

# IEA Training Manual

for the Arab Region

## Volume Two

### Themes

Vulnerability and Impact assessments for Adaptation to Climate Change (VIA Module)



**iisd** International Institute for Sustainable Development  
Institut International du Développement Durable

 **unitar**  
United Nations Institute for Training and Research

# Introduction



This module builds on the IEA process and provides training on how to include vulnerability, climate change and adaptation in the process.

It focuses on vulnerabilities, impacts of the changing climate and developing adaptive responses in the context of other issues such as ecosystems and human well-being, capacity and long-term development.

The module aims at defining climate change impacts and development adaptation and response strategies in the light of current stressors and vulnerability to climate change.



Climate change is considered a long-term global problem that entails complicated interactions between environmental elements and the socio-economic, political, institutional and technological conditions.

Climate change has become a reality and there is a scientific consensus that the changing climate is a result of emissions basically released by man. There are indicators of this change which leads to significant impacts at the regional and international levels.



Warming of the climate system is unequivocal, and since the 1950s, many of the observed changes are unprecedented over decades to millennia. The atmosphere and ocean have warmed, the amounts of snow and ice have diminished, sea level has risen, and the concentrations of greenhouse gases have increased (see Figures SPM.1, SPM.2, SPM.3 and SPM.4). {2.2, 2.4, 3.2, 3.7, 4.2–4.7, 5.2, 5.3, 5.5–5.6, 6.2, 13.2}

Each of the last three decades has been successively warmer at the Earth's surface than any preceding decade since 1850 (see Figure SPM.1). In the Northern Hemisphere, 1983–2012 was *likely* the warmest 30-year period of the last 1400 years (*medium confidence*). {2.4, 5.3}

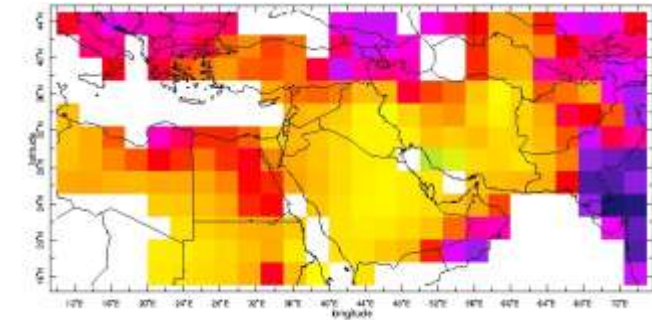
The rate of sea level rise since the mid-19th century has been larger than the mean rate during the previous two millennia (*high confidence*). Over the period 1901 to 2010, global mean sea level rose by 0.19 [0.17 to 0.21] m (see Figure SPM.3). {3.7, 5.6, 13.2}



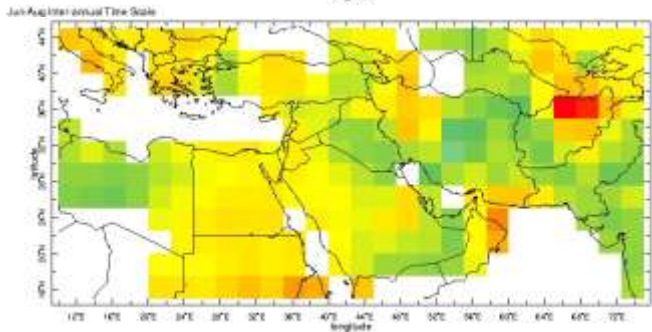
Global surface temperature change for the end of the 21st century is *likely* to exceed 1.5°C relative to 1850 to 1900 for all RCP scenarios except RCP2.6. It is *likely* to exceed 2°C for RCP6.0 and RCP8.5, and *more likely than not* to exceed 2°C for RCP4.5. Warming will continue beyond 2100 under all RCP scenarios except RCP2.6. Warming will continue to exhibit interannual-to-decadal variability and will not be regionally uniform (see Figures SPM.7 and SPM.8). {11.3, 12.3, 12.4, 14.8}

Changes in the global water cycle in response to the warming over the 21st century will not be uniform. The contrast in precipitation between wet and dry regions and between wet and dry seasons will increase, although there may be regional exceptions (see Figure SPM.8). {12.4, 14.3}

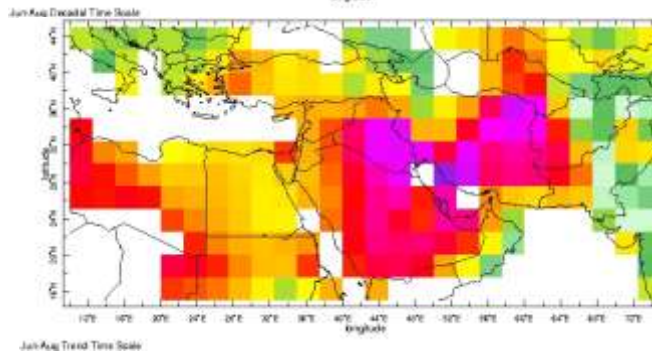
# Summarizing 100 years of climate change data in MENA region



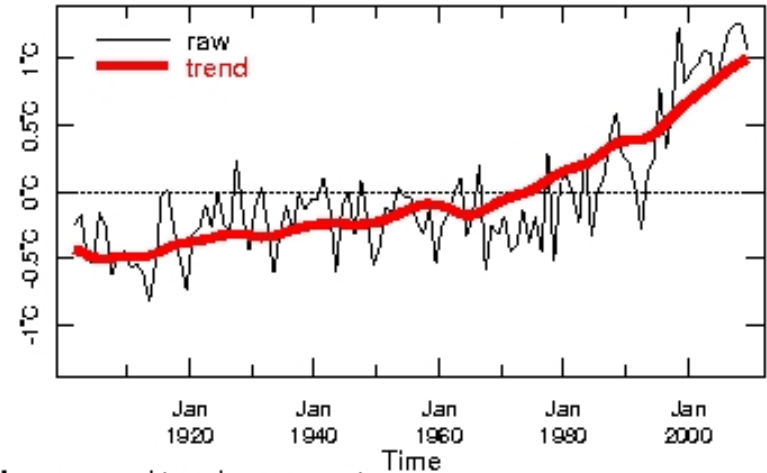
Interannual variability – 17% of overall pattern



Decadal variability – 11% of total



Long-term climate change – 71% of total



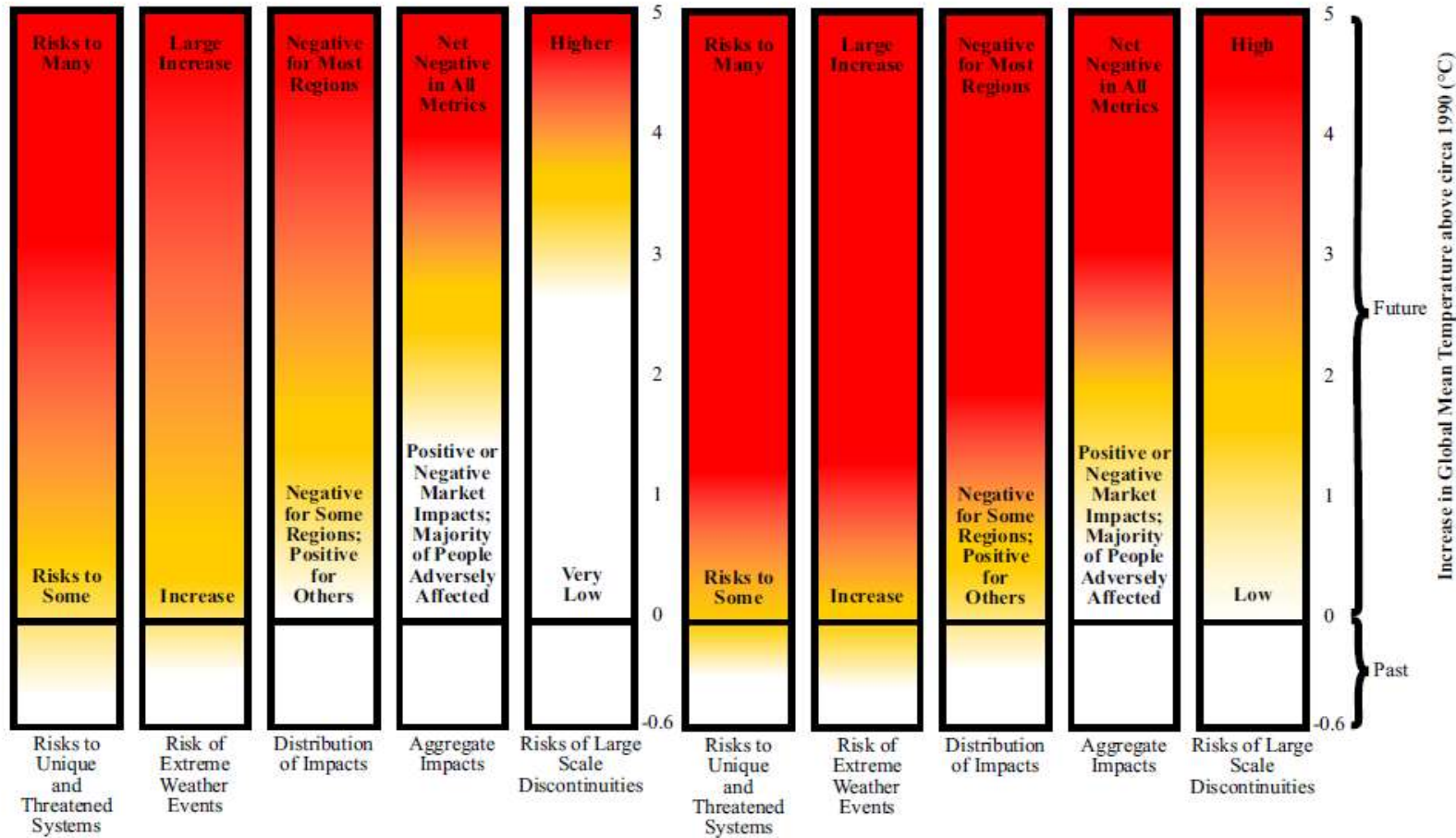
Jun-Aug raw and trend components

You can make maps like these yourself at [http://iridl.ldeo.columbia.edu/maproom/Global/Time\\_Scales/](http://iridl.ldeo.columbia.edu/maproom/Global/Time_Scales/)



