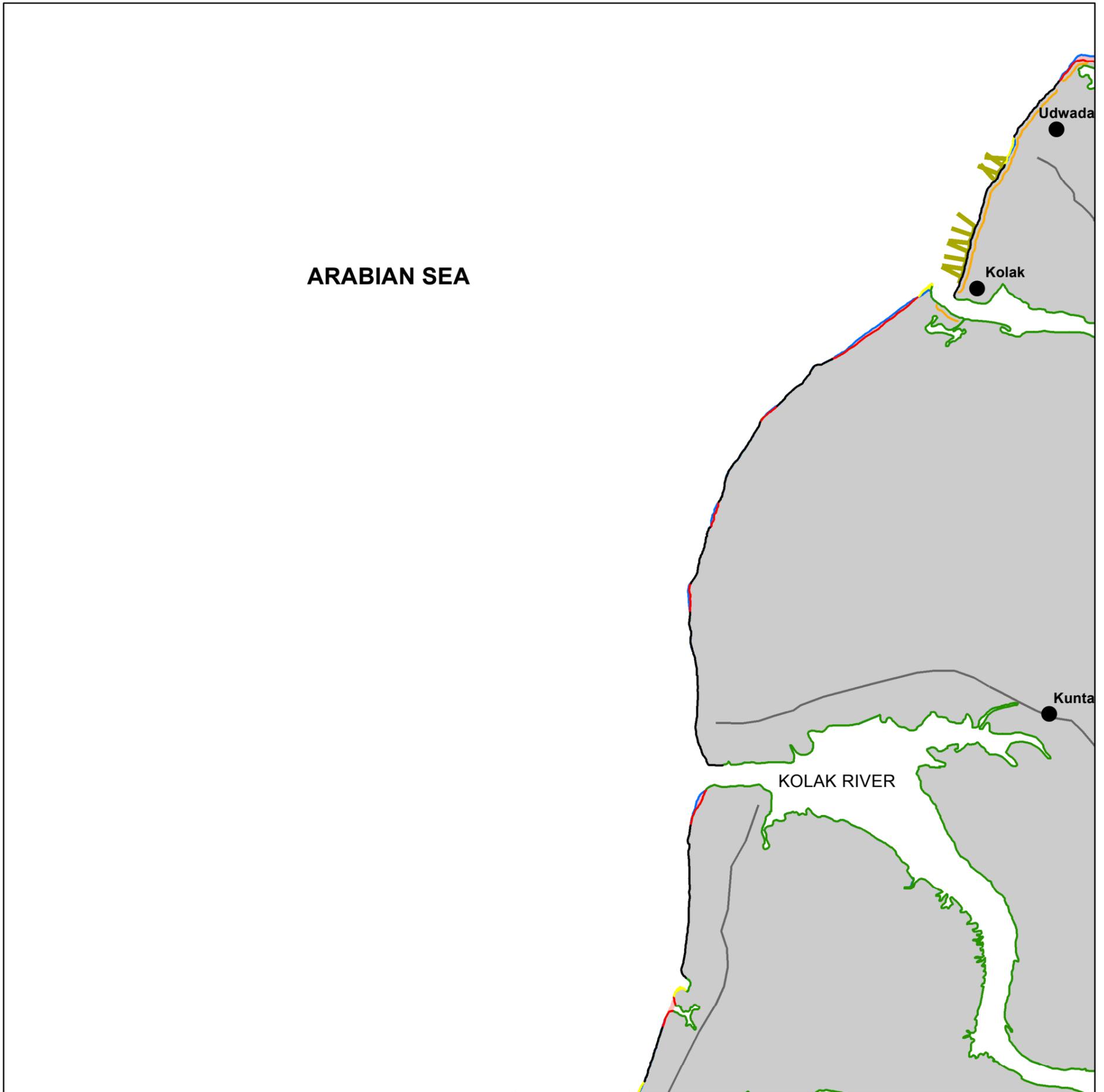


# SHORELINE CHANGE MAP

DAMAN  
VALSAD DISTRICT

GUJARAT AND DAMAN & DIU

FOR OFFICIAL USE ONLY  
SHEET NO. 46D15NW



## Legend

- EROSION
- ACCRETION
- HIGH-TIDE LINE 2014-16
- HIGH-TIDE LINE 2004-06
- STABLE
- ROAD
- SEA WALL
- GROYNES
- HABITATION

