



# Environmental Challenges and Earth Observation Solutions in Egypt

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# Challenges



- ***Achieving SDGs - Egypt Vision***
- ***LULC Changes***
- ***Food Security***
- ***Urban Growth***
- ***Coastal and Marine Resources / Threat***



To ensure achieving the  
three cornerstones of  
sustainable development

## V. INVESTMENT PRIORITIES OPTIONS

### A. Mega Projects

The GoE aims at creating a leap in the development of its infrastructure by attracting private investors and public-private-partnerships. Several projects were recently launched, and feasibility studies and master plan projects.

#### A2. Agriculture land reclamation for one million feddans

The main objective of this project is to create an integrated agricultural zone. The SDS objective of increasing the urbanized area by 5 percent every three years, in addition to its impact on supporting productive and decent job opportunities, and ensuring the participation of women in the economic and social development.

#### A6. The development of the Golden Triangle

The Golden triangle is located in the south-eastern area of the triangle is 41041 km<sup>2</sup>. The project aims at developing the area into a modern industrial and commercial zone.

#### A3. Building one million social housing units

The project aims at providing one million housing units for the middle and low-income population. The total cost of LE 150 billion during 5 years. More recently, the GoE announced in 2014 to establish the Social Housing Fund, which aims at reducing the number of social housing units on the state. It is estimated that this project will create almost 100,000 jobs. This important project will also contribute to achieving the Sustainable Development Goals by 2030.

#### A4. Creating new development axes

The project aims at developing more than 4800 km<sup>2</sup>, which represent

### A8. The development of North West Coast

The project extends from the El Alamein city to the Mediterranean Sea (about 280 km). The project aims at establishing a modern transportation. This project also plays a significant role in generating power through solar energy, as well as to develop the Daba area. The goals of this project are aligned with the national strategy, and increasing the energy security, and providing the energy needed to achieve economic growth. It is also expected to generate positive economic impacts.

### B. Sectoral strategies and projects

#### B1. The Energy Sector

In September 2014, the GoE announced the new strategy for the energy sector. The plan aims at installing 4,300 MW of renewable energy sources. Producers will enjoy long-term lease agreements. A customs tariff of 2 percent will apply to the import of energy equipment. The government is currently developing an integrated energy strategy to reduce the energy subsidy bill. The plan also aims at reducing energy consumption and implement initiatives based on a number of measures to settle payments to foreign partners to support water exploration. The sector strategy will also identify challenges related to the use of coal by heavy industries.

#### B2. The Tourism Sector

The tourism sector is a key sector for achieving the national strategy. The sector aims at developing the tourism sector by



- Realization of:
  - EO and geospatial information provide full support to achieving the 2030 development goals.
  - EO will support decision making process with information at the right location and at the right time

# Sustainable Development

Societal Benefit  
Areas

Decision Making  
Tools

Security & Resilience

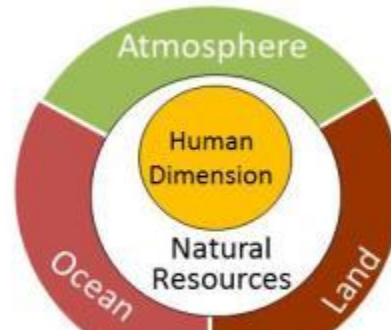
- Adaptation and Mitigation to Climate Change
- Biodiversity and Ecosystem Conservations
- City Development & Urban Resilience
- Disaster Resilience
- Energy Management
- Food Security & Sustainable Food Production
- Global Water Cycle & Integrated Water Resources Management
- Health Surveillance
- Infrastructure Design & Human Settlement

Economy

Models

Data  
Integration

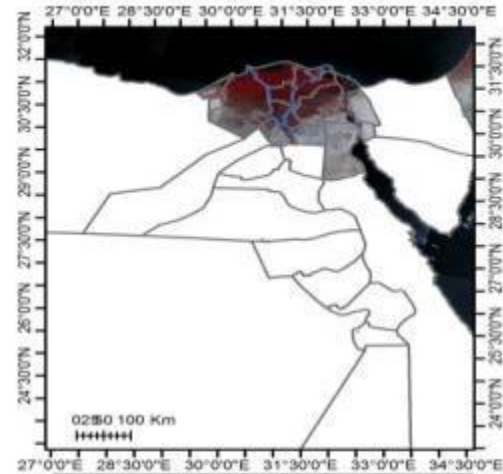
Earth Observation



EO is the Core of implementing the SDGs

# Land Use/ Land cover of the Nile Delta

## Egypt



Land cover classes of Nile Delta	2014 Area (ha.)
Cultivated land	2260599.529
Urbanized area	371568.9535
Combined linear coverage	120484.0714
Nile coarse	13618.92
Fish farms	126047.611
Lakes	151035.076

### Legend

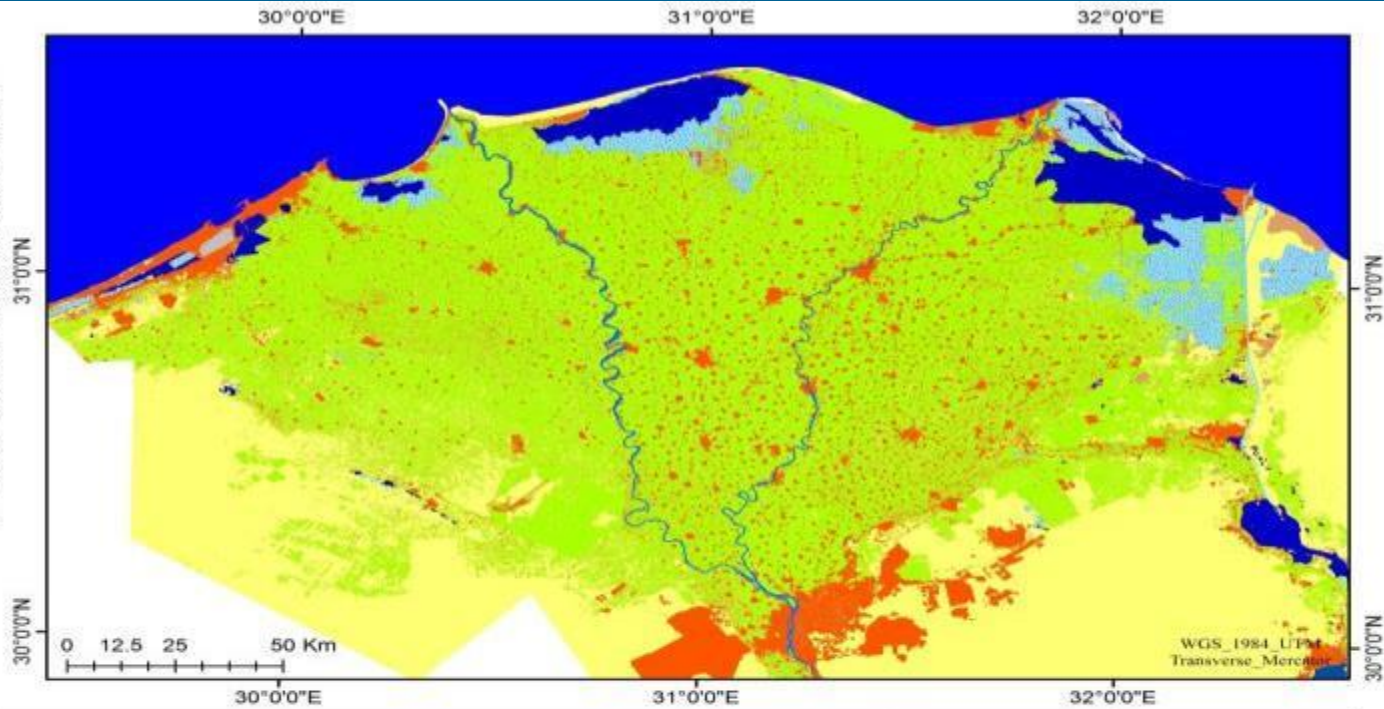


This map is produced by  
Agricultural Applications Dept.  
National Authority of Remote  
Sensing and Space Science  
(NARSS)  
Under Supervision of  
Prof. Sayed Medany Arafat  
E-mail : arafatsm@narss.sci.eg