TAR (2001) Reasons For Concern

Updated Reasons For Concern



Smith et al 2009

Understanding about climate change impacts has led to accelerating concern



## Impacts of climate extremes can be felt locally or regionally

### **AGRICULTURE**

**“Mongolian herdsman face starvation”**

*March 14, 2000, BBC World News*

### **ENERGY**

**“Heatwave hits French power production”**

*August 12, 2003, The Guardian*

### **WATER**

**“Drought returns to haunt Ethiopia”**

*May 19, 2008, Reuters*

### **PUBLIC HEALTH**

**“Cholera confirmed in Pakistan flood disaster”**

*August 14, 2010, Associated Press*

### **TOURISM**

**“Alpine resorts feel heat during record warm spell”**

*December 08, 2006, CNN World News*

### **TRANSPORTATION**

**“Flash flooding causes train to derail”**

*July 30, 2001, Chicago Sun Times*



# Climate Change Impacts in the Arab Region as Cited in National Reports



**Tunisia: By 2030, the following impacts are projected:**

- A 1.1 ° C average increase in temperature
- Extremity of drought events and a 28% reduction in water resources
- Loss of about 20% of the agricultural land and 50% of the un-irrigated forests in the south .

**Arab Republic of Egypt: Potential impacts of climate change :**

- A substantial decline in major crop yields (wheat and maize)
- An erosion in the Delta shores , seawater intrusion into freshwater and the degradation of some ecosystems as a result of climate change
- A potential sea level rise of 0.5-1 m during the next hundred years will lead to the drowning of 30% of the coastal areas in Alexandria and subsequent economic damage including the following:
  - The dislocation of at least two million people
  - The loss of 195,000 jobs,
  - The absence of any remedial measures will lead to an economic loss estimated at about 35 billion U.S. dollars and the most affected sectors will be agriculture, industry and tourism respectively.

**Republic of Lebanon: Potential impacts of climate change:**

- The high temperature will lead to the dislocation of plant communities in the mountainous areas and the migration of species to other higher places,
- Decrease in rainfall rate and the inundation of some coastal areas and small islands.

# Climate Change Impacts in the Arab Region as Cited in National Reports



## **Kingdom of Morocco: By 2020, the following impacts are projected:**

- A 0.6 -1.1 ° C rise in temperature
- A 4% reduction in the precipitation rate and an increase in drought frequency and severity which will lead to a 15% decrease in water resources.
- A 50% decline in agricultural production in years of drought and a 10% reduction in normal rainfall years,
- A 7-12% increase in irrigation allocations

## **kingdom of Saudi Arabia: Potential impacts of climate change**

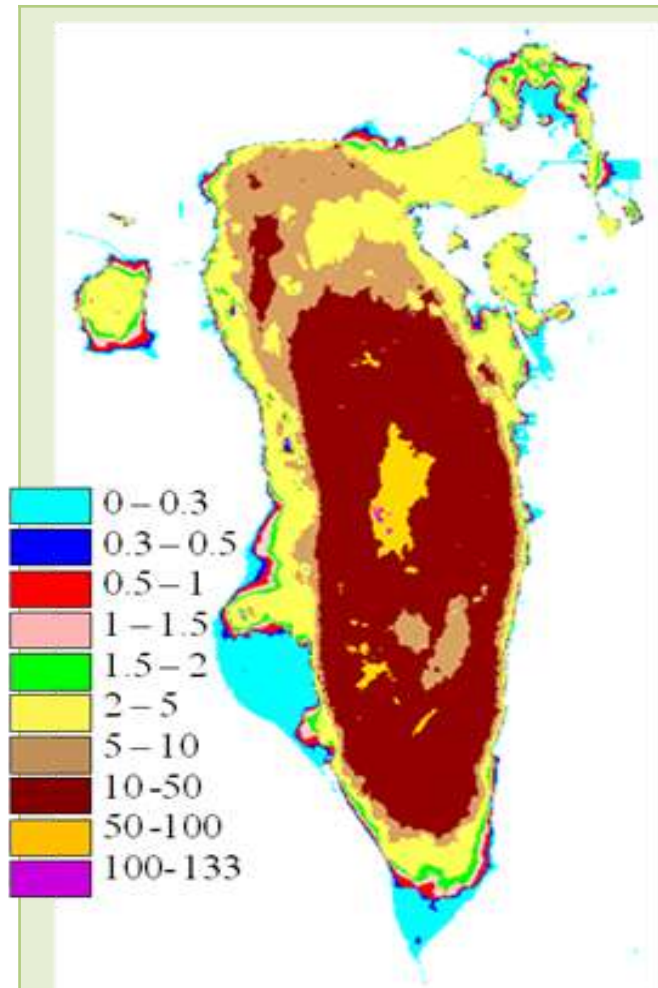
- A 2.2-2.7 ° C **increase** in summer temperature in the northwestern regions of the Kingdom and a rise of 0.2-0.4 ° C in the south and south-west of the country,
- This increase will lead to a 5-25% reduction in agricultural production in all regions.
- A sea level rise of 0.5 m by the year 2100 will drown 2663 hectares of sandy beaches in the Kingdom.

## **Republic of Sudan: By 2060, the following impacts are projected:**

- A significant increase in temperature ranging between 1.5 -3.1 ° C according to seasons,
- A decrease in the average precipitation rate of about 6 mm per month during the rainy season,
- These changes will have a negative impact on agriculture, water resources and public health. Climate scenarios for Northern Kordofan anticipate a 1.5 ° C rise in surface temperatures between 2030 and 2060, and a 5% decrease in rainfall, which could lead to a 70% reduction in white maize crop yields.

Source: National communications and various countries' reports.

# Impact of Sea Level Rise on the kingdom of Bahrain



- The Kingdom of Bahrain occupies an area of 740 Km<sup>2</sup>. It is an archipelago of small islands that might be at great risk of losing significant land mass as a result of sea level rise.
- Eighty Km<sup>2</sup> or more than 10% of the total area of the kingdom is estimated to be only 0.5 m above mean sea level.
- More than two-thirds of the population live within 2.0 km of the coastline.
- Sea level rise may pose a substantial threat to Bahrain's resources because of their low-lying physiographical setting as well as the vulnerability of the residential, economic, tourist, and other vital activities.
- As a small island state with high population density and high population growth rates, the Kingdom of Bahrain has a limited capacity to adapt to relative sea level rise which underlines the need to undertake risk assessment measures and develop an appropriate adaptive strategy to cope with impacts of sea level rise.



- Drought persistence had a devastating effect on agricultural production in Syria. Most notably was the disastrous drought that occurred during the agricultural seasons of 1999/2000 and 2007/2008, which led to substantial decline in cereal production and caused damage to thousands of families and livestock herders.
- In 2008, drought reduced wheat and barley production by 47 and 67 percent, respectively, as compared to the previous year.
- 
- In 2009 frequent and persistent drought had forced 300,000 people to desert their villages in the north-eastern region of the country.
- A decline in health and education standards was evident in this region and poverty has soared.

# Actual crises have tended to be worse than predicted




**Climate in Peril**  
A popular guide to the latest IPCC reports

• **FIVE minutes, and everything was on fire**



Thursday, July 31, 2003  
*Jonathan Herald*

## Water crisis

By JOHN MOORHOUSE  
*Penetration Herald*

The hot, dry Okanagan summer may be about to claim its first victims.

If current conditions persist, Summerland could be out of water by September, Mayor Tom Johnston said Wednesday.

And that has community officials eyeing water allocated for preservation of fish habitat in Trout Creek and tighter controls on agricultural water consumption.

Summerland council has also approved increased domestic water restrictions. In addition to the twice-weekly restrictions already in place, no lawn or garden sprinkling is permitted between 9 a.m. and 1 p.m.

Agricultural water use will be closely monitored.

Johnston said although many growers are conscientious about their water consumption, some are not.

"We're going to have to go after the abusers," he said. "We're going through 80 million gallons per day, and half the community is not watering at all."

Johnston said Summerland is in a water supply crisis. At current consumption rates, it could run out of water in its upper reservoir by mid-September.

"It's a crisis and the next step is an emergency," he said. "Ultimately, the mayor does have the power to declare an emergency -- and if all the factors are there to do so, I'll do that."

This would enable the municipality to order people to consume less water and even shut off water if they don't comply.

"We've got to make it through the growing season and we can't allow our homes not to have any water."

The entire Okanagan Valley is experiencing one of its driest summers on record, coming on the heels of a below-average snowpack, especially in the Summerland watershed, where the municipality has several storage reservoirs.

