



Egypt



**Ministry of
Environment**

Climate Change Vulnerability & Adaptation in Egypt and NAP Process



EEAA

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Bonn, July 2016

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Introduction

Egypt's large and dense packed population makes the country extremely vulnerable to climate change.

Egypt does not produce enough food to feed its current population.

Its water resources also are rather limited.

Moreover, The studies have indicated that the following areas are the most vulnerable :

Agriculture, coastal zones, aqua-culture and fisheries, water resources, human habitat & settlements, human health and others.

The most vulnerable areas in the world (IPCC, 2007)

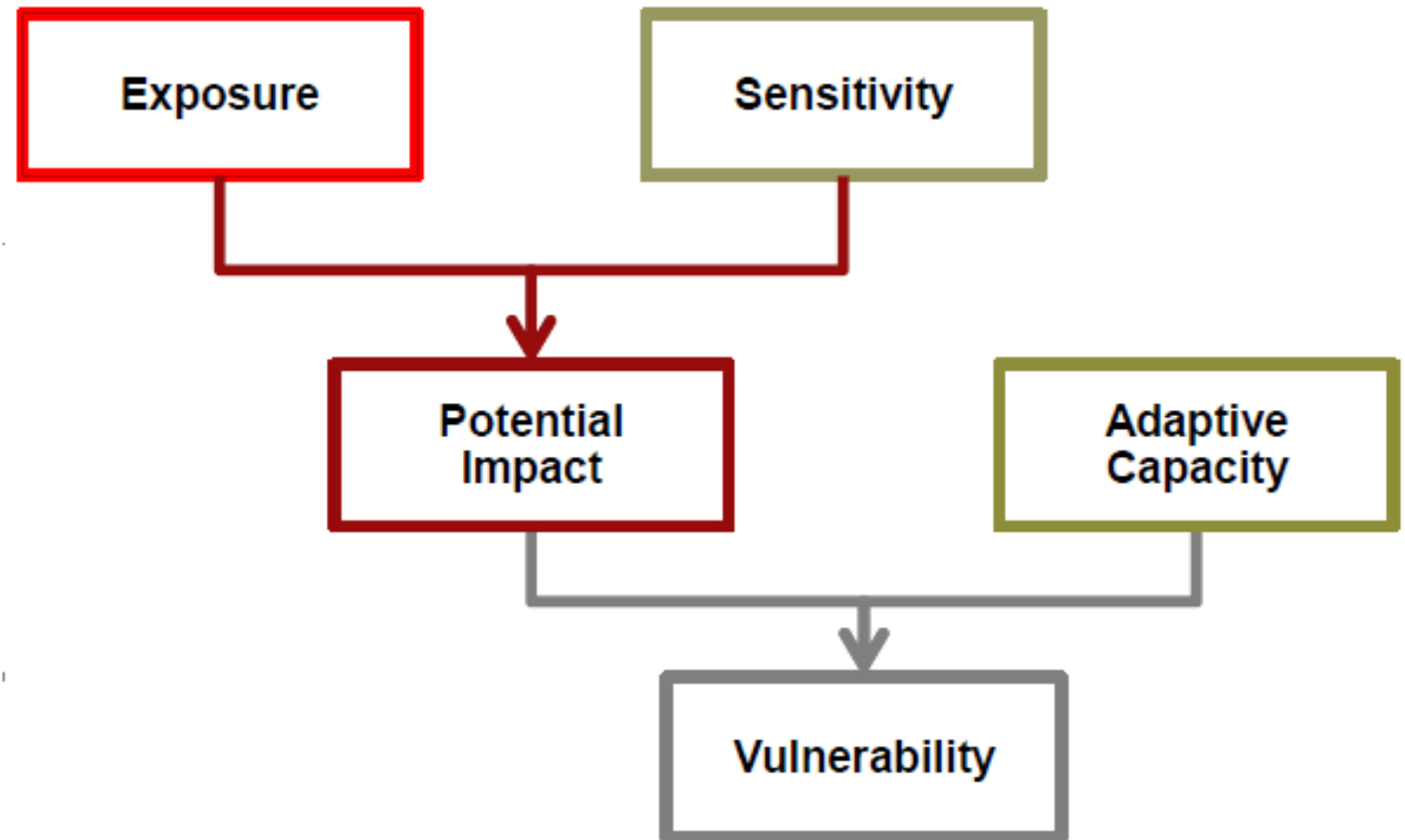


Vulnerability

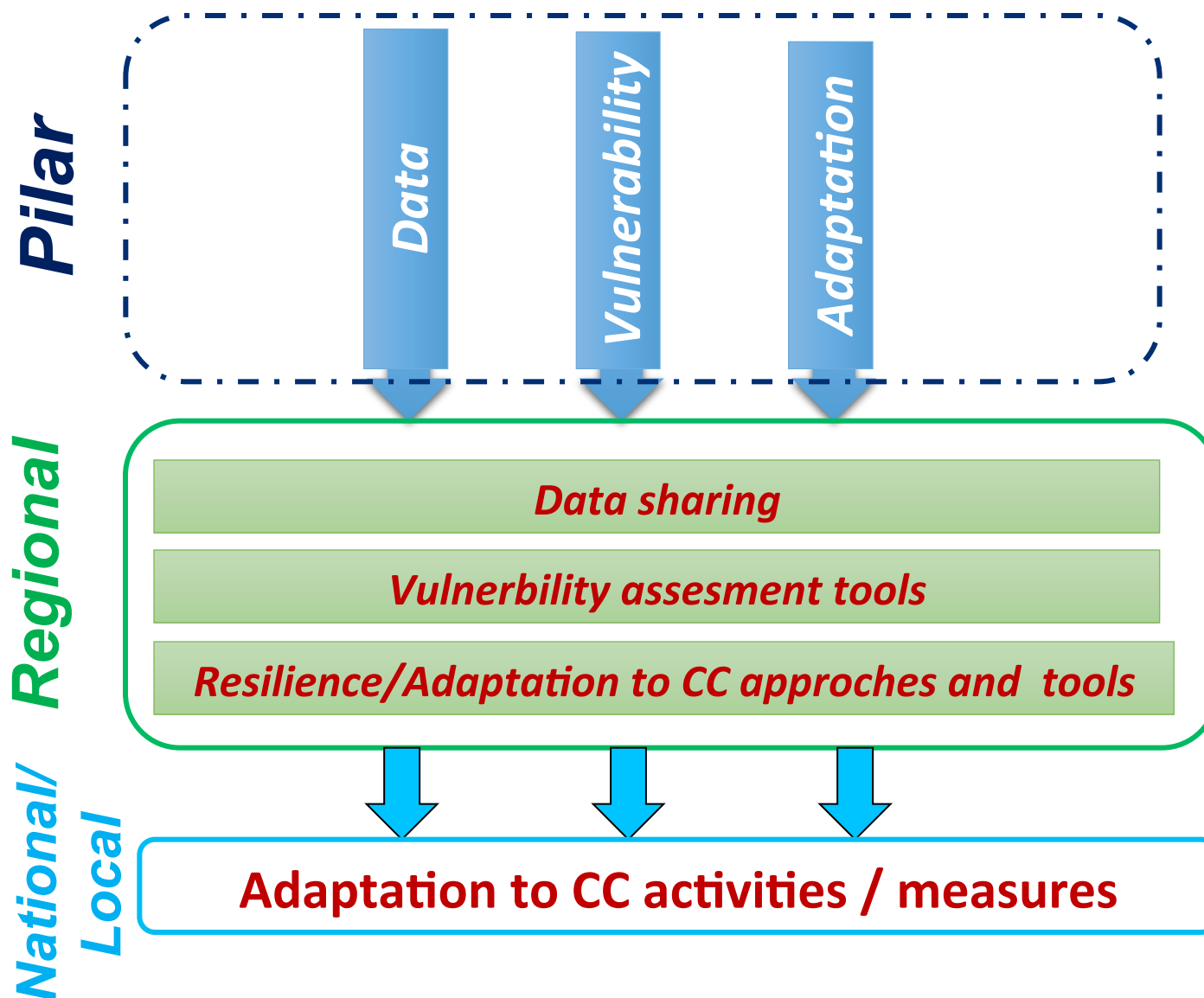
- **Exposure**
to Climate
Change
Risks

and

- **(Natural)
Adaptive
Capacity**
to Cope
with Risks

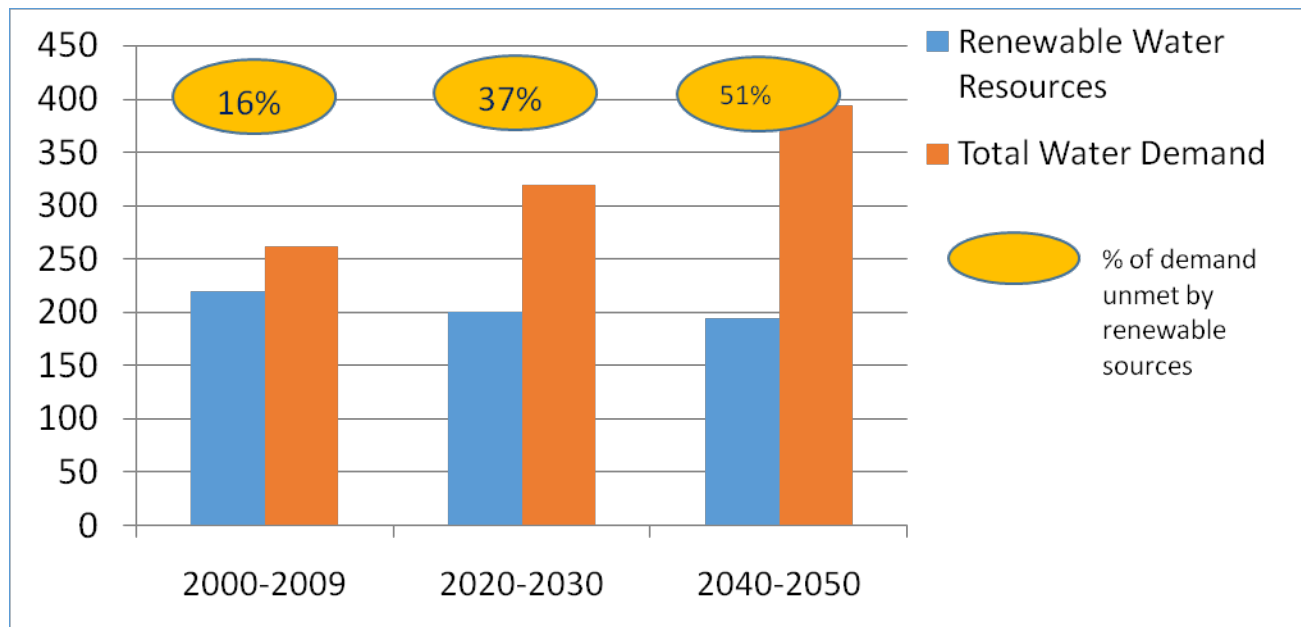


Core ideas to build the Resilience / adaptation to CC



Renewable Water Resources versus Total Water Demand through 2050

- **Water scarcity is a main constraint to socio-economic development in the region**
- **In 2040, the region will likely face a**
 - reduction in water run off by 10% due to climate change
 - 50% renewable water supply gap, hence water need to be e.g. imported, desalinated, etc.
- **Today, there is already 16% renewable supply gap for the region**
 - met by overexploiting renewable water resources, depleting groundwater and desalinating at high societal and environmental cost



Vulnerability of Egypt to climate change

