Climate Change & Biodiversity in Africa and MENA Region

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2 May 2017

- Africa and MENA regions, representing more than 30% of UN Member States, have a rich and varied biological, renewable and non renewable, resources which are not only locally important, but also of global significance for the world's climate and for the development of agriculture, industrial activities, pharmaceutical production, construction, and tourism.

- Africa is the home to 25% of the world's 4700 mammal species, more than 2000 species of birds (20% of all known bird species), at least 2000 fish species, 950 amphibian species, up to 60,000 plant species and about 100,000 known species of insects, spiders and other arachnids, Eight of the world's 34 biodiversity hotspots are in Africa.

- In addition, the coastal and marine ecosystems are extraordinary diverse, including 5 Oceanic realms, four coastal realms, and five fauna provinces. Some of the waters surrounding the two regions, particularly from the Strait of Gibraltar to Guinea, are among the richest fishing grounds in the world. Furthermore, MENA region includes some of the world's largest reserves of oil and fossil gas, but is poor in water resources and arable lands. It is also considered one of the most arid region in the world

brief
environment

CIFOR *environment briefs* provide concise, accurate, peer-reviewed information on current topics in forest research

CIFOR

No. 3, November 2008 | www.cifor.cgiar.org

Adaptation to climate change in Africa

Synergies with biodiversity and forest

Johnson Nkem[1], Monica Idinoba[1], Maria Brockhaus[1]
Fobissie Kalame[1] and Adriaan Tas[2]

Africa Partnership Forum

8th Meeting of the
Africa Partnership Forum
Berlin, Germany
22-23 May 2007

Climate Change and Africa

BIODIVERSITY CONSERVATION UNDER A CHANGING CLIMATE

Building Capacity for Sustaining Ecosystem Services in the Albertine Rift

START's Program on Biodiversity Conservation under a Changing Climate promotes experiential learning, awareness building and networking for managing emerging risks from climate change and other drivers in the Albertine Rift biodiversity hotspot in Eastern Africa. Comprising parts of Tanzania, Burundi, Rwanda, DR Congo and Uganda, the region is known for its enormous diversity of flora and fauna and its unique ecosystems and habitat. It is also a source of vital ecosystem services. Current conservation strategies designed for a more static climate may not adequately address new and additional risks from climate change. Managing for greater resilience requires targeted capacity building of local individuals and institutions to enable a continuous process of learning for the assessment of multiple risks and the development of context specific adaptation responses.

More information at: www.start.org/programs/biodiv

Impact of Climate Change

A Review of
Climate Change Adaptation Initiatives
within the Africa Biodiversity Collaborative Group Members



Lead authors:

Contributing authors:

UNEP

State of Biodiversity

in Africa

Biodiversity and Climate Change

Adapting forest policy framework conditions to climate change in the MENA region (Middle East-North Africa)

Partner countries: Algeria, Lebanon, Morocco, Syria, Tunisia, Turkey

Adaption to Climate Change in the Joint Africa-EU Strategy and the Copenhagen Climate Summit

2009

VENRO

INTERAFRICAN BUREAU FOR ANIMAL RESOURCES

AU-IBAR Climate Change Adaptation-Mitigation Strategy for Animal Resources

AU-IBAR Monographic Series No. 2

2012

Arab Human Development Report

Research Paper Series

Mapping of Climate Change Threats and Human Development Impacts in the Arab Region

Eatgib Osman Elasha

UNIVERSITY OF GOTHENBURG
SCHOOL OF BUSINESS, ECONOMICS AND LAW

Environmental and Climate Change Policy Brief - MENA[1]

This Environment and Climate Change Policy Brief aims to summarise the key environmental problems and opportunities for the Middle East and Northern Africa (MENA) region, related to poverty reduction and economic development and the Swedish government's thematic priority Environment and Climate which includes four focus areas; (i) climate change adaptation, (ii) energy, (iii) environment and security, and (iv) water. Together with the Water Concept Note[2], this Policy Brief is aimed at giving input to the process of developing a new Swedish Cooperation Strategy for the MENA region.

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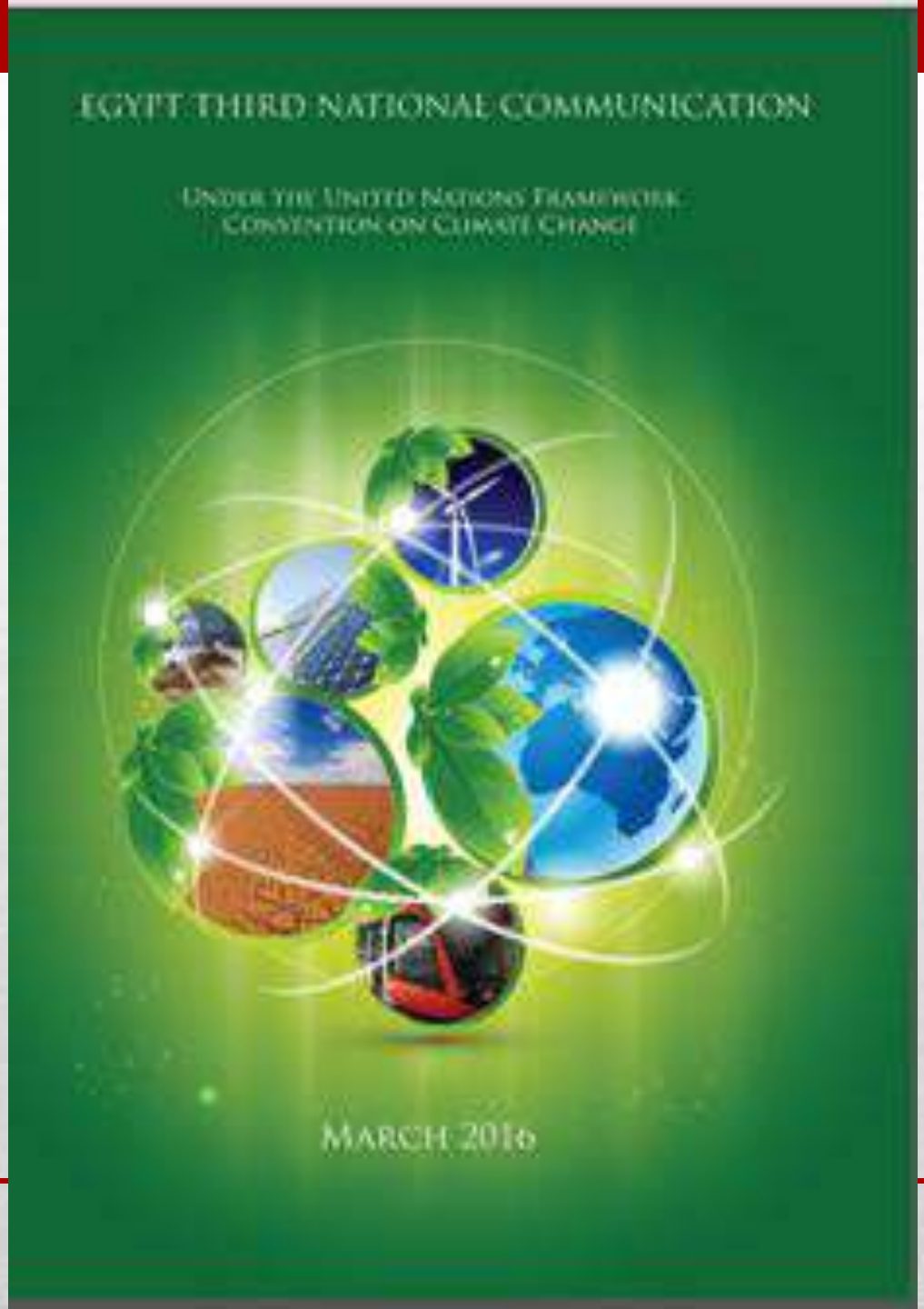
CLIMATE CHANGE RISK MANAGEMENT PROGRAMME IN EGYPT