The municipality has acquired a portable measuring device to accurately determine water consumption by individual growers.

"We're not minimizing the fact that we have to get the agricultural consumption down by 20 to 25 per cent," Johnston said. "Based on the measurements that have been done already, there's a number of abusers that are taking four or five times the amount of water they should be."

Meanwhile, the district also wants to utilize the 14 acre-feet of water the municipality must release daily from its reservoirs into Trout Creek to preserve trout habitat under federal fisheries regulations. One acre-foot is equal to 21,900 gallons of water.

Johnston said although this would cause the lower part of the creek to dry up, the municipality has offered to make the fish supply with young fish reared at the provincial government's Summerland trout hatchery.

An emergency response team meeting was held Tuesday with Okanagan-Capitola MP Stockwell Day and Okanagan-Westside MLA Rick Therpe. Both have promised to help.

Day said Wednesday he contacted federal Fisheries Minister Robert Trudeau, who promised to look into the possible diversion of fisheries water for emergency use, although he could not guarantee approval at this time.

"We're asking for common sense and acceptance of a plan that will save the agricultural community and look at actually enhancing the fish population," Day said.

Johnston said the fisheries department has stated approval can't be given without a study, which would take up to six months to complete. Summerland still doesn't have that long, he said.

Another option calls for pumping water from Okanagan Lake to allow it to run back down the creek. The Princeton Indian band has suggested restoring fish habitat on Shoglen Creek through the reserve, since Trout Creek historically has occasionally dried up in the summer.

Fisheries officials could not be reached for comment Wednesday.

Chinese floods kill 15, displace 550000

Drought in Africa: Ethiopia's bitter harvest



# 1. Characteristics of vulnerability and scope of the assessment

2. Vulnerability assessment and the DPSIR framework

3. Monitoring vulnerability

4. Creating responses - determining the adaptation options

5. Prioritizing the adaptation options

6. Developing a basic implementation plan and a communication strategy

# Defining Vulnerability



- People and communities are experiencing a number of threats such as climate change , environmental degradation and social and economic changes
- Impacts of these challenges interact and cumulatively increase the vulnerability of local and regional areas and populations
- **Vulnerability** could be defined as the degree to which human-environment systems are susceptible to, and unable to cope with, the adverse impacts.

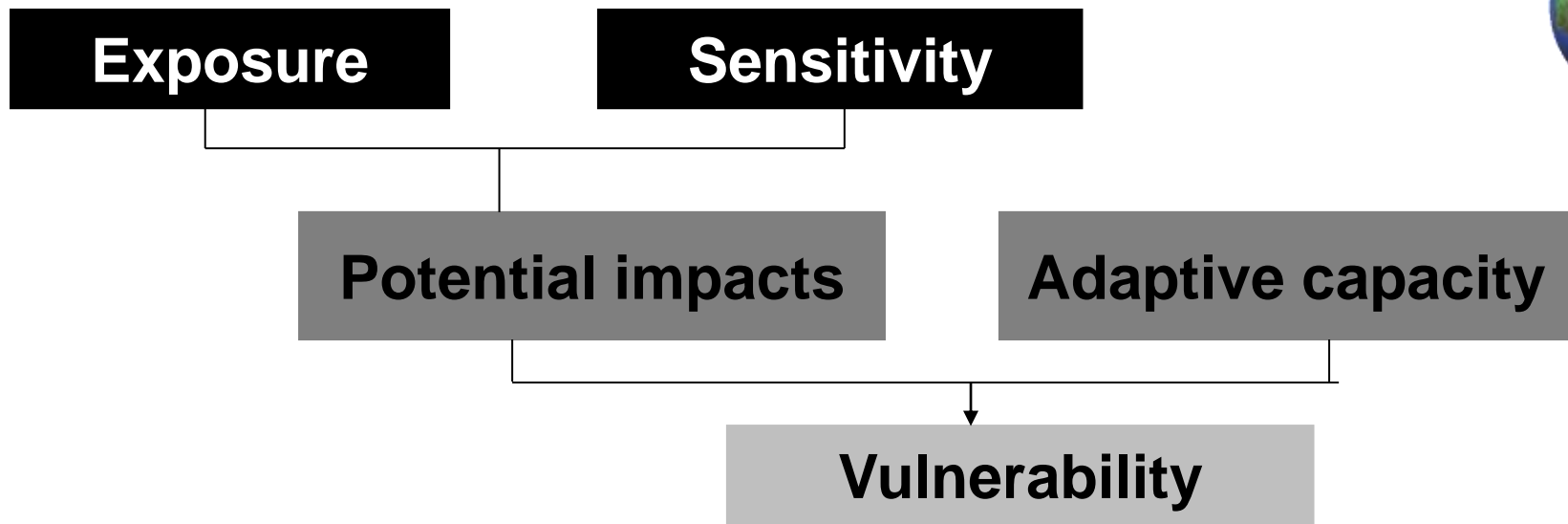
# Vulnerability to Climate Change



- Vulnerability could be described as the degree to which a system is susceptible to, or unable to cope with, adverse effects of climate change, including climate variability and extremes.
- It could include for example: whole vulnerable areas such as low-lying islands or coastal cities; negative impacts of climate change on agricultural lands, forced migration; or the mechanism causing these impacts, e.g., disintegration of the West Antarctic ice sheet.  
(UNEP, 2009).