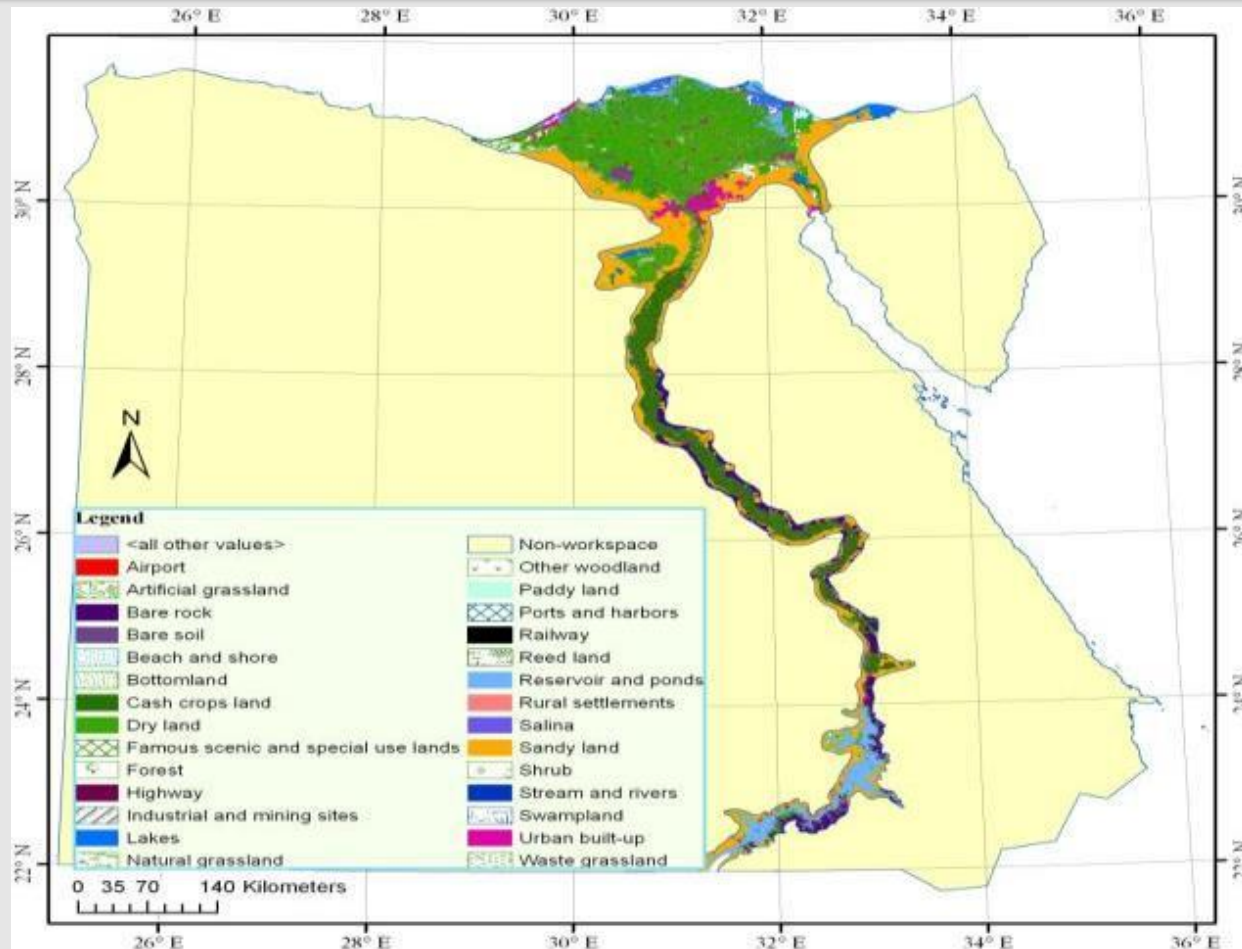
Land use and land cover



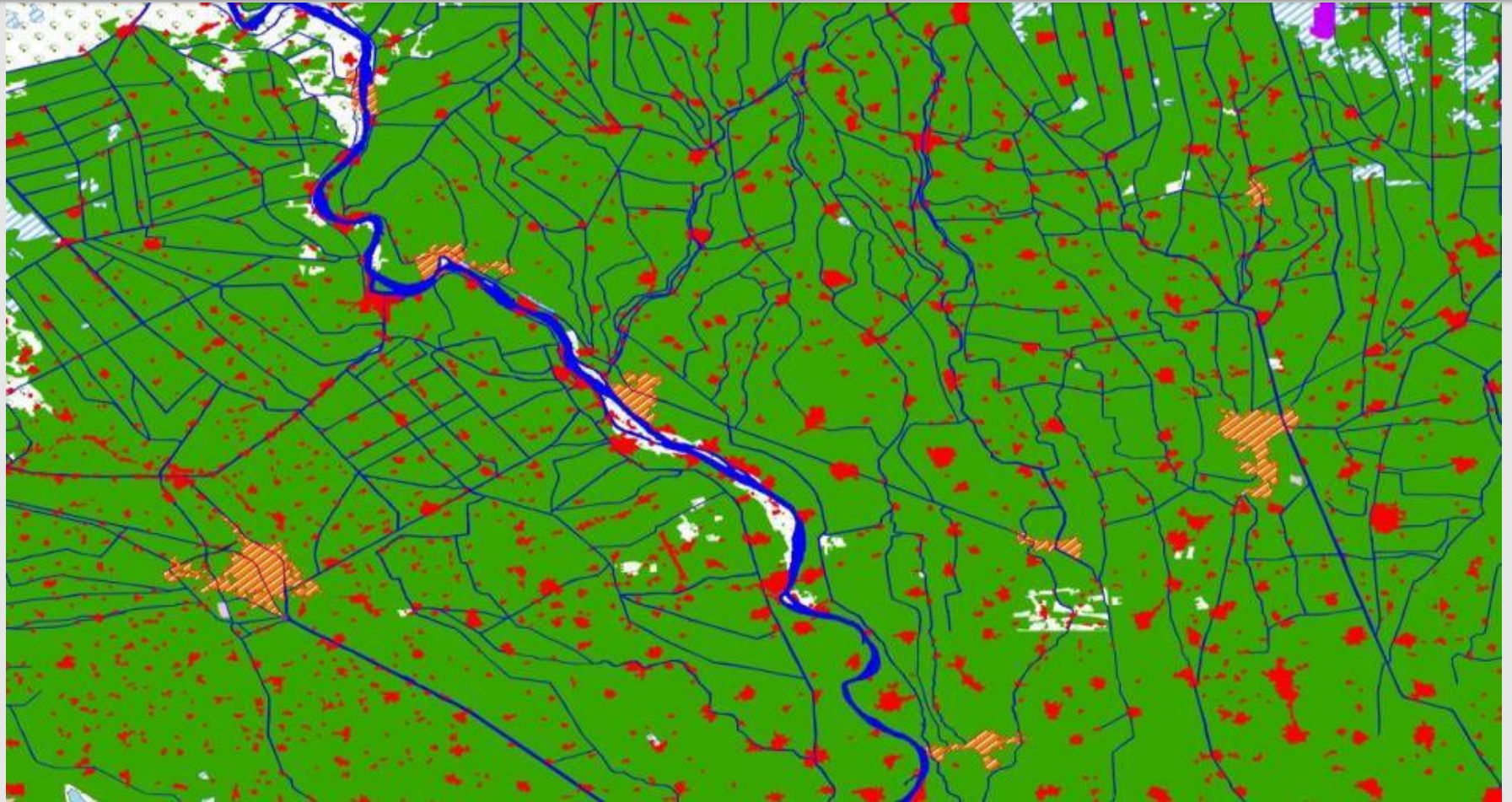
Delta of Nile River



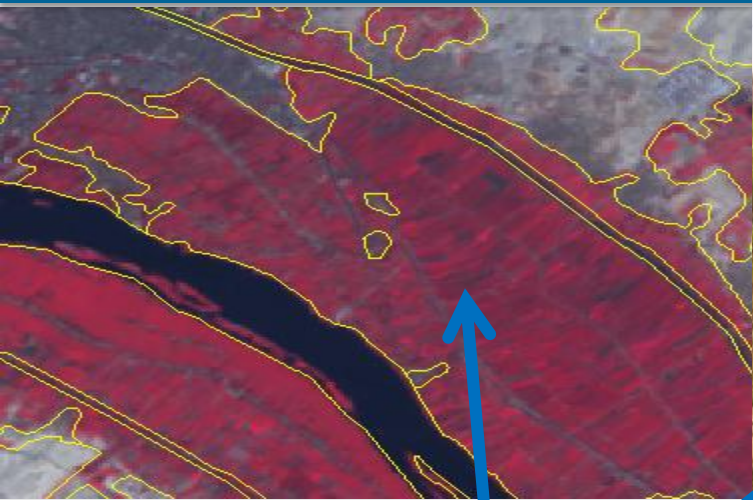
# Full Coverage of Land use



# Full Coverage of Land use



# Interpretation & Validation Process



Google earth photo

**Cash crops land**



Google earth photo

# Interpretation & Validation Process



**Industrial and mining sites**



Google earth photo

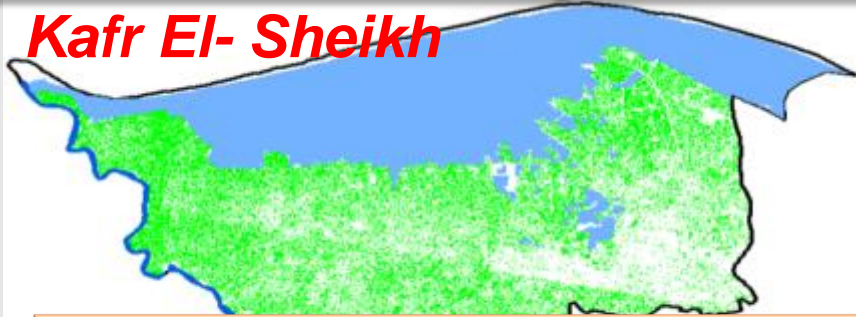
**GEO-CRADLE WS 25.05.2017**

# Monitor cash crops

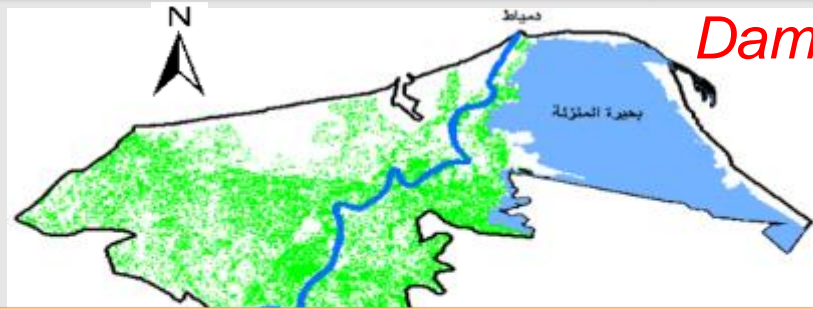
- [illegible]