EGYPT THIRD NATIONAL COMMUNICATION
UNDER THE UNITED NATIONS FRAMEWORK
CONVENTION ON CLIMATE CHANGE
MARCH 2016

Proposed CLIMATE CHANGE ADAPTATION STRATEGY for the Ministry of Water Resources & Irrigation in Egypt

prepared for
UNESCO – Cairo
Planning Sector – Env. & Climate Change Research Institute
By Mohamed M Nour El-Din

Potential Impacts of Climate Change on the Egyptian Economy

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Cairo, Egypt
April 4, 2013

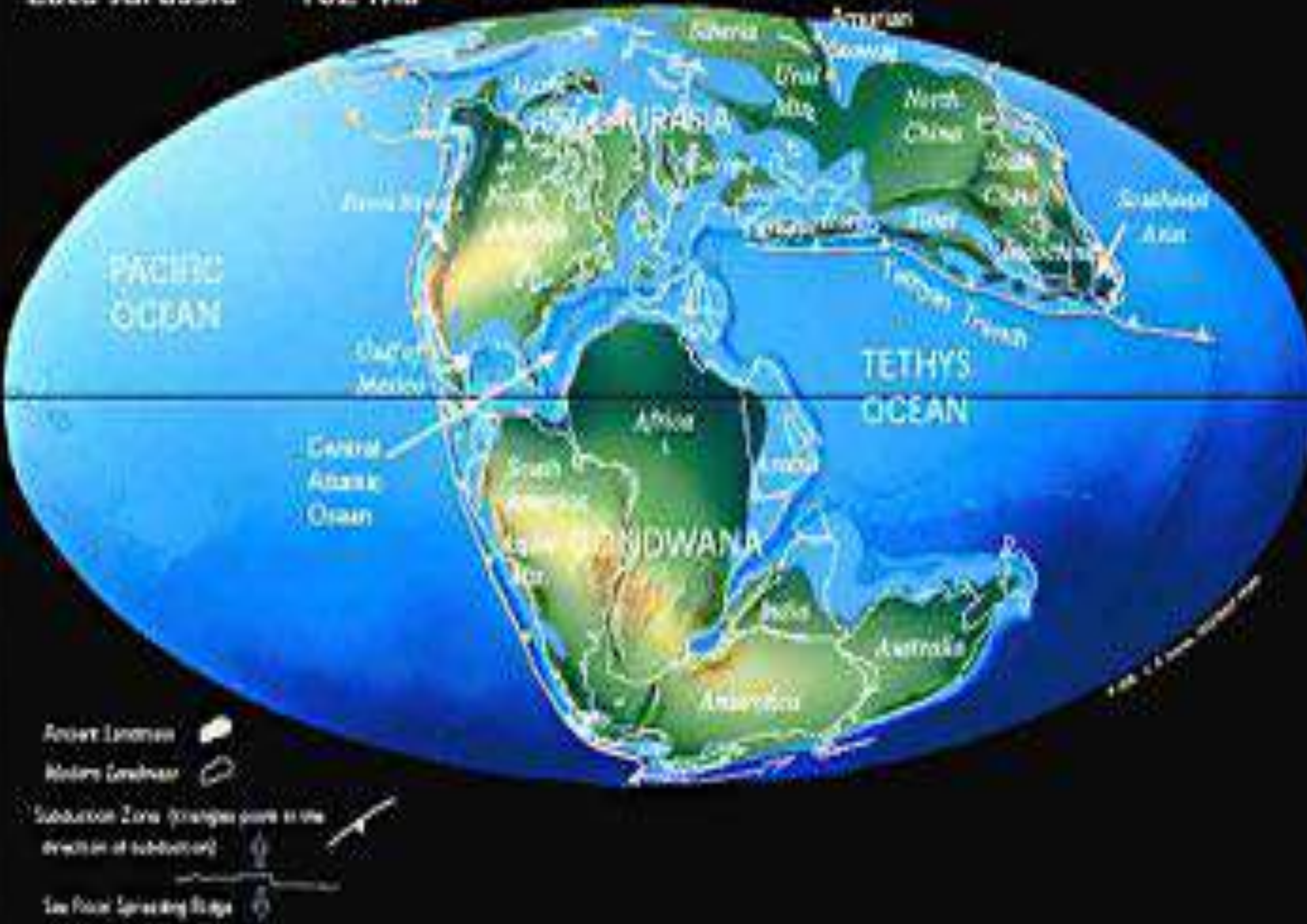
- The 5th IPCC assessment report (Nov. 2014) confirmed that it is extremely likely that human influence has been the dominant course of the observed warming of the atmosphere and the ocean since the mid-20th century. The report documented both observed impacts of climate change on biodiversity and human well-being, as well as the projected impacts according to a number of scenarios. It also set options for mitigation actions.

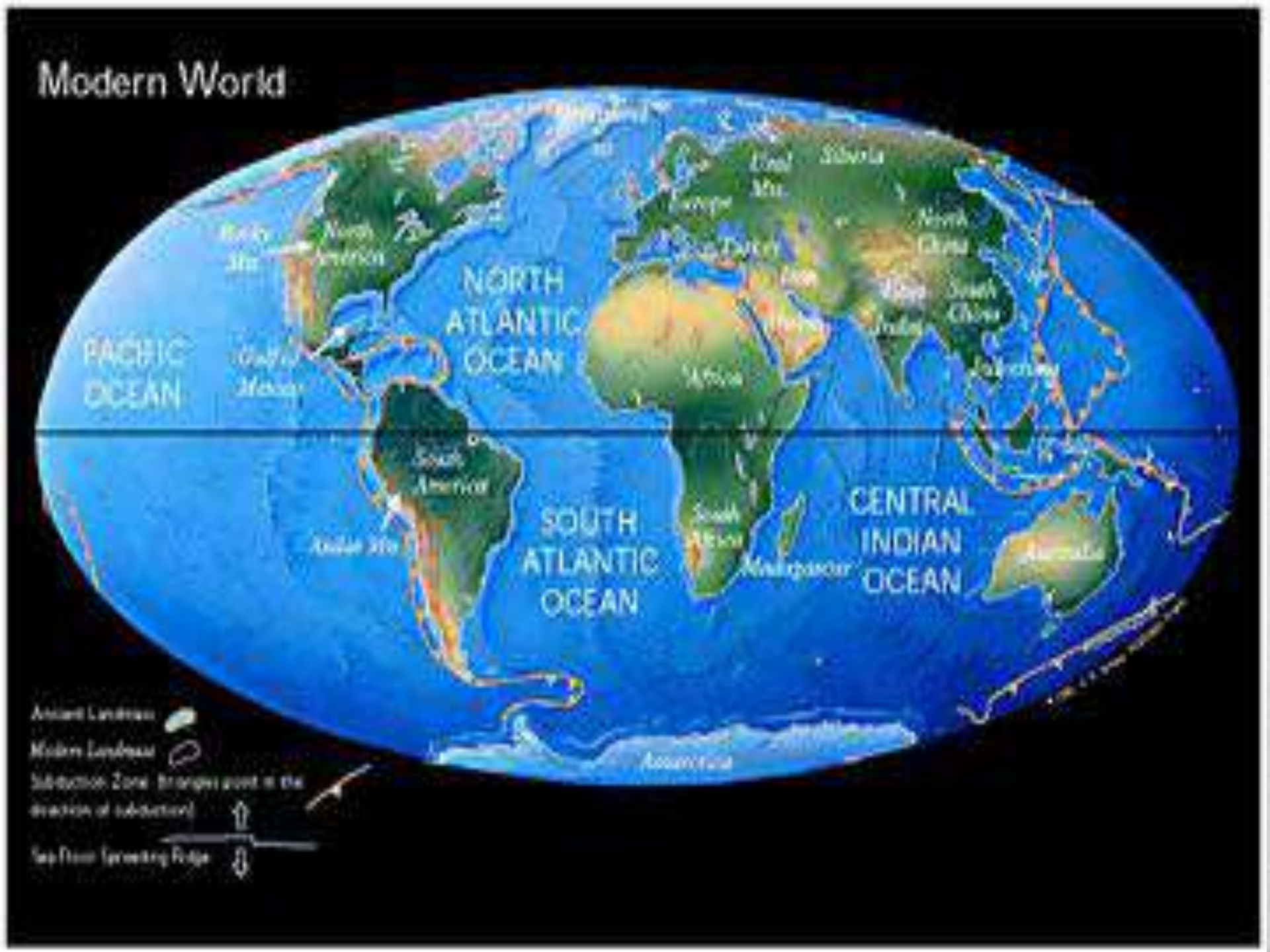
- However, the fourth Global Biodiversity Outlook (GBO4) (October 2014) shows that it is possible to limit climate change, protect biodiversity, and attain food security. This will require political coherence: a clear policy and legal framework, incentives, monitoring and public support. These are extremely relevant to Africa and MENA countries to draw strategies for adaptation to climate change, and to the conservation and sustainable use of biodiversity.