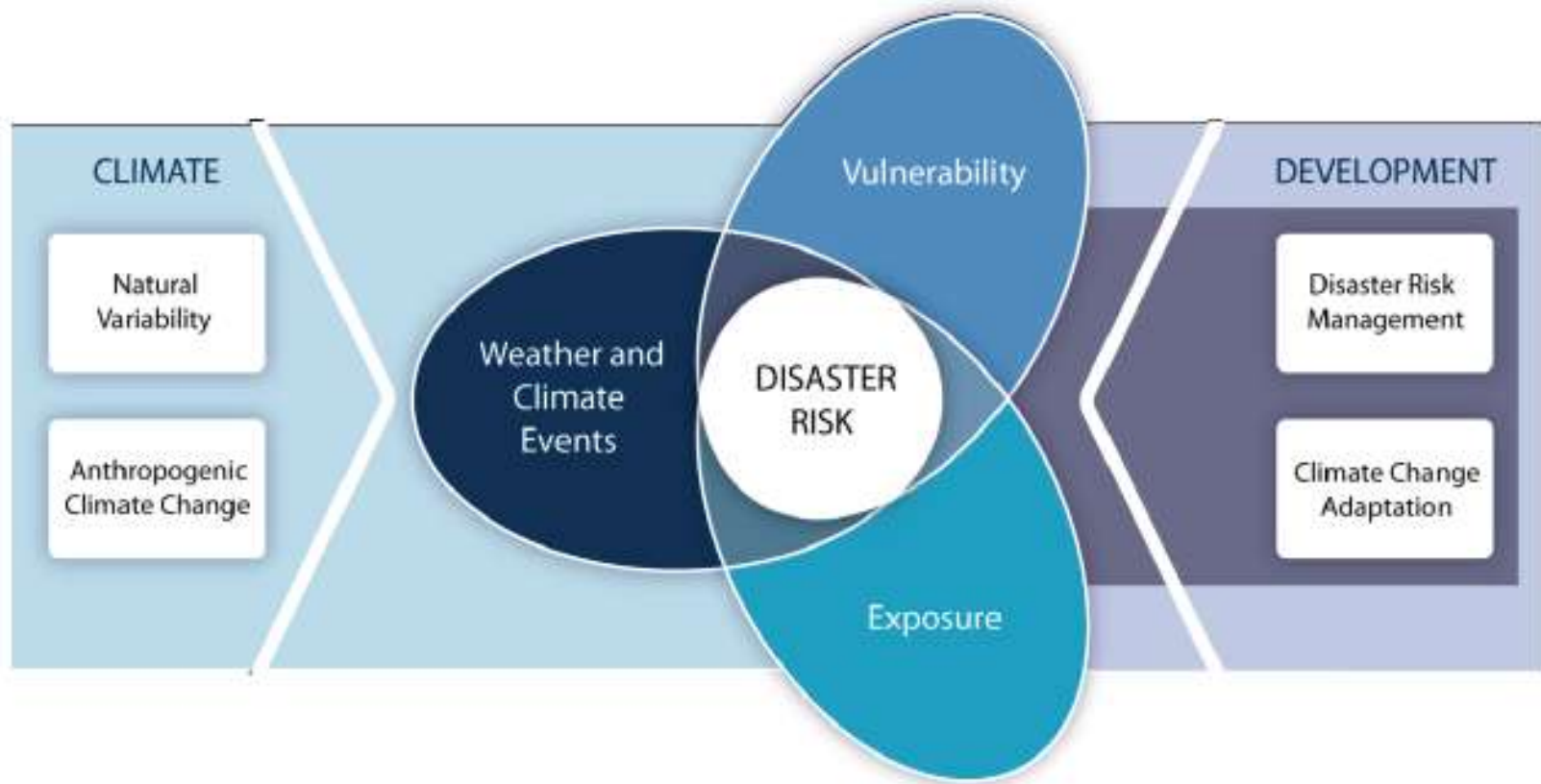


# Characteristics of Vulnerability



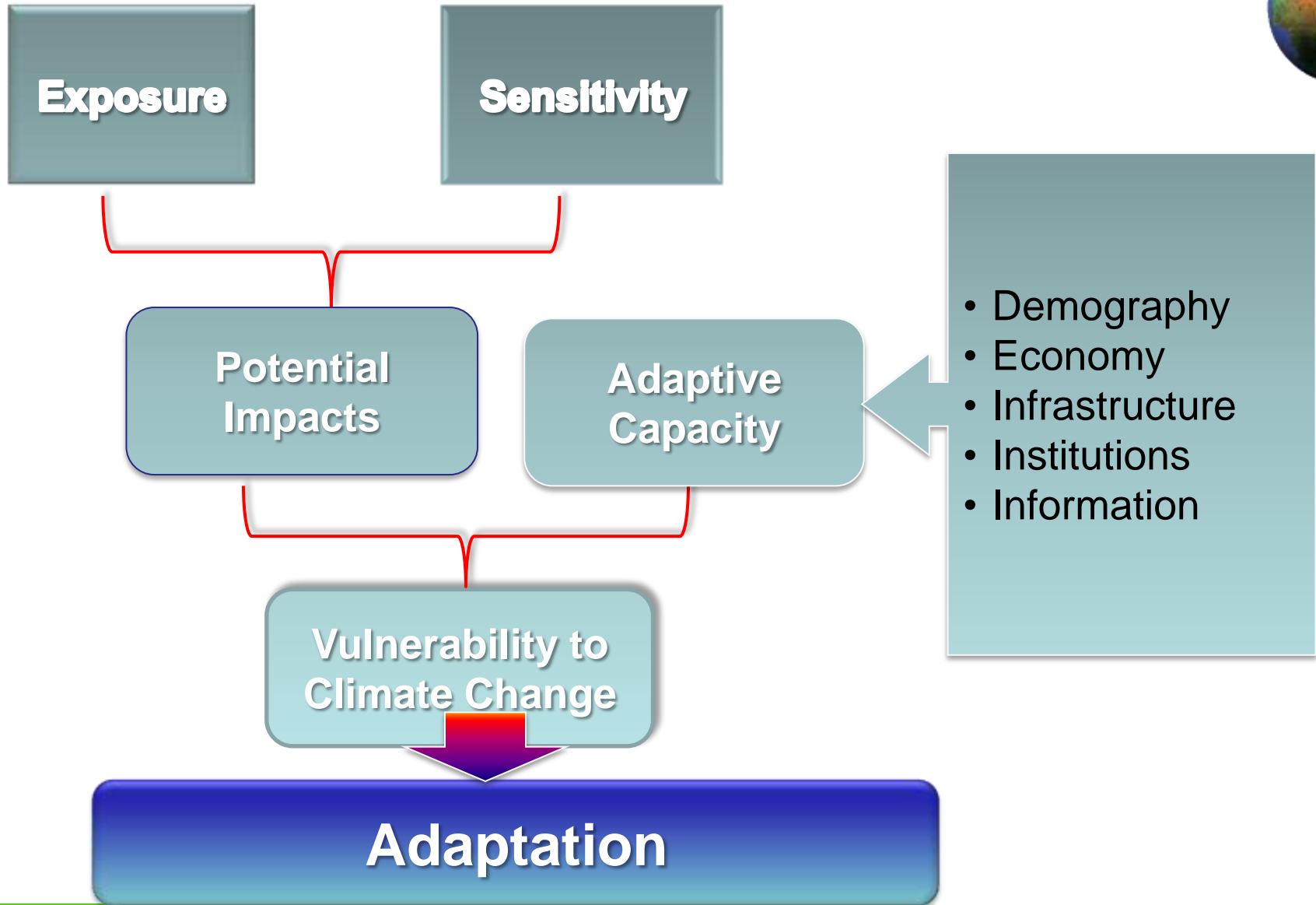
The **exposure** can be to hazards such as droughts, conflicts or extreme price fluctuations, and also underlying socio-economic, institutional and environmental conditions. The **vulnerability** not only depends on the exposure, but also on the **sensitivity** of the specific unit exposed (such as an ecosystem, a watershed, a household, a village, a country) and **the capacity to cope or adapt**.

# Current IPCC framework





- They are context-specific
- **Capacities** depend **on access to resources** that could help in responding to threats and exposures (i. e. functioning community networks, access to low-rate loans, accessible services - health care and sanitation, irrigation systems and water storage etc.).
- **Capacities** of the communities are **often depleted** when they are in conflict zones, when they are forced to migrate and in areas with low law enforcement.



# The Concept of Double Exposures

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The Arab region is home to 5% of the world's population but has access to only 1% of global fresh water resources.

Some of the world's biggest and longest-running conflicts are playing out in the region: Somalia, Iraq, the occupied Palestinian territories and Sudan.

# Concept of Resilience



- It has been used to characterize a **system's ability to bounce back** to a reference state after a disturbance, and the capacity of a system to maintain certain structures and functions despite disturbance. If the resilience is exceeded, collapse can occur.
- The focus of the vulnerability reduction efforts should be on helping **increasing resilience** both for people and ecosystems instead of only reacting to actual impacts.

(Gunderson and Holling, 2002; Jäger and Kok, 2008; UNEP 2009)

# Criteria for Climate Change Vulnerability Assessments



- The knowledge base engaged for analysis should be varied and flexible (**collaborative**).
- Vulnerability assessments should be “**place-based**,” with an awareness of the nesting of scales.
- The global change **drivers** examined should be recognized as multiple and interacting.
- Vulnerability assessments should allow for **differential adaptive capacity**.
- The information should be both **prospective and historical**.
- **Institutional aspects** to uncover how they address vulnerability and implement adaptation responses

# Defining the scope of the assessment

## Resource Unit versus Jurisdictional



*Table 2: Comparing SoE reporting in regions with ecosystem versus political boundaries (modified after Pintér, Zahedi and Cressman 2000).*

### **Ecounit boundary**

#### **Advantages**

- More meaningful interpretation of environmental trends relevant to specific ecosystems.
- Better understanding of ecosystems as functional units.
- Direct connection to ecosystem-scale policies.

#### **Disadvantages**

- Limited availability of some data expressed at the scale of ecounit (particularly socio-economic data).
- Political complexity arising from analysis of resources under shared jurisdiction.

### **Jurisdictional (political) boundary**

#### **Advantages**

- More uniform regulatory environment.
- More simple data collection.
- Direct connection to jurisdiction-wide policies.

#### **Disadvantages**

- Resource-specific trends masked by data collected on the level of political jurisdiction.
- Difficulty detecting differences in ecosystem impacts of specific policies.





- **Thematic approach:**
  - A more traditional approach; i.e., water, air
  - Challenge is that different themes can be impacted by the same policies or sectors
- **Sectoral approach:**
  - i.e., transportation, agriculture, energy
  - Challenge is that one environmental theme can be impacted by multiple sectors



- What were the contexts of the previous State of the Environment reporting processes in the country?
- Having considered the contexts of previous reporting processes and the existing environmental and climate change information needs for decision making, what is the best context for assessment process in your country?
- How might the new assessment process and report be designed to minimize the “cutting the cake dilemma?”

