The Research and Policy Forum on Climate Change and Environment in the Arab World

at the

Issam Fares Institute for Public Policy and International Affairs, AUB

presents

"Climate Change, Water and the Policy-Making Process in the Levant and North Africa"

A closed workshop with leading water experts from the Levant

AUB, Tuesday, August 4, 2009

Issam Fares Institute for Public Policy & International Affairs | American University of Beirut

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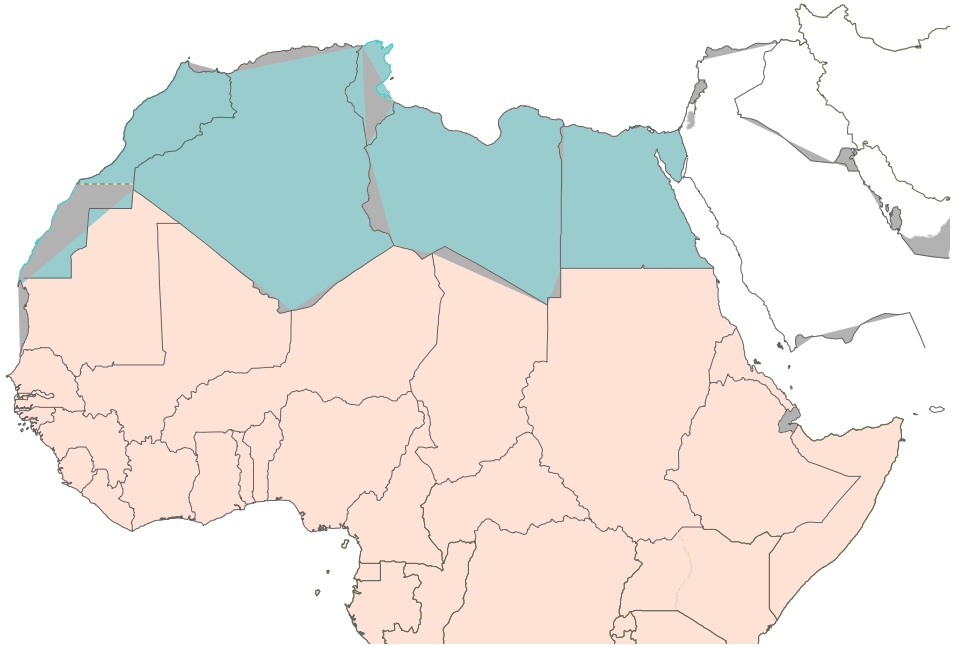
Climate Change in the Levant and North Africa Region:

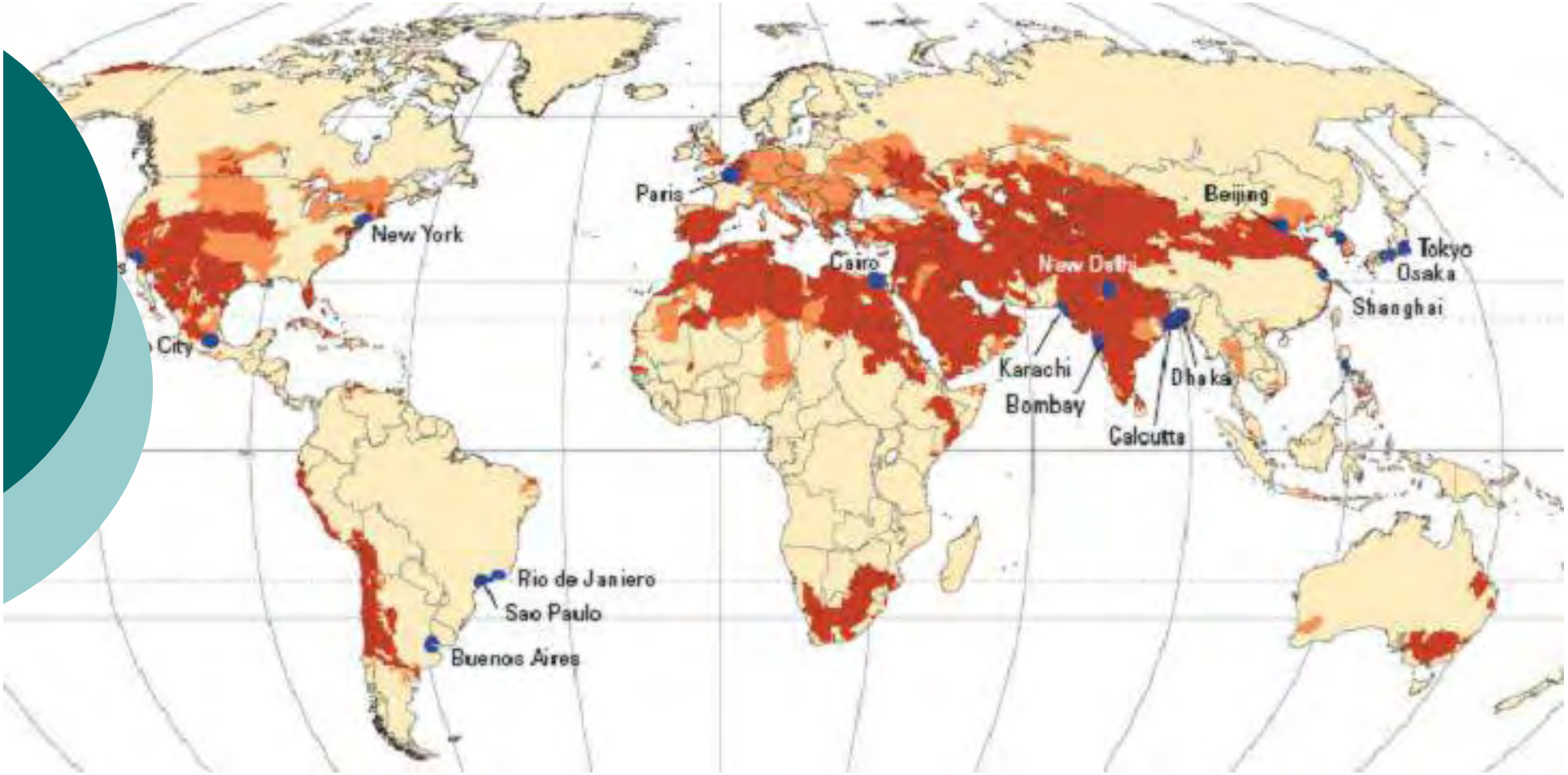
An assessment of implications for water resources, regional state of awareness and preparedness, and the road ahead.



ANTOINE HREICHE, PH.D., P.ENG.
Universite Saint-Joseph

Presentation Outline

- Water Resources Status
- North Africa's Climates
- Climate Change adds new complexity
- Impacts
- What can be done?



Low water stress Medium water stress Severe water stress

The majority of the mega cities were found along the coasts. These regions are experiencing mild to severe water stress (particularly in **North Africa, Middle East**, Asia, Western United States).