- Climate change, and its impacts on ecosystems and people, will likely be the biggest threat to biodiversity conservation in Africa and MENA region in the future. The expected impacts of climate change include shifting rainfall patterns, rising temperatures, shifts in seasons, and sea level rise.

- The most vulnerable sectors to climate change include agriculture, water, and health; coastal areas and islands are expected to be heavily impacted. An economic loss of approximately 10% due to climate change is projected for Africa.

Late Jurassic 152 Ma




Modern World
Siberia
Europe
North America
NORTH ATLANTIC OCEAN
PACIFIC OCEAN
Africa
South America
SOUTH ATLANTIC OCEAN
CENTRAL INDIAN OCEAN
Madagascar
Australia
Antarctica
Ancient Landmass
Modern Landmass
Sea Floor Spreading Ridge

- Biodiversity impacts of climate change include shifts in species distribution and range, and the impacts of mitigation activities. There are also concern that existing protected area networks may not be adequate for biodiversity conservation in a time of changing climate. Moreover, the Mediterranean sea is becoming warmer; its salinity is increasing, and the rise in sea level is accelerating. The Nile Delta is considered one of the most vulnerable sites in the world due to climate change inputs.

Potential impact of sea level rise: Nile Delta

Population: 3 800 000
Cropland (Km²): 1 800

Population: 6 100 000
Cropland (Km²): 4 500

GRID Arendal UNEP

0 50 km

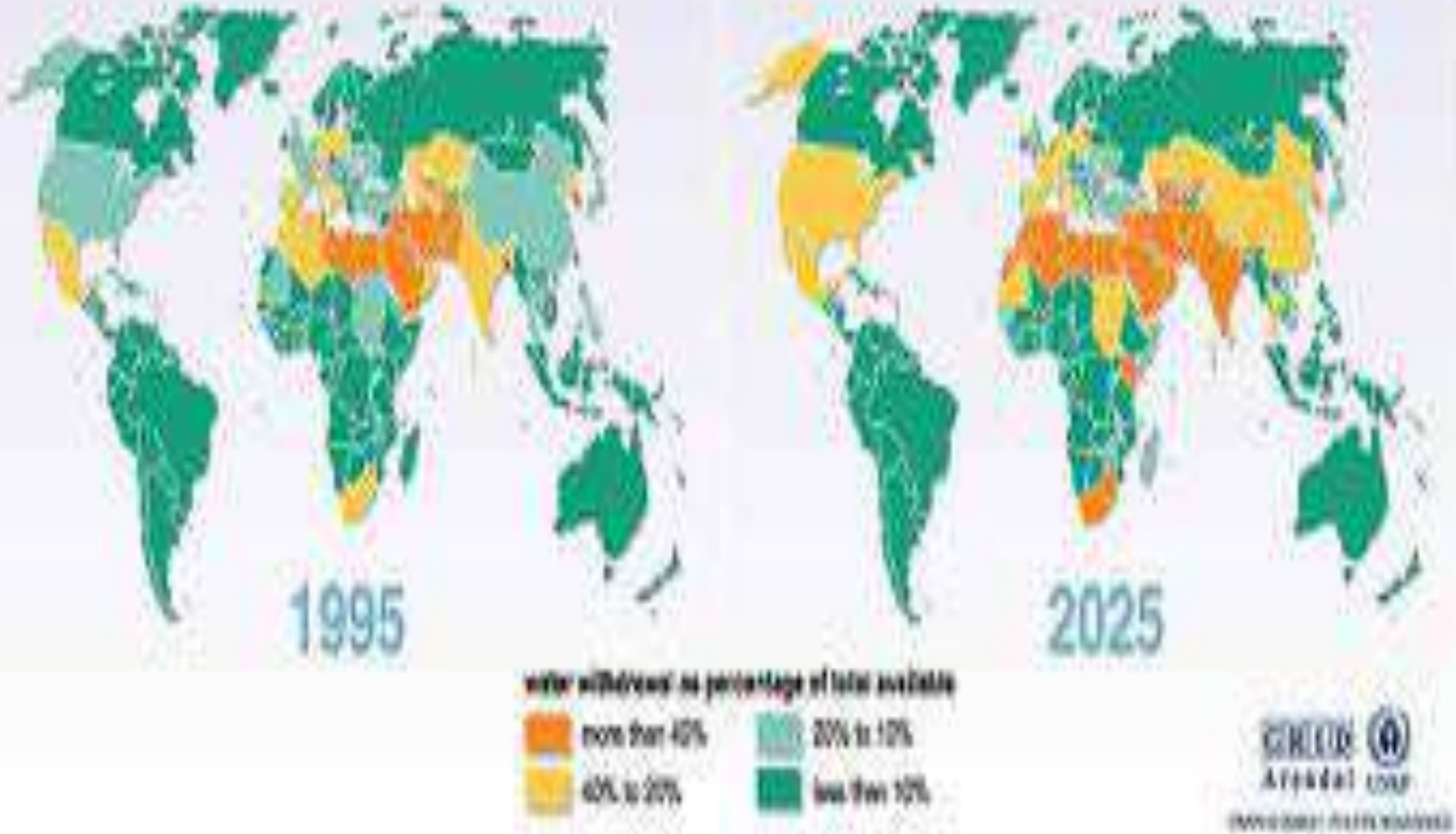
Sources: Otto Simonett, UNEP/GRID Geneva; Prof. G. Sestini, Florence; Remote Sensing Center, Cairo; DEDICKE Weltwirtschaftsatlas

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. The impacts would be very serious: 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 innundated. Vital, low-lying installations in Alexandria and Port Said would be threatened. Recreational tourism beach facilities would be endangered and essential groundwater would be salinated. Dykes and protective measurements would probably prevent the worst flooding up to a 50 cm sea level rise. However, it would cause serious groundwater salination and the impact of increasing wave action would be serious.

as well as confidence levels (high, medium or low)