## INDEX TO SHEETS

SEA	SEA	46D14SE
SEA	46D15NW	46D15NE
46D11SE	46D15SW	46D15SE



DATA SOURCE:  
IRS LISS4 IMAGES OF 2004-06 & 2014-16

PREPARED BY:  
SPACE APPLICATIONS CENTRE, ISRO, AHMEDABAD  
AND CENTRAL WATER COMMISSION, NEW DELHI

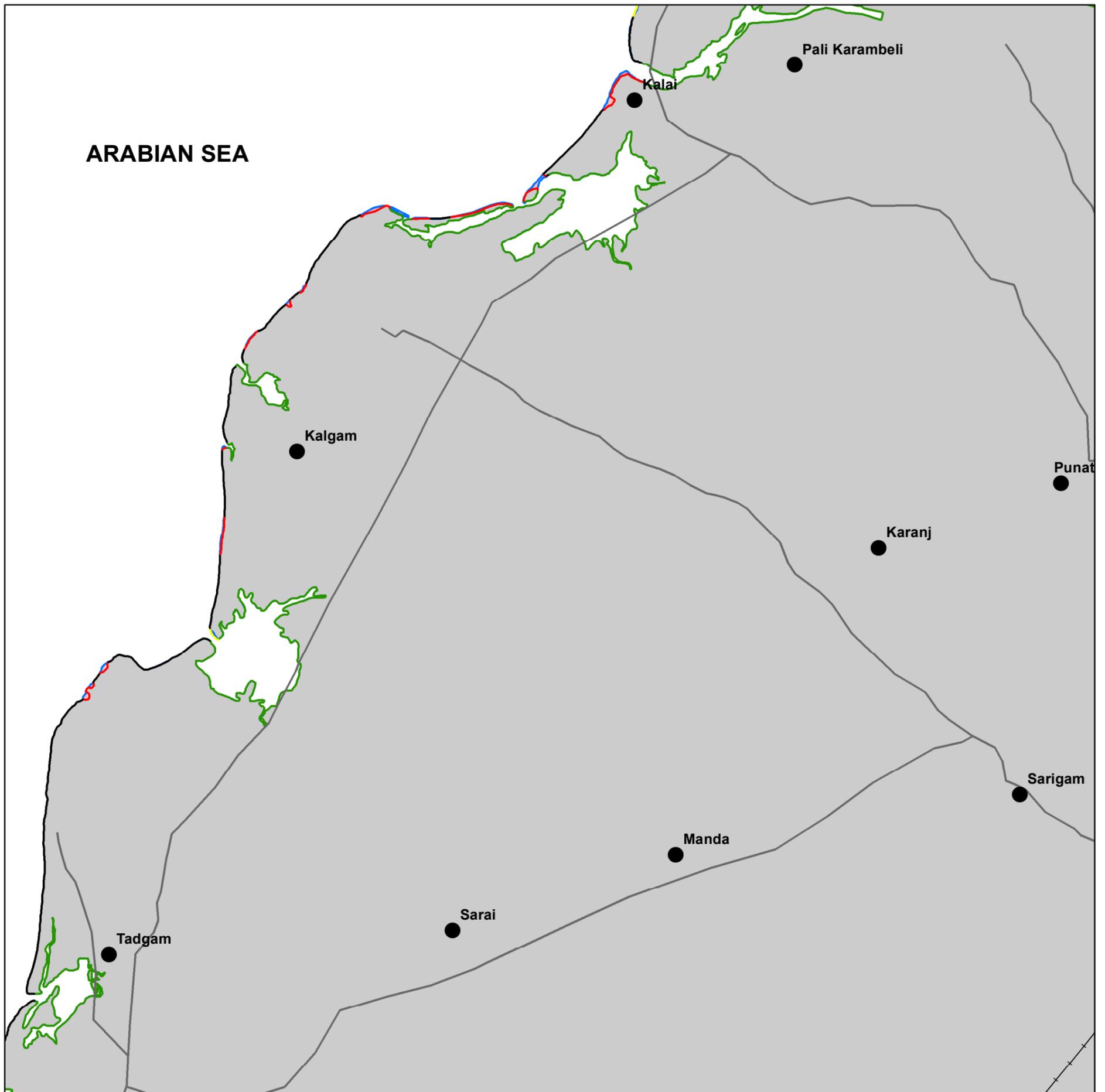


# SHORELINE CHANGE MAP

DAMAN/  
VALSAD DISTRICT

GUJARAT AND DAMAN & DIU

FOR OFFICIAL USE ONLY  
SHEET NO. 46D15SW



## Legend

- EROSION
- ACCRETION
- HIGH-TIDE LINE 2014-16
- HIGH-TIDE LINE 2004-06
- STABLE
- ROAD
- RAILWAY
- HABITATION

## INDEX TO SHEETS

SEA	46D15NW	46D15NE
46D11SE	46D15SW	46D15SE
46D12NE	46D16NW	46D16NE



DATA SOURCE:  
IRS LISS4 IMAGES OF 2004-06 & 2014-16

PREPARED BY:  
SPACE APPLICATIONS CENTRE, ISRO, AHMEDABAD  
AND CENTRAL WATER COMMISSION, NEW DELHI