North Africa

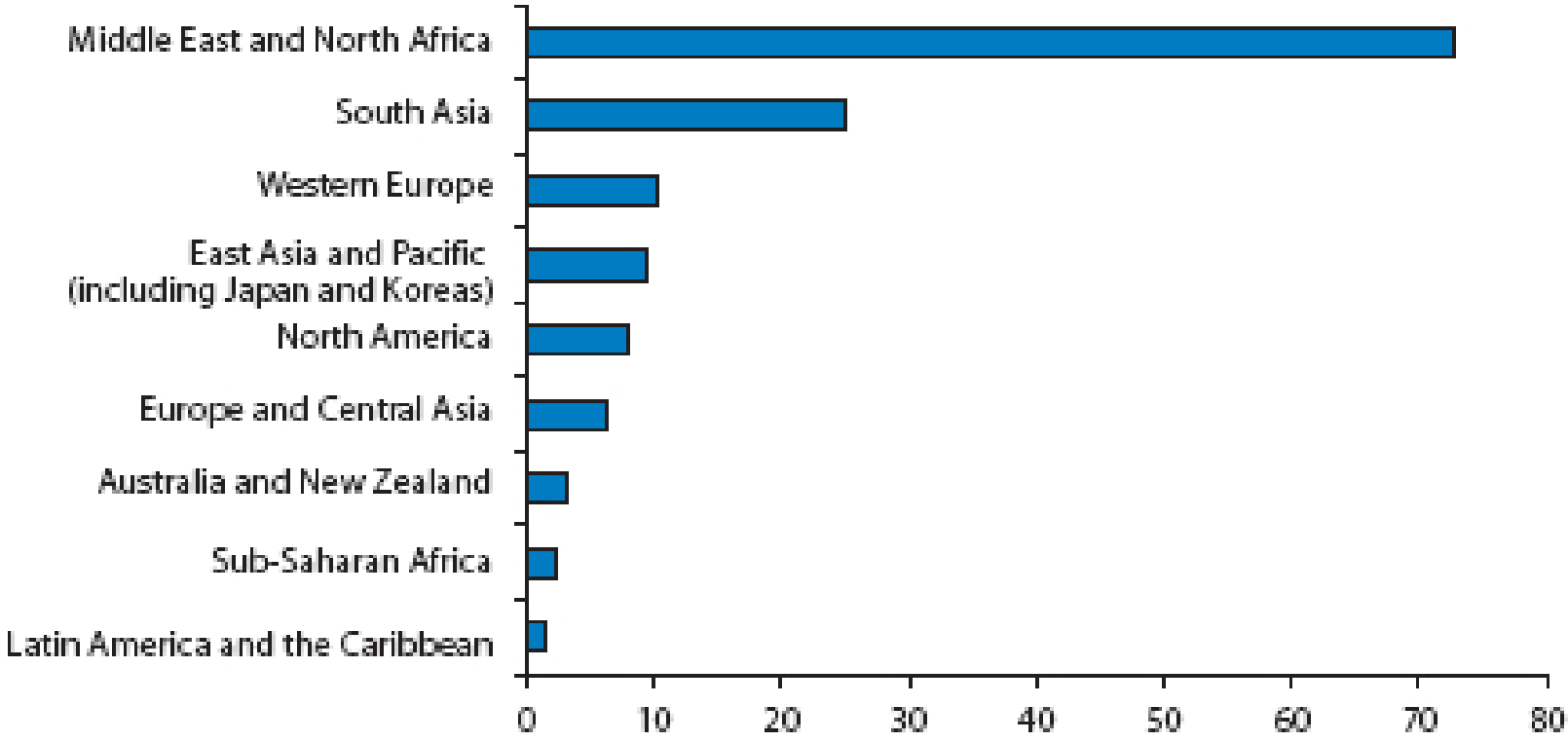
- **The population of the LNA region is about 6% of the total world population**

Water Resources Status

- LNA region is considered to be the most water scarce region in the world, with the highest levels of water deficit.
- Per capita renewable water resources in the region, which in 1950 were 4,000 m3 per year, are currently 1,100 m3 per year (the LNA region falls far below the global average of 8000 m3 per year).
- In 14 countries in the region, per capita water resources are less than 500 m3 per year.

Water Balance

- LNA region is rapidly approaching full utilization of its available water resources: about 80% of the total water resources



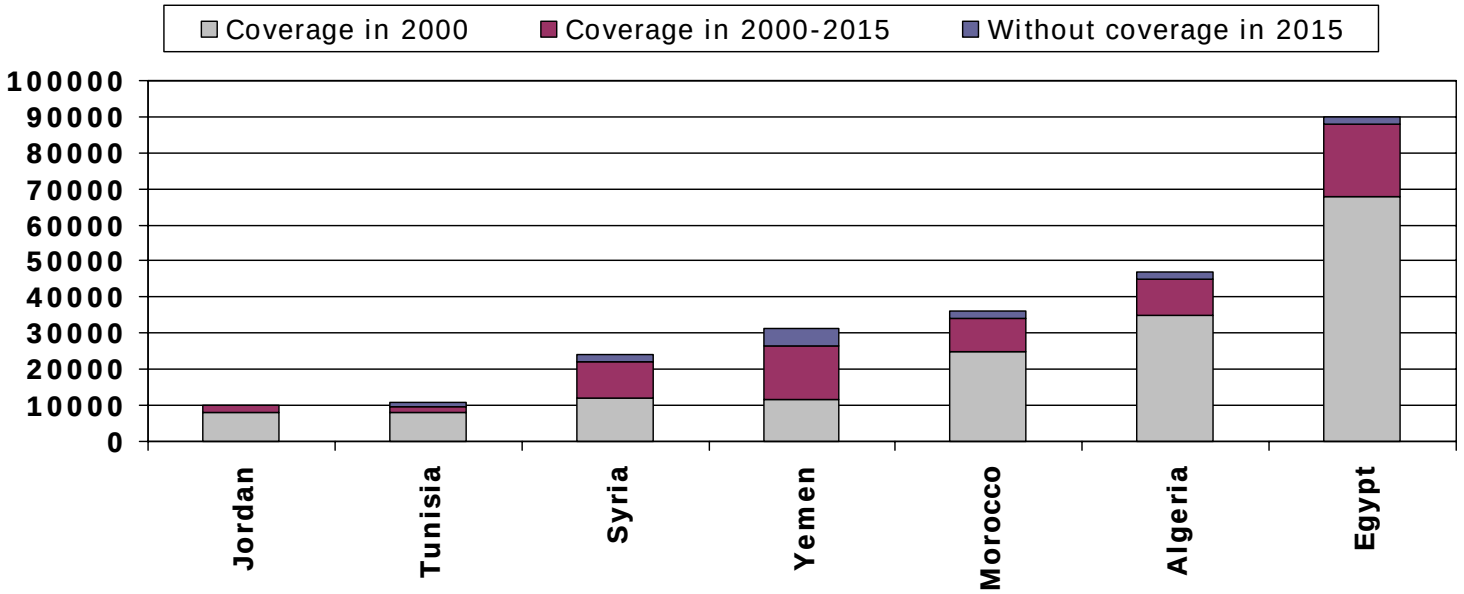
Source: World Bank, 2007

Water Balance

- The forecast of water requirements depends on future economic and demographic trends
  - Water to agriculture remains the most important (85%) followed by industry and tourism sectors (10-15%)
  - The domestic (urban and rural) water requirements will increase with the population growth.
  - Industrial and tourism water requirements may be multiplied by a factor equal to 2 or 3.