What to expect ... As a result of climate change??!!

Although it is difficult to predict the effects of high temperature and sea level rise in the specific area, but there are many expectations:

- **Flooding large areas of the coastal plains**, which is considered one of the **best agricultural land** in the world.
- **Vulnerable the coastal installations (Coastal Constructions)** such as bridges, water barriers and Utilities also will increase the erosion of beaches.
- **Saltwater intrusion (Saline Water Intrusion)** to aquifers (Aquifers) and scarcity of water resources.
- **The difficulty of agriculture in arid regions** and increase the high temperatures of the demands on irrigation.

What we expect also?

- Reduction in **agricultural crop** and thus **shrinking food stocks**.
- You'll also find **some species** they are in an environment where the environment not having enough time to adjust.
- Declining **soil fertility** and worsening as the erosion change citizen of plants and increased drought and **changing rainfall patterns** will lead to the exacerbation of **desertification**.
- A lot of **disorder ecosystems** (Ecosystems) and **Biodiversity**.
- **Spread of pests** (Pests) and disease-carrying insects (Mosquitoes) that **transmit malaria**.
- The **accelerating frequency** of **climatic disasters** such as high **droughts, floods, storms** and other than harms to communities and their economies.

Delta Region

- **Risks through sea level rise on the costal zone, which is already subsiding at approximately 3-5mm/year around the Nile delta.**