Mediterranean Sea	What is happening	What is likely to happen by the end of the 21st century	Reference
Temperature	Surface temperatures have risen by roughly 1°C	Surface temperatures will rise by a further 2-3°C on average by 2100, and intermediate and deep layer temperatures will rise as well (High confidence)	Lionello, 2012
Salinity	Increased by 0.05 ppt in intermediate and deep layers in the 20th century	Will tend to increase in surface, intermediate and deep layers; surface salinity could increase by 0.4 ppt by 2100 depending on freshwater inputs, ocean circulation and other factors with a higher increase in the Aegean and Adriatic seas (Medium confidence)	Vargas-Yáñez et al., 2010
Sea-level	Mediterranean sea levels have been rising by 1–3 mm/yr	Temperature and salinity increases would have opposite effects on sea-level (Low confidence). Ocean temperature-driven sea-level rise during the 21st century could be between 3 and 61 cm, while salinity-driven sea-level change estimates between -22 and +31 cm	EEA Report No 12/2012
Sea acidification	Ocean surface water pH has fallen by 0.1 pH unit, equivalent to a 30% increase in acidity	The Mediterranean Sea will continue to acidify with increasing CO_2 emissions. At global level it is projected to drop another 0.2 to 0.4 units by 2100 (to a pH less than 7.8) (Low confidence)	Dahlman et al., 2011
Mediterranean circulation	No observed effects at the moment	Possible weakening and disruption of the thermohaline circulation (Medium confidence)	Li et al., 2012 in Lionello, 2012
Coastal erosion	Impacts on shoreline, beach and deltaic coastal areas, with reduced sediment deposition	Expected to increase in the future due to the effects of sea-level rise and storms, particularly in autumn and winter (Low confidence)	Kritis et al., 2012; Sano et al., 2011
Upwellings and current intensity	No observed effects at the moment	Lower intensity (Low confidence)	Lionello, 2012

Freshwater stress



Impacts of Climate Change on Biodiversity

Migratory animals

- **Breeding range shift (extend breeding range)**
- **Wintering range shift (change in the timing of events: 70% of species arrive earlier than 30 years ago)**
- **Mistiming of biological shift (breeding)**
- **Sea level rise (flooding)**

- Mangroves
- Coral Reefs (coral bleaching)
- Wetlands
- Mountains (plant communities shifts)
- Arid land
- Water systems

- Mediterranean Sea

  1°c ↑in 30 years ↑ frequency of extreme events.

  No model to assess biodiversity

  Debate on adaptation measures

- Hot spots (Elba / St. Katherine)
  - Sinai butterfly
  - Ombet / plant communities
  - Coral bleaching
  - Migratory animals
  - Wetlands

- Four strategic directions, each has national and regional actions, owners, time frame and indicators. These are:

1. Develop scientific knowledge and technical capacities to deal with climate change and ensure informed decision – making at all levels (8 actions).
2. Accelerate the uptake of climate-smart technologies (6 actions)

- 3- Leverage existing and emerging climate financing – mechanisms (international, national, private sector (4 actions)

- 4- Encourage institutional, policy and legal reforms for effective mainstreaming of climate change responses into national and local development frameworks.

- CBD addressed the relationship between biodiversity and climate change.

- Within the framework of the expected climate agreement (Paris), there exist tools, guidance and information related to biodiversity and climate change.

- According to GBO 4 (October 2014) mitigating climate change is a key long term priority and urgent action to reduce emissions is essential to limit climate change to 2°c warming while halting biodiversity loss, and achieving other SDGs can be accomplished if coherent and strategic action is taken (e.g. Effective management of protected areas).

- Ecosystem – based approaches for adaptation include sustainable management, conservation and restoration of ecosystem, as part of an overall adaptation strategy that take into account the multiple social, economic and cultural co-benefits for local communities.

Declarations

- *Hyderabad Call for a Concerted Effort on Ecosystem Restoration:*
- http://www.cbd.int/doc/restoration/Hyderabad-call-restoration-en.pdf
- *The Lima 2014 Declaration on Biodiversity and Climate Change from Science to Policy-Makers, for Sustainable Development: http://www.ipbes.net/images/documents/plenary/third/insession/*
- non-paper/other_matters/The_Lima_declaration.pdf

Decisions:

- *IX/16 – Biodiversity and Climate Change (contains proposals for the integration of climate change* activities within the programmes of work of the Convention and options for mutually supportive actions addressing climate change within the three Rio Conventions)

- *X/31 – Protected Areas (contains a section on climate change)*

- *X/2 – Strategic Plan for Biodiversity 2011-2020*

- *X/33 – Biodiversity and Climate Change (contains guidance on ways to conserve, sustainably use* and restore biodiversity and ecosystem services while contributing to climate change mitigation and adaptation)

- *XI/19 – Biodiversity and climate change related issues: advice on the application of relevant* safeguards for biodiversity with regard to policy approaches and positive incentives on issues relating to reducing emissions from deforestation and forest degradation in developing countries; and the role of conservation, sustainable management of forests and enhancement of forest carbon stocks in developing countries.

- *XI/21 – Biodiversity and climate change: integrating biodiversity considerations into climate change* related activities
- *XII/1 – Mid-term review of progress in implementation of the Strategic Plan for Biodiversity*
- 2011-2020 including the fourth edition of the Global Biodiversity Outlook, and actions to enhance implementation
- *XII/20 – Biodiversity and climate change and disaster risk reduction*

- **Publications**

- CBD Technical Series – http://www.cbd.int/ts/ :
- o *Technical Series No. 10 – Interlinkages between Biological Diversity and Climate Change*
- - Advice on the integration of biodiversity considerations into the implementation of the United Nations Framework Convention on Climate Change and its Kyoto Protocol (2003)
- o *Technical Series No. 25 – Guidance for Promoting Synergy among Activities Addressing* Biological Diversity, Desertification, Land Degradation and Climate Change (2006)
- o *Technical Series No. 41 – Connecting Biodiversity and Climate Change Mitigation and* Adaptation: Report of the Second Ad Hoc Technical Expert Group on Biodiversity and Climate Change (2009)