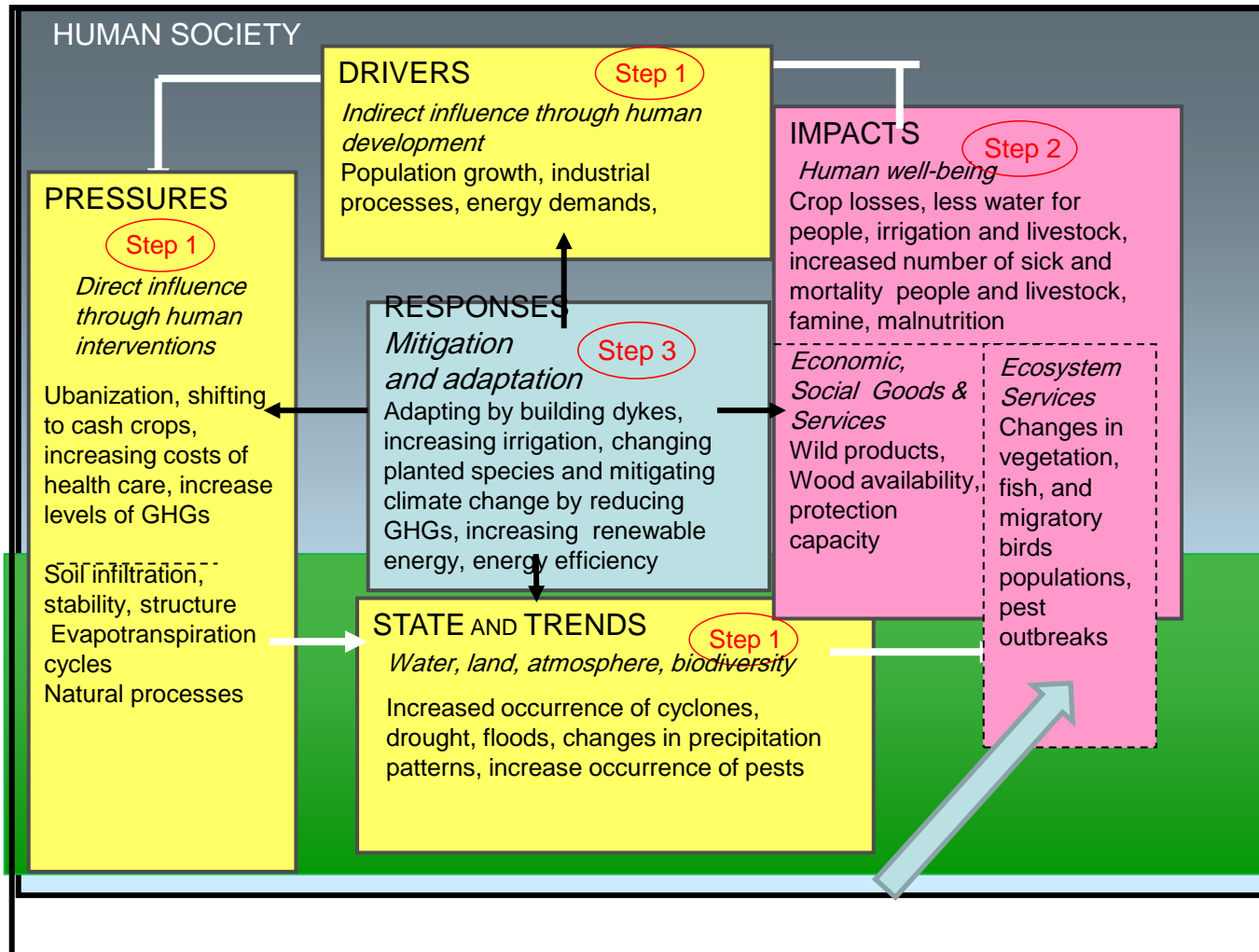


1. Characteristics of vulnerability and scope of the assessment
- 2. Vulnerability assessment and the DPSIR framework**
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# Vulnerable to What, When and Where?



- Focusing on identifying how different drivers and pressures interact and lead to vulnerability: processes such as epidemics or environmental changes, including climate change, are not occurring in isolation of one another, or in isolation of other drivers and pressures.
- Vulnerability is a dynamic concept, and stressors on the human-environment system are constantly changing, as are the available capacities over time.
- Differences in vulnerability between countries, regions, communities and even within households



# Key questions



- How often do the identified impacts including disasters hit the community?
- Based on the elements of the DPSIR, what are the main causes of vulnerability?
- What coping strategies exist for each identified impact?
- What are the capacities that are lacking to address the identified impacts?
- Which organizations/institutions, if any, support existing coping strategies or promote new strategies?
- Who has access to/uses these capacities?
- Are capacities available to address potential future adaptation strategies?

# Example of impacts: Changes in precipitation



State Changes	Environmental /Ecosystem Impacts	HUMAN WELL-BEING IMPACTS			
		Human Health	Food Security	Physical Security and Safety	Socio-economic Effect
↑↓ Precipitation	↑ Flood damage	↑ Water-related diseases	↑ Crop destruction	↑ Drowning and flood damage	↑ Damage to property
	↑ Drought	↑ Malnutrition	↑ Crop reduction		

Source: Jäger and Kok, 2008



**PROVIA Guidance on Assessing  
Vulnerability, Impacts and Adaptation  
to Climate Change**

**CONSULTATION DOCUMENT**

- **New resource released last month**
- <http://www.unep.org/provia/RESOURCES/Publications/PROVIAGuidancereport/tabid/130752/Default.aspx>



# Exercise



- In small groups identify an ecosystem or an area and complete the following tasks
- Identify major current exposures and sensitivities.
- What are the main coping strategies and capacities that people use to respond to the exposures?
- Write down key drivers and pressures that also contribute to the identified exposures, sensitivities and coping responses and stick them next to the impacts written on the flipchart.
- Try to identify examples of policies and measures that help and halt coping and maintaining capacities.



<b>Focus: Area /Ecosystem/</b>	
<b>1. Current exposures</b>	<b>Current sensitivities</b>
<b>1. Examples of coping responses</b>	
<b>1. Current policies and measures that help in coping with exposures</b>	<b>1. Current policies and measures that are limiting capacities to cope with exposures</b>



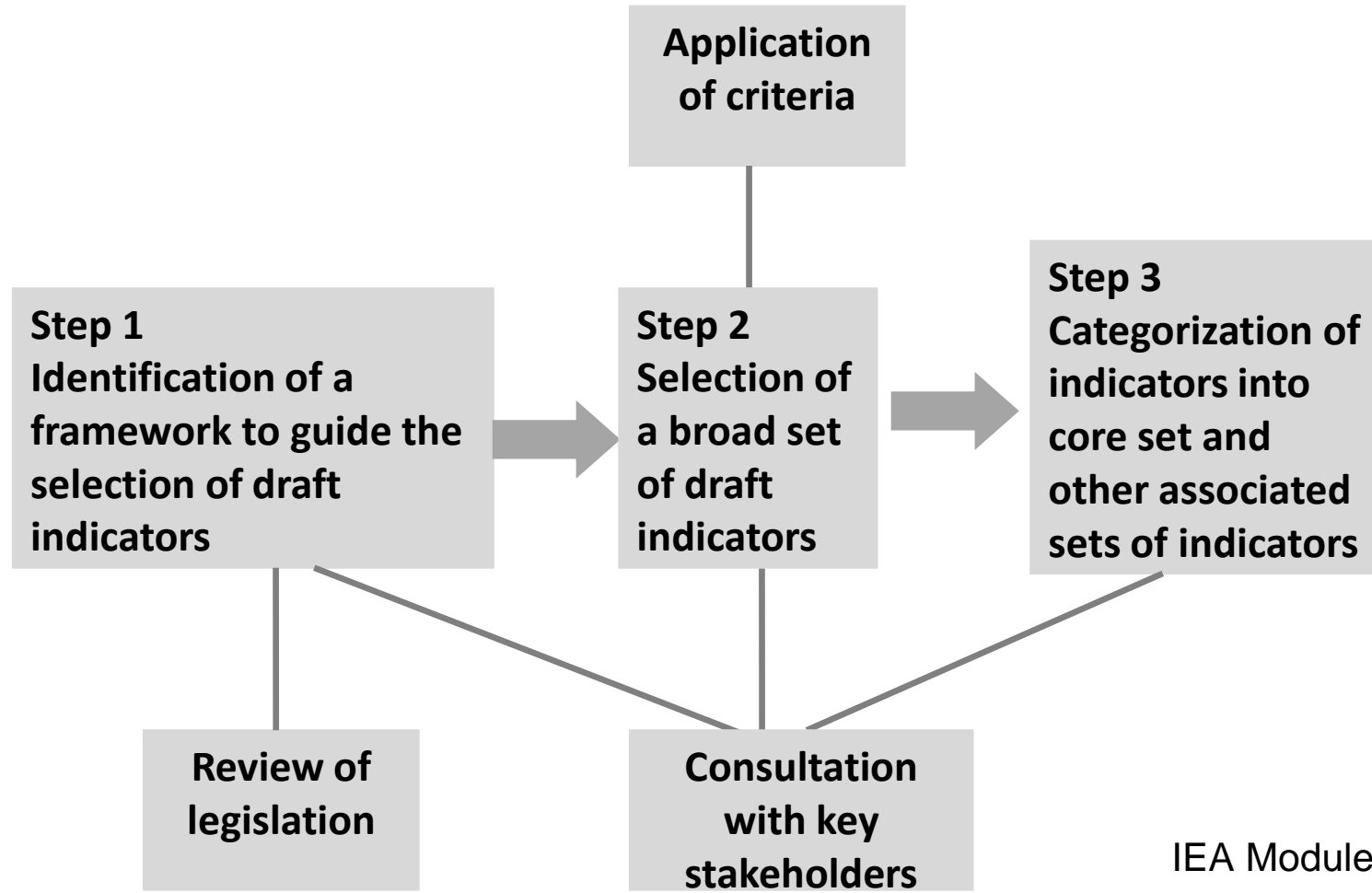
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# Monitoring Vulnerability



- So far we looked at vulnerabilities related to current climate and climate variability
- We can use indicators to monitor changes in vulnerability over time and help guide decision-making
- Same processes that are outlined in module 4
- Vulnerability can be monitored by identifying indicators and by creating indices that could both be presented spatially and non-spatially.

# Example of an indicator development process from South Africa

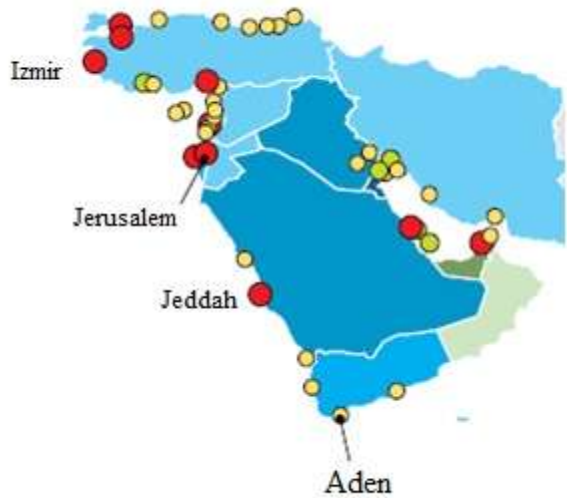


IEA Module 4

# Examples of Indicators



- Frequency of natural events (droughts and cyclones)
- Infrastructure (road network, coastal defense etc.)
- Wildfires (location, intensity)
- Land use
- Assets, land value, house value
- Household size –  
female-headed households
- Food sufficiency
- Population affected by disasters
- Crop types, cropping systems
- Irrigation rate, irrigation source
- Households below poverty
- Level of education or literacy
- Health care delivery



