



# Dubai Coast Smart System



Eng. Noora Hokal

Head of Coastal Monitoring & Design Unit  
Environment Department



# Outline

1 Introduction

---

2 The Need

---

3 Monitoring Methods

---

4 Data Collection

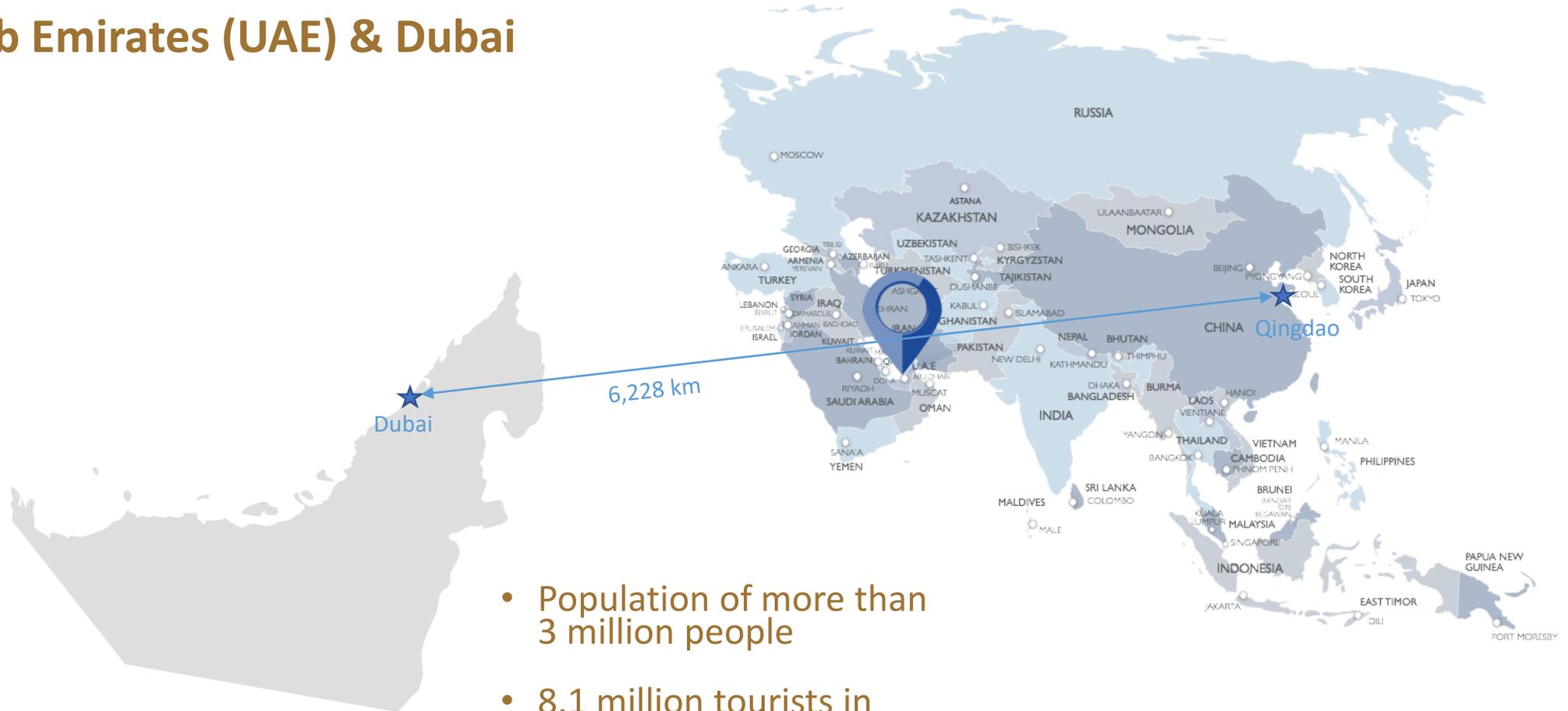
---

5 Applications

---

# Introduction

## United Arab Emirates (UAE) & Dubai



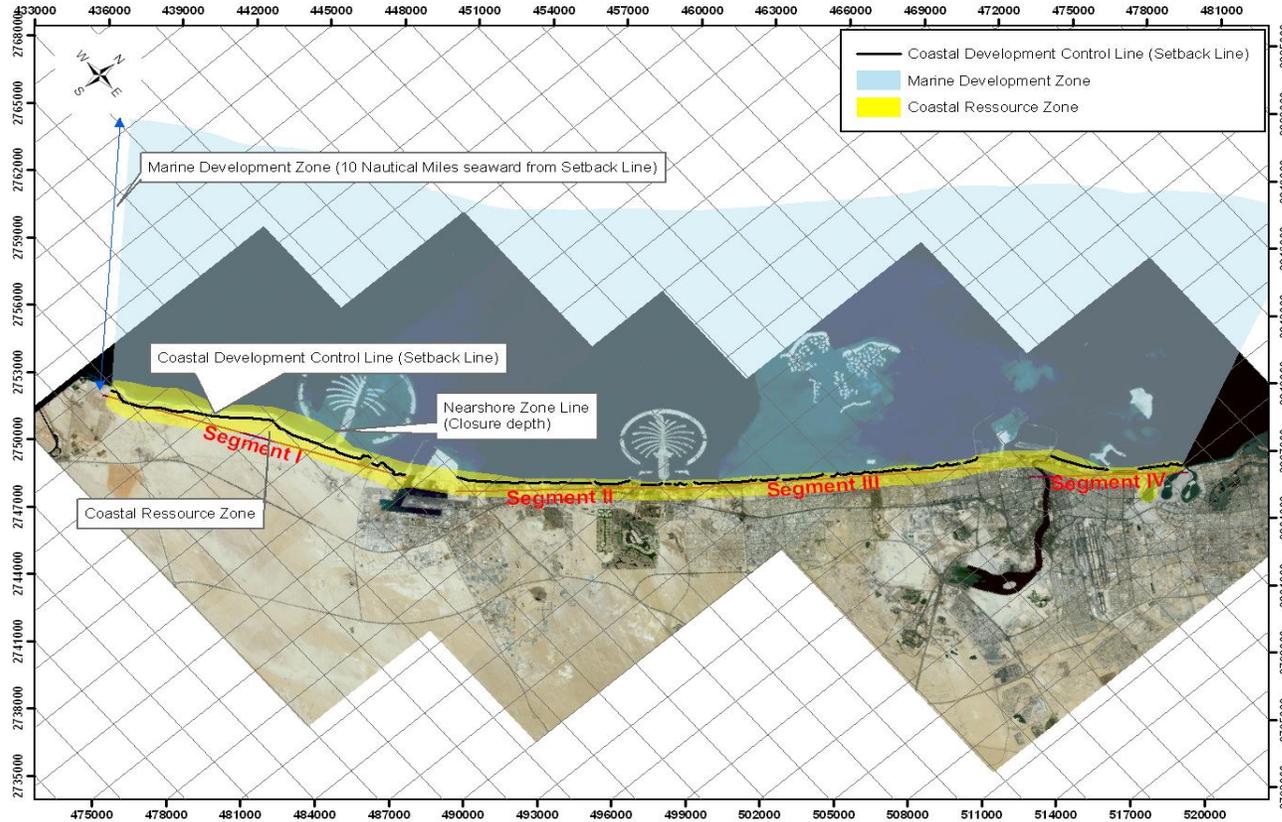
- Population of more than 3 million people
- 8.1 million tourists in the 1<sup>st</sup> half of 2018