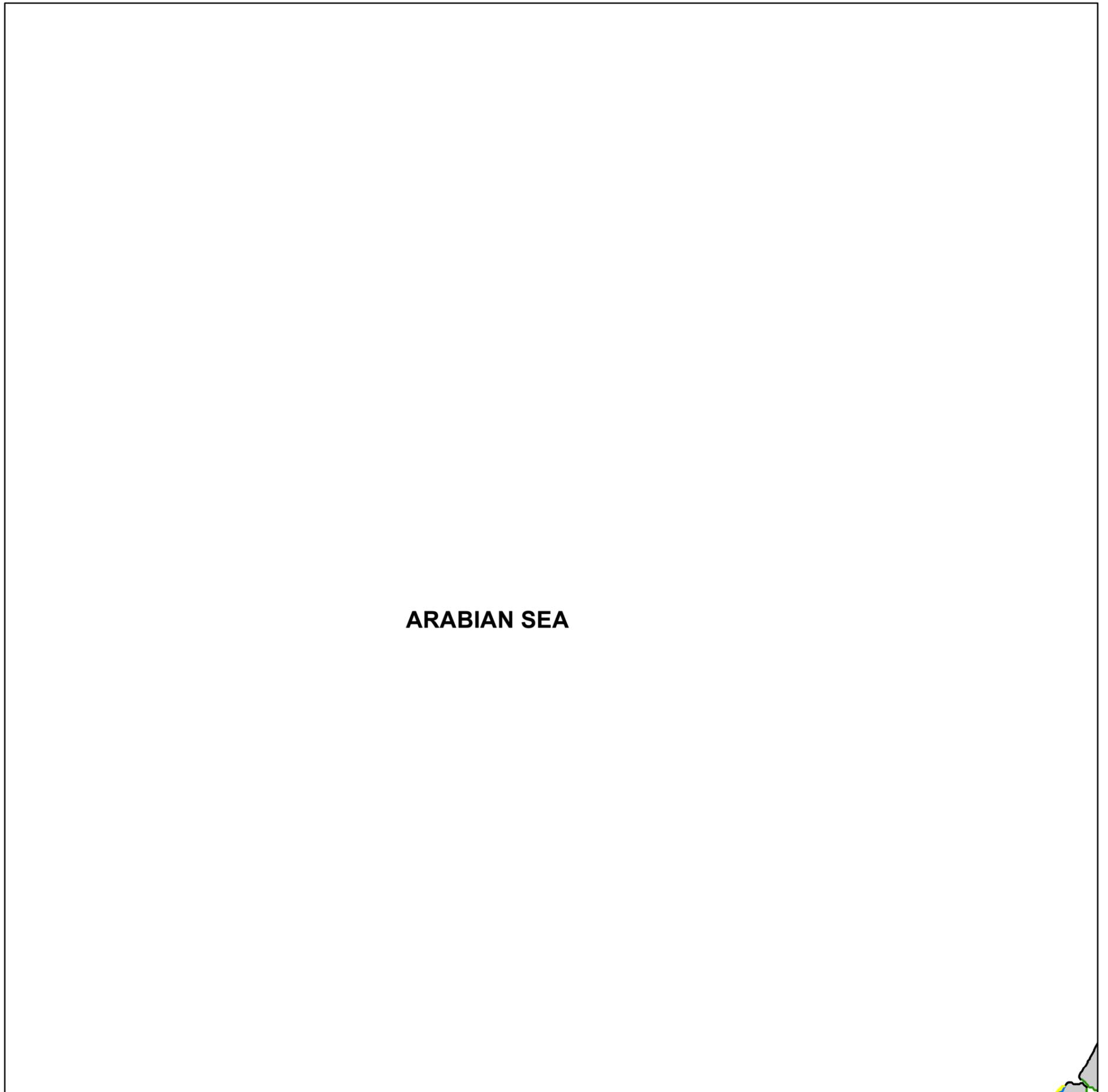
# SHORELINE CHANGE MAP

FOR OFFICIAL USE ONLY

VALSAD DISTRICT

GUJARAT

SHEET NO. 46D11SE

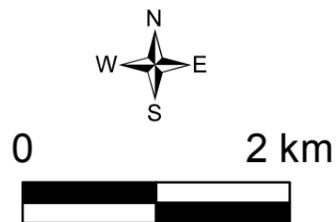


### Legend

-  ACCRETION
-  HIGH-TIDE LINE 2014-16
-  HIGH-TIDE LINE 2004-06
-  STABLE

### INDEX TO SHEETS

SEA	SEA	46D15NW
SEA	46D11SE	46D15SW
SEA	46D12NE	46D16NW



DATA SOURCE:  
IRS LISS4 IMAGES OF 2004-06 & 2014-16

PREPARED BY:  
SPACE APPLICATIONS CENTRE, ISRO, AHMEDABAD  
AND CENTRAL WATER COMMISSION, NEW DELHI



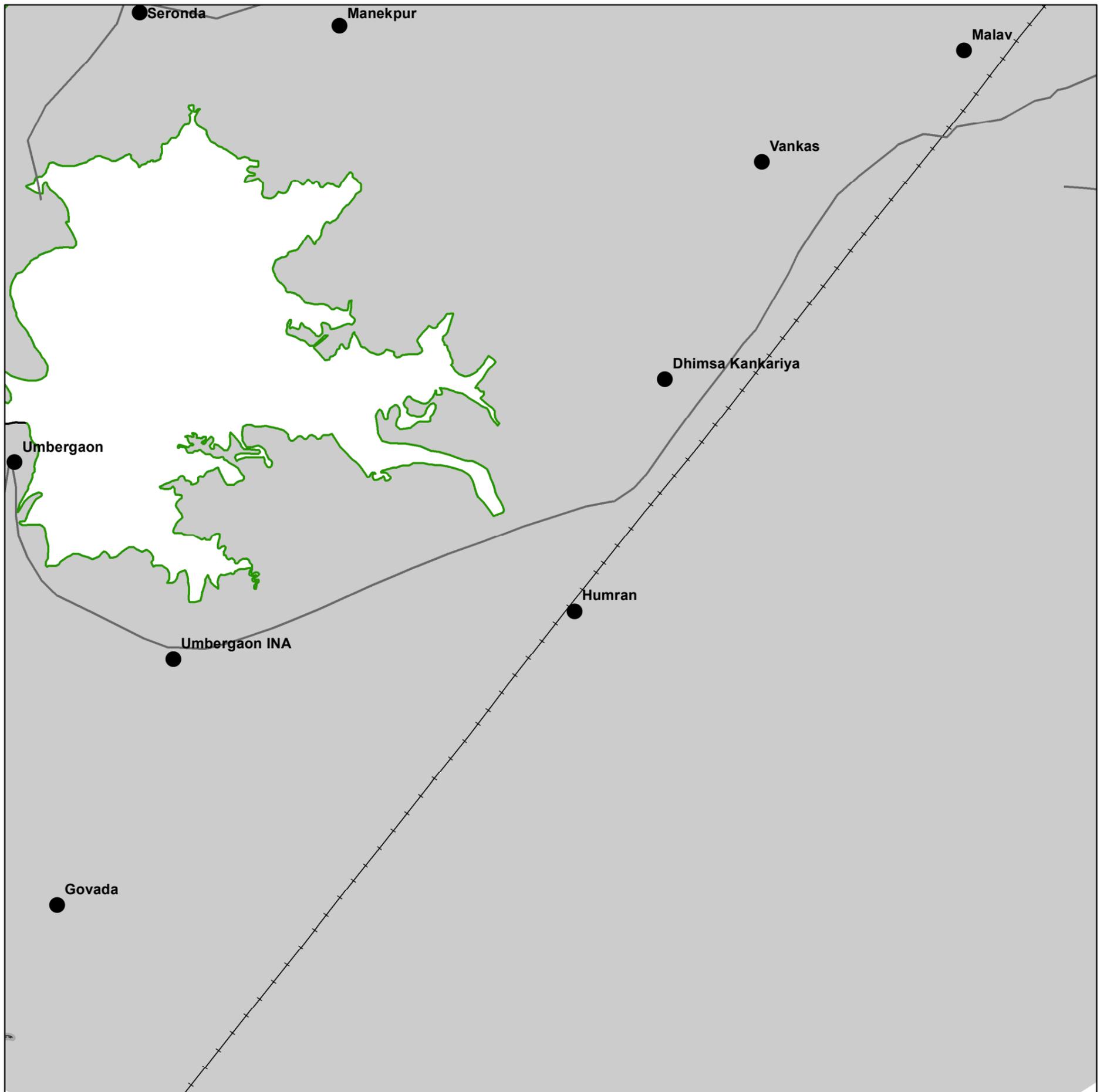
# SHORELINE CHANGE MAP

FOR OFFICIAL USE ONLY

VALSAD DISTRICT

GUJARAT

SHEET NO. 46D16NW



## Legend

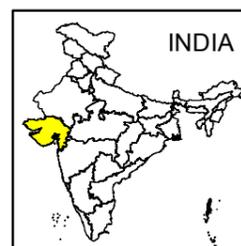
- HIGH-TIDE LINE 2014-16
- HIGH-TIDE LINE 2004-06
- STABLE
- ROAD
- +— RAILWAY
- HABITATION