**Urban population percentage in the low-lying coastal areas**

<ul style="list-style-type: none"> <li>Coastal areas which are not low-lying:</li> <li>0.0-5.0</li> <li>5.1-10.0</li> <li>10.1-15.0</li> <li>15.1-20.0</li> <li>20.1-25.0</li> <li>25.0 &lt;</li> </ul>	<p><b>Size of city</b></p> <ul style="list-style-type: none"> <li>Small</li> <li>Medium</li> <li>Big</li> </ul> <p>Cities Population:</p> <ul style="list-style-type: none"> <li>Small cities: 100,000 – 500,000 people</li> <li>Medium cities: 500,000 – 1,000,000 people</li> <li>Big cities: more than one million people</li> </ul>
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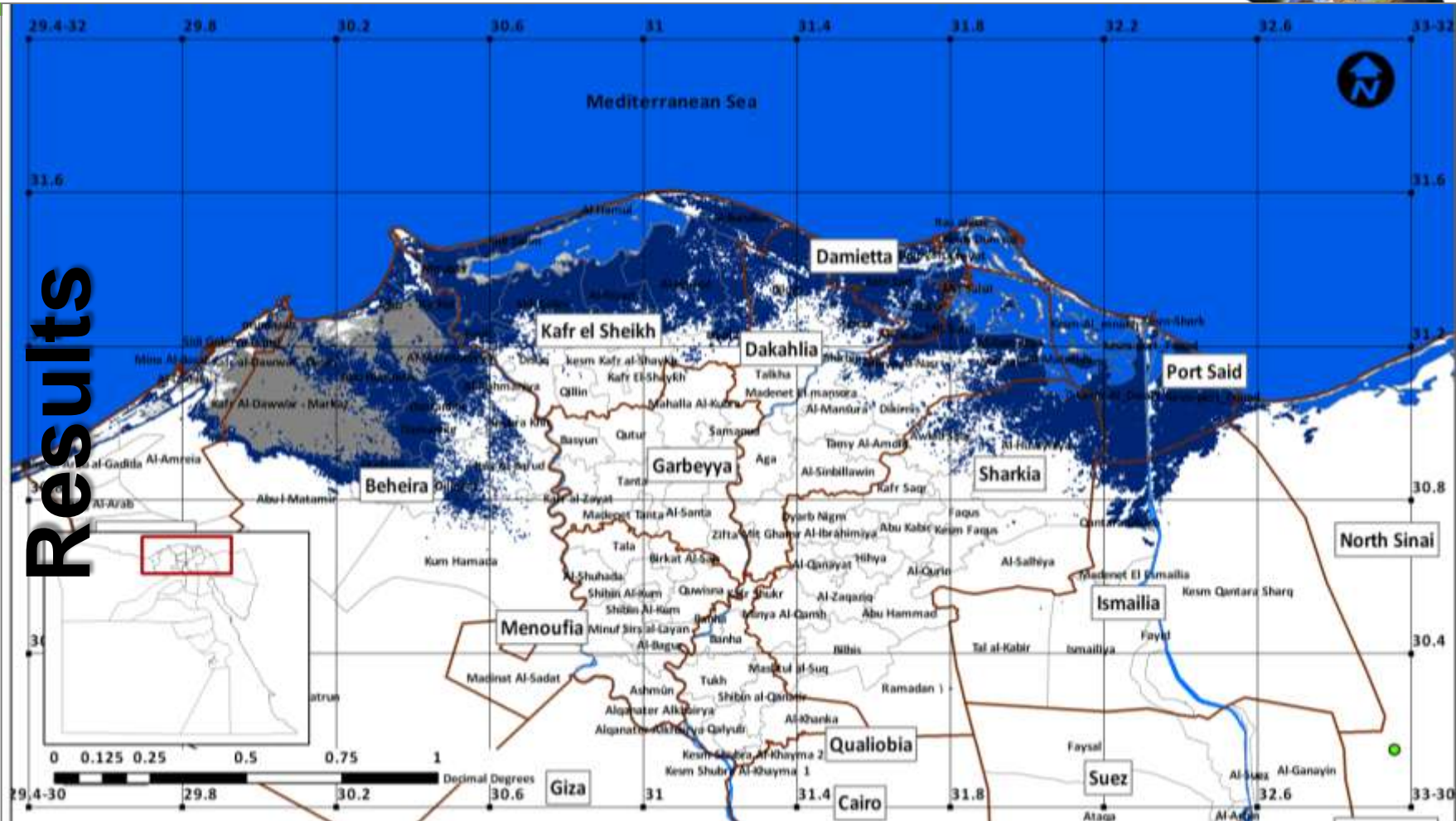
Source: Coastal areas' Analysis data-Gramps Project, Centre for International Earth Science Information Network, the Earth Institute, University of Columbia  
 Figures refer to an area of one km<sup>2</sup>