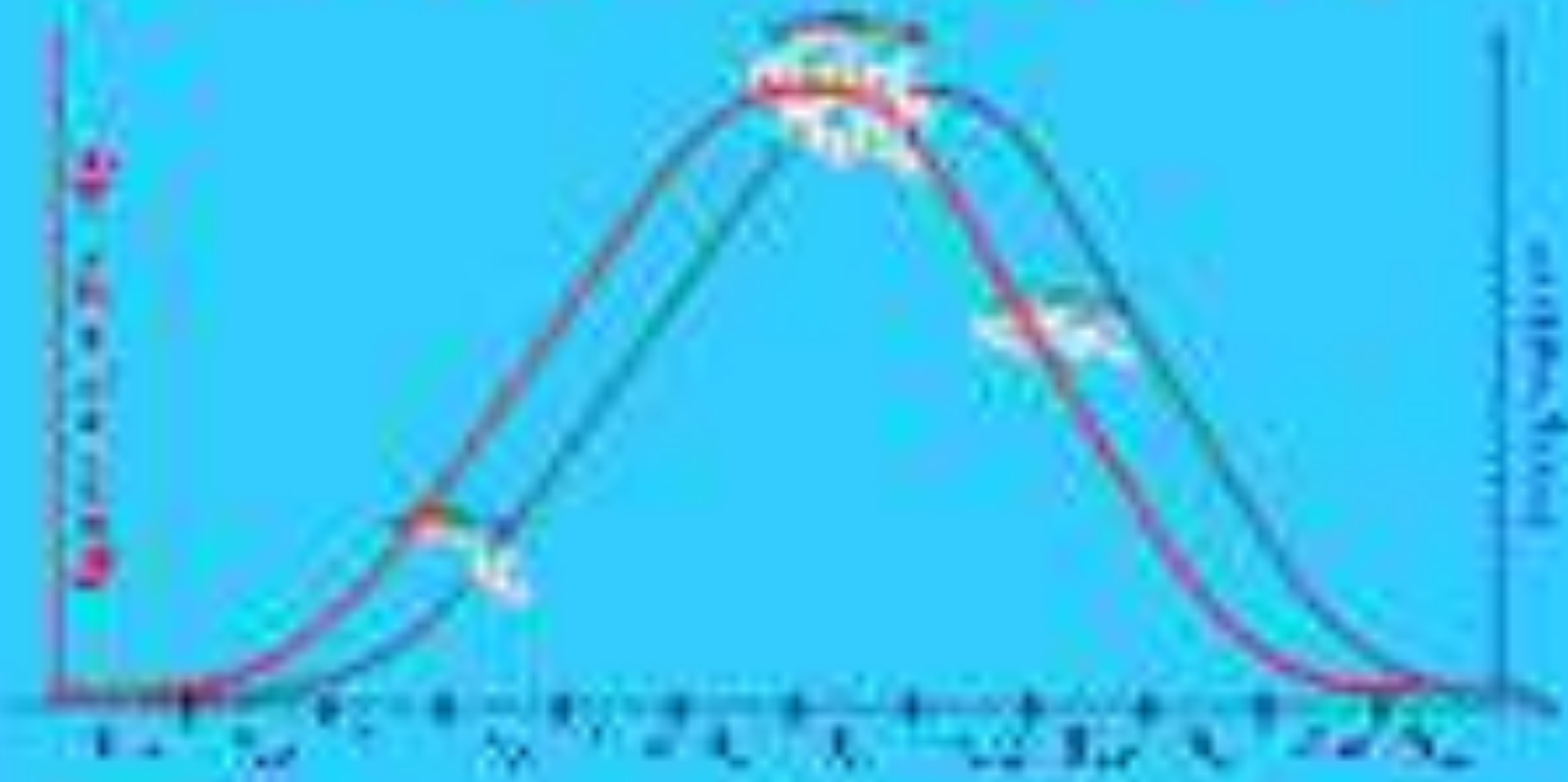
- *Technical Series No. 42 – Review of the Literature on the Links between Biodiversity and* Climate Change: Impacts, Adaptation and Mitigation (2009)
- *Technical Series No. 43 – Forest Resilience, Biodiversity, and Climate Change. A* synthesis of the biodiversity/resilience/stability relationship in forest ecosystems (2009)
- *Technical Series No. 46 – Scientific Synthesis of the Impacts of Ocean Acidification on* Marine Biodiversity (2009)
- *Technical Series No. 59 – REDD+ and Biodiversity (2011)*
- *Technical Series 75 - An Updated Synthesis of the Impacts of Ocean Acidification on* Marine Biodiversity (2014)

- **Tools**
- E-learning module on protected areas and climate change: http://www.cbd.int/protected/elearning/
- The Ecosystem Approach Sourcebook: http://www.cbd.int/ecosystem/sourcebook/

Related notifications

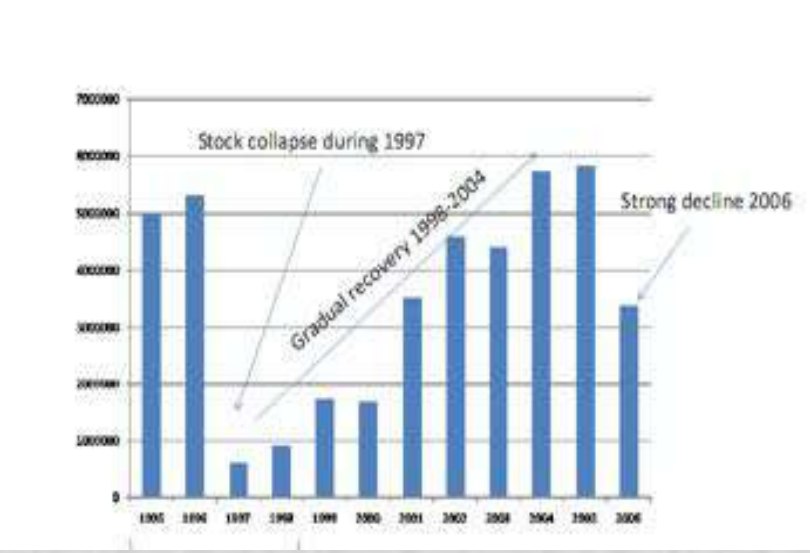
- FAO's tools and guidance on food and agriculture to assist implementation of the Convention on Biological Diversity and the Strategic Plan for Biodiversity 2011-2020:
  http://www.cbd.int/doc/notifications/2014/ntf-2014-099-agri-en.pdf
- Incorporating disaster risk reduction into National Biodiversity Strategies and Action Plans and opportunities to engage with national agencies responsible for the Hyogo Framework for Action 2005 – 2015 and its follow up in 2015:
  http://www.cbd.int/doc/notifications/2014/ntf-2014-116-nbsaps-en.pdf
- Request for information from Parties and partners on commitments to reduce habitat loss and on ecosystem restoration (Aichi Biodiversity Targets 5 and 15):
  http://www.cbd.int/doc/notifications/2015/ntf-2015-014-ecosystem-restoration-en.pdf

Global warming and reproduction of a warm water fish – (a model)



Fishery stocks changes (Morocco)

- During the past twnty years, three major events occurred in the south of Moroccan coast and are believed to be related to the impacts of climate change
  - Sardine Stock collapse as natural event (1997)
  - Migrating sardinella to the North
  - Important decline of sardine stock in 2006



Source: Orabi, 2009

By 2050

- 11% of natural resources remaining in 2000 could be lost, due to:
  - Conversion for agriculture
  - Expansion of infrastructure
  - Climate change
- 40% of the current extensive agriculture land could be converted to intensive agriculture (further biodiversity loss)
- 60% of coral reefs could be lost by 2030 through:

  Fishing / pollution/diseases/invasive species/coral bleaching
- Trends in land/seas/oceans. Demonstrate serious changes that biodiversity loss pose to human health-well-being (poor people at risk from continuing biodiversity loss)
- Payment for ecosystem services (PES)
- New markets need appropriate
  - Infrastructure
  - Incentives

- Appropriate technology transfer and capacity building support (Bali Action Plan)
- Ecosystem / pre-cautionary approaches
- Contribution of biodiversity to climate change adaptation
- Measures that enhance adaptive potential of biodiversity components
- Enhance scientific tools, methodologies, knowledge and approaches to respond to the impacts of climate change (including socio-economic and cultural impacts)

- Increase stakeholder involvement in the decision-making process related to climate change impacts

- Implement existing tools such as CHM / web sites and fora to:

  - Publish electronic bulletin on synergies between the Rio Convention

  - Produce electronic CEPA materials

  - Develop web-based communication tools

  - Compile case-studies and lessons learned

Egypt is a very good example to study climate change in Protected Areas

Why?

Egypt witnessed very important events that took place in Planet Earth

600 – 800 Million years ago

- St,Katherine Mountains (compared with Alp mountains)

50 – 60 Million years ago

Extinction

Dababiya PA

What kind of life that existed?