# Food Security 1 “Rice Crop Monitoring”

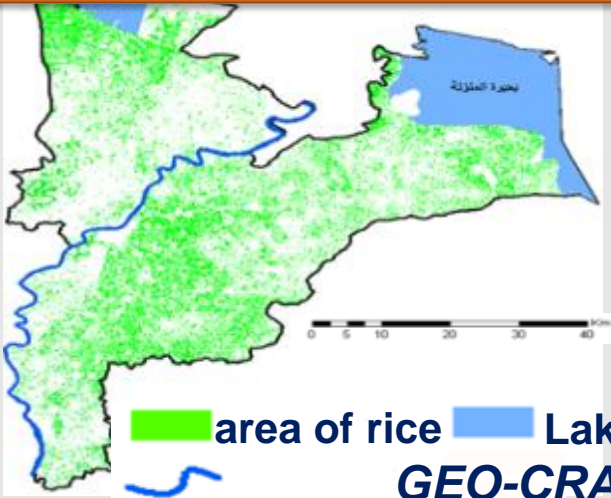
*Kafr El- Sheikh*



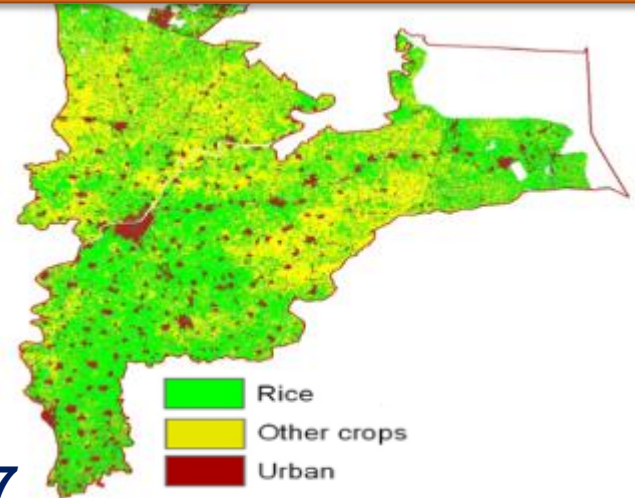
*Damietta*



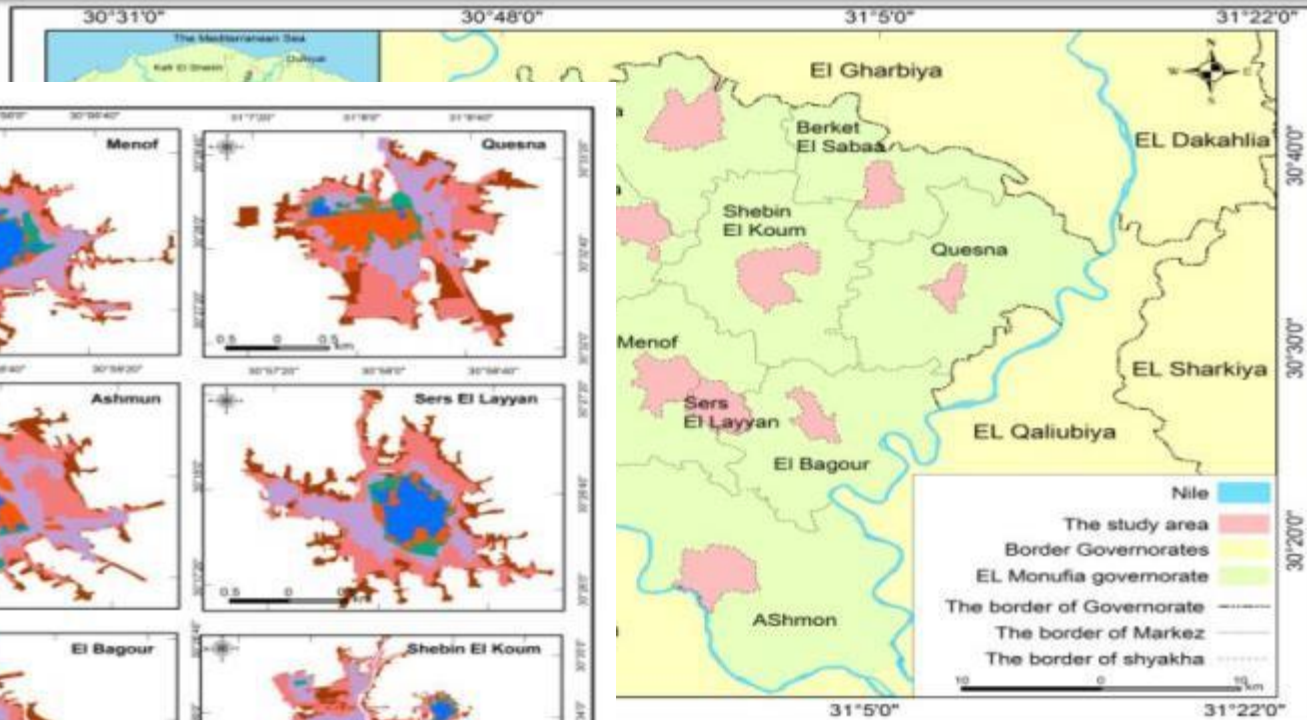
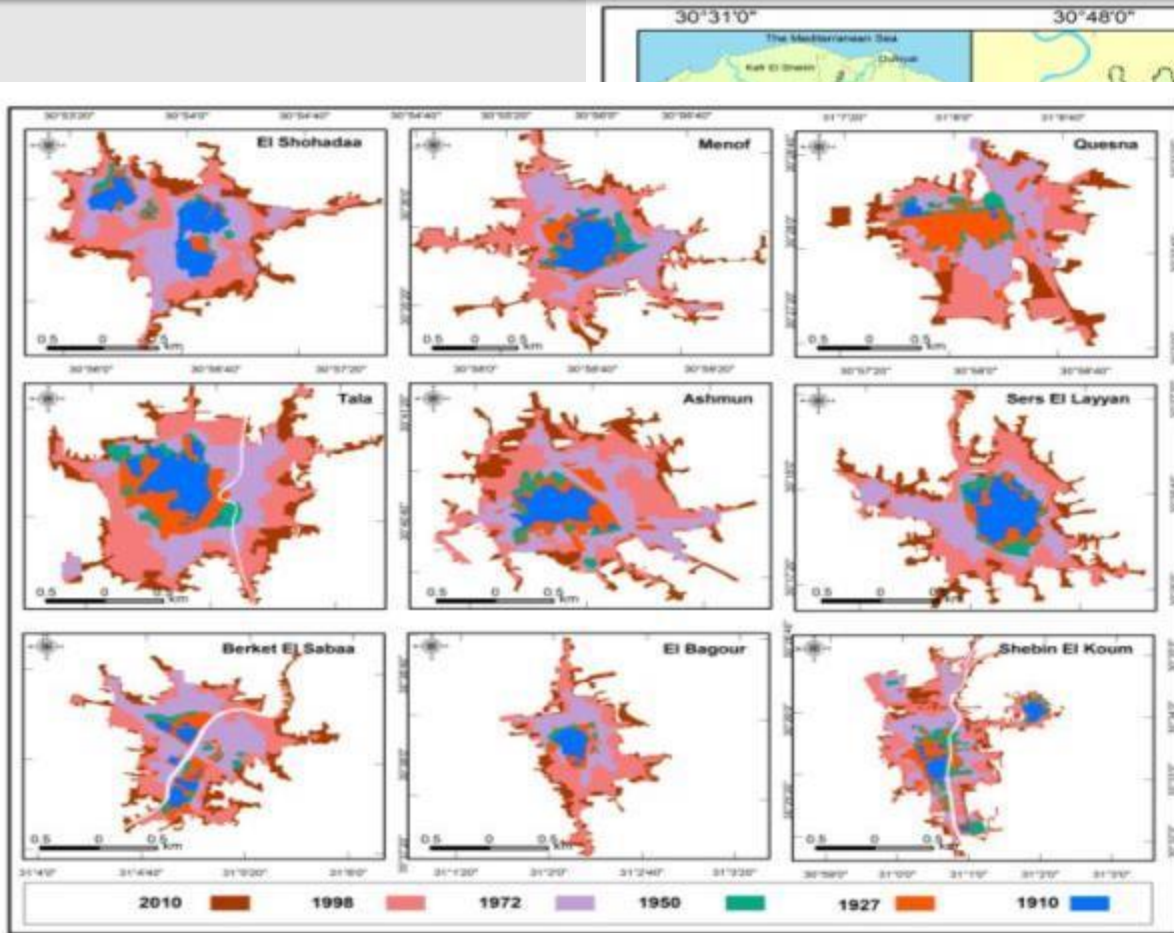
$$\text{Yield} = \int \text{NDVI} / \text{DVI} / \text{LAI} * \text{Coefficient}$$