# Scenario (4) the expected impact of a 100cm SLR



EGSLR

Results



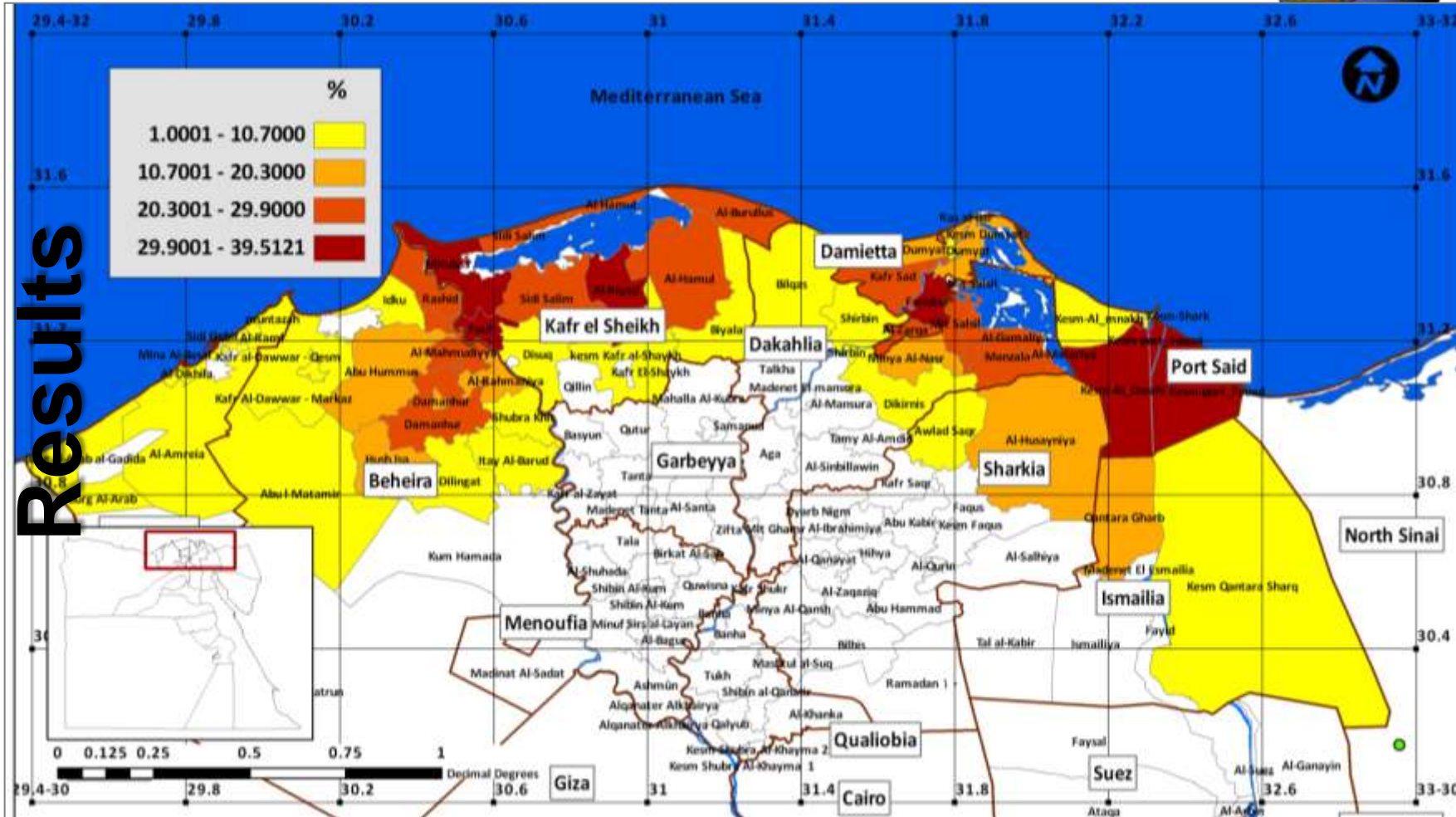


# Scenario (4) The impacted districts of a 100cm SLR



EGSLR

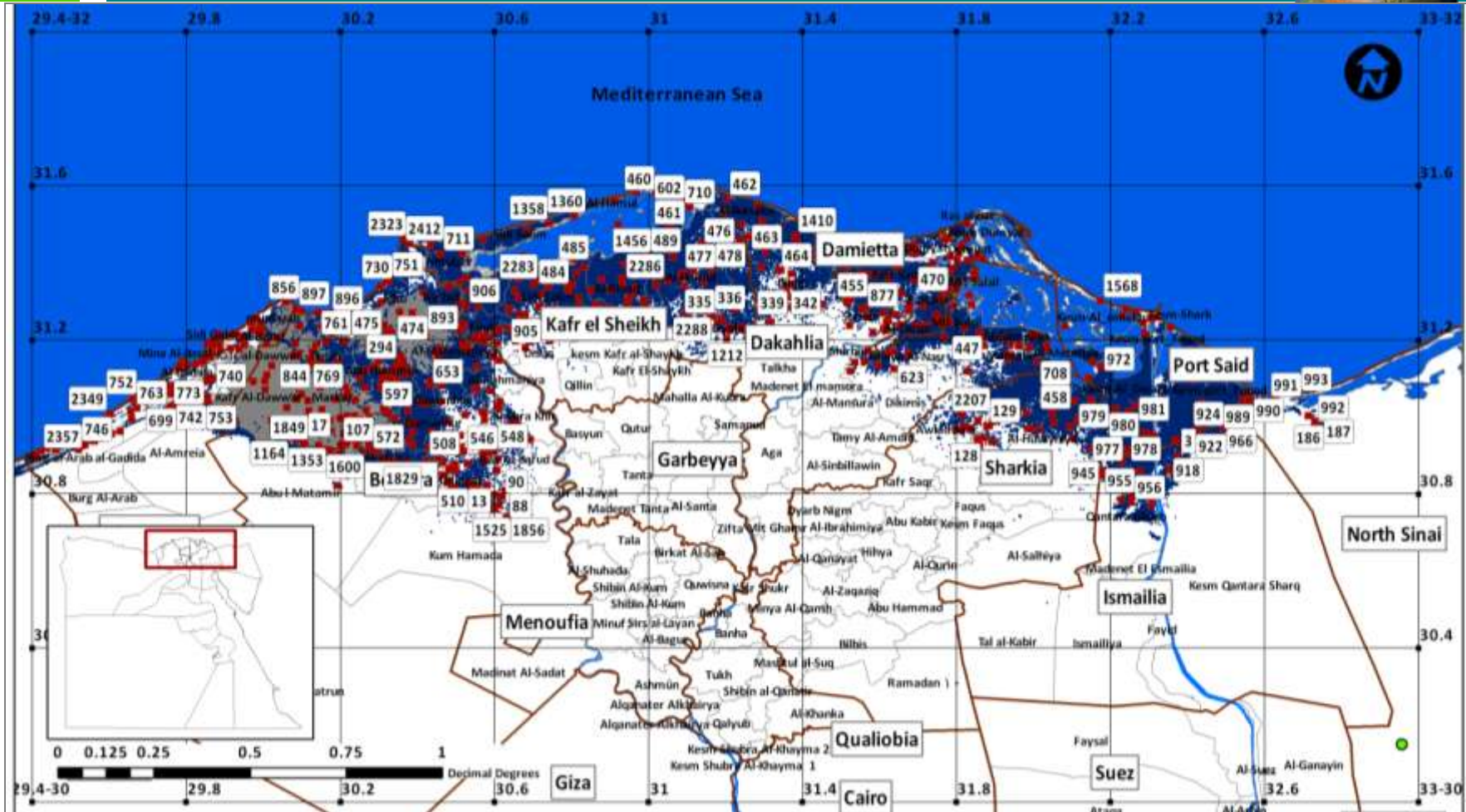
Results



# Scenario (4) The impacted hotspots of a 100cm SLR

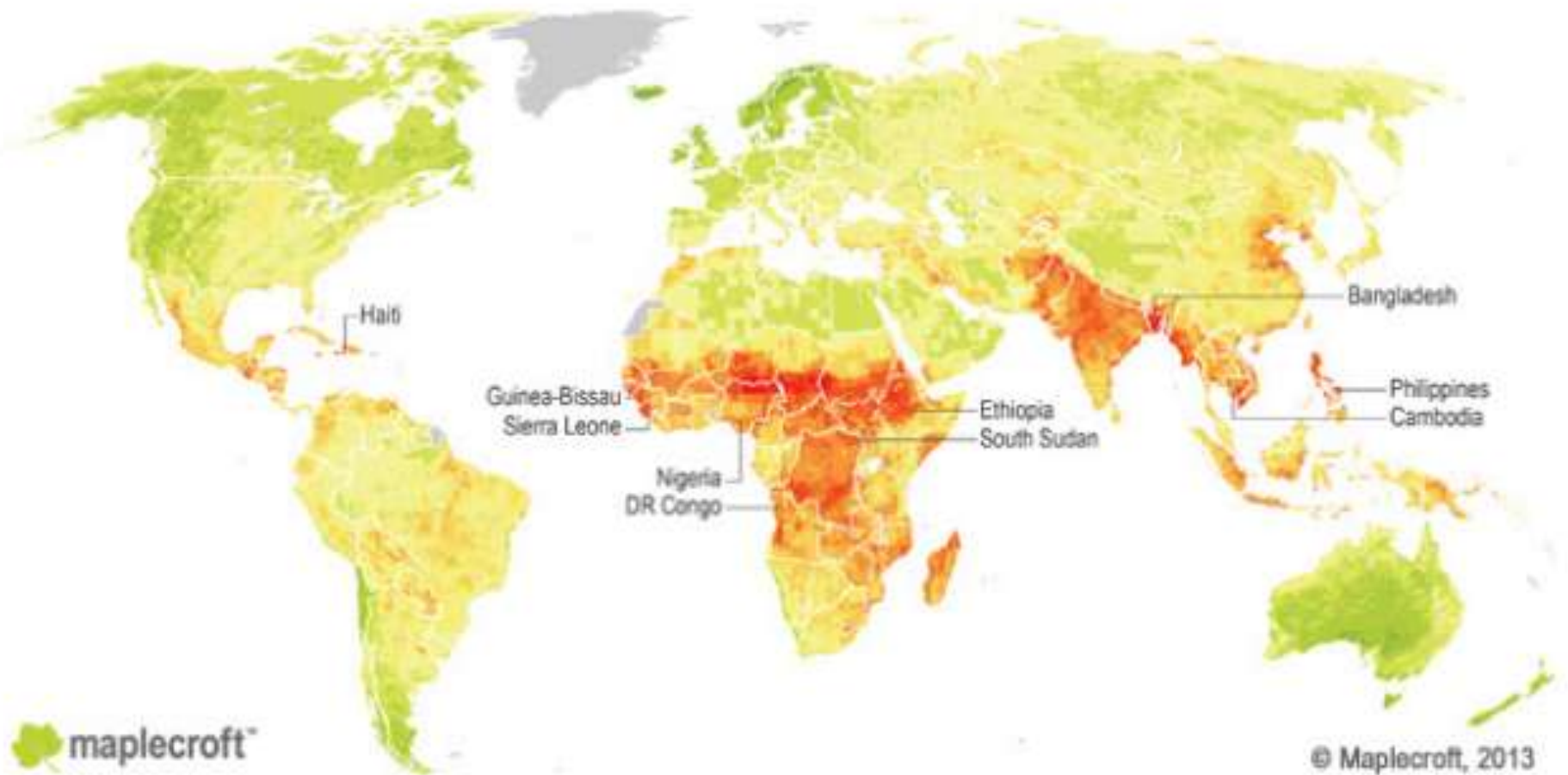


EGSLR





## Climate Change Vulnerability Index 2014



# Principles of effective monitoring



- Indicators strongly linked to a vulnerability framework
- Stakeholders understand the framework and how the indicators fit it
- The implications of changes in the indicators are well understood
- There are clear connections to specific behaviors and policies

These provide a basis for  
accountability and  
improvement



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# Example



## Managing the risks: **heat waves** in Europe

### Risk Factors

- lack of access to cooling
- age
- pre-existing health problems
- poverty and isolation
- infrastructure



### Risk Management/ Adaptation

- cooling in public facilities
- warning systems
- social care networks
- urban green space
- changes in urban infrastructure

Projected: *likely* increase in heat wave frequency and *very likely* increase in warm days and nights across Europe

# Mainstreaming Adaptation



- Climate change is not just an environmental issue – it is a development issue.
- Mainstreaming includes compromises and tradeoffs among competing local, national and/or regional interests and priorities.
- Finally, climate change adaptation mainstreaming process should contribute to sustainable development goals of the country at hand, talking into account all elements, including local/indigenous coping strategies.