## INDEX TO SHEETS

46D11SE	46D15SW	46D15SE
46D12NE	46D16NW	46D16NE
46D12SE	46D16SW	46D16SE



0 2 km



DATA SOURCE:  
IRS LISS4 IMAGES OF 2004-06 & 2014-16

PREPARED BY:  
SPACE APPLICATIONS CENTRE, ISRO, AHMEDABAD  
AND CENTRAL WATER COMMISSION, NEW DELHI



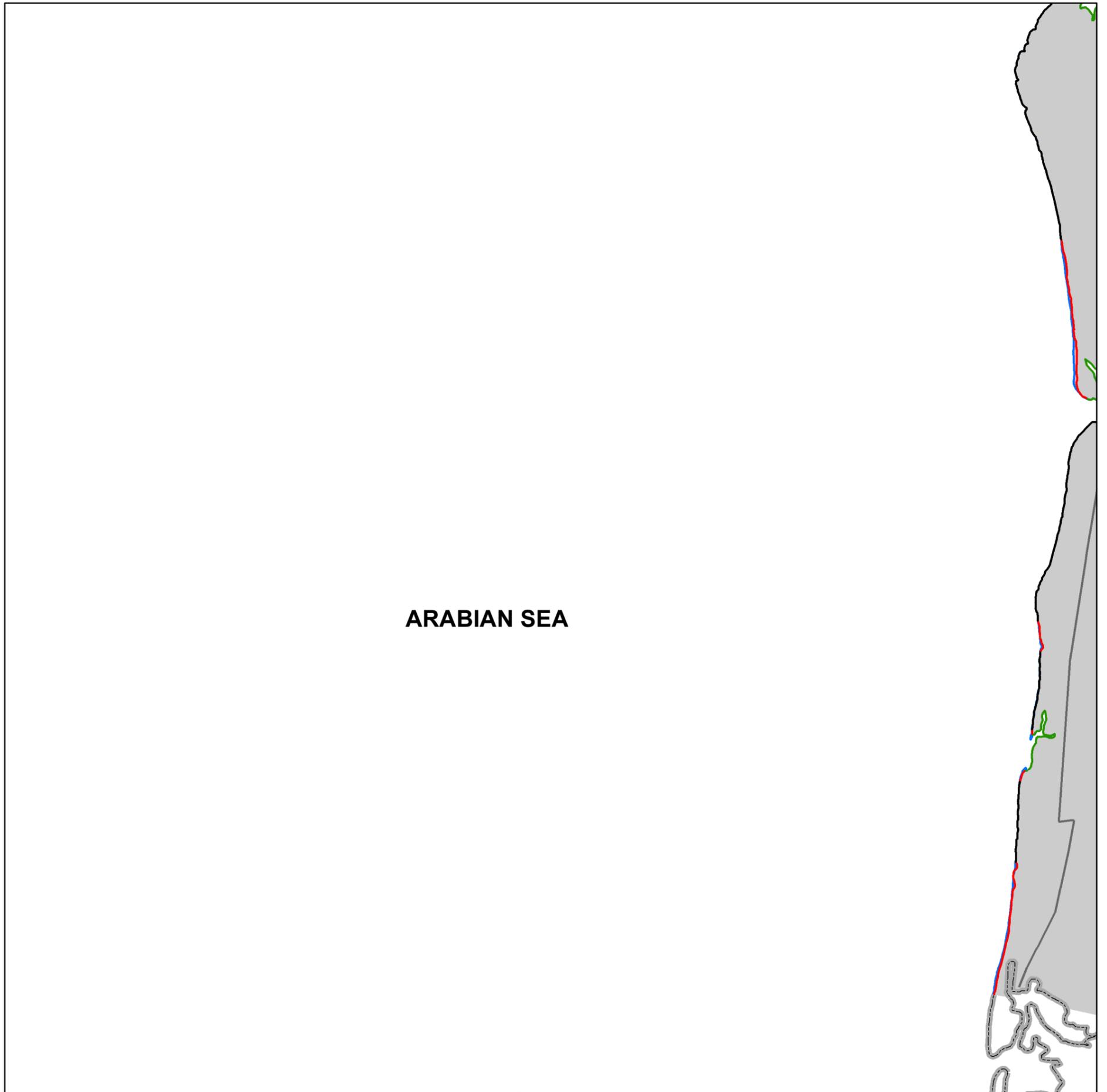
# SHORELINE CHANGE MAP

FOR OFFICIAL USE ONLY

VALSAD DISTRICT

GUJARAT

SHEET NO. 46D12NE



ARABIAN SEA

## Legend

- ACCRETION
- EROSION
- HIGH-TIDE LINE 2014-16
- HIGH-TIDE LINE 2004-06
- STABLE
- ROAD

## INDEX TO SHEETS

SEA	46D11SE	46D15SW
SEA	46D12NE	46D16NW
SEA	46D12SE	46D16SW



0 2 km



DATA SOURCE:  
IRS LISS4 IMAGES OF 2004-06 & 2014-16

PREPARED BY:  
SPACE APPLICATIONS CENTRE, ISRO, AHMEDABAD  
AND CENTRAL WATER COMMISSION, NEW DELHI



# **HOT SPOTS OF SHORELINE CHANGE**

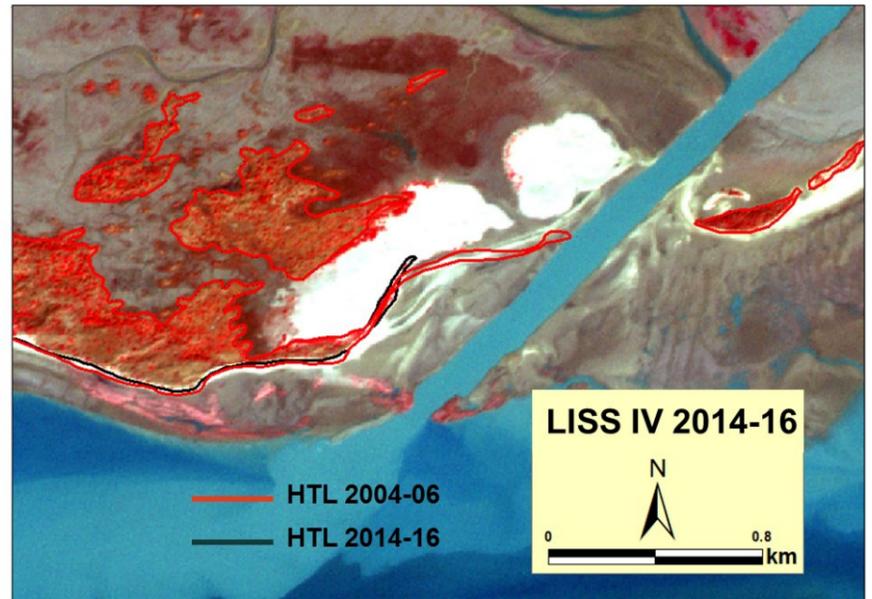
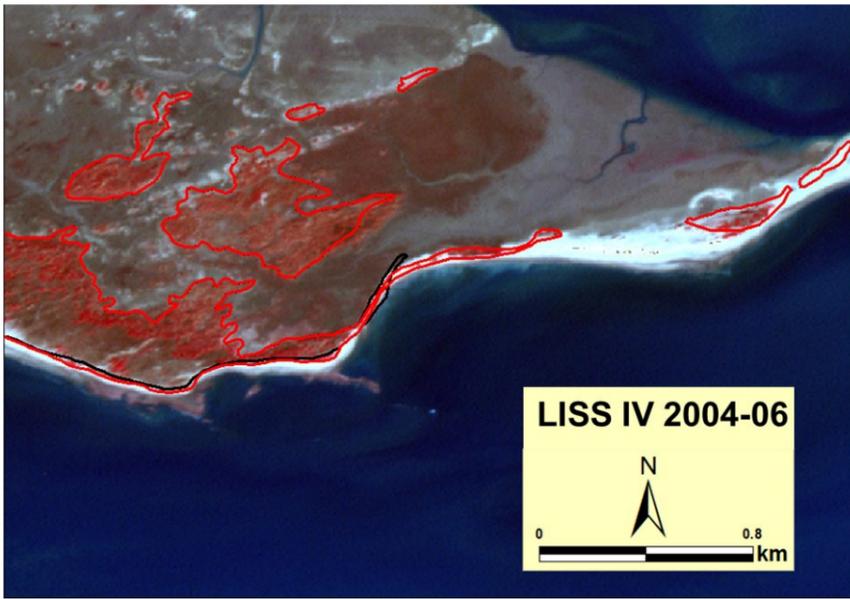


Plate 1: Shoreline change at Nana Bhadiya (41F05SE) marked on LISS IV images of IRS P6 and Resourcesat-2

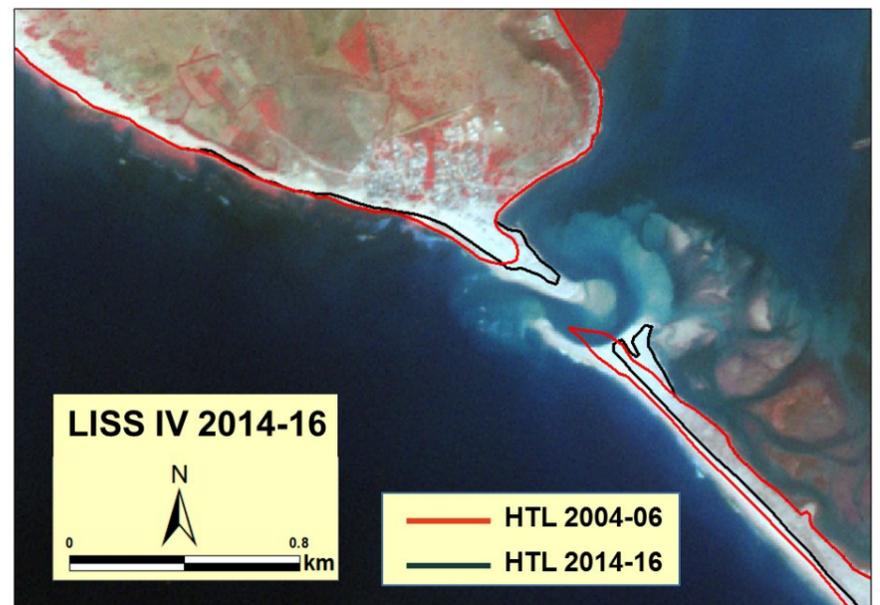
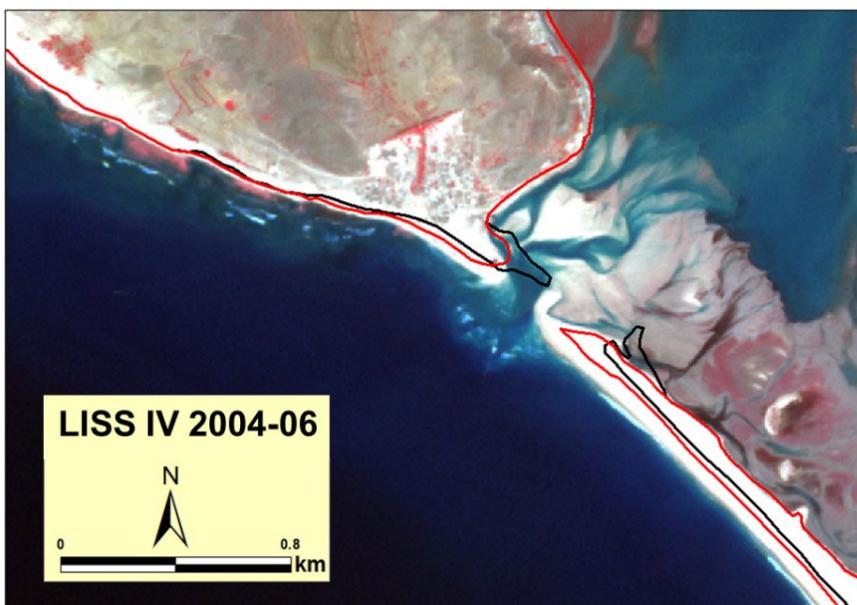