State of Water

- Many people still lack access to safe water:



Population with Water Coverage

Total population without coverage: 22.6 million

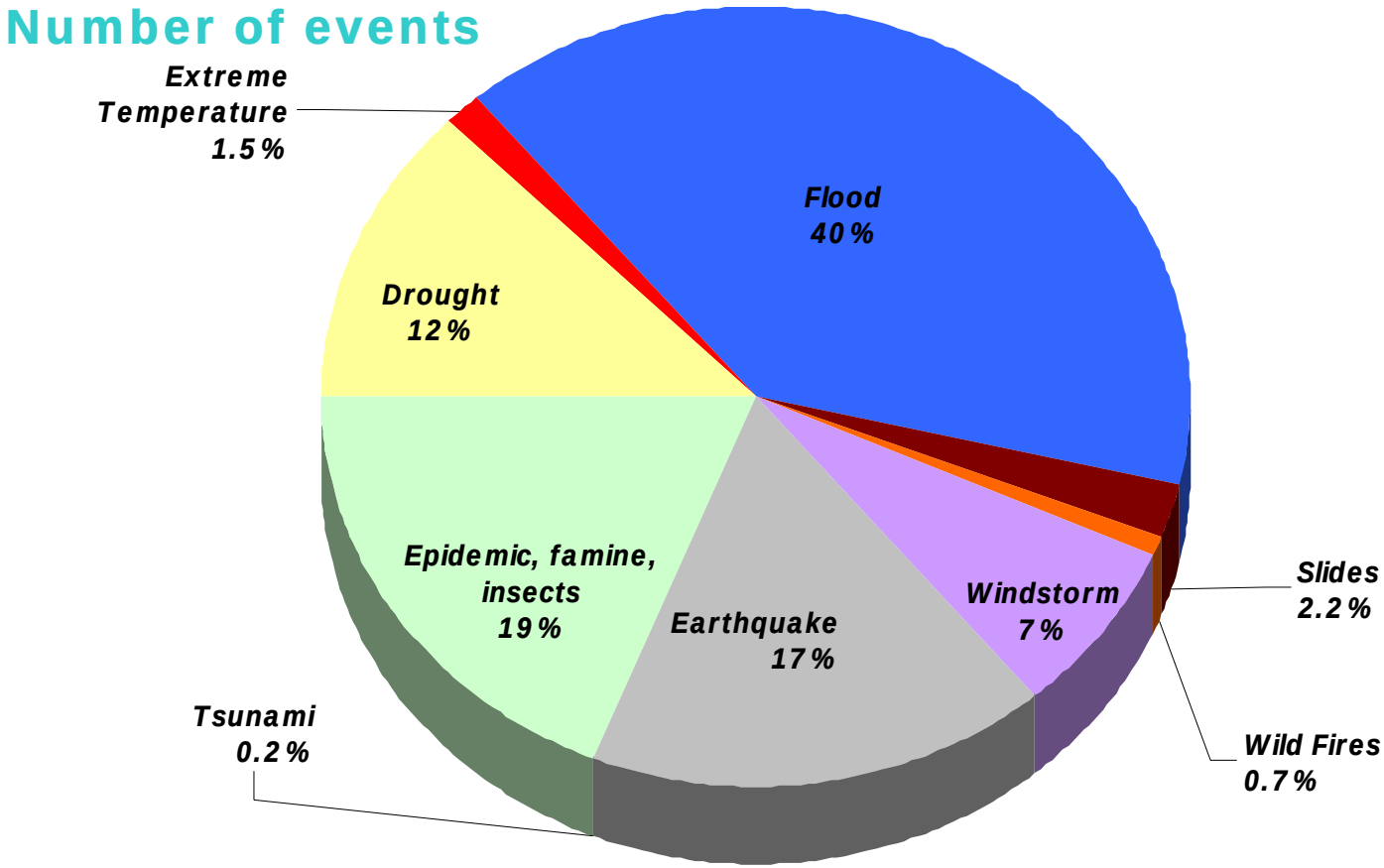
Water scarcity in LNA : Reasons

- Available surface water is limited and threatened by increasing soil erosion.
- Groundwater is being pumped in excess of natural recharge rates.
- high variability and low rainfall over space and time
- Inefficient use of freshwater: Poor irrigation practices, leakage in water delivery systems, and excessive consumption
- Pollution of fresh water resources
- Some 60 percent of the region's water flows across international borders, further complicating the resource management challenge.

Water scarcity in LNA – Consequences

- The scarcity of freshwater resources is challenging food independency and social stability of a growing population in LNA.
- Further disturbance and degradation of 'natural' systems by using low quality irrigation water
- Contamination of groundwater
- Reduction of crops yields, limitation of cultivation
- Long-term damage to soils and aquifers that may not be easily recoverable
- Possible water conflicts

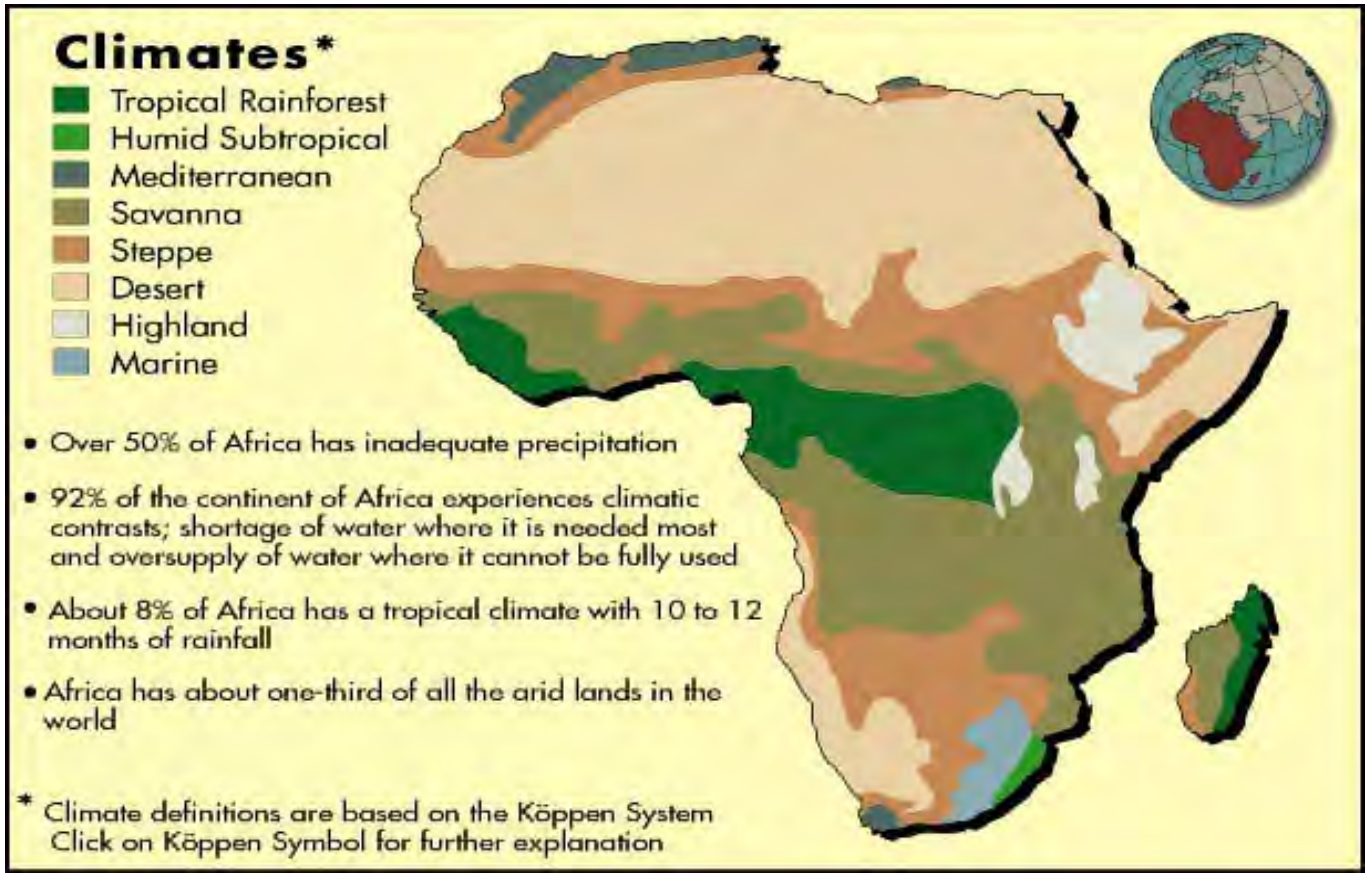
Distribution of Natural Disasters in LNA Region (1980-2005)