Life ceased completely for 2.5 million years

A rapid global warming

A global extinction event of deep-sea benthic foraminifera occurred

35- 40 Million years ago

Evolution

- **Marine :**

Wadi Hitan

whales – crocodiles- turtles

mangroves - sea cows

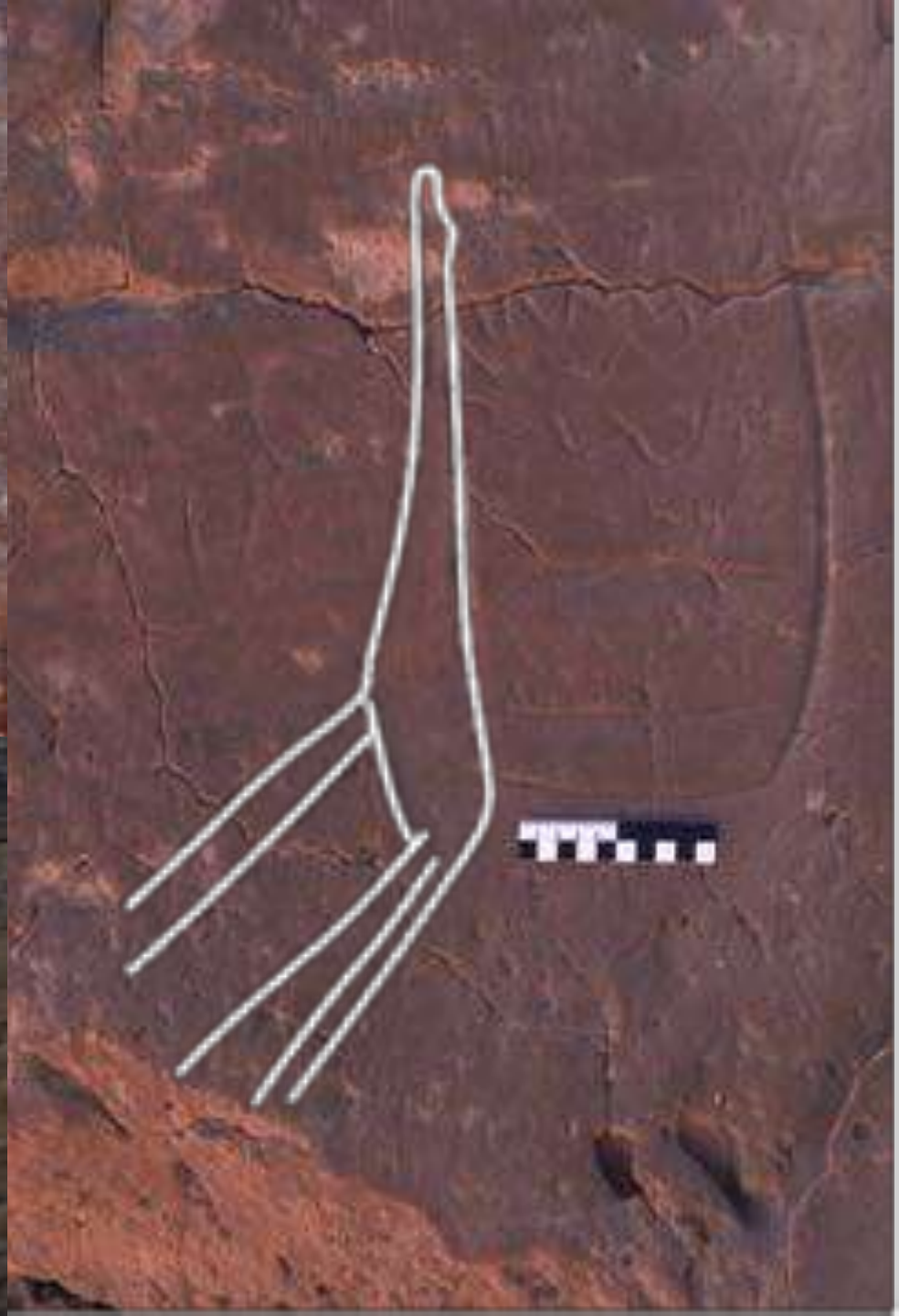
35- 40 Million years

- **Terrestrial:**

Petrified Forests - primates (monkeys) – elephants ……..