Plate 2: Shoreline changes along the spit near Ghandvi (41G05SW) marked on LISS IV images of IRS P6 and Resourcesat-2

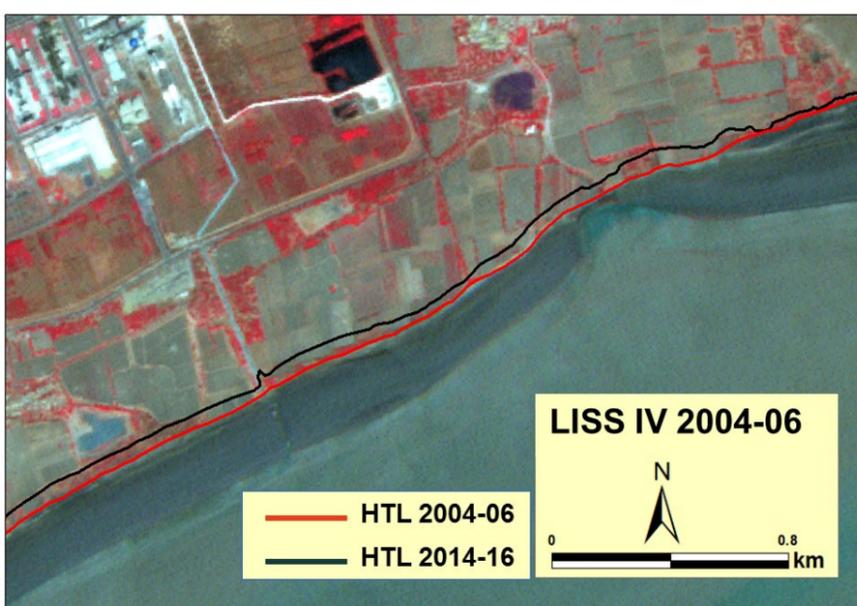


Plate 3: Coastal erosion to the northern bank of Narmada River at Ambheta (46C10NW) marked on LISS IV images of IRS P6 and Resourcesat-2

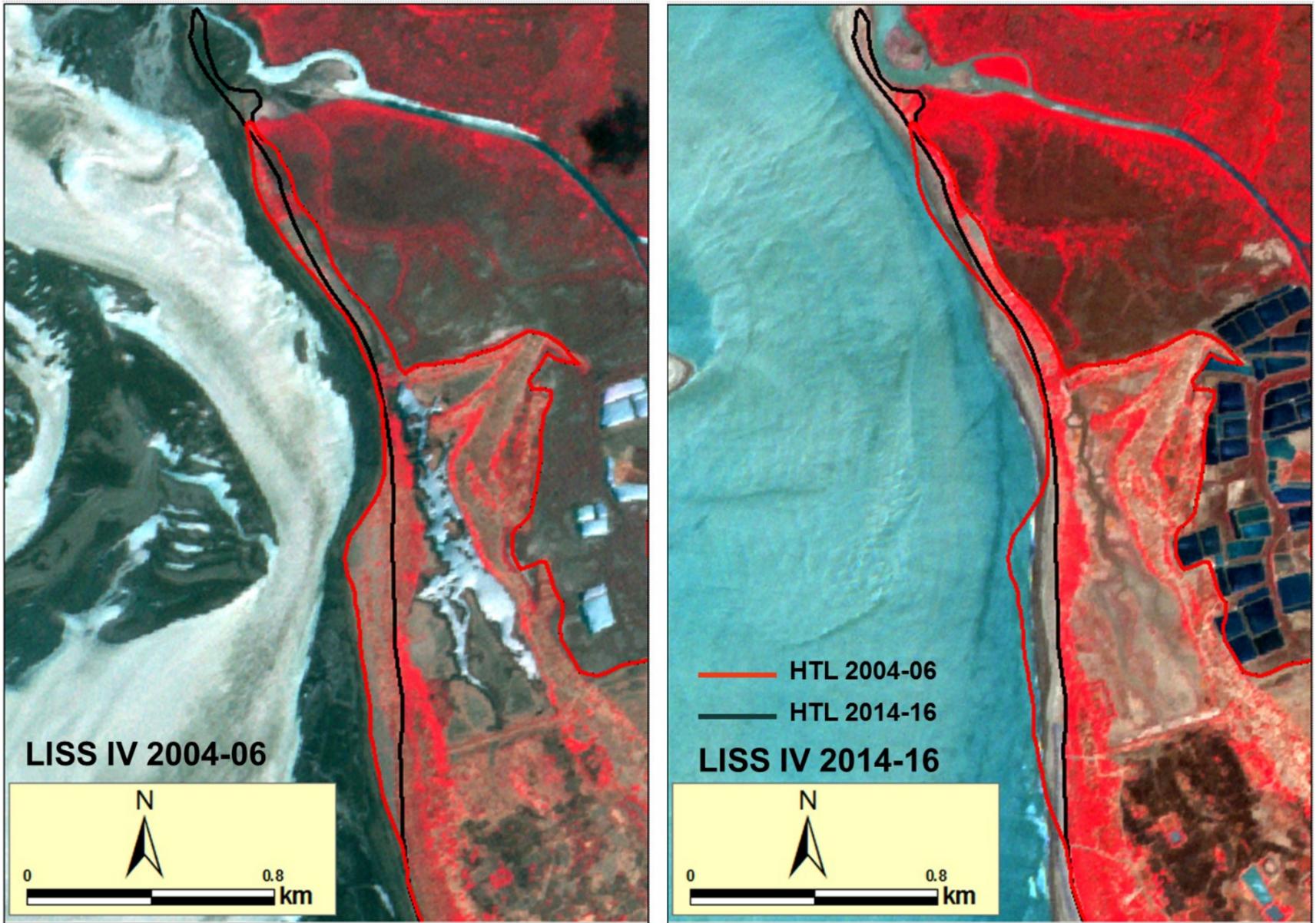


Plate 4: Coastal erosion to the north of Dandi (46D13NW) marked on LISS IV images of IRS P6 and Resourcesat-2

# **LIST OF SATELLITE DATA USED**

Table No. 2: Satellite data used for Gujarat, Daman and Diu Coast (2004-06 time-frame)

S NO	MAPSHEET NO.	SATELLITE	SENSOR	ORBIT NO.	SEGMENT	STRIP	SCENE NO.	DATE OF PASS
1	41E17	IRS-P6	LISS IV	10402 10402 10402	2	2	68 70 71	18-10-05 18-10-05 18-10-05
2	41F13	IRS-P6	LISS IV	11709 11709	2	2	73 74	18-01-06 18-01-06
3	41I03	IRS-P6	LISS IV	10402 11709	2	2	67 71	18-10-05 18-01-06
4	41I04	IRS-P6	LISS IV	10402 11709	2	2	70 73	18-10-05 18-01-06
5	41I08	IRS-P6	LISS IV	10402	2	2	70	18-10-2005
6	41I12	IRS-P6	LISS IV	10274 11226 11226	2	2 1 1	74 94 95	09-10-05 15-12-05 15-12-05
7	41J01	IRS-P6	LISS IV	10402 10402 11709	2	2	70 71 74	18-10-05 18-10-05 18-01-06
8	41J05	IRS-P6	LISS IV	11226 11226	2	1	95 96	15-12-05 15-12-05
9	41I16	IRS-P6	LISS IV	10274 10274	2	2	73 74	09-10-05 09-10-05
10	41J13	IRS-P6	LISS IV	10416	2	2	79	19-10-2005
11	41I15	IRS-P6	LISS IV	10274 10274	2	2	72 73	09-10-05 09-10-05
12	41M03	IRS-P6	LISS IV	10274 10274	2	2	72 73	09-10-2005
13	41M04	IRS-P6	LISS IV	10274 10274	2	2	73 74	09-10-05 09-10-05
14	41A06	IRS-P6	LISS IV	11439 11439	2	1	97 98	30-12-05 30-12-05
15	41A05	IRS-P6	LISS IV	11439 11439 11439	2	1	96 97 98	30-12-05 30-12-05 30-12-05
16	41I11	IRS-P6	LISS IV	11226	2	1	94	15-12-2005
17	41N02	IRS-P6	LISS IV	10416	2	2	80	19-10-2005
18	41F09	IRS-P6	LISS IV	10402	2	2	71	18-10-2005
19	41F10	IRS-P6	LISS IV	10402 10402	2	2	71 72	18-10-05 18-10-05
20	41J09	IRS-P6	LISS IV	11226 11226	2	1	95 96	15-12-05 15-12-05
21	41J06	IRS-P6	LISS IV	11226	2	1	96	15-12-2005
22	41J10	IRS-P6	LISS IV	11226	2	1	96	15-12-2005