Source: EM-DAT: The OFDA/CRED International Disaster Database - www.em-dat.net - Université Catholique de Louvain - Brussels - Belgium

More than 80 % of natural disasters were caused by Weather-related hazards.

North Africa's Climates



The Sahara is the world's largest desert, stretching 3.5 million square miles.

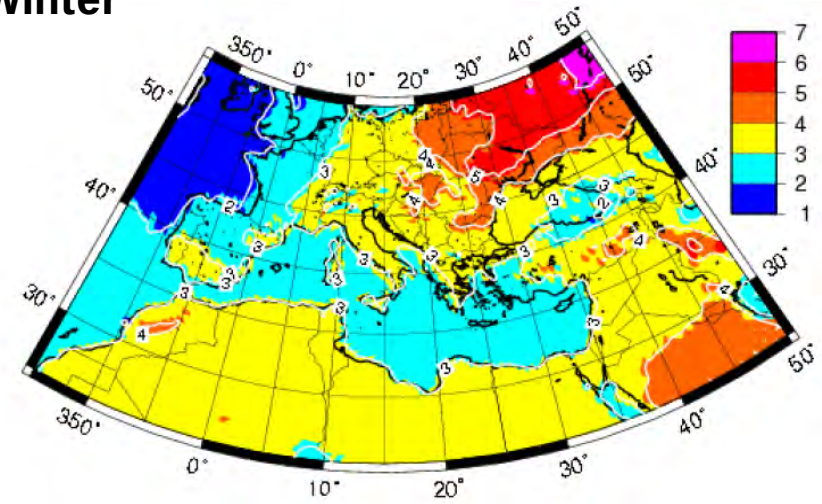
North Africa's major climates are Arid (Desert) & Semi-arid (Steppe)

Climate Change adds new complexity

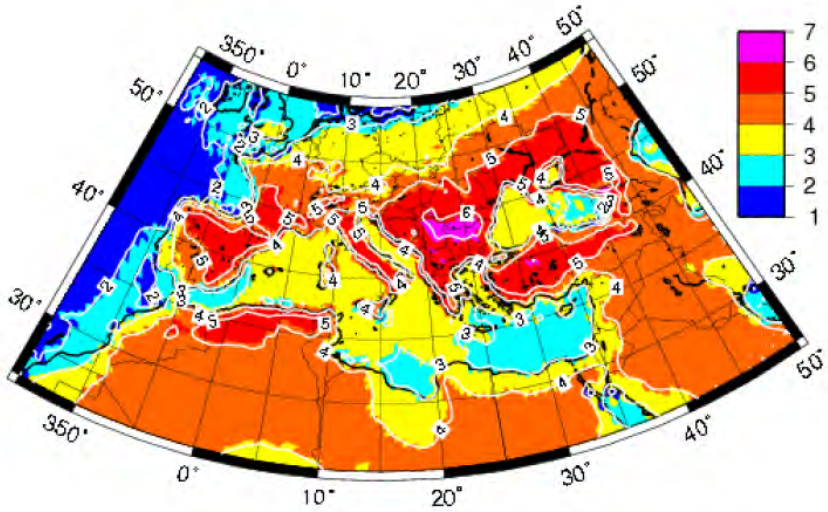
Climate Change Forecasts: Mediterranean Challenges

Air Temperature (°C): 2070-2099 vs. 1961-1990 using AORCM

Winter



Summer



(Somot et al., 2007)

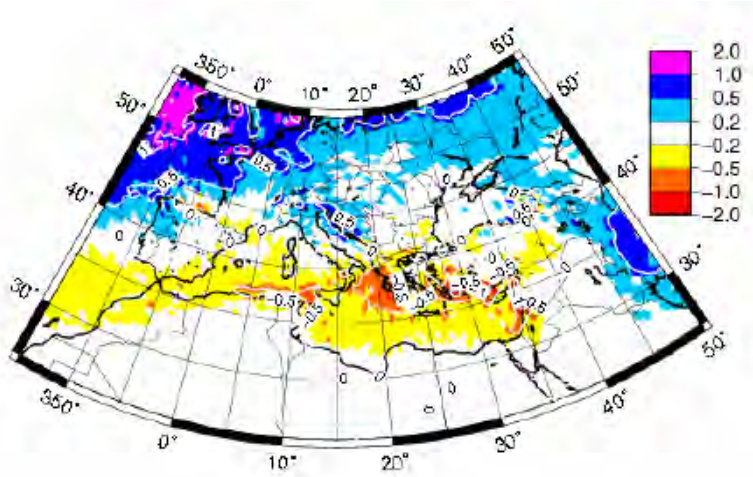
- Mediterrenean region will have an increase in temperature > global average (in all the scenarios)
- Warming increase specially in summer (> 5°C at the end of the 21è s.)
- ↗ frequency, duration and intensity of heat wave

Climate Change adds new complexity

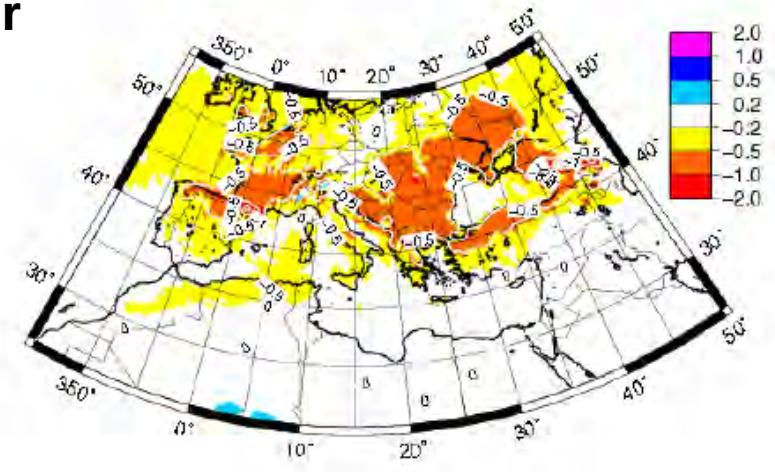
Climate Change Forecasts: Mediterranean Challenges