Prehistoric

Evidence of human occupation

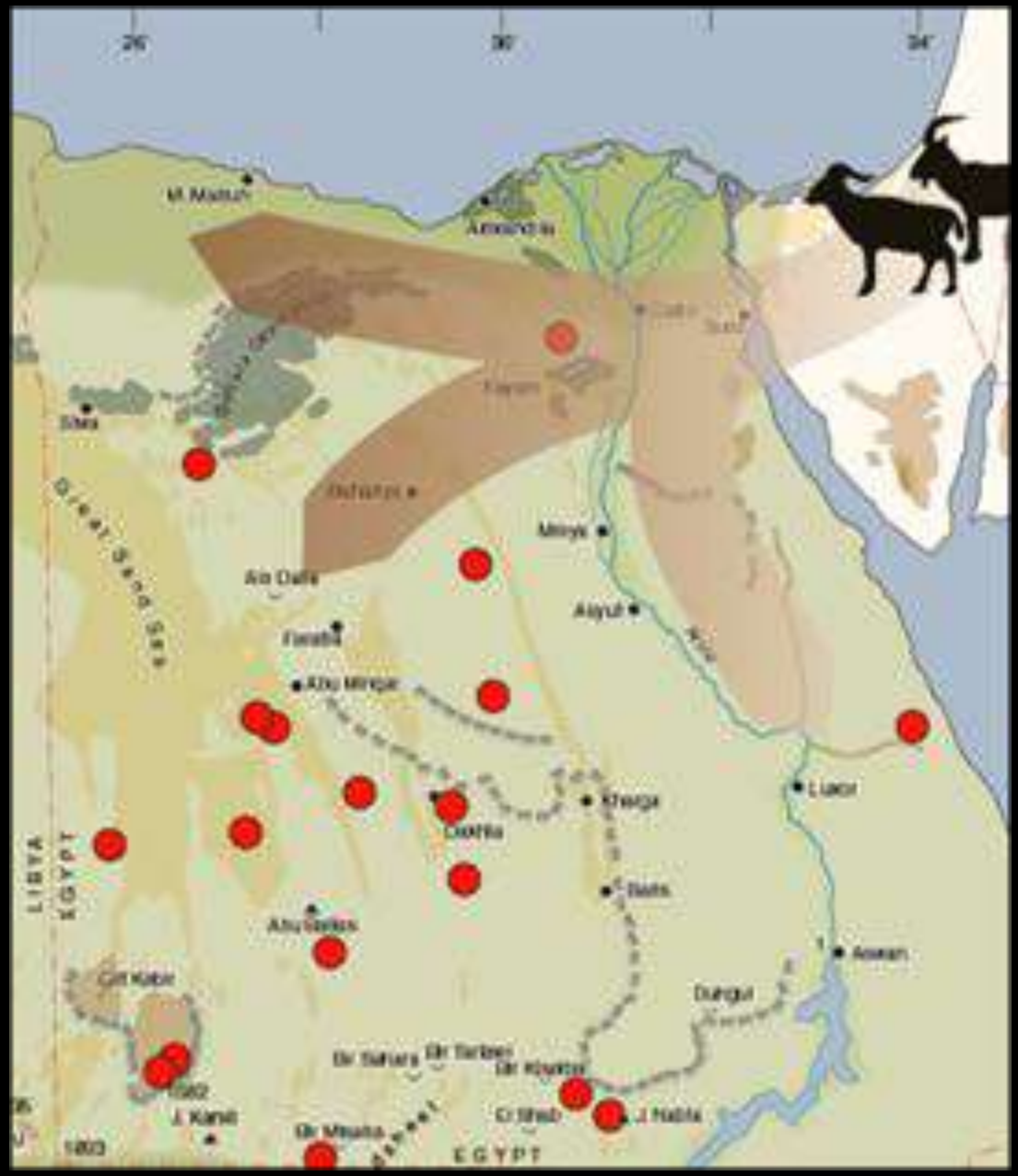


ةقلطم ءارحص

تاتابنلاب هاطغم ءارحص

ءارحص ةبش

انافاس

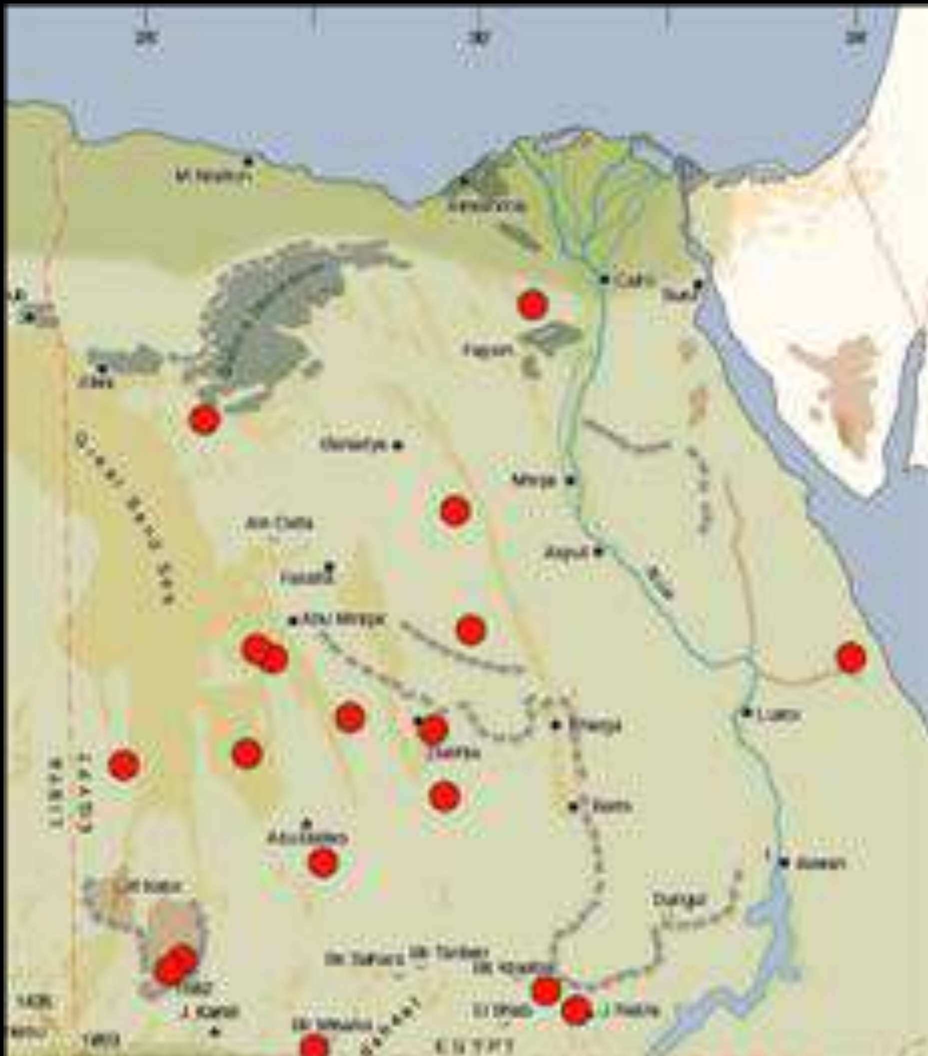


6000 دلايملا لبق

Formation

- Near Eastern influence

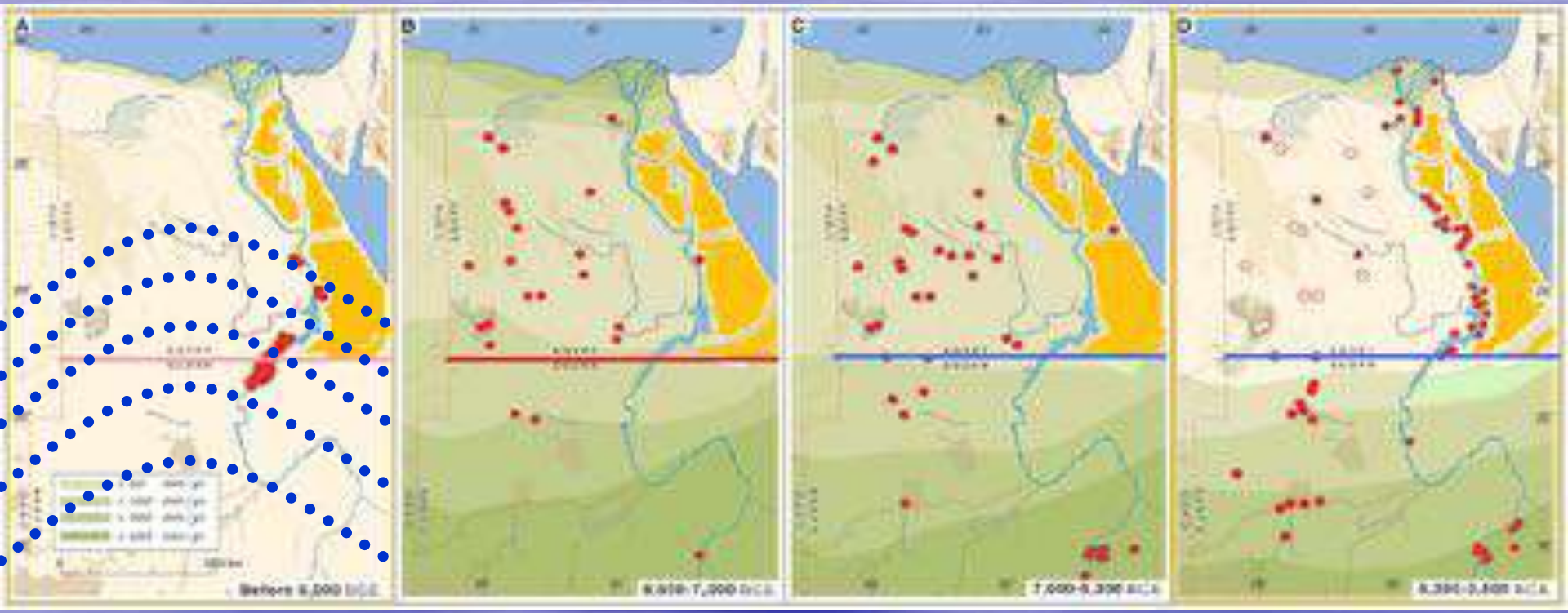
- regional development of cattle pastoralism



6000 دلايملا لبق

4000 دلايملا لبق

Prehistoric



Present

1.Coral reef bleaching

- **In 2006**
- In 2007
- In 2012

Present

2. Plant communities:

- St. Catherine PA.
- Elba PA.

Move towards higher elevation

Lower elevations

Poor vegetation

60% dead

Present

3.Fauna Communities

- St. Catherine PA.

The Sinai Baton Blue: world's smallest butterfly

It feeds only on an endangered plant , the Sinai Thyme (*Thymus decussates)*

Sinai butterfly

Adaptation

- **Coral reef:**

Reducing non-climatic stresses, such as:

- development near the coast
- Preparing integrated costal zone management.
- EIA
- pollution
- invasive alien species
- International road.
- Combating Crown of Thorn

Adaptation

Fauna & Plant commun

Grazing pressure:

- Traditional helf has already been declared on Safsfa

Reduce pressure on natural resources

- Provide Oven
- Bees cells

Over-collection:

- Grow Sinai Thyme in gardens and farms to replace wild sources

adaptation

Mangrove

- ✓Protection of(700 ha) costal mangroves.
- ✓Implanted 120 acre.