# Introduction

## Dubai Coastal Zone

Decree No. 22/2001  
(regarding the  
conservation of the  
coastal zone in  
Dubai)

- 1 Km inland
- 10 Nautical Miles seaward



دولة الإمارات العربية المتحدة  
حكومة دبي  
H.H. The Ruler's Court  
Government of Dubai

مرسوم رقم (٢٢) لسنة ٢٠٠١  
بشأن  
المحافظة على المنطقة الساحلية في إمارة دبي

نحن مكتوم بن راشد آل مكتوم حاكم دبي  
تحقيقاً للمصلحة العامة،  
نرسم ما يلي:

المادة (١)

يُحظر على الأشخاص الطبيعيين والإعتباريين بما في ذلك الدوائر الحكومية والهيئات والمؤسسات العامة إقامة أية مشاريع أو منشآت أو تنفيذ أية أعمال هندسية في المنطقة الساحلية لإمارة دبي قبل القيام بما يلي:-

أ- الحصول على شهادة عدم ممانعة بذلك من بلدية دبي.

ب- فحص تربة الأرض قبل إقامة أو تنفيذ تلك الأعمال أو المنشآت للتحقق من نوعية وكمية الرمال المتوقع استخراجها عند حفر الأرض، وإخطار بلدية دبي بنتيجة الفحص لتمكينها من استخدام الرمال الزائدة عن حاجة المشروع في تغذية الشواطئ المعرضة للبحر في الإمارة.

كما تعتبر في حكم الأعمال المحظورة، والتي تستوجب الحصول على موافقة بلدية دبي قبل القيام بها في المنطقة الساحلية، أعمال الحفر والرمد وتجريف ونقل الرمال لأي غرض كان سواء تمت هذه الأعمال ضمن تلك المنطقة أو من هذه المنطقة إلى خارجها وبالعكس.

المادة (٢)

تحدد الخريطة الملحقة بهذا المرسوم المنطقة الساحلية المشمولة بأحكامه.

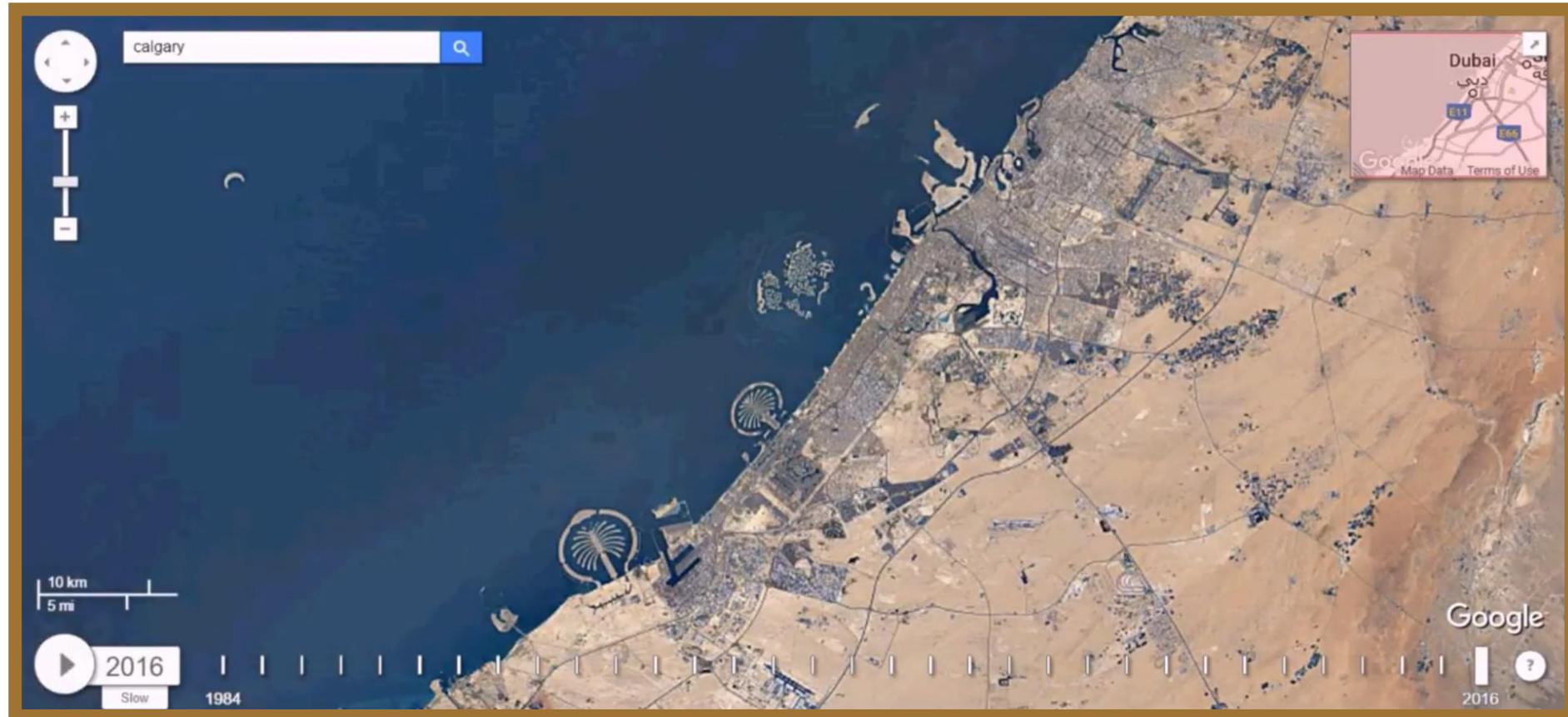
المادة (٣)