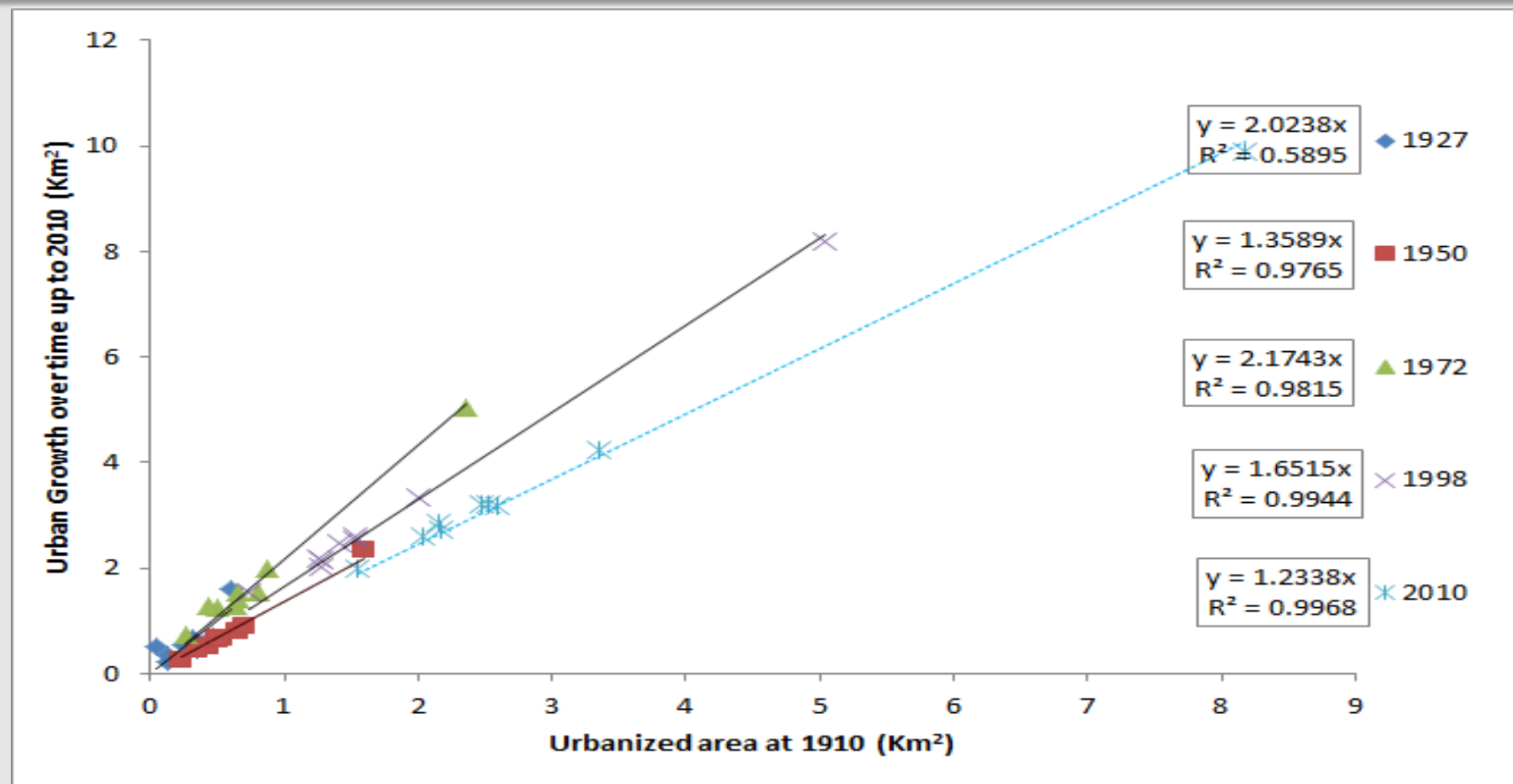
*El- Dakahleyia*



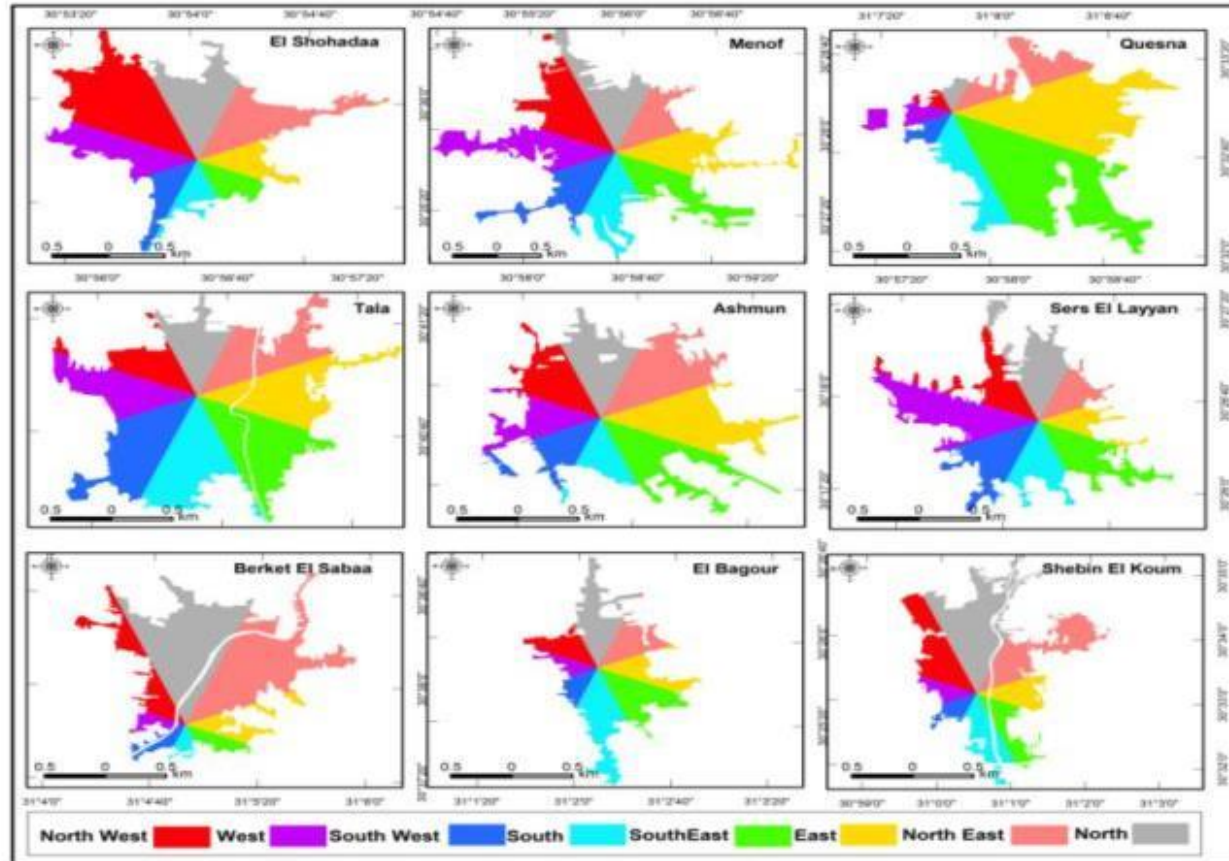
# Food Security 2 “Urban Growth Hazard”