23	41M02	IRS-P6	LISS IV	10274 10274 10416 10416	2	2	71 72 75 77	09-10-05 09-10-05 19-10-05 19-10-05
24	41E15	IRS-P6	LISS IV	10402 10473	2	2	67 61	18-10-05 23-10-05
25	41F14	IRS-P6	LISS IV	10402 10402 11709 11709	2	2	71 72 74 75	18-10-05 18-10-05 18-01-06 18-01-06
26	41A02	IRS-P6	LISS IV	11709 11709 11354 11439	2	2 1 1 1	76 89 98 87	18-01-06 24-12-05 30-12-05 24-12-05
27	41A01	IRS-P6	LISS IV	11354 11354 11139 11439	2	1	88 89 96 98	24-12-05 24-12-05 30-12-05 30-12-05
28	41F14	IRS-P6	LISS IV	10402 10402 11709 11709	2	2	71 72 74 75	18-10-05 18-10-05 18-01-06 18-01-06
29	41F15	IRS-P6	LISS IV	11709 10402 10473 11709	2	2	76 72 68 76	18-01-06 18-10-05 23-10-05 18-01-06
30	41J03	IRS-P6	LISS IV	11709 11709	2	22	75 76	18-01-06 18-01-06
31	41J02	IRS-P6	LISS IV	10402 11709 11709 11709	2	2222	71 74 75 76	18-10-05 18-01-06 18-01-06 18-01-06
32	41J01	IRS-P6	LISS IV	10402	2	2	70	18-10-2005
33	41J13	IRS-P6	LISS IV	10416	2	2	79	19-10-2005
34	41J06	IRS-P6	LISS IV	11226	2	1	96	15-12-2005
35	41J05	IRS-P6	LISS IV	11226 11226	2	11	95 96	15-12-05 15-12-05
36	41F10	IRS-P6	LISS IV	10402 10402	2	2 1	71 72	18-10-05 18-10-05
37	41F11	IRS-P6	LISS IV	10473 10473	2	2	67 68	23-10-05 23-10-05
38	41F12	IRS-P6	LISS IV	10473	2	2	68	23-10-2005
39	46C05	IRS-P6	LISS IV	11510 11510 10487	2	2	98 99 85	04-01-06 04-01-06 24-10-05
40	46B08	IRS-P6	LISS IV	10487 10885 11510 11510	2	2	82 72 97 98	24-10-05 21-11-05 04-01-06 04-01-06
41	46B11	IRS-P6	LISS IV	10615 10487	2	2	54 82	02-11-05 24-10-05

42	46B12	IRS-P6	LISS IV	10487	2	2	83	24-10-2005
43	46B15	IRS-P6	LISS IV	10615	2	3	54	02-11-2005
44	46B16	IRS-P6	LISS IV	10615	2	3	54	02-11-2005
45	46C13	IRS-P6	LISS IV	10956	2	3	56	26-11-2005
46	46C15	IRS-P6	LISS IV	10956 10956	2	3	59 57	26-11-05 26-11-05
47	46C16	IRS-P6	LISS IV	10629 10956 10956 10956	2	3	59 58 59 60	03-11-05 26-11-05 26-11-05 26-11-05
48	46F03	IRS-P6	LISS IV	10956	2	3	54	26-11-2005
49	46F04	IRS-P6	LISS IV	10956	2	3	55	26-11-2005
50	46G01	IRS-P6	LISS IV	10956	2	3	55	26-11-2005
51	46C15	IRS-P6	LISS IV	10956	2	3	59	26-11-2005
52	46C16	IRS-P6	LISS IV	10629 10956 10956 10956	2	3	59 58 59 60	03-11-05 26-11-05 26-11-05 26-11-05
53	46D10	IRS-P6	LISS IV	10629	2	3	61	03-11-2005
54	46D13	IRS-P6	LISS IV	10629	2	3	59	03-11-2005
55	46D14	IRS-P6	LISS IV	10629	2	3	61	03-11-2005
56	46H01	IRS-P6	LISS IV	10629	2	3	59	03-11-2005
57	46H04	IRS-P6	LISS IV	10757	2	3	63	12-11-2005
58	41O16	IRS-P6	LISS IV	11969 11510 11510	2	2	88 101 102	11-12-05 04-01-06 04-01-06
59	41N16	IRS-P6	LISS IV	10828	2	2	82	17-11-2005
60	41O12	IRS-P6	LISS IV	10885	2	2	78	21-11-2005
61	41O13	IRS-P6	LISS IV	10885	2	2	74	21-11-2005
62	41P01	IRS-P6	LISS IV	10203	2	2	80	04-10-2005
63	41P02	IRS-P6	LISS IV	10203	2	2	80	04-10-2005
64	41P05	IRS-P6	LISS IV	10203 10686	2	2	80 86	04-11-05 07-11-05
65	41P09	IRS-P6	LISS IV	10885	2	2	78	21-11-2005
66	41P13	IRS-P6	LISS IV	11169	2	2	88	11-12-2005
67	46B03	IRS-P6	LISS IV	11510 11510	2	2	97 96	04-01-06 04-01-06
68	46B04	IRS-P6	LISS IV	10487 11510 11510	2	2	83 97 98	24-10-05 04-01-06 04-01-06
69	46B06	IRS-P6	LISS IV	10828 11510	2	2	80 96	17-11-05 04-01-06
70	46B07	IRS-P6	LISS IV	10487 11510 11510	2	2	82 96 97	24-10-05 04-01-06 04-01-06
71	46B08	IRS-P6	LISS IV	10487 10487 11510 11510	2	2	82 83 97 98	24-10-05 24-10-05 04-01-06 04-01-06
72	46B11	IRS-P6	LISS IV	10487 10615	2	2	82 54	24-10-05 02-11-05
73	46B12	IRS-P6	LISS IV	10487	2	2	83	26-11-2005