مع عدم الإخلال بأية عقوبة أشد ينص عليها أي تشريع آخر، يعاقب أي شخص طبيعي أو اعتباري يخالف أحكام هذا المرسوم أو القرارات الصادرة بموجبها، بغرامة لا

من إعداد: ١٢٨١٨ دبي - الإمارات العربية المتحدة هاتف: ٢٥٢٣٣٣٣ - فاكس: ٢٥٢٨٤٣٨  
P.O.Box : 12848 Dubai, United Arab Emirates . Tel.: 3533333, Fax: 3538438

# Uniqueness of Dubai Coast

- Mega offshore developments took place along Dubai Coast
- The coastline increased from 70 km to more than 1200km in few years





# The Need

Urban Developments.





Urban Developments.

Water

Canals



Urban Developments.



Water Canals

Reclamation Work



Urban Developments.



Water Canals



Reclamation Work

Coastal Structures



100% of freshwater supply relies on desalination.



Urban Developments.



Water Canals



Reclamation Work



Coastal Structures

Desalination Plants



Urban Developments.



Water Canals



Reclamation Work



Coastal Structures



Desalination Plants

Large Industrial Ports

# The Need



Dubai has three major industrial ports.



Jebel Ali Port

Port Rashid

Port Hamriyah

# The Need

Dubai hosts 2 Marine Sanctuaries



# The Need

## Oil transportation from the Arabian Gulf

**1/3** of the world's sea-borne oil passing through Arabian Gulf every day.

- The U.S. Energy Information Administration estimates a record **18.5 million** barrels per day of sea-borne oil passed through it in 2016.
- High risk of Oil Spill.

### Strait of Hormuz

World's biggest waterway "chokepoint" for transported oil



Source: EIA

AFP

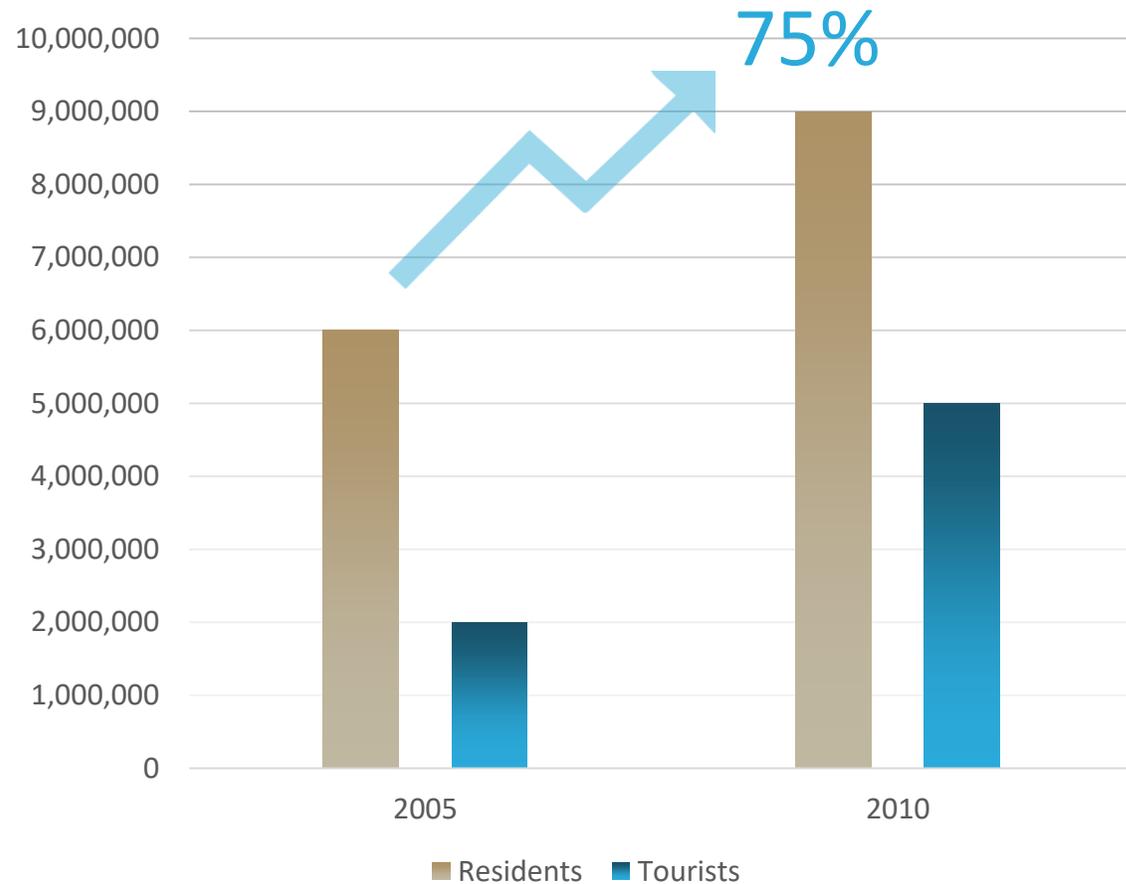
# The Need

Beaches area = **1,761,850 Sq meters.**



# The Need

## Annual Beach Visitors of Dubai



# The Need

## Natural Changes

### Post Storm Erosion



Umm Suqeim-1 Beach  
(19 January 2015)