- **Low lying Nile delta region, which constitutes the main agricultural land of Egypt and hosts most of the population, industrial activities and commercial centers, is highly vulnerable to various impacts of climate change.**

Delta Region (Cont.)

- **Rising sea level would destroy weak parts of the sand belt, which is essential for the protection of lagoons and the low-lying reclaimed lands in the Nile delta of Egypt (Mediterranean Sea).**
- **One third of Egypt's fish catches are made in the lagoons. Sea level rise would change the water quality and affect most fresh water fish. Valuable agricultural land would be inundated.**

Agriculture sector: vulnerability

- CC may lead to reduction in crop productivity

Crop	Change %		Reference
	2050s	2100s	
Wheat	-15*	-36**	(Abou- Hadid ,2006)
Rice	-11		(Eid and El-Marsafawy,2002)
Maize	-19		(Eid, El-Marsafawy, Ainer, El-Mowelhi, El-Kholi, 1997)
	-14	-20	(Hassanein and Medany, 2007)
Soybeans	-28		(Eid and EL-Marsafawy, 2002)
Barley	-20		(Eid, El-Marsafawy, Ainer, El-Mowelhi, El-Kholi, 1997)
Cotton	+17*	+31**	(Eid, El-Marsafawy, Ainer, El-Mowelhi, El-Kholi, 1997)
Potato	-0.9 to -2.3	+0.2 to +2.3	(Medany and Hassanein, 2006)

Coastal areas: vulnerability

- Sea level rise
- Impact on human settlements
- Impact on touristic villages in Northern coast (e.g Marina), thus impacting economy
- Impact on agricultural areas (saltwater intrusion)



Coastal areas: vulnerability

- Coral communities in the Red Sea would be exposed to bleaching due to increasing temperatures.
- Loss of habitats and loss of biodiversity.
- Fish stocks will be moving northward to deeper waters.
- System dynamics of the Northern lakes of Egypt will change.