74	46B14	IRS-P6	LISS IV	10956	2	2	52	26-11-2005
75	46B15	IRS-P6	LISS IV	10615	2	2	54	02-11-2005
76	46B16	IRS-P6	LISS IV	10615 10956	2	2	54 54	02-11-05 26-11-05
77	46C01	IRS-P6	LISS IV	10487 10487 10487 11510 11510	2	2	83 84 85 98 99	24-10-05 24-10-05 24-10-05 04-01-06 04-01-06
78	46C02	IRS-P6	LISS IV	10487 10487 11510	2	2	85 86 99	24-10-05 24-10-05 04-01-06
79	46C05	IRS-P6	LISS IV	10487 11510 11510	2	2	85 98 99	24-10-05 04-01-06 04-01-06
80	46C06	IRS-P6	LISS IV	11510 10487 10487	2	2	99 85 86	04-01-06 24-10-05 24-10-05
81	46F03	IRS-P6	LISS IV	10956	2	3	54	26-11-2005
82	46F04	IRS-P6	LISS IV	10956	2	3	55	26-11-2005
83	41O16	IRS-P6	LISS IV	11169 11510 11510	2	2	88 101 102	11-12-05 04-01-06 04-01-06
84	41O12	IRS-P6	LISS IV	10885	2	2	78	21-11-2005
85	41O15	IRS-P6	LISS IV	11510	2	2	101	04-01-2006
86	41P05	IRS-P6	LISS IV	10203	2	2	80	04-10-2005
87	41P09	IRS-P6	LISS IV	10885	2	2	78	21-11-2005
88	41P13	IRS-P6	LISS IV	11169	2	2	88	11-12-2005
89	46C02	IRS-P6	LISS IV	10487 10487 11510	2	222	85 86 99	24-10-05 24-10-05 04-01-06
90	46C03	IRS-P6	LISS IV	10487 10487 11510	2	222	86 87 101	24-10-05 24-10-05 04-01-06
91	46C04	IRS-P6	LISS IV	10487 11510 11510	2	222	87 101 102	24-10-05 04-01-06 04-01-06
92	46C06	IRS-P6	LISS IV	11510 10487 10487	2	2	99 85 86	04-01-06 24-10-05 24-10-05
93	46C07	IRS-P6	LISS IV	10487	2	2	86	24-10-2005
94	46C09	IRS-P6	LISS IV	10615	2	3	55	02-11-2005
95	46C10	IRS-P6	LISS IV	10615	2	3	57	02-11-2005
96	46C14	IRS-P6	LISS IV	10629	2	3	55	03-11-2005
97	41F12	IRS-P6	LISS IV	10473	2	2	68	23-10-2005
98	41G05	IRS-P6	LISS IV	10473	2	2	70	23-10-2005
99	41G06	IRS-P6	LISS IV	10487	2	2	71	23-10-2005
100	41G09	IRS-P6	LISS IV	11709	2	2	79	18-01-2006
101	41G10	IRS-P6	LISS IV	10473	2	2	71	23-10-2005
102	41G11	IRS-P6	LISS IV	10473 11709 11709	2	2	71 80 81	23-10-05 18-01-06 18-01-06

103	41G14	IRS-P6	LISS IV	11709	2	2	80	18-01-2006
104	41G15	IRS-P6	LISS IV	11226 11709 11709	2	2	103 80 81	15-12-05 18-01-06 18-01-06
105	41G16	IRS-P6	LISS IV	11226 11226 11709	2	1 1 2	103 104 81	15-12-05 15-12-05 18-01-06
106	41K02	IRS-P6	LISS IV	11226	2	1	102	15-12-2005
107	41K03	IRS-P6	LISS IV	11226	2	1	103	15-12-2005
108	41K04	IRS-P6	LISS IV	10274 11226	2	2	84 103	09-10-05 15-12-05
109	41K08	IRS-P6	LISS IV	10274	2	2	84	09-10-2005
110	41L01	IRS-P6	LISS IV	10274	2	2	84	09-10-2005
111	41L05	IRS-P6	LISS IV	10274 10416	2	2	84 89	09-10-05 19-10-05
112	41L06	IRS-P6	LISS IV	10416	2	2	89	19-10-2005
113	41L09	IRS-P6	LISS IV	10416	2	2	89	19-10-2005
114	41L10	IRS-P6	LISS IV	10416	2	2	89	19-10-2005
115	41P01	IRS-P6	LISS IV	10203	2	2	80	04-10-2005
116	41P02	IRS-P6	LISS IV	10203	2	2	80	04-10-2005

Table No. 3: Satellite data used for Gujarat, Daman and Diu Coast (2014-16 time-frame)

S. NO.	MAPSHEET NO.	SATELLITE	SENSOR	PATH	ROW	SUBSCENE	DATE
1	41A06SE	IRS-R2	L4FX	89	55	C	10-Mar-15
2	41A07NE	IRS-R2	L4FX	89	55	C	10-Mar-15
3	41A10NW	IRS-R2	L4FX	89	55	C	10-Mar-15
4	41A10SW	IRS-R2	L4FX	89	55	C	10-Mar-15
5	41A11NW	IRS-R2	L4FX	89	55, 56	C,A	10-Mar-15
6	41A11SE	IRS-R2	L4FX	89	55	C	10-Mar-15
7	41A11SW	IRS-R2	L4FX	89	55, 56	C,A	10-Mar-15
8	41A12NE	IRS-R2	L4FX	89	55, 56	C,B	10-Mar-15
9	41A12NW	IRS-R2	L4FX	89	56, 55, 55	B, D, C	10-03-2015 16-01-2015 10-03-2015
10	41A12SE	IRS-R2	L4FX	89	55, 56	D,B	18-11-2017 16-01-2015
11	41A16SE	IRS-R2	L4FX	89	56	B	16-01-2015
12	41A16SW	IRS-R2	L4FX	89	56	B	16-01-2015
13	41B13NE	IRS-R2	L4FX	89, 90	56, 56	B, A	16-01-2015 26-03-2015
14	41B15NE	IRS-R2	L4FX	90	56	C	26-01-2015
15	41B15SE	IRS-R2	L4FX	90	56	C	26-01-2015
16	41B16NE	IRS-R2	L4FX	90	56, 57	C, A	26-01-2015
17	41F01NE	IRS-R2	L4FX	89, 90	56	B,A	16-01-2015 26-03-2015
18	41F01NW	IRS-R2	L4FX	89, 90	56	B,A	16-01-2016 26-03-2015

19	41F01SE	IRS-R2	L4FX	89, 90	56	B,A	16-01-2016 26-03-2015
20	41F03NE	IRS-R2	L4FX	90	56	C	26-01-2015
21	41F03NW	IRS-R2	L4FX	90	56	C	26-01-2015
22	41F03SE	IRS-R2	L4FX	90	56	C	26-01-2015
23	41F04NW	IRS-R2	L4FX	90	56, 57	C, A	26-01-2015 26-01-2015
24	41F04SE	IRS-R2	L4FX	90	56, 57	C, A	26-01-2015 26-01-2015
25	41F04SW	IRS-R2	L4FX	90	56, 57	C, A	26-01-2015 26-01-2015
26	41F05SE	IRS-R2	L4FX	90	56	A	26-03-2015
27	41F05SW	IRS-R2	L4FX	90	56	A	26-03-2015
28	41F07SE	IRS-R2	L4FX	90	56	D, C	19-01-2015 26-01-2015
29	41F07SW	IRS-R2	L4FX	90	56	C	26-01-2015
30	41F09SE	IRS-R2	L4FX	90	56	B	02-01-2015
31	41F09SW	IRS-R2	L4FX	90	56	A, B	26-03-2015 02-01-2015
32	41F11NE	IRS-R2	L4FX	90	56	D	19-01-2015
33	41F11SE	IRS-R2	L4FX	90	56	D	19-01-2015
34	41F11SW	IRS-R2	L4FX	90	56	D	19-01-2015
35	41F13NE	IRS-R2	L4FX	90	56	B	02-01-2015
36	41F13SW	IRS-R2	L4FX	90	56	B	02-01-2015
37	41F14SE	IRS-R2	L4FX	91, 90	56	C, D	31-01-2015 19-01-2015
38	41F15NE	IRS-R2	L4FX	91, 90	56	C, D	31-01-2015 19-01-2015
39	41F15NW	IRS-R2	L4FX	90	56	D	19-01-2015
40	41G01NE	IRS-R2	L4FX	90	57	A	26-01-2015
41	41G05NW	IRS-R2	L4FX	90	57	A,B	26-01-2015 02-01-2015
42	41G05SE	IRS-R2	L4FX	90	57	B	02-01-2015
43	41G05SW	IRS-R2	L4FX	90	57	A, B	26-01-2015 02-01-2015
44	41G06NE	IRS-R2	L4FX	90	57	B	02-01-2015
45	41G10NW	IRS-R2	L4FX	90	57	B	02-01-2015
46	41G10SE	IRS-R2	L4FX	90, 91	57	B, C	02-01-2015 31-01-2015
47	41G10SW	IRS-R2	L4FX	90	57	B	02-01-2015
48	41G11NE	IRS-R2	L4FX	91	57	C	31-01-2015
49	41G15NW	IRS-R2	L4FX	90	57	B, C	02-01-2015 31-01-2015
50	41G15SE	IRS-R2	L4FX	91	57	C	31-01-2015
51	41G15SW	IRS-R2	L4FX	90	57	B,C	02-01-2015 31-01-2015
52	41G16NE	IRS-R2	L4FX	91	57	C	31-01-2015
53	41I04SE	IRS-R2	L4FX	90, 91	56	B, A	02-01-2015 31-03-2015
54	41I12SW	IRS-R2	L4FX	91	56	A	31-03-2015
55	41J02NE	IRS-R2	L4FX	91	56	A	31-03-2015
56	41J02SE	IRS-R2	L4FX	90, 91	56	D, C	19-01-2015 31-01-2015
57	41J02SW	IRS-R2	L4FX	91, 90	56	C, D	31-01-2015 19-01-2015