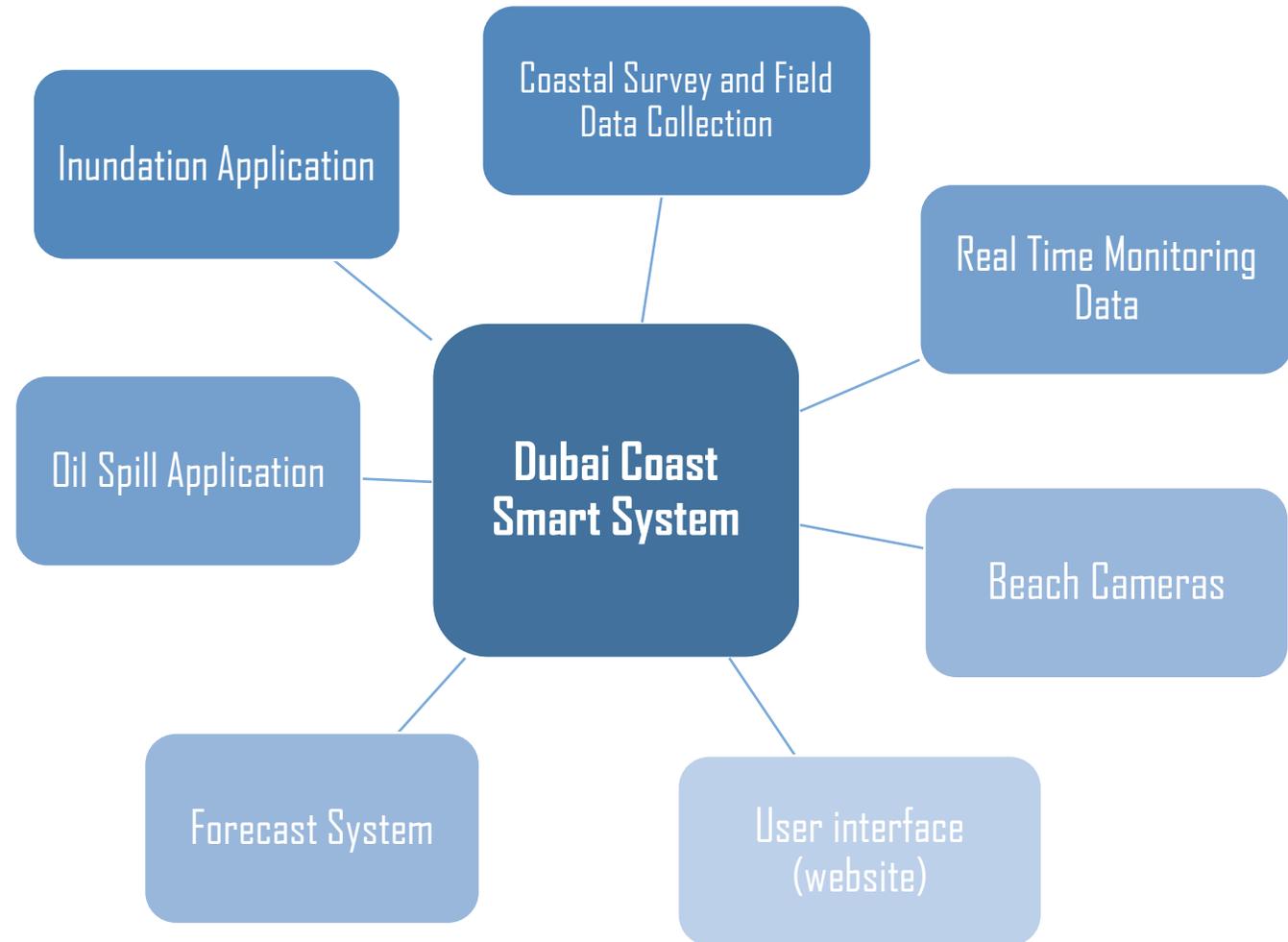


Umm Suqeim-2 Beach  
(19 January 2015)



# Dubai Coast Smart System

- An Integrated Platform



# Field Data Collection

Marine environment monitoring by taking in-situ readings and collecting samples for lab analysis



# Beach Survey

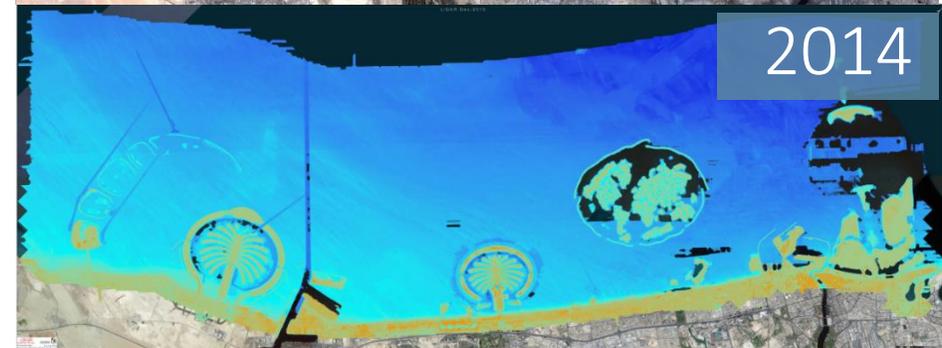
## Hydrographic and Topographic Survey



# Coastal Zone Survey

## Lidar Survey

- Light Detection and Ranging
- Pulsed Laser Beam (1KHz Laser)
- LIDAR provides:
  - Accurate and high resolution model of the sea bottom surface including natural and man-made features



# Real-time Monitoring Instruments

## ADCPs



Wave Height, Wave Direction, Wave Period, Current Speed, Current Direction, Water level and Water Temperature.

## Water Quality Sonde



Temperature, Salinity, Dissolved Oxygen, pH, Turbidity, Chlorophyll and Blue Green Algae.