# Urban Growth



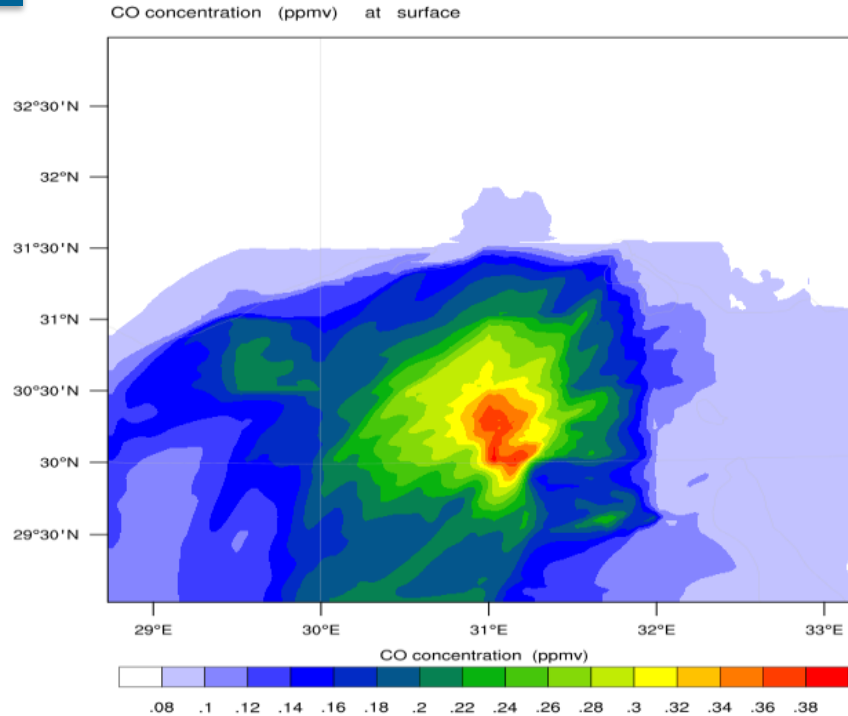
# Urban Growth



# Air Quality

REAL-TIME WRF2010-04-14\_00:00:00

Init: 2010-04-13\_00:00:00  
Valid: 2010-04-14\_00:00:00



## CO Concentration

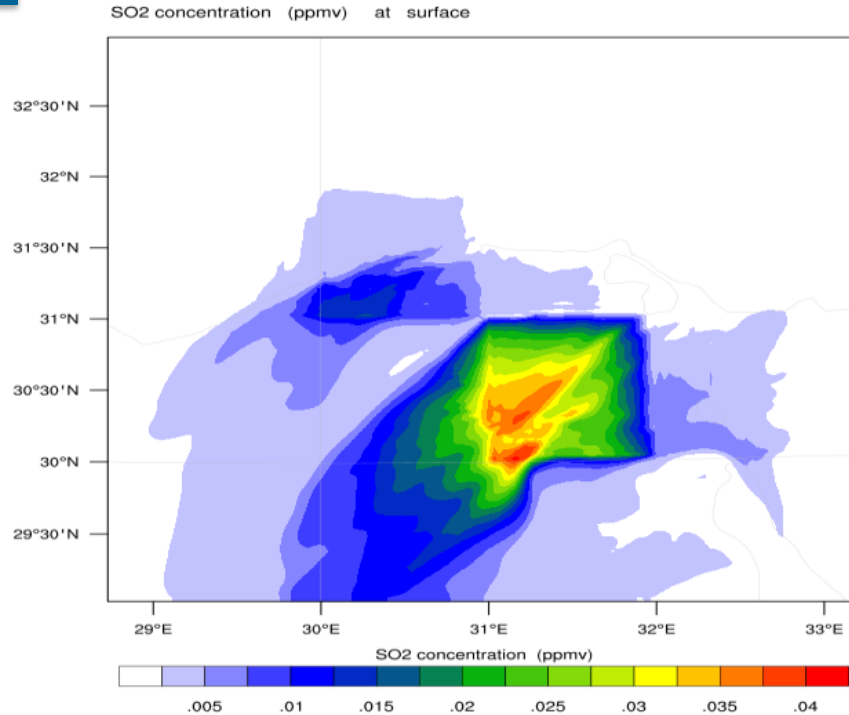
OUTPUT FROM WRF V3.0.1.1 MODEL  
WE = 148 ; SN = 148 ; Levels = 41 ; Dis = 3km ; Phys Opt = 4 ; PBL Opt = 1 ; Cu Opt = 5

# Air Quality

REAL-TIME WRF2010-04-14\_00:00:00