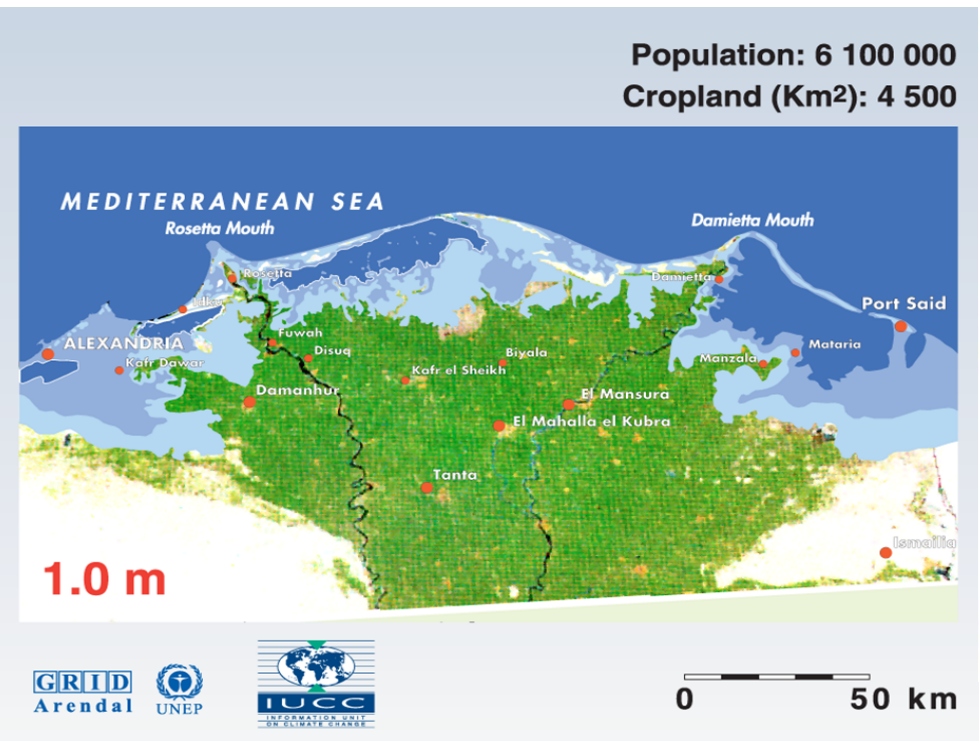


Coastal areas: vulnerability

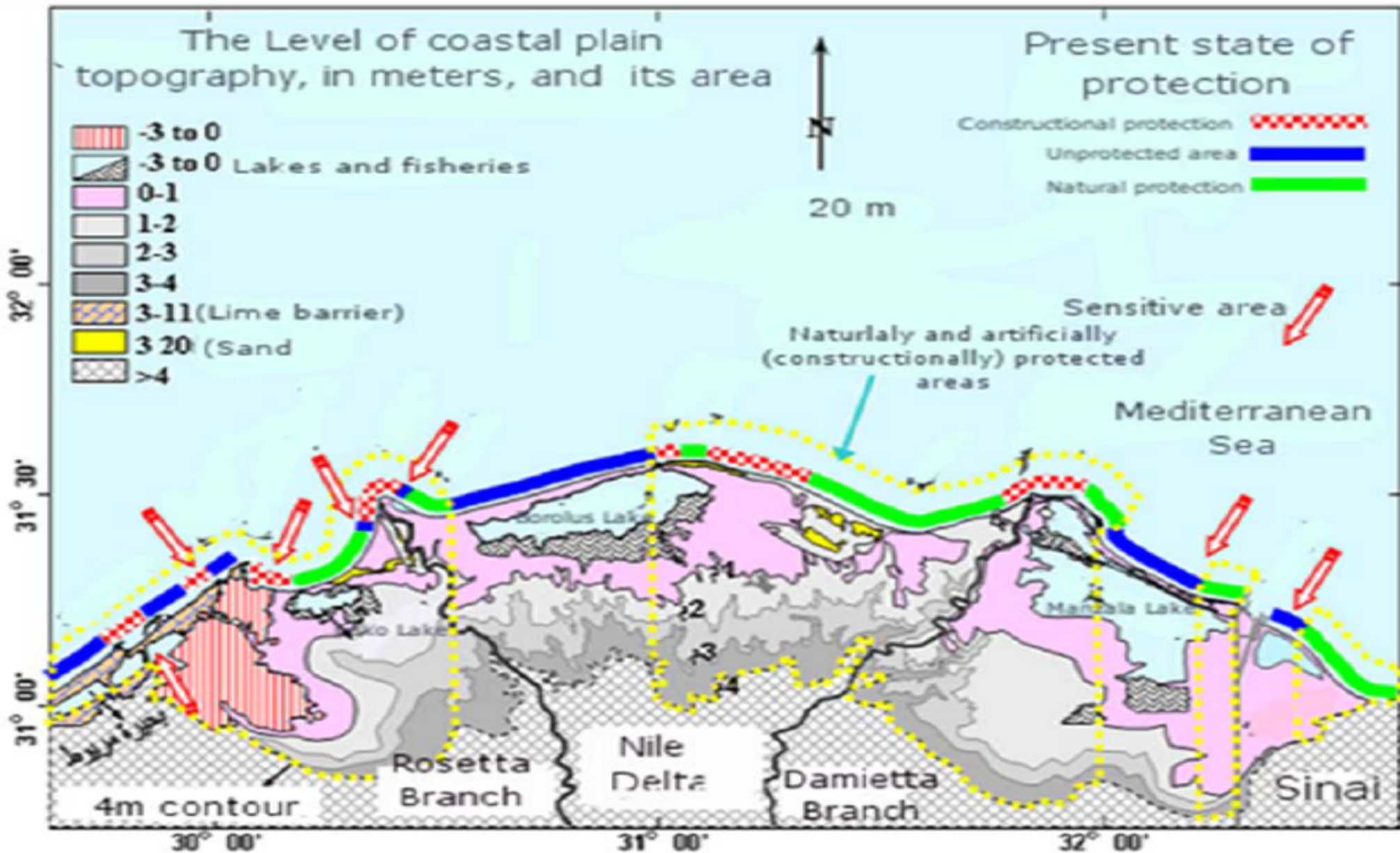
- **Biological marine systems**
- **Coastal dynamics**
- **Inundation**
- **Saltwater intrusion**