## Tide Gauge



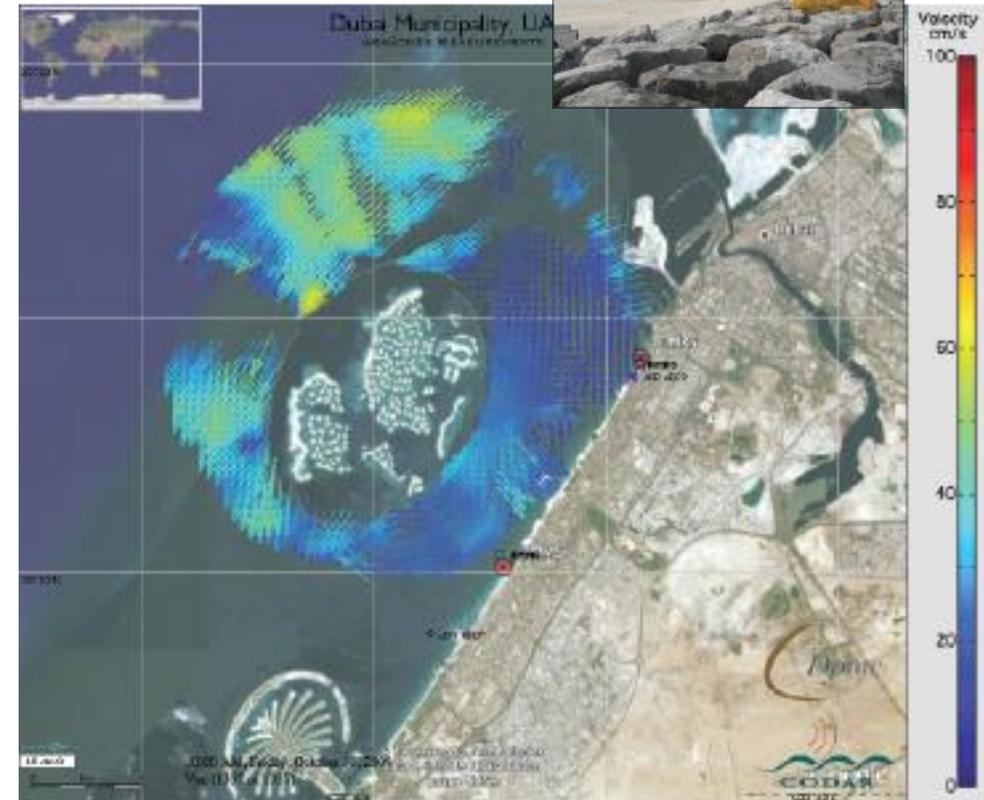
Water Level

## Met Station



Air Temperature, Relative Humidity, Wind Speed, Wind Direction, Gust Speed, Air Pressure and Visibility.

## HF Radar Surface Currents





# Monitoring Stations

## Legend



● ADCP



● Camera



● HF Radar



● Tide Gauge



● MET Station



● Water Quality



Management Cells



# Live Beach Cameras

## Live Beach Images

From 35 beach cameras every 30 minutes.

- Biweekly shorelines,
- Monthly inter-tidal beach profiles,
- Pre and post shamal shorelines,
- Wave run up,
- Mapping of rip currents
- Sandbars occurrence location and beach user statistics



# Data Collection

Currents and Waves



Field Data Collection Program



High Frequency Radar



Water Levels



Offshore Buoys



Coastal Cameras



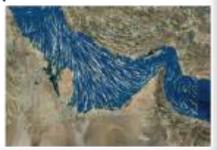
Water Quality



Meteorology



Marine Forecast System



Dubai Coast website

# Dubai Coast Website

## Real-Time Data

**Live Beach Conditions** Today, August 12, 2018

Dubai Marina

WAVES	WIND	AIR TEMP.	WATER TEMP.	HIGH TIDE	LOW TIDE
0.20 m	2.99 m/s	35.15 °C	35.38 °C	1.82 m	0.93 m
15:00	15:30	15:30	15:10	13:36	18:30

[View Other Parameters](#)

**Wave Forecast**

Dubai Marina

TODAY	MONDAY	TUESDAY	WEDNESDAY
0.52 m	0.74 m	0.51 m	0.66 m

[Beaches](#) [Nearshore](#) [Offshore](#)

**LEGEND:** Swim With Caution Don't Swim Potentially harmful marine life

[View Other Parameters](#)



[www.dubaicoast.dm.gov.ae](http://www.dubaicoast.dm.gov.ae)

# Marine Forecast System

## The Forecast System Provides

- Predictions for wind speed, wave conditions, water levels, water temperature and Salinity.
- Predictions every 12 hours.
- If adverse sea conditions are predicted then early warnings are sent to public automatically.