Init: 2010-04-13\_00:00:00

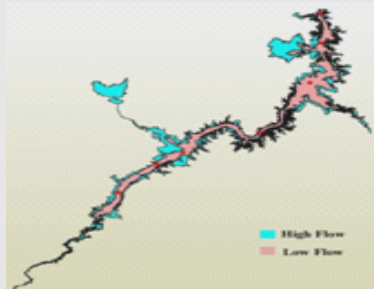
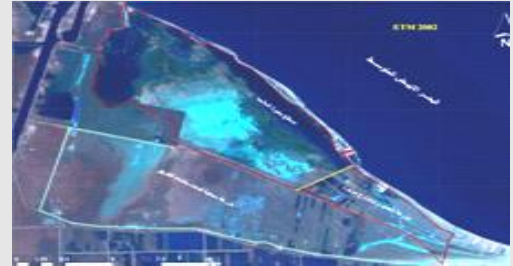
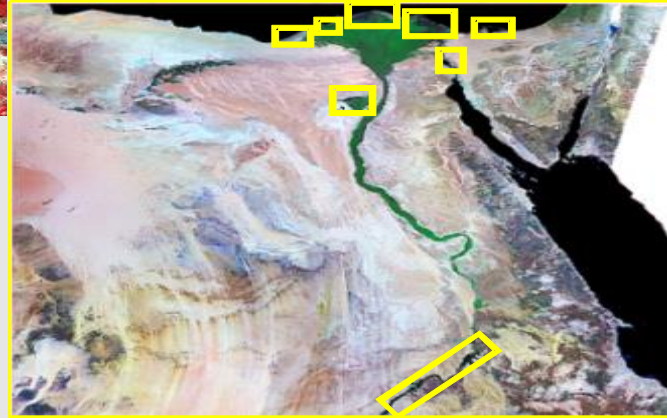
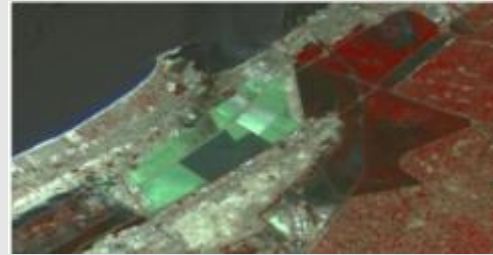
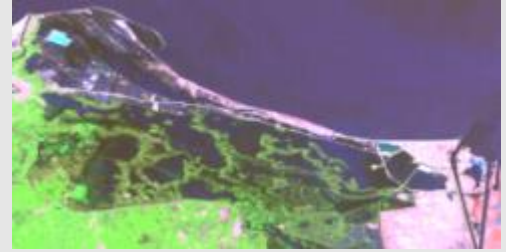
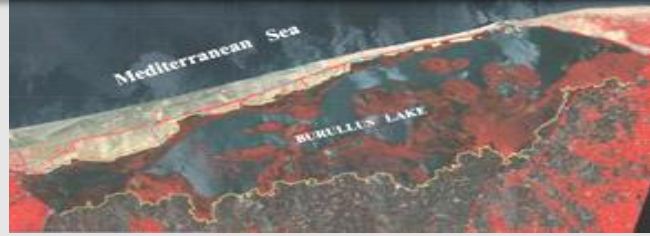
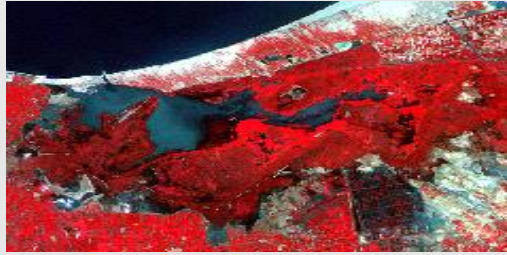
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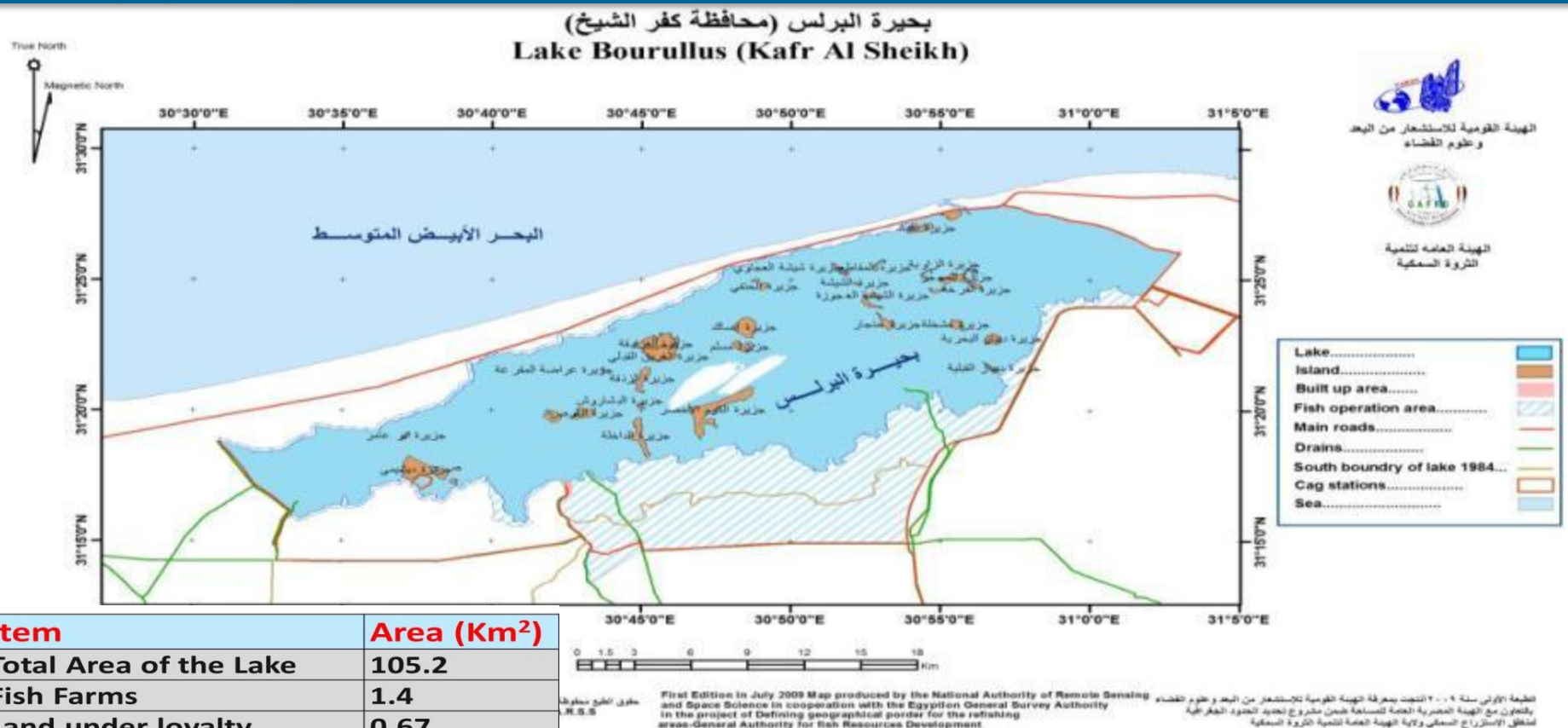
## SO<sub>2</sub> Concentration