Coastal areas: vulnerability

- Some coastal low lying land could be inundated in the Nile Delta.



Vulnerability of Costal Zones



Total affected area and its percentage to the Nile Delta area

	With protection	Without protection
Area (km ²) 2030	152.9	1150
% of Nile Delta	0.6	3.9
Area (km ²) 2060	450.0	3100
% of Nile Delta	1.9	12.0



Threatened Areas due to SLR in the Nile Delta

Potential inundation of Nile Delta from high SLR in 2060

Vulnerable Cities in Coastal zone

Alexandria City:

A scenario involving a Sea Level Rise (SLR) of between 0.5m and 1.0 m is assumed. If no action is taken, an area of about 30% of the city will be lost due to inundation, almost 2 million people will have to abandon their homes, 195,000 jobs will be lost and an economic loss of over \$ 35.0 billions. The most severely impacted sectors are agriculture, industry and tourism, respectively.

Rosetta City:

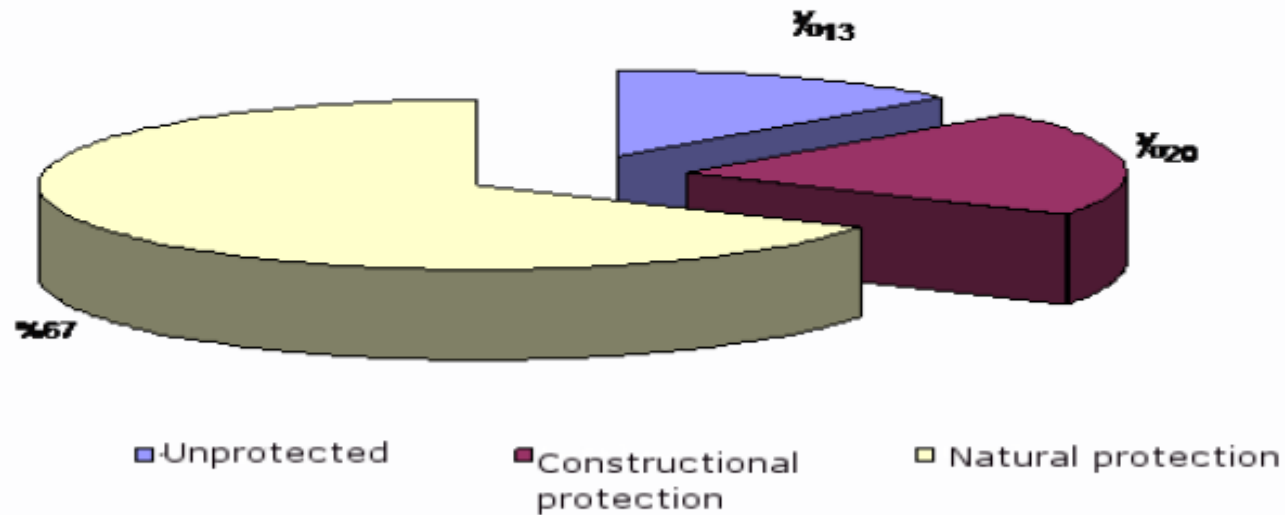
The expected economic losses in land cover of Rosetta for a sea level rise of 0.5 m were estimated. Studies showed that about 1/3 of the employment in the city will be affected and a loss of about \$ 2.9 billion is expected.