Adaptation

Habitat Restoration

- *Acacia* rehabilitation in St Katherine

100 000

Adaptation

- *Ex-situ* conservation for the Argun palm (***Medemia argun)***
- Critically endangered CR (IUCN list)
- Endemic to the Nubian Desert

Adaptation

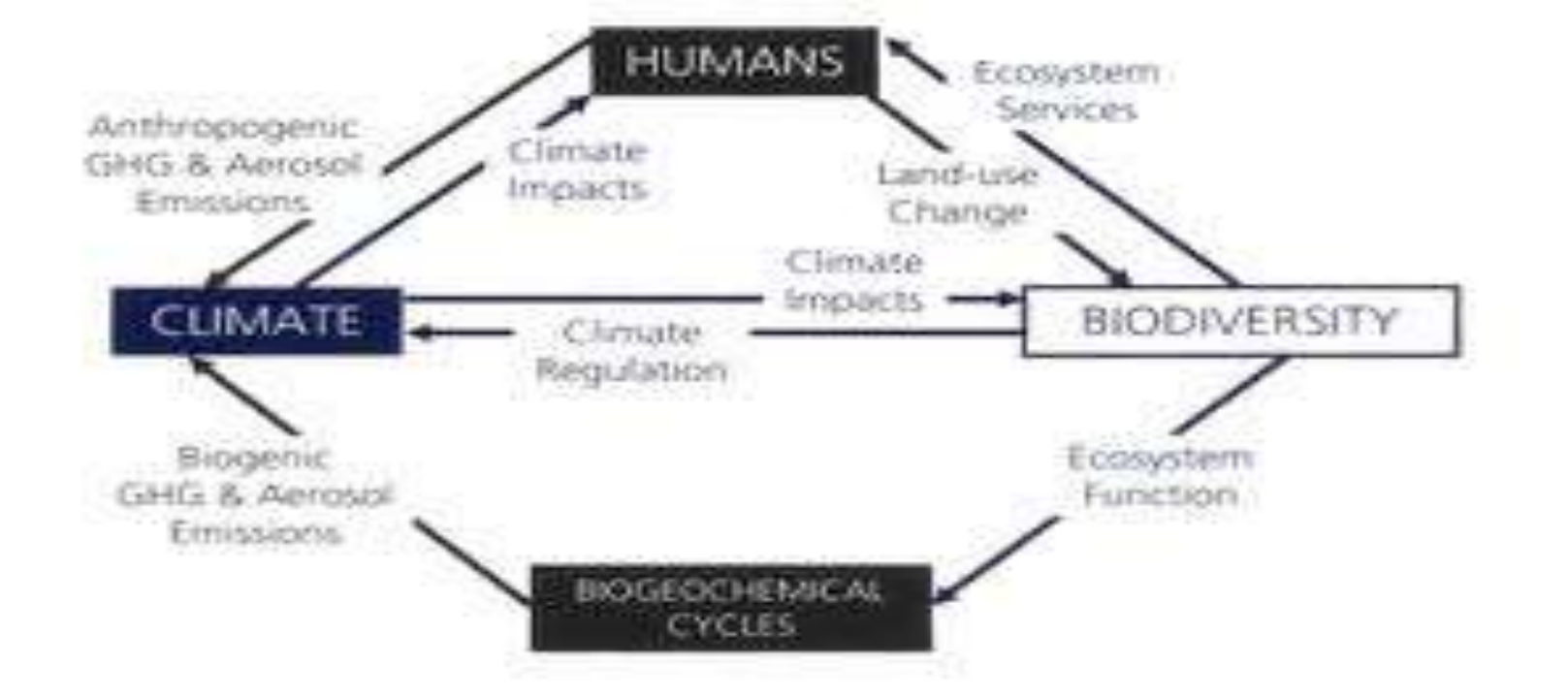
- Support *ex-situ* conservation efforts

Local Community Involvement

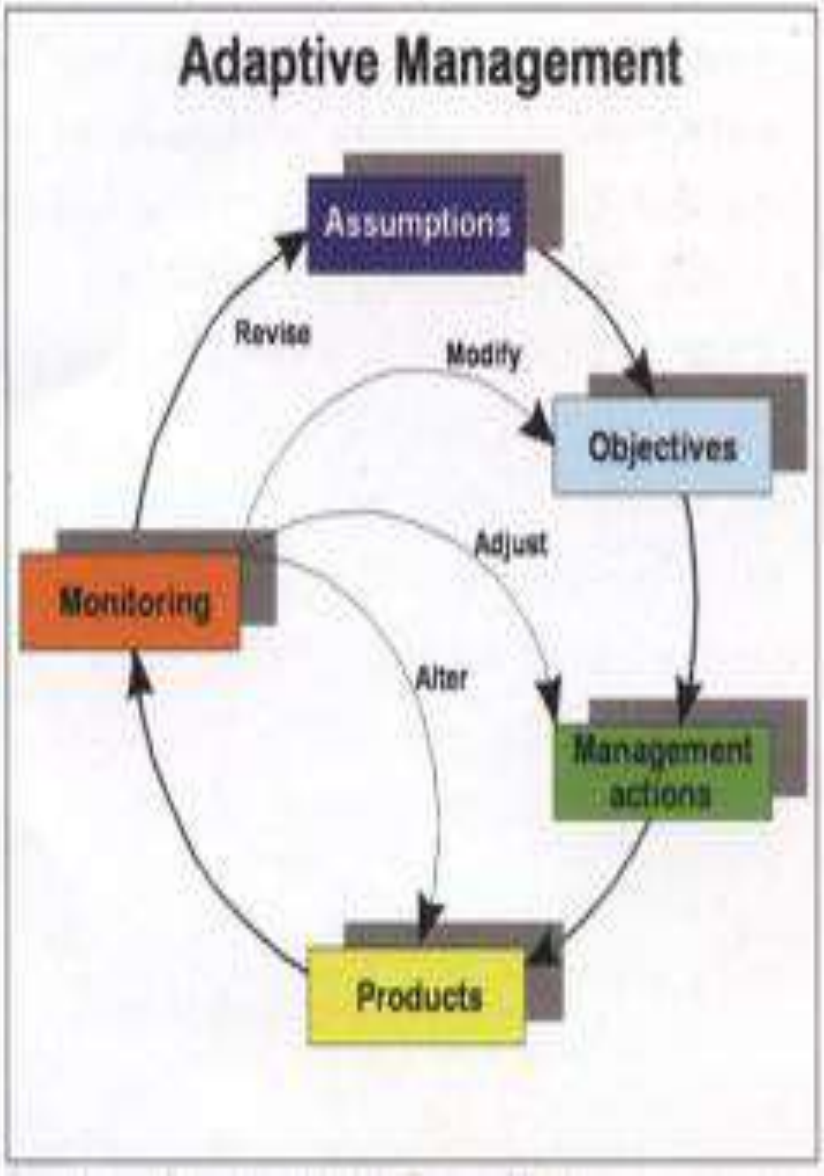
- Medical care services
- Community guards: an important link with local communities
- Veterinary services
- Community development aid
- Programmes to preserve traditional knowledge and practices.

What is needed?

- Assessment of climate change impacts, mitigation and adaptation measures on relevant ecosystems
- Most vulnerable components of biodiversity
- Risks and consequences for ecosystem services and human well-being



- Monitoring threats and impacts on biodiversity
- Impacts of mitigation and adaptation activities on biodiversity, and opportunities provide for biodiversity conservation and sustainable use.
- Critical knowledge needed to support implementation (scientific research, data availability, appropriate measurements and monitoring techniques, technology, traditional knowledge)



How ?

A task multi disciplinary team to implement a specific work plan on coral bleaching

Goals :

- Document an early warning of climate change and coral bleaching
- **Harmonize ongoing initiatives**
- Address threats facing coral reefs
- Prioritize activities
- Mobilize funding

- The current information and expertise available in Africa and MENA region can contribute to the creation of a regional hub to understand
- ***First: the nature of the threat*** – the impact of climate change on biodiversity, how biodiversity influences the vulnerability or resilience of ecosystems to climate change, techniques to assess extinction risks across species and communities, how human activities may exacerbate the impacts of climate change and the technologies available to measure and report these changes.
- ***Second: solutions*** that enhance carbon stocks, conserve biodiversity and improve human well-being through ecosystem restoration community-level approaches to conservation, incentives to promote sustainable land-use practices and coherent policy frameworks.

Education and Public Awareness

Special programmes for:

- School children
- University students
- Local communities
- Businesses
- NGO's
- Decision makers

THANK YOU