OUTPUT FROM WRF V3.0.1.1 MODEL  
WE = 148 ; SN = 148 ; Levels = 41 ; Dis = 3km ; Phys Opt = 4 ; PBL Opt = 1 ; Cu Opt = 5

# Coastal & Marine Resources



# Mapping “Land Protection”



Item	Area (Km <sup>2</sup> )
Total Area of the Lake	105.2
Fish Farms	1.4
Land under loyalty GAFRD	0.67
Islands	1.4

# Coastal Development

Fish  
farming

Salt  
pans



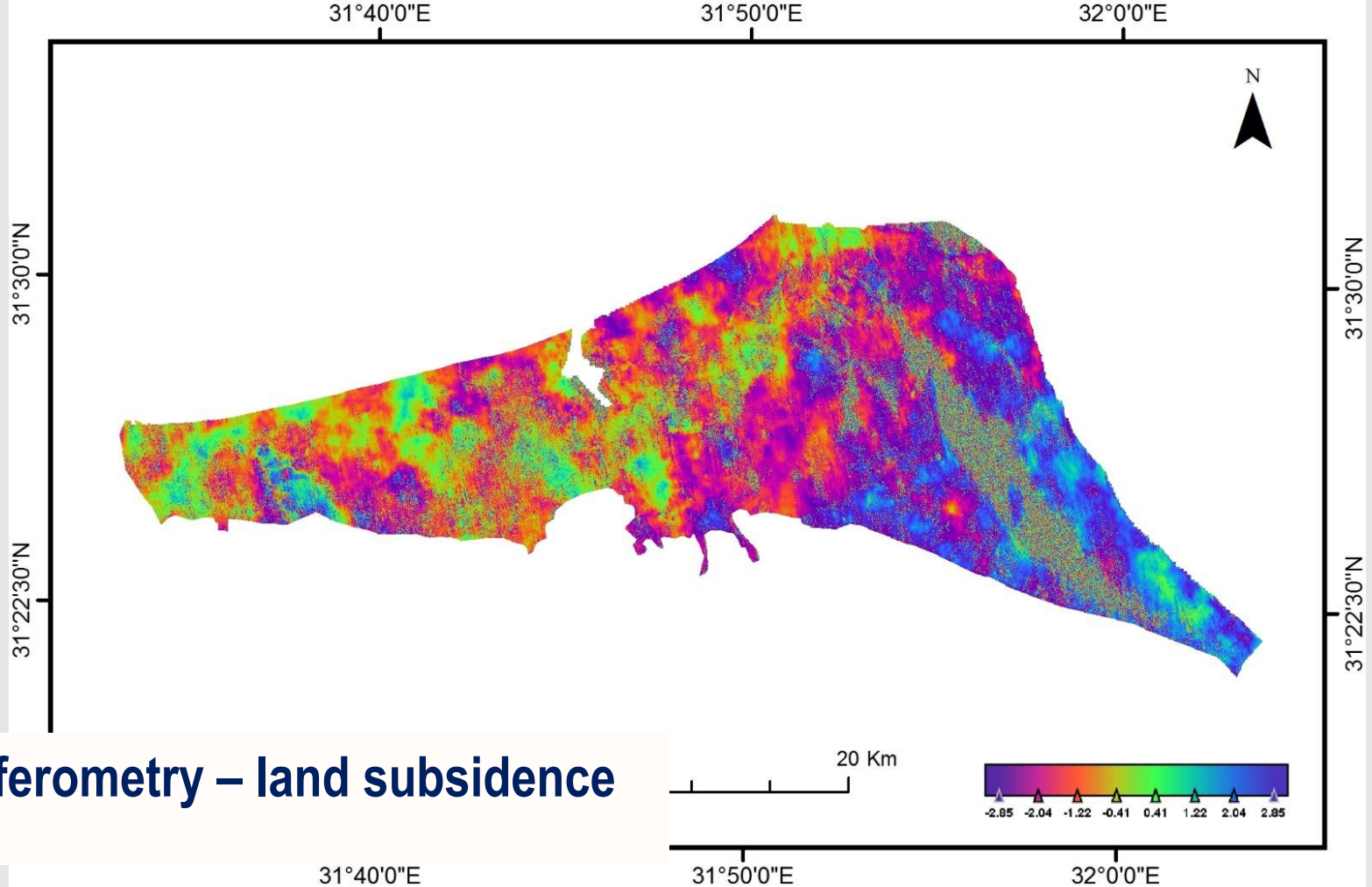
# Coastal Threat

Damietta Promontory lost 1.5 km between 1965-2008



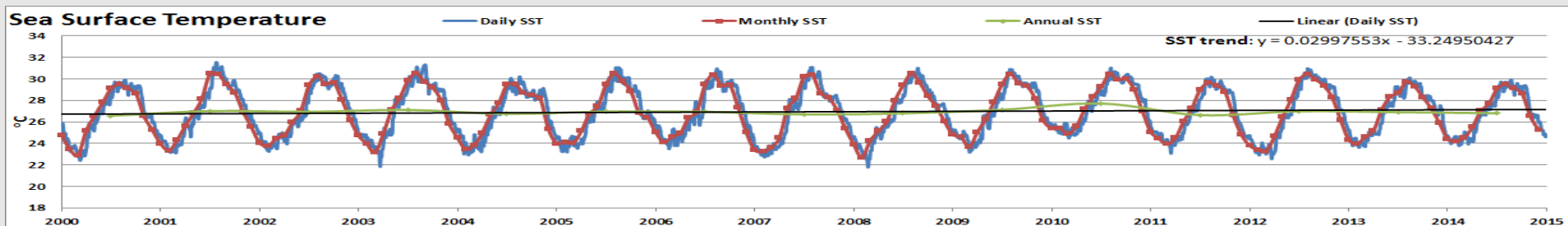
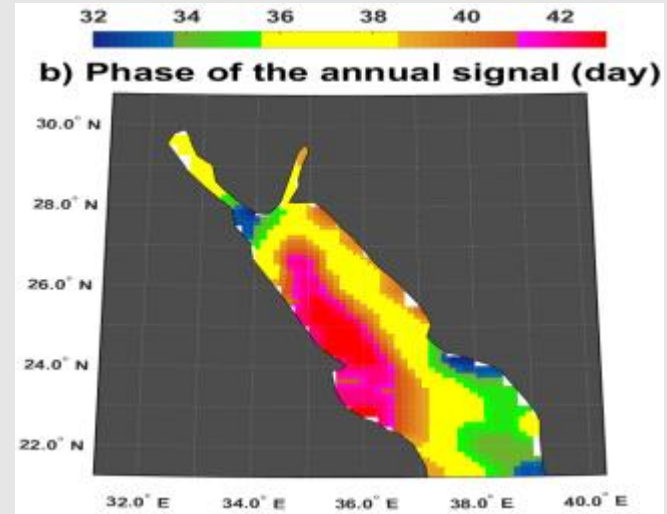
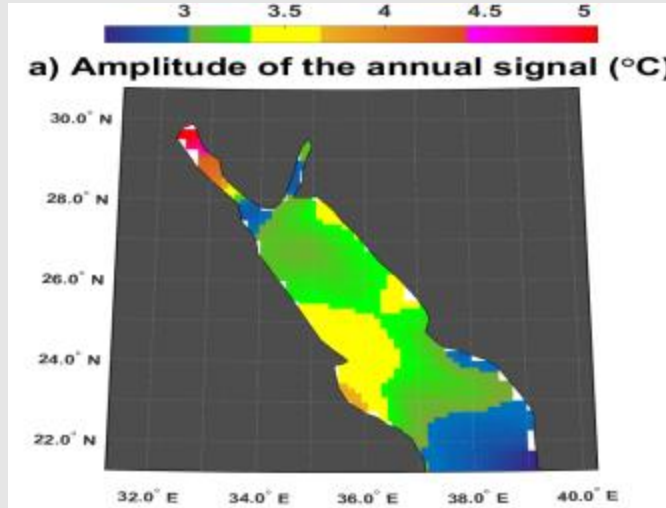