Précipitations (mm/d): 2070-2099 vs. 1961-1990 using AORCM

Winter



Summer



(Somot et al., 2007)

- In Winter : Precipitation decrease in North Africa

In Summer : Precipitation decrease in the MEditerranean

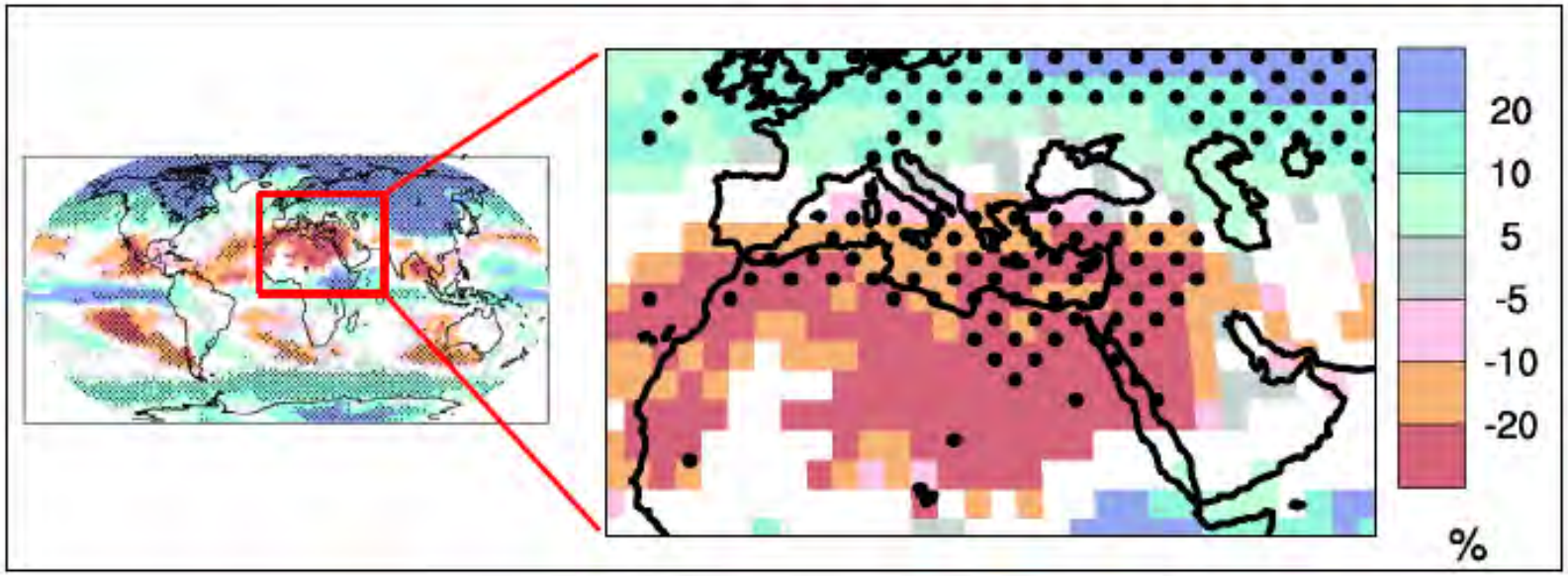
Precipitation decrease in Spring and Automn

↗ frequency of extreme precipitation

Climate Change adds new complexity

The LNA region will be THE dryland hot-spot of climate change: hotter, drier, more (intense) droughts

change in precipitation in the 21st century:

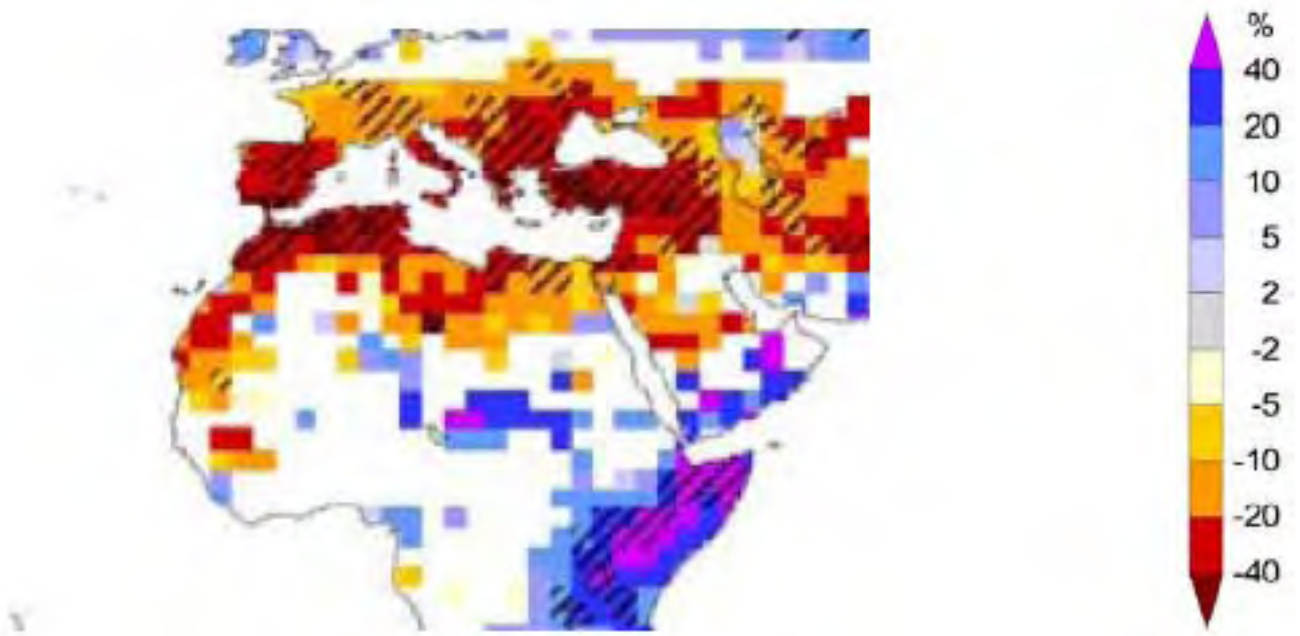


winter (DJF), A1B scenario, model average

IPCC 2007

Climate Change adds new complexity

Future water availability – change in runoff

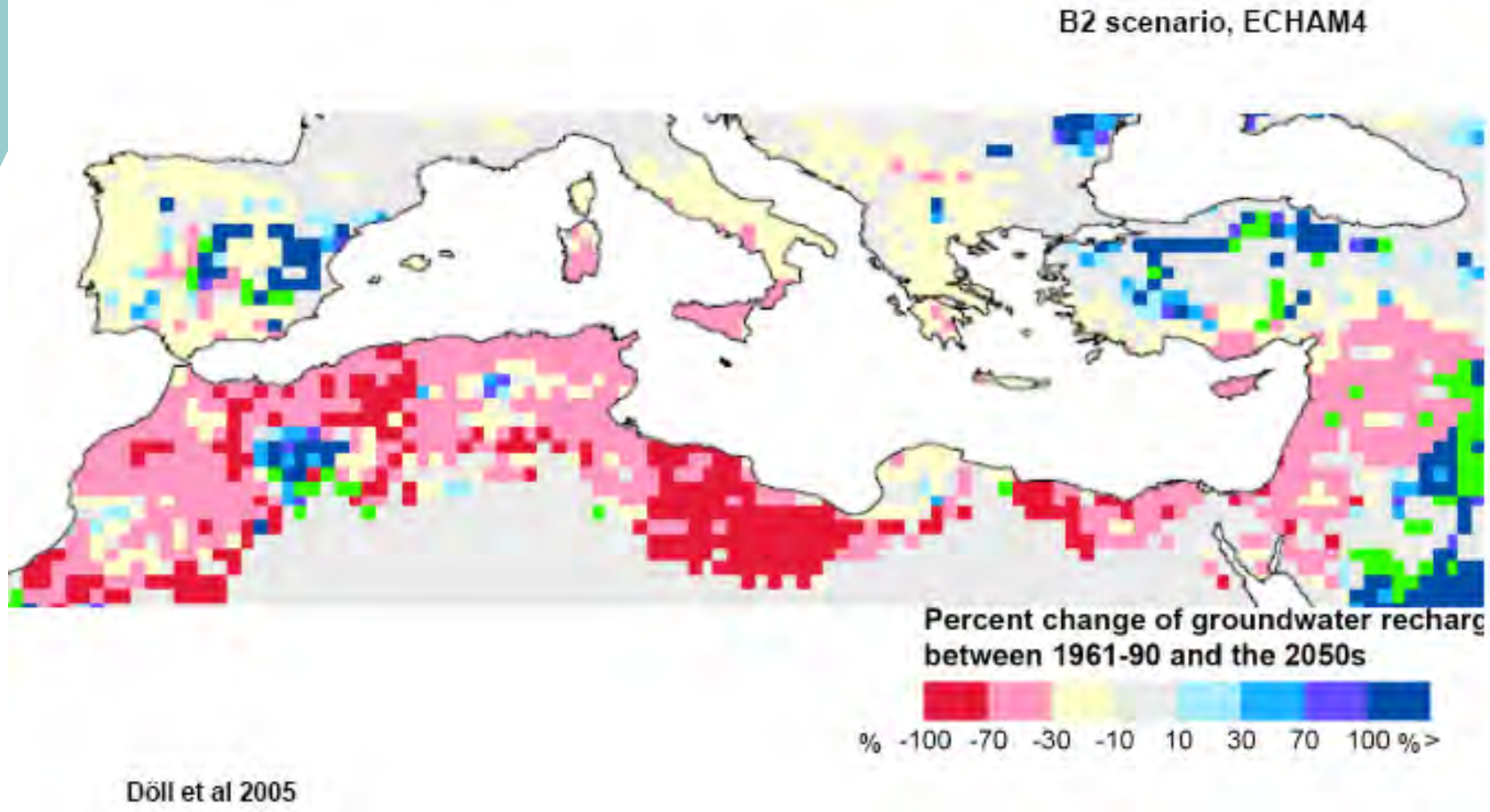


A1B scenario, mid 21st century relative to 1900-1970
12 GCMs, hatched > 90% agreement

Milly et al 2005

Climate Change adds new complexity

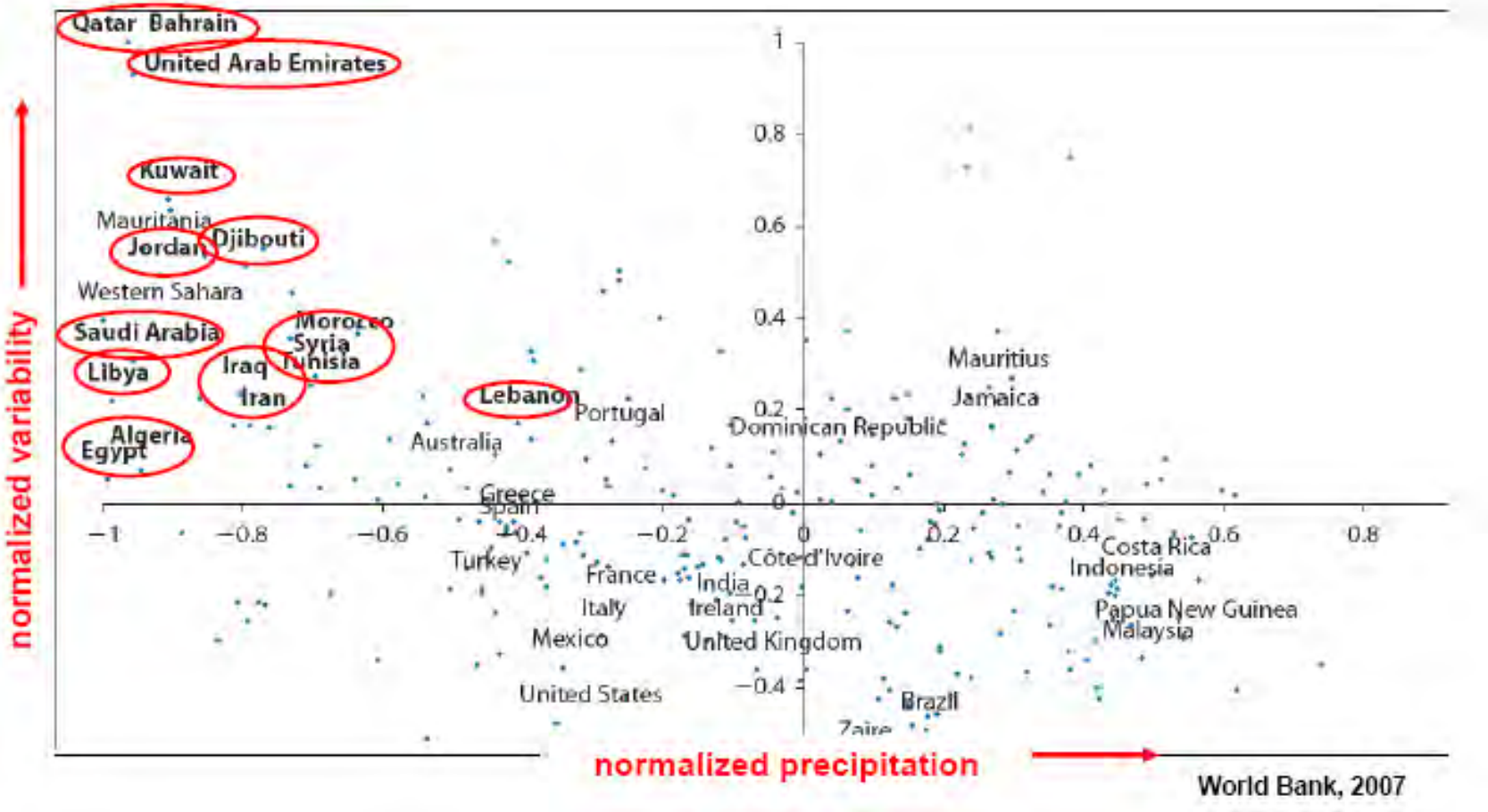
Future water availability – change in groundwater recharge