Met Model



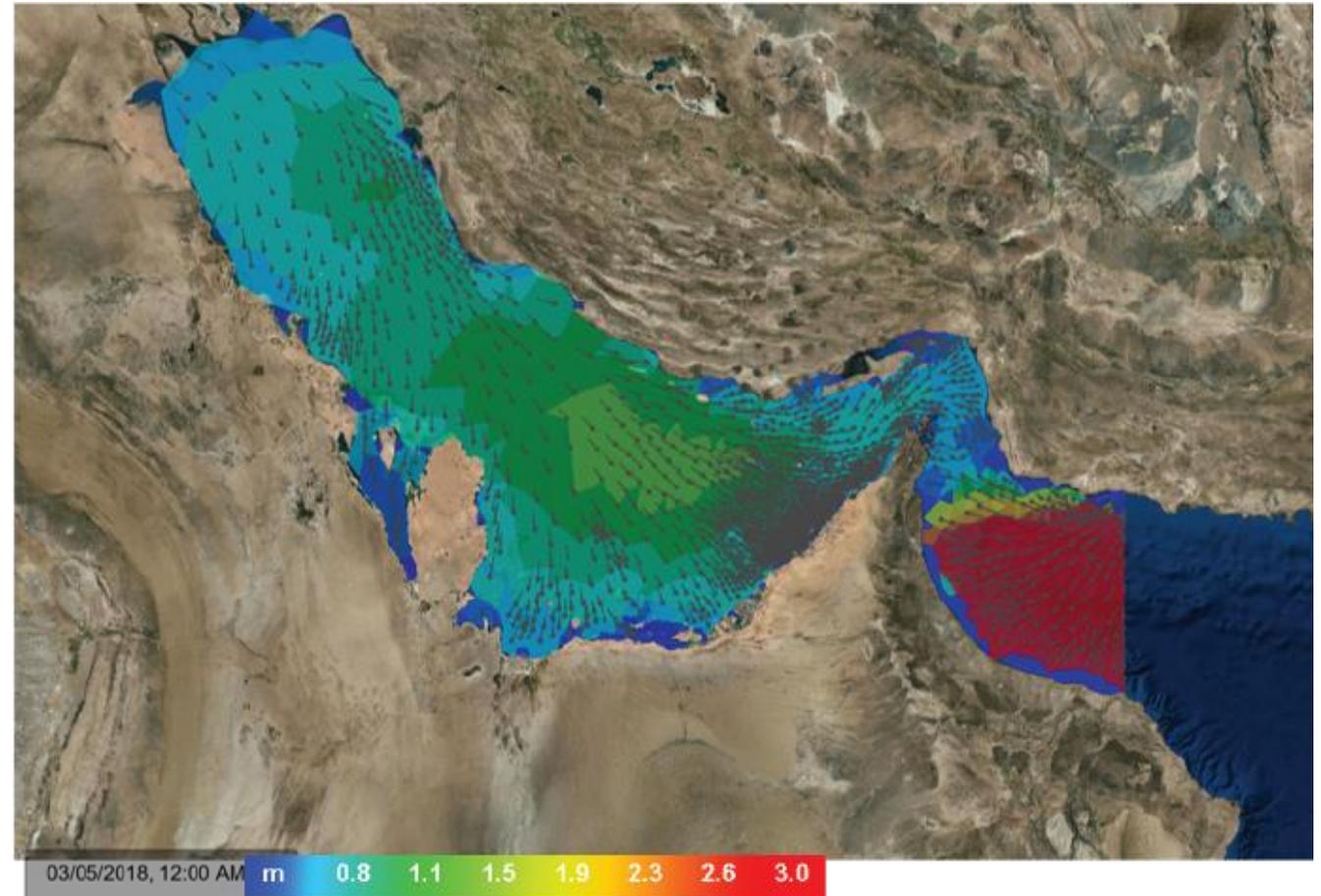
Hydrodynamic Model



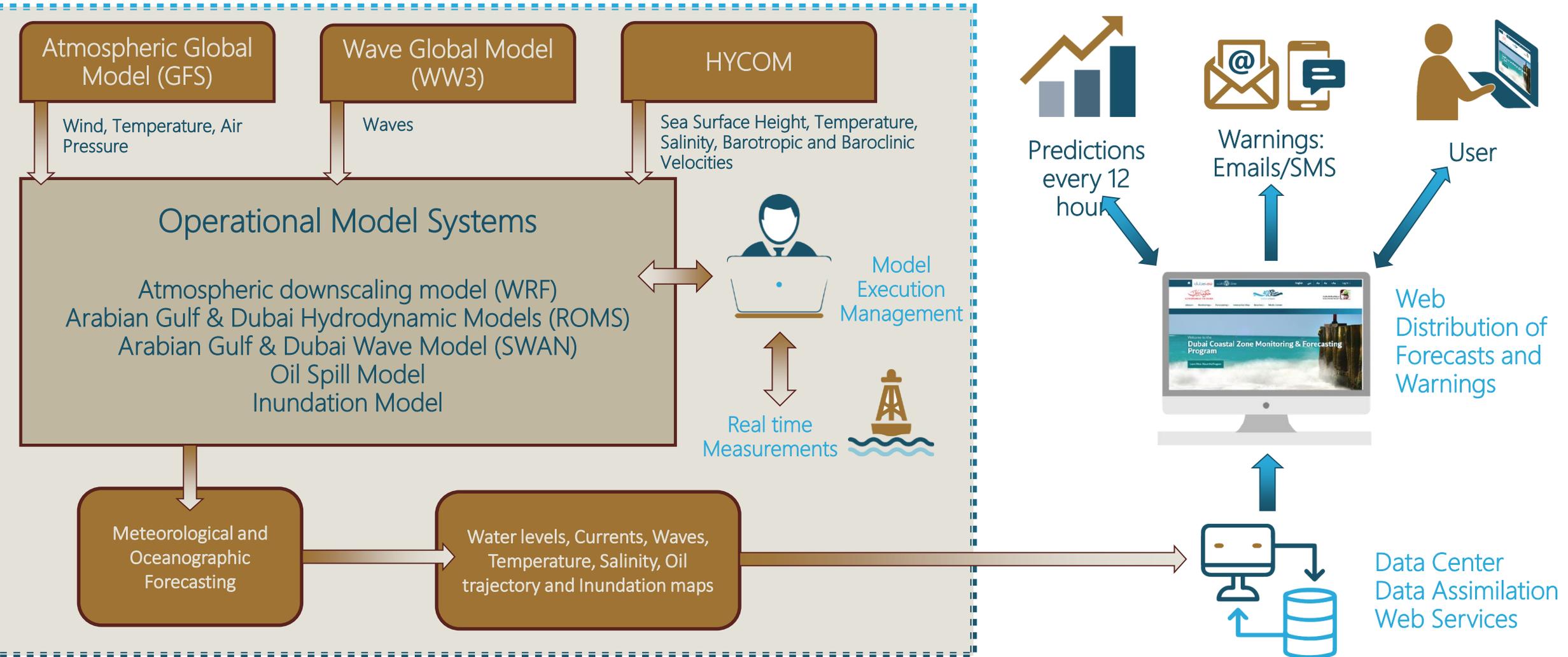
Wave Model

## How it works

It consists of individual numerical models of meteorology, hydrodynamics and waves that are coupled to work together to produce marine forecast.