Port-Said City:

Several studies point out the high vulnerability of the city to sea level rise. The most affected sectors are expected to be the industrial, transportation and urban sectors. Agriculture is not affected, because it is mainly found in El Dawahy district which is not affected by the rise in sea level. A loss of employment of 6,759 jobs is expected due to a SLR.

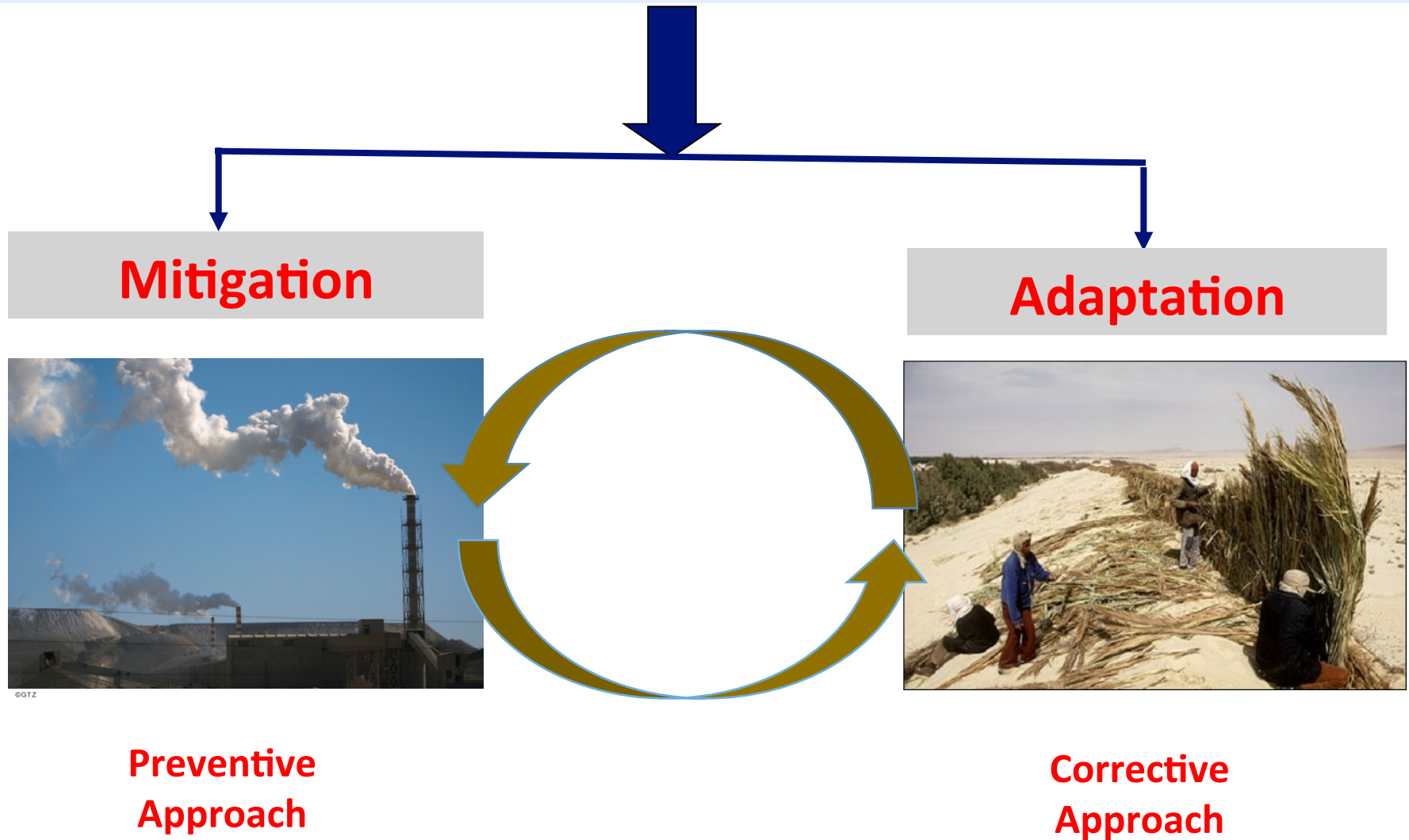
The Coastal Zone in Alexandria City

Protection status of the coast of Alexandria city



Adaptation

How to Adapt with climate change ?