Adaptation type	Example	Implementation level
Anticipatory	Water harvesting	Individual- society
Reactive	Expanding water harvesting establishments to absorb great quantities thereof	Society
Top down	Changing the building code	National
Bottom up	Societal measures related to building	Societal and institutional
Autonomous	Farmers changing agricultural schedules	Society- individual
Planned	Changing sectors' water allocations/provisions	Society- institutions





<b>Drought</b>	<p><b>Sudan:</b> Expanded use of traditional rainwater harvesting and water conserving techniques; building of shelter-belts and wind-breaks to improve resilience of rangelands; monitoring of the number of grazing animals and cut trees; set-up of revolving credit funds.</p>
<b>Sea-level rise; storm surges</b>	<p><b>Philippines:</b> Capacity -building for shoreline defense system design; introduction of participatory risk assessment; provision of grants to strengthen coastal resilience and rehabilitation of infrastructures; construction of cyclone-resistant housing units; retrofit of buildings to improved hazard standards; review of building codes; reforestation of mangroves.</p>
<b>Landslide</b>	<p><b>China:</b> Dense and deep-rooted vegetation helps to bind soil together, resisting slippage of surface layers. China's grain for green program bans logging and agriculture on steep slopes and prohibits forest clearing for shifting agriculture in the mountains of Southwest China. In exchange, the local communities get grain provisions and cash subsidies as well as resilience against flooding events.</p>



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- 1- Identification of the problem
- 2- Selection of the approach of action
- 3- Assessment of approach vulnerability
- 4- Selection of scenarios
- 5- Impact assessment
- 6- Assessment of the adaptive capacity
- 7- Assessment of adaptation options

# Scoring the criteria



Technology required	<p>Is the technology for the intervention readily available?</p> <p>1 = Not available, 2 = must be imported, 3 = available in the country, 4 = locally available, 5 = already installed</p>
Additional running costs	<p>Will the intervention incur additional running costs?</p> <p>1 = High costs, 2 = Medium, 3 = Low, 4 = No O&amp;M costs</p>
Local employment	<p>To what extent will the intervention impact on job creation?</p> <p>1 = Loss of jobs , 2 = Neutral, 3 = Few jobs (&lt;10), 4 = Many jobs (10-30)</p>
Local capacity to implement	<p>What level is the institutional capacity currently at with respect to the intervention?</p> <p>1 = Very low, 2 = Low, 3 = Adequate, 4 = High</p>
Acceptability to local community	<p>What is the consumer acceptability of this intervention in terms of additional cost to them and convenience?</p> <p>1 = None (high additional costs) , 2 = Low (some additional costs or inconvenient), 3 = Neutral, 4 = High (no additional costs)</p>
Long -term applicability	<p>What is the period of impact of the intervention? (short - long term)</p> <p>1 = &lt;2 years, 2 = 2-5 years, 3 = 5-15 years, 4 = 15-25 years, 5 = &gt;25 years</p>

# Adaptation Prioritization



- Using multi-criteria assessment ,options will be classified in categories such as :
- A = Urgent adaptation options which can be done by communities themselves
- B = Urgent adaptation options for which communities needed assistance from the Government; options will be then allocated to the responsible ministries
- C = “No-regrets” options that help to address problems that need to be dealt with anyway
- D = Adaptation options that were less important/urgent
- E = Adaptation options for which there was no need or willingness to implement

# Illustration of an application in West Africa

	Scalability	Relative cost	Ease of implementation	Return time	Adverse impact on Environmental	Potential impact on poverty alleviation
Drought tolerant/improved seed varieties	High	Medium	Medium	Short	Low	High
Soil and water conservation	High	Medium	Med	Medium	Low	High
Irrigation	Low	High	Low	Short-Med	Moderate	High
Early detection and destruction of locust	High	Medium	High	Short	Moderate	Low
Community level food and fodder banks	High	Med	Med	Short	Low	High
Vaccination programs	High	Med	Med	Med	Low	High
Contingent financing (	High	Low	High	Short	Low	Low
Shortening emergency response time	Med	Low	Med	Short	Low	Low
Strategic de-stocking	Low	Medium	Low	Med	Low	Low
Insurance	Low	Low	Med	Med	Low	Low



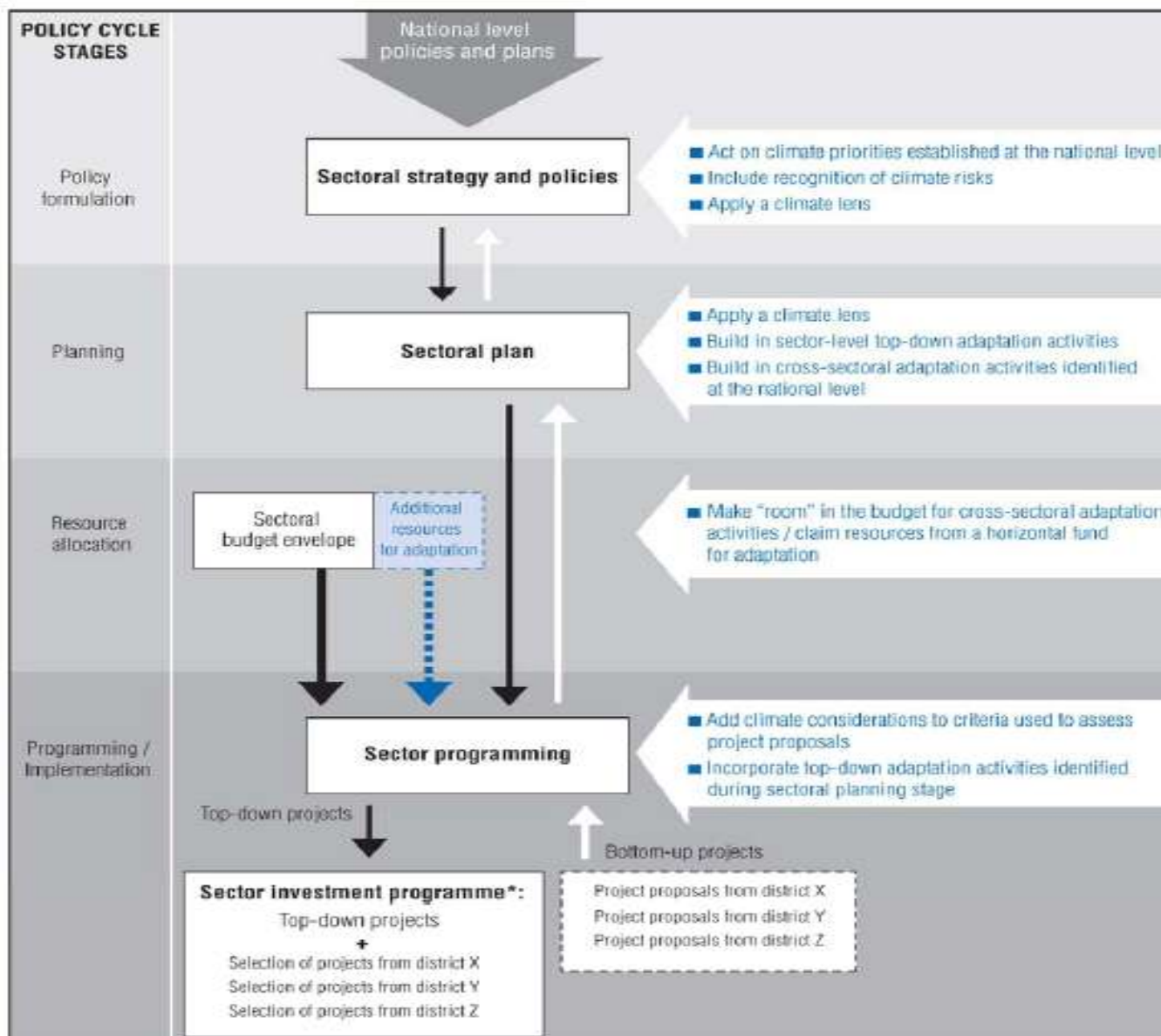
1. Characteristics of vulnerability and scope of the assessment
2. Vulnerability assessment and the DPSIR framework
3. Monitoring vulnerability
4. Creating responses - determining the adaptation options
5. Prioritizing the adaptation options
- 6. Developing a basic implementation plan and a communication strategy**

# Implementation of Responses



- Adaptation options include activities that are new and untested, but most of the activities are well-known to communities.
- Local communities should be seen as a valuable knowledge about climate change impacts and adaptation, even if the options are not explicitly recognized as helping to reduce vulnerability to climate change.
- Building on this familiarity helps to empower local communities and decision-makers to engage in developing relevant responses to climate change.





# National Priorities



- Improving the coverage and quality control of climate monitoring data. Commissioning national-level assessments of climate change impacts, vulnerabilities and adaptation options;
- Moving the co-ordination for adaptation into powerful central bodies (Office of the President or Prime Minister or planning agencies);
- Including considerations of climate change risks within long-term visions, PRSPs and SD plans;
- Making an economic case for adaptation through *horizontal funds* for the incorporation of adaptations in policies, plans and programs (OECD, 2009)

# Integrating the Adaptation Strategy into National Plans



- Proper scientific assessment and a better understanding of climate change impacts and risks represent the first step towards developing an adaptation policy to tackle potential effects of climate change.
- This requires capacity- building in the field of scientific assessment of the vulnerable sectors and fragile ecosystems, and the provision of the necessary financial resources to carry out this mission.
- According to various social circumstances as well as the economic and political environment in the country, appropriate measures and mechanisms are developed to integrate these policies into national plans.

# Communicating Adaptation Options



- Priority adaptation options must be delivered to the masses and target groups including decision-makers.
  - Much easier if they have been involved in evaluating them
- Learned lessons and knowledge, especially local (inherited practices and information) must be disseminated and technology transfer should be encouraged.
- Focal points have to be expanded and appropriate messages have to be transmitted.

# Dissemination of Information



- Ensure you have a **good distribution network**
- Ensure your distribution list matches your **target audience** and update it if needed.
- Consider **different ways** of distributing your strategy
- **Keep thinking** about distribution long after your product has been produced (even if it is hard to do so)

# Adaptation never ends



Managing risks of disasters in a changing climate benefits from an iterative process



*Learning-by-doing and low-regrets actions can help **reduce risks now** and also promote future adaptation*

# You aren't doing this alone



**PROVIA** PROGRAMME OF RESEARCH ON  
CLIMATE CHANGE VULNERABILITY,  
IMPACTS AND ADAPTATION

<http://www.unep.org/provia/>

The Nairobi work programme on impacts, vulnerability and adaptation to climate change

[http://unfccc.int/adaptation/workstreams/nairobi\\_work\\_programme/items/3633.php](http://unfccc.int/adaptation/workstreams/nairobi_work_programme/items/3633.php)



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**Good adapters are good networkers** 53