Döll et al 2005

North Africa's Climate Change

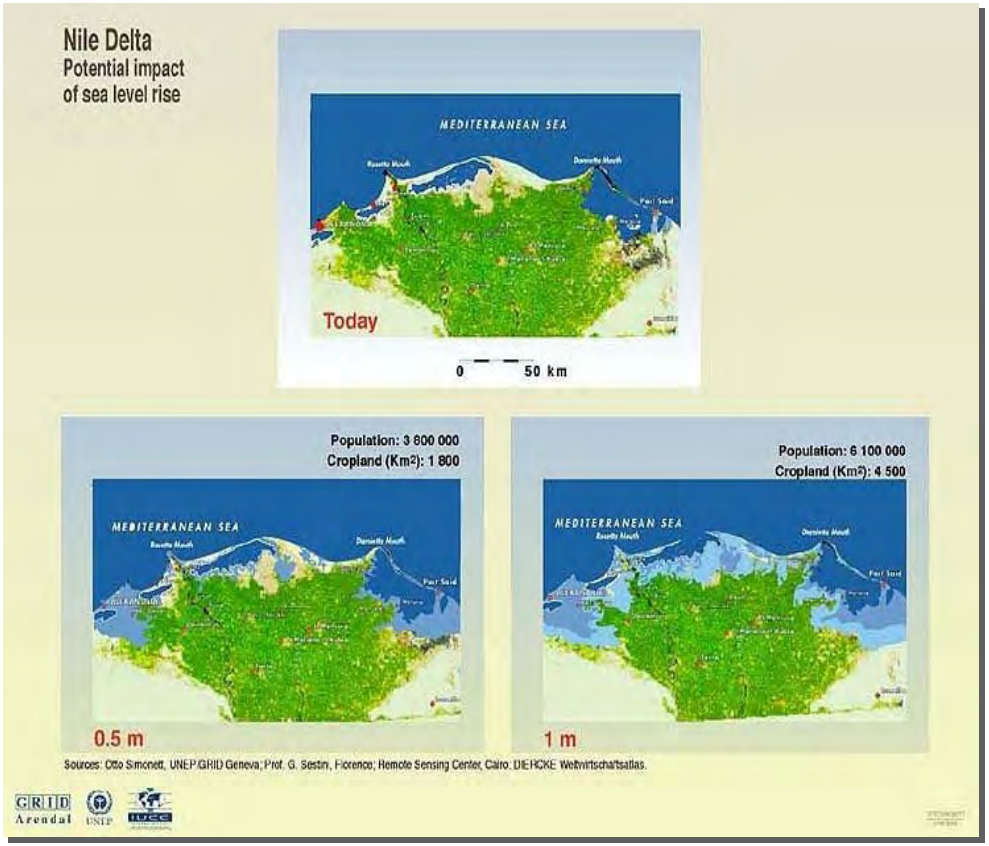
More severe drought
on top of high current climate variability in the LNA region

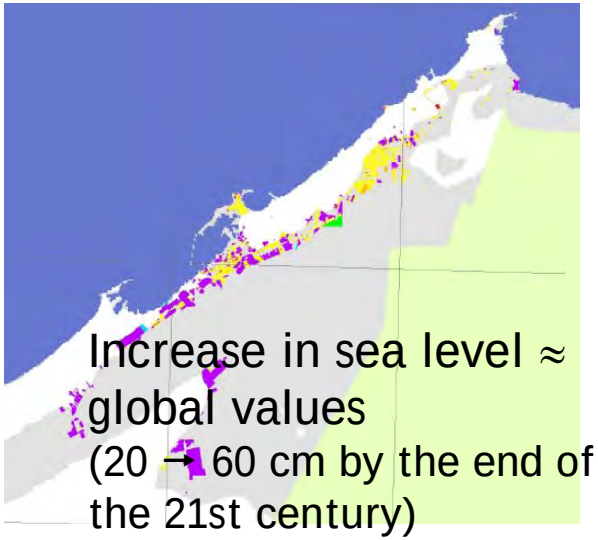


Climate Change adds new complexity

..and sea level rise:

e.g. the Nile delta





Increase in sea level ≈ global values
(20 → 60 cm by the end of the 21st century)

- Worsening flooding in coastal zones
- Strengthening the salinization of estuaries
- Reducing the volume of freshwater in coastal aquifers

Climate Change adds new complexity

..and sea level rise:

e.g. the Nile delta

- **Alexandria, Port Said, Damietta** and **Rosetta** all heavily impacted by 0.5m sea-level rise
- > 2 million people displaced
- > $35 billion loss of land, property and infrastructure
- 220,000 jobs gone
- Incalculable value of historic and cultural assets lost

(Prof. M. El Raey, Alexandria University, UNEP 2002)