- The total area taken by the sea in the last 25 years 5.3 Km<sup>2</sup> with a yearly rate of 25 m/year
- This was estimated at a length of about 1002m
- The total area deposited in the last 25 years is 3.14 Km<sup>2</sup>

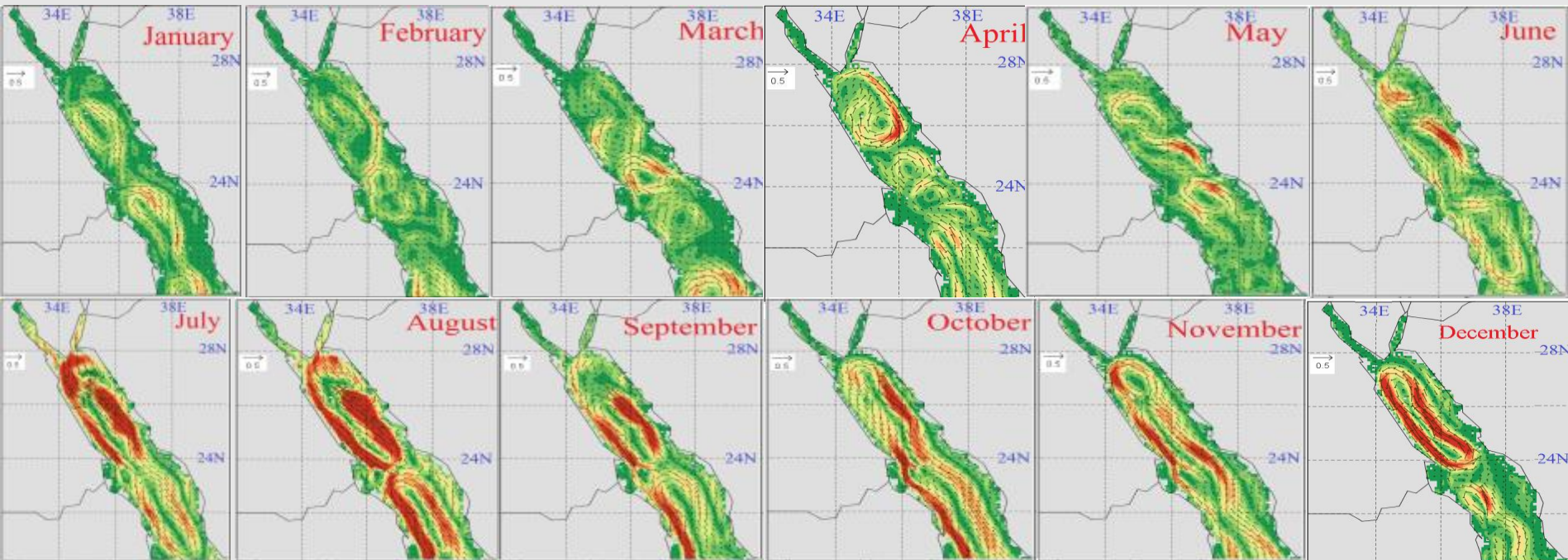
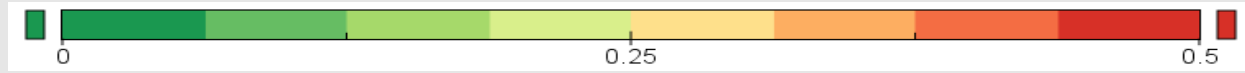


- Interferometry – land subsidence

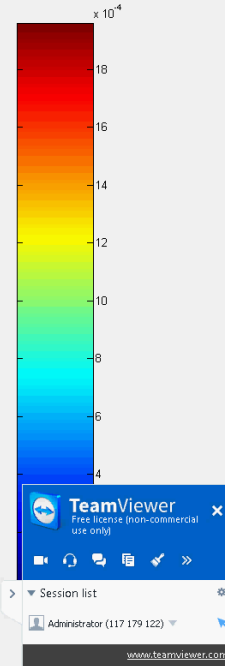
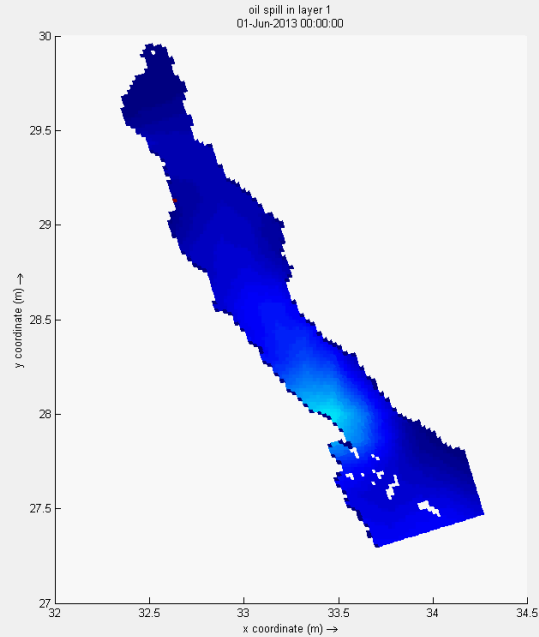
# Sea surface temperature with SST Fronts



# *HYCOM surface circulation*



# *6 months simulation of oil dispersion*





Thank you....