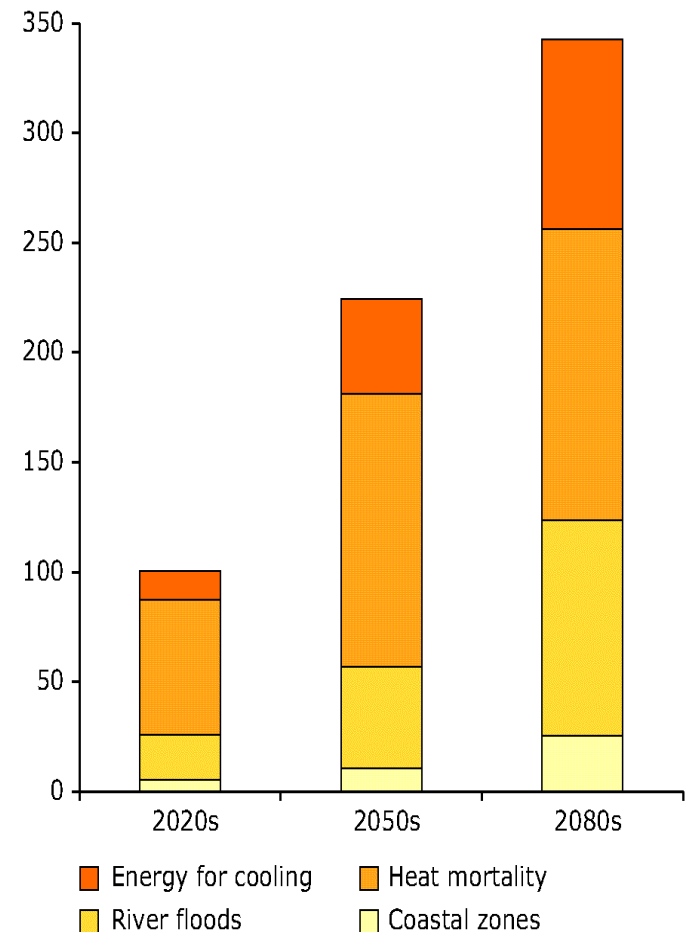


To adapt or to mitigate: Is that the question?

Mitigation and adaptation are both necessary and complementary.

- **We need to increase mitigation efforts.** If the 2°C target is missed, adaptation increasingly costly.
- **We need to adapt.** Adaptation is inevitable (delayed impact of emissions). Adaptation is cheaper
 - 1€ invested in flood protection saves 6 € damage costs.
- **We need to act now.** Postponed adaptation and maladaptation will lead to higher damage costs.

Projected damage costs, A1B, billion EUR per year, undiscounted



Proposals for combating climate change

- Logical solution optimized to address climate change **is to stop emissions significantly**
- Increase the **forestry** and changing agricultural **practices**.
- Reduce dependence on **fossil fuels** as the primary source of energy and seek forward to providing **clean energy sources** (renewable energy production **from wind, water and sun**).
- Recycling & walking and the use of **mass transportation** and reduce consumption (Turning Down) and lights-out time of departure (Switching Off) and **change behaviors**.

Preventive measures

To reduce the risk of flooding requires speed to take the necessary measures to control high groundwater levels are as follows:

- immediately stop of domestic exchange in groundwater in all villages in Delta and the work covered drainage systems to reduce groundwater levels in all coastal cities.
- Reduce leaching rates of irrigation water to groundwater through the use of modern irrigation methods.
- Water re-use and recycling to reduce wastewater and reduce its negative effects.

Preventive measures

- **The construction of waves walls along our coasts.**
- **The Nile Delta will not be with the effectiveness meaningful protection from flooding coastal areas unless it is to control the continuing rise in groundwater levels to those areas.**
- **The problem may increase to include flooding the coastline groundwater.**

Adaptation Process

Address the opportunity and challenges

- **The opportunities:**

- 1. Adaptation Strategy**
- 2. Some individual results**
- 3. Some expertise in the field**
- 4. Study about what we need?**

- **The Challenges :**

- 1. Technical support**
- 2. Financial resources**
- 3. Coordination and cooperation between the relevant stakeholders**
- 4. Legal and Institution**

The Process

- **Identifying available information on climate change impacts.**
- **Addressing capacity gaps and weaknesses in the NAP process.**
- **Compiling and communicating NAPs**

The Process

(cont.)

- **Reviewing and Evaluate the adaptation options**
- **Prioritizing CC adaptation in national planning**
- **Integrating CC adaptation into national and sub-national development and sectoral planning**

What we have ?

- **Proposal of short and long term of national adaptation plan**
- **Start to enhance capacity building for planning and implementing adaptation plans in all sectoral level.**