# System Forecast System Architecture



# Early Warning System

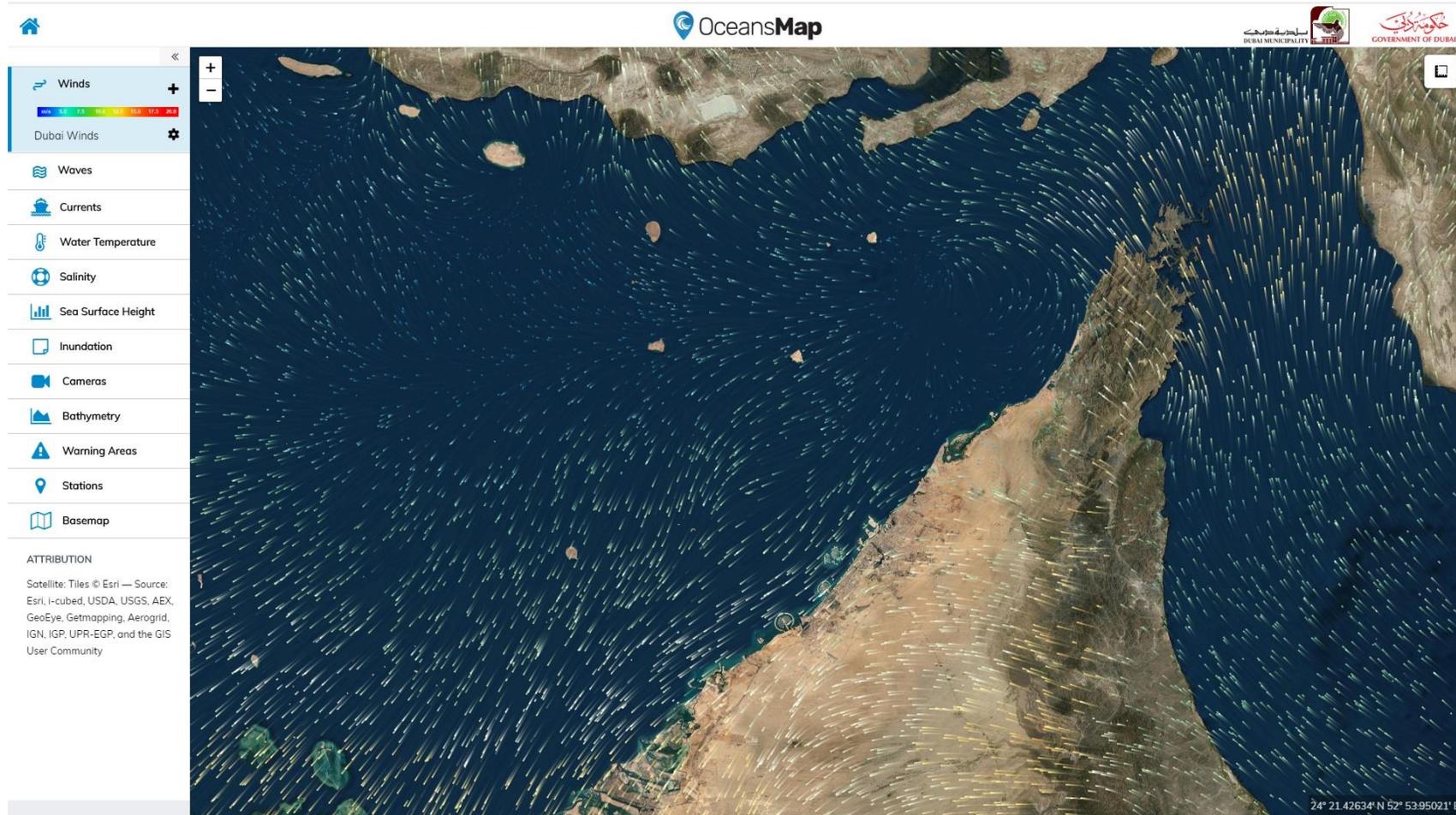


Implementing the early warning system to notify the community once adverse sea conditions are predicted to ensure their safety.