58	41J05NE	IRS-R2	L4FX	91	56	A	31-03-2015
59	41J05SE	IRS-R2	L4FX	91	56	A, C	31-03-2015 31-01-2015
60	41J06NW	IRS-R2	L4FX	91	56	A,C	31-03-2015 31-01-2015
61	41J09NW	IRS-R2	L4FX	91	56	A	31-03-2015
62	41K04NW	IRS-R2	L4FX	91	57	C	31-01-2015
63	41K04SE	IRS-R2	L4FX	91	57	C, D	31-01-2015 07-01-2015
64	41K04SW	IRS-R2	L4FX	91	57	C	31-01-2015
65	41L01NE	IRS-R2	L4FX	91	57	C	31-01-2015
66	41L05NE	IRS-R2	L4FX	91	57	D	01-01-2015
67	41L05NW	IRS-R2	L4FX	91	57	D	01-01-2015
68	41L05SE	IRS-R2	L4FX	91	57	D	01-01-2015
69	41L09SE	IRS-R2	L4FX	91, 92	57, 58	D, A	01-01-2015 05-02-2015
70	41L09SW	IRS-R2	L4FX	91, 92	57, 58	D, A	01-01-2015 05-02-2015
71	41L10NE	IRS-R2	L4FX	91, 92	57, 58	D, A	01-01-2015 05-02-2015
72	41L14NE	IRS-R2	L4FX	92	58	A	05-02-2015
73	41L14NW	IRS-R2	L4FX	91, 92	57, 58	D, A	07-01-2015 05-02-2015
74	41O12SE	IRS-R2	L4FX	92, 93	57	D,C	12-01-2015 17-01-2015
75	41O16NE	IRS-R2	L4FX	93	57	C	17-01-2015
76	41O16SE	IRS-R2	L4FX	92, 93	57, 57	D, C	12-01-2015 17-01-2015
77	41O16SW	IRS-R2	L4FX	92, 93	57	D, C	12-01-2015 17-01-2015
78	41P01SE	IRS-R2	L4FX	92, 92, 92	58, 57, 58	A,D,B	05-02-2015 12-01-2015 12-01-2015
79	41P01SW	IRS-R2	L4FX	92	58	A	05-02-2015
80	41P02NW	IRS-R2	L4FX	92	58	A	05-02-2015
81	41P05NE	IRS-R2	L4FX	92	57, 58	D, B	12-01-2015 12-01-2015
82	41P05SE	IRS-R2	L4FX	92	57, 58	D, B	12-01-2015 12-01-2015
83	41P05SW	IRS-R2	L4FX	92	57, 58	D, B	12-01-2015 12-01-2015
84	41P09NE	IRS-R2	L4FX	92, 93	57	D, C	12-01-2015 17-01-2015
85	41P09NW	IRS-R2	L4FX	92	57	D	12-01-2015
86	46B04NE	IRS-R2	L4FX	93	56	C	17-01-2015
87	46B04SE	IRS-R2	L4FX	93	57, 56	A, C	17-01-2015 17-01-2015
88	46B07SE	IRS-R2	L4FX	93	56	C	17-01-2015
89	46B07SW	IRS-R2	L4FX	93	56	C	17-01-2015
90	46B08NW	IRS-R2	L4FX	93	56	C	17-01-2015
91	46B11SW	IRS-R2	L4FX	93	56	C, D	17-01-2015 10-02-2015
92	46B12NE	IRS-R2	L4FX	93	56	D	10-02-2015
93	46B12NW	IRS-R2	L4FX	93	56	C, D	17-01-2015 10-02-2015

94	46B12SW	IRS-R2	L4FX	93	56, 56, 57	C, D, B	17-02-2015 10-02-2015 20-03-2015
95	46C01NE	IRS-R2	L4FX	93	57	A	17-01-2015
96	46C03NE	IRS-R2	L4FX	93	57	C,A	17-01-2015 17-01-2015
97	46C03SE	IRS-R2	L4FX	93	57	C	17-01-2015
98	46C03SW	IRS-R2	L4FX	93	57	C	17-01-2015
99	46C04NW	IRS-R2	L4FX	93	57	C	17-01-2015
100	46C06NW	IRS-R2	L4FX	93	57	A	17-01-2015
101	46C06SW	IRS-R2	L4FX	93	57	A	17-01-2015
102	46C07NW	IRS-R2	L4FX	93	57	A	17-01-2015
103	46C10NW	IRS-R2	L4FX	93	57	B	20-03-2015
104	46C10SE	IRS-R2	L4FX	93	57	B	20-03-2015
105	46C11NE	IRS-R2	L4FX	90, 93, 93	57, 57, 57	B, B, D	02-01-2015 20-03-2015 30-03-2015
106	46C11SE	IRS-R2	L4FX	93	57, 57	B, D	20-03-2015 30-03-2015
107	46C11SW	IRS-R2	L4FX	93	57, 57	B, D	20-03-2015 30-03-2015
108	46C12NE	IRS-R2	L4FX	93	57	D	30-03-2015
109	46C12SE	IRS-R2	L4FX	93	57	D	30-03-2015
110	46C12SW	IRS-R2	L4FX	93	57	D	30-03-2015
111	46D09NE	IRS-R2	L4FX	93, 94	57, 58	D, A	30-03-2015 15-02-2015
112	46D11SE	IRS-R2	L4FX	94	58	A	15-02-2015
113	46D12NE	IRS-R2	L4FX	94	58	A	15-02-2015
114	46D12SE	IRS-R2	L4FX	94	58	A	15-02-2015
115	46D13NW	IRS-R2	L4FX	93, 94, 94	57, 58, 58	D, A, A	30-03-2015 15-02-2015 15-02-2015
116	46D13SW	IRS-R2	L4FX	93, 94	57, 58	A, A	30-03-2015 15-02-2015
117	46D14NE	IRS-R2	L4FX	94	58	A	15-02-2015
118	46D14NW	IRS-R2	L4FX	93, 94	57, 58	D, A	30-03-2015 15-02-2015
119	46D14SE	IRS-R2	L4FX	94	58	A	15-02-2015
120	46D15NE	IRS-R2	L4FX	94	58	A	15-02-2015
121	46D15NW	IRS-R2	L4FX	94	58	A	15-02-2015
122	46D15SW	IRS-R2	L4FX	94	58	A	15-02-2015
123	46D16NW	IRS-R2	L4FX	94	58	A	15-02-2015