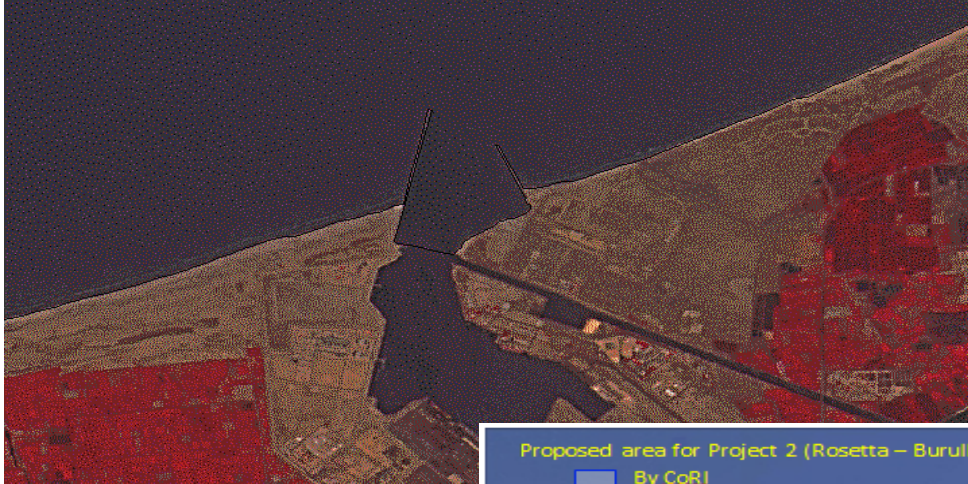
Lesson learned

Coastal Zone Protection Activities

- **Sand Dunes** systems should be treated as the first defensive line for the Nile Delta.
- **Coastal Lakes** are appropriate adaptive measure against sea level rise.
- **International Coastal Road** may be considered as the second protection measure and studies to support it are urgently required.
- **Coastal Protection work** needs regular maintenance and should be considered in any coastal zone management plans.

1- Utilizing Dredged Bed Material from Damietta Port Approaching Channel in Beach Nourishment

Proposed nourished areas



2- Coastal Sand Dunes Stabilizing



International coastal road

3- Managed Alignment

**Ras-El-Bar City shore
before Shore
protection**



**Ras-El-Bar City
shore After Shore
protection**



Shore Protection in different regions



Shore Protection in different regions cont.



Top Agriculture Policy

- **Certified seed / Stress tolerant varieties**
- **Crop pattern under climate change**
- **Focus on Crops that consume little water**
- **Consider Focus on Cotton**
- **Protect old and new Agriculture land**

Examples of the agriculture adaptation



Stresses tolerant varieties (heat & salinity)

Specify deficit irrigation (di) management levels and recommendations that could be applied under different agricultural systems in targeted areas.

Wheat



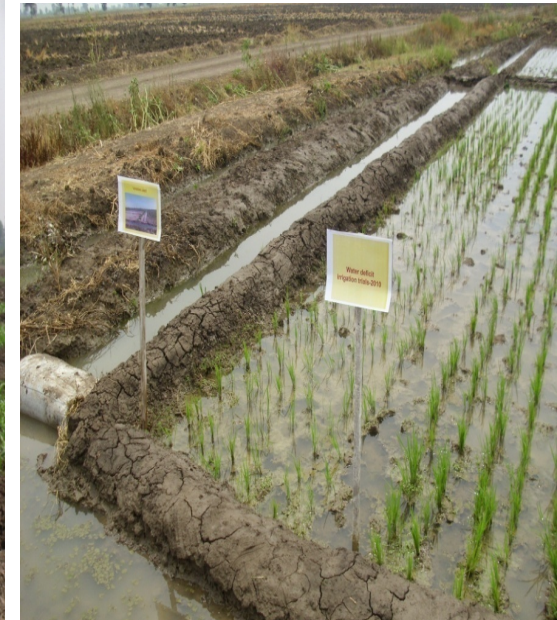
Faba beans



Maize



Rice



Hydroponics in severe salinity lands

strawberry

Cantaloupe

Tomato

Snap beans

Lettuce



Adaptation Needs

Estimated overall costs for adaptation measures for agriculture and coastal zone at 2020 and 2050 in Egypt

Program	Financed Needed (million US\$)	
	2020	2050
Observation and control of climate change	90	210
Land and agriculture production	311	948
Irrigation	2055	2150
Socio-economic studies	16	28
Capacity building, enlightenment and training	17	51
Coasts and shore regions	330	620
Total	2719	4007

(Source: Egypt National Environmental Economic and development Study (NEEDS) for Climate Change, April 2010.
Prepared in cooperation with UNFCCC

Conclusions

- Egypt adaptation strategies to CC impacts in water resources sector **is closely linked with development.**
- Egypt already **faces major water management challenges.**
- It is Clear that **reduction in Nile supply** due to CC may increase the problem.
- Thus, it is crucial for Egypt to increase its **understanding of the potential risks from CC and to reduce its vulnerability** to these effects.

Recommendations

1. Political **will** at **all** levels.
2. **Human resource management, financial and technical are needed.**
3. **Development of legal and institutional frameworks.**
4. Establish **systems for evaluation, monitoring and follow-up and performance indicators for :**
 - **Vulnerability Assessment**
 - **Loss and damage Assessment.**
 - **Financing: Support / help partners to benefit from funding through various funds (GCF, AF, GEF, EU, bilateral... etc).**
5. Develop a **national model** for the **analysis and prediction of socio-economic impacts .**

For more information :

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Thank You