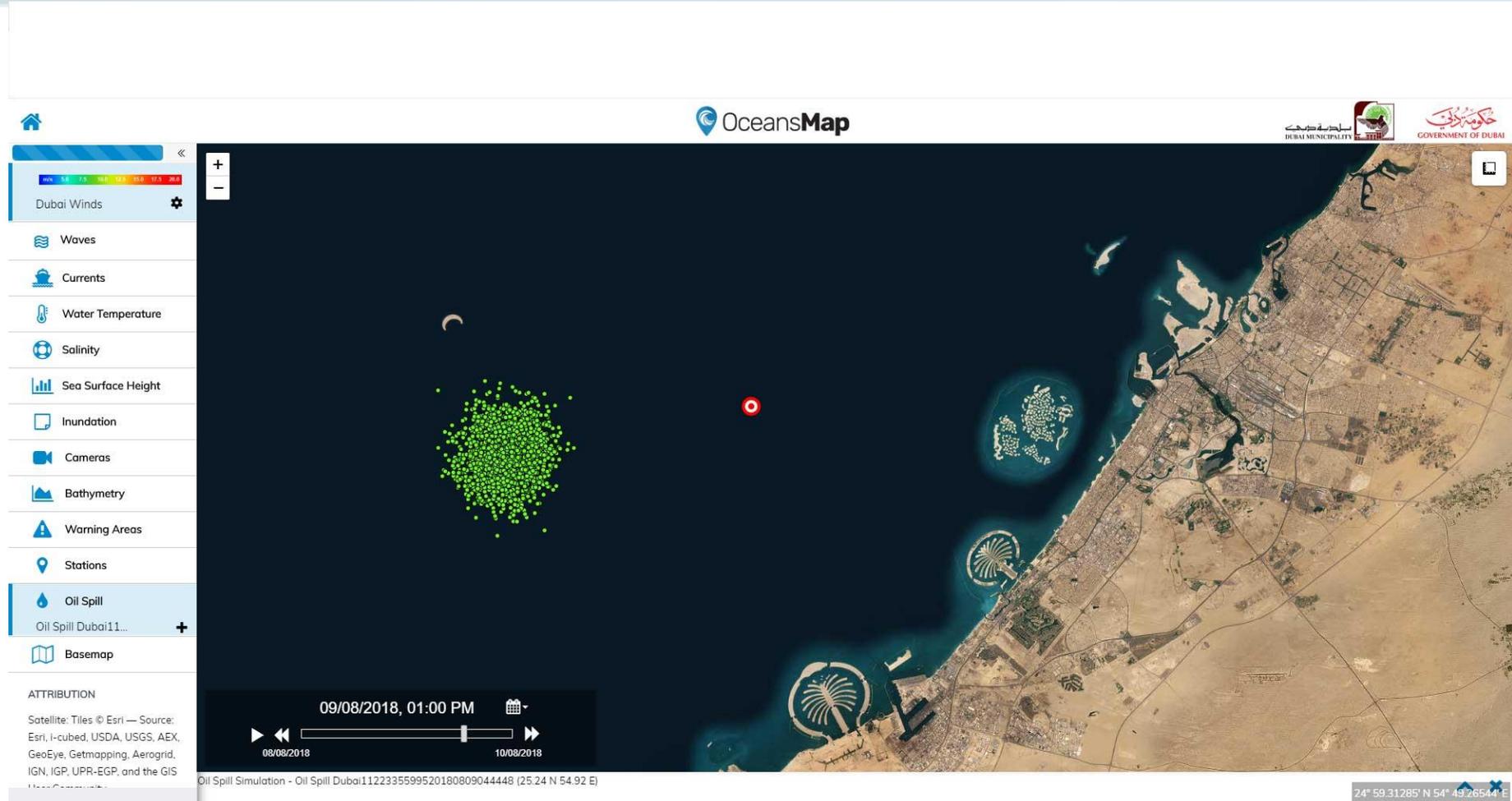


- Providing live feeds and forecasted information on marine and beach conditions
- Implementing the early warning system to automatically notify the community once adverse sea conditions are predicted

# Interactive Map



# Oil Spill Tracking Application

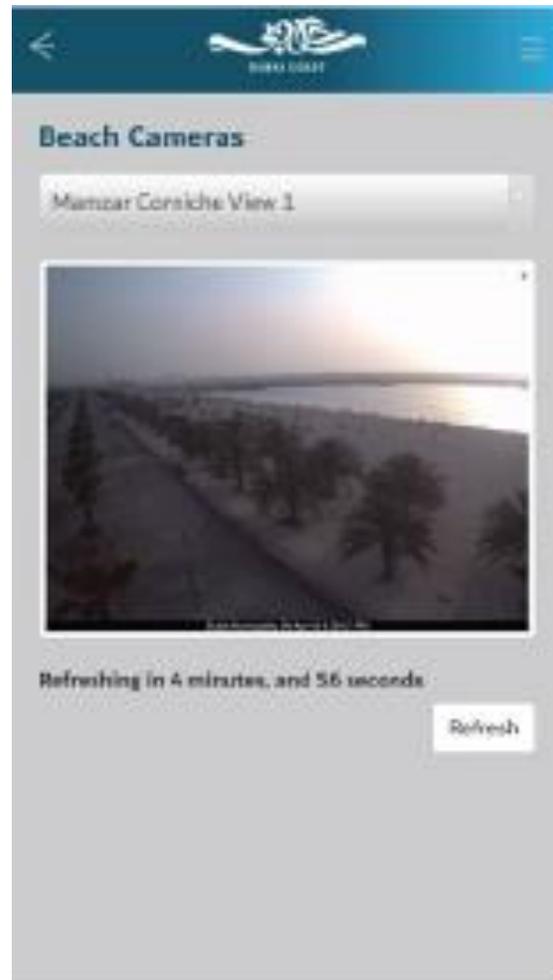
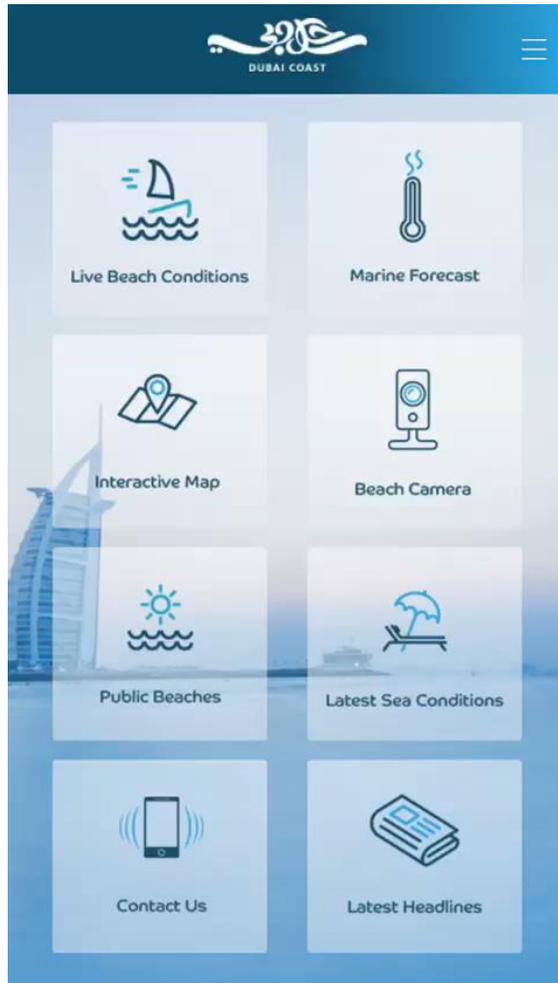


# Inundation Application





# Dubai Coast Smart App



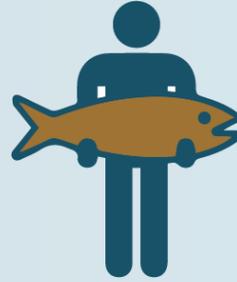
# Beneficiaries



Governmental Authorities



Planning Authorities



Fishermen



Contractors / Consultants



Navigation Companies



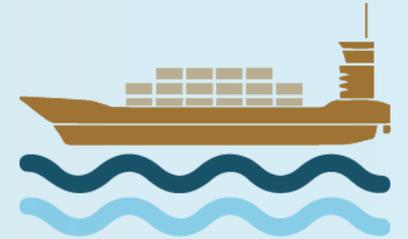
Desalination Plants



Swimmers and Beach Goers



Universities and Research Institutes



Marine Transport Operators



Environmental Protection Agency



Response and Emergency Authorities



Port Authorities



Marine and Sports Clubs



# Thank you

Name: Noora Hokal

Contact Number: +971-4-2064561

Email: [NMHOKAL@dm.gov.ae](mailto:NMHOKAL@dm.gov.ae)