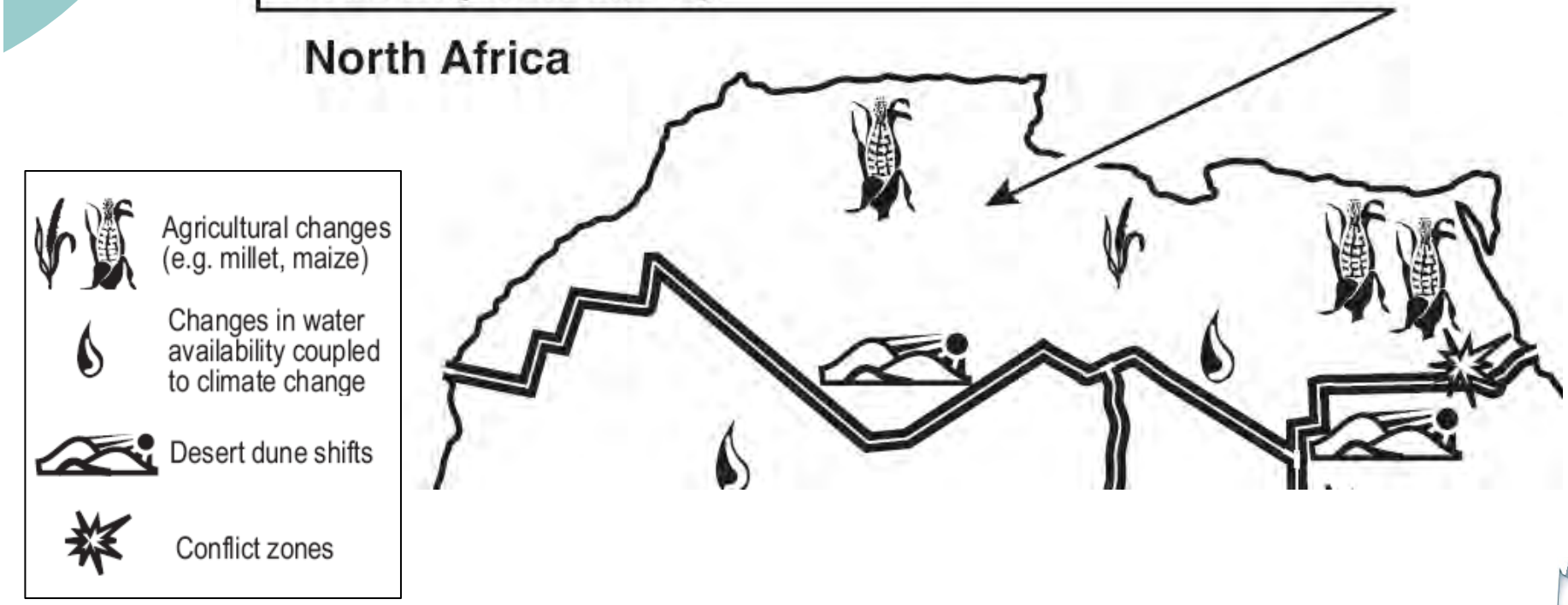
Impacts …

<u>These will have major economic impact because it is:</u>

- The most water-scarce region in the world
  More scarcity and water stress
- Still highly dependent on agriculture (10-26% GDP, 30-45% LF)
  Significant decrease in yields and outputs (-10 to -30%) in the absence of significant adaptation instruments
- Highly urbanized and still urbanizing with 60-80% of GDP produced in cities and coastal cities
  Severe flooding will cause major economic and human losses
- One of the most energy inefficient regions and intensity of GHG Emission (CO2/GDP)
  Opportunity for lower carbon economy (fiscal & health benefits)

Impacts ...

- Climate change could decrease mixed rain-fed and semi-arid systems, particularly the length of the growing period, e.g. on the margins of the Sahel.
- Some assessments show increased water stress and possible runoff decreases in parts of North Africa by 2050. While climate change should be considered in any future negotiations to share Nile water, the role of water basin management is also key.

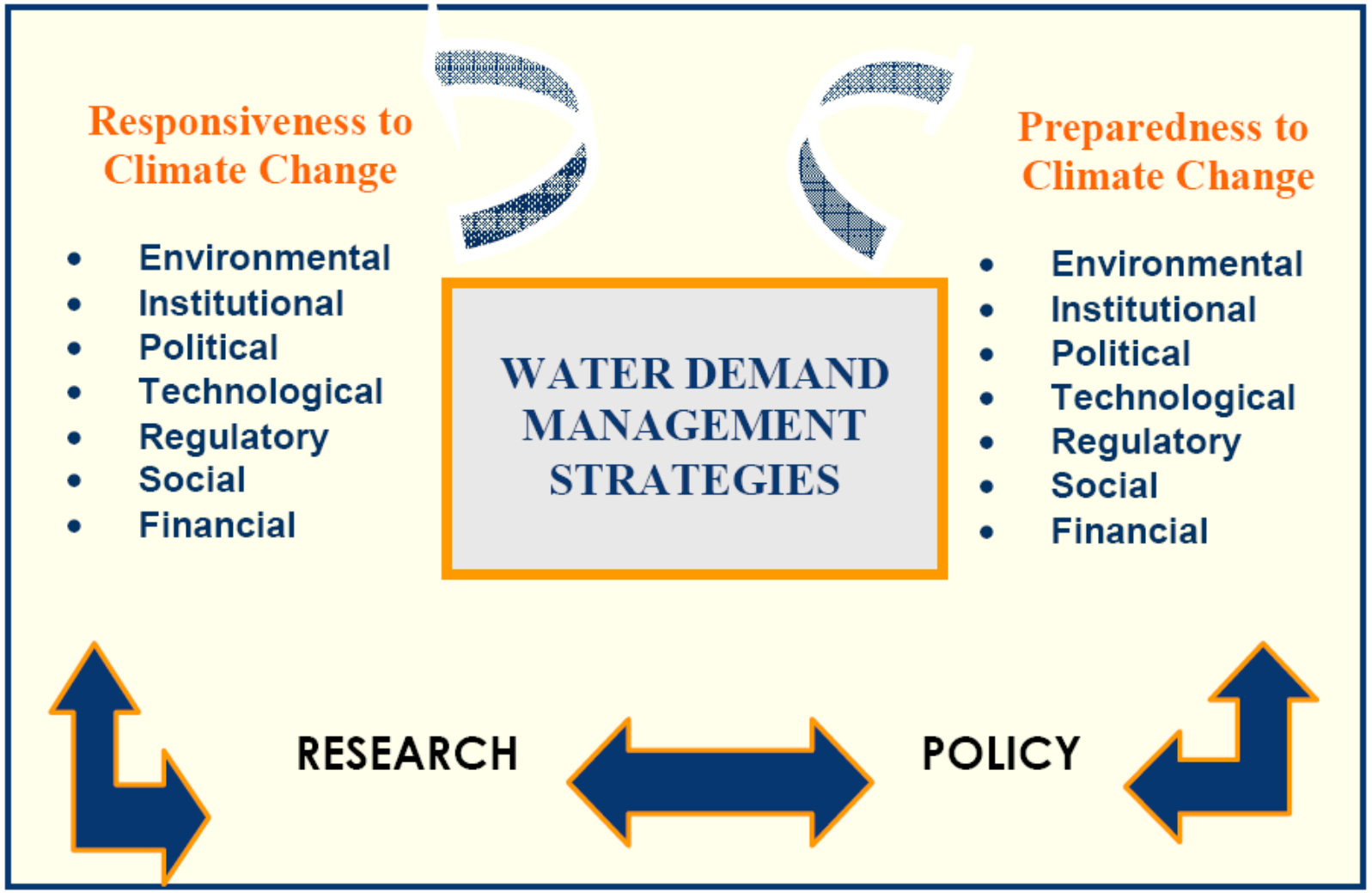


Impacts ...

CONSEQUENCES FOR HUMAN POPULATIONS

- Impacts to agriculture and food security
- Health impacts
- Decreases in economic activity
- Conflict over water resources

WHAT CAN BE DONE?



WHAT CAN BE DONE?

LNA Climate Change Strategy is being developed

- Integrating climate resilience into regular business (Water, Agriculture, Urban, etc)
- Promote low-carbon growth opportunities (energy efficiency, renewables, carbon finance, etc)
- Enhance knowledge on:
  - Climate change impacts (on sectors, and across sectors)
  - Cost-effective adaptation options (at policy and project level)
- Promote partnerships
  - Country level (investment co-financing, capacity building, etc)
  - Regional level (region-wide investment initiatives -e.g. solar power, knowledge sharing, advocacy, etc)

WHAT CAN BE DONE?

Major Water Policy Reforms Needed

1. **Adopt an integrated approach to water resource management in service delivery**
2. **Raise water tariffs, without excluding targeted subsidies to the poorest.**
3. **Promote policy reforms to encourage farmers to shift to irrigated crops, which provide higher value per unit of water:**
   - Priority should be given to crops requiring less water.
   - With globalization, the 'virtual water' concept becomes an important factor in agricultural trade.
4. **Decentralize water management responsibility**
5. **Promote cooperation for sustainable management of transboundary water resources:**
   - The ongoing experience of Algeria, the Libyan Arab Jamahiriya and Tunisia (IFAD-supported programme implemented by the Sahara and Sahelian Observatory) is a possible model.


Thank You...
Winds of change. A Somalian girl searches for edible seeds among the dust.
Increasing droughts are one of the most devastating effects of climate change.
Hamish Wilson/Panos Pictures