

**EUROPE-INBO 2013 11th International Conference 13-16
Nov 2013, PLOVDIV Bulgaria**

**WaterProtection of Climate Change Impacted
resourcesR**

ecosystems Survival of Libya & its E

Prof Dr. Satya P. Bindra, Salem Abulifa, Khalifa
Hamuda, Dr. Naser Grima, Abd Hamid Shadi,
Hussein Binsalem & Adnan Khalifa

Sponsor: ABC Led UNCSD Rio+20 Focal Point
Libya

Rio+20, 20 - 22 June 2012

FOCAL POINT

Prof Dr S.P.Bindra

Principal Resource Person

INFORMATION

Input to Compilation Document (N/A) •

Responses from Synthesis Report (Not available) •

[Statements](#) (1) •

[Link to National Information on UN-DSD website](#) •

SIDE EVENTS AT RIO+20

MEETINGS

PUBLICATIONS

GREEN ECONOMY PRACTICES/POLICIES/INITIATIVES IN LIBYA

NEWS

Source: UNCSD

United Nations Committee for Sustainable Development



National Preparations



Libya - Overview

- ❑ **Area** - 1.7 Million square kilometers
- ❑ **Capital** - Tripoli
- ❑ **Population** - 6.5 Million
- ❑ **Main resources** - Oil and gas
- ❑ **Main industries** - Petroleum, steel, cement and textiles.



LIBYA'S LAND & WATER

• Libya has **1%** of world's land, **0.5%** of freshwater, less than **1%** of population and **1%** of its cattle.

• Ground water is the primary source of freshwater, accounting for **95.6%** of total demand, Surface water **2.3%**, desalination **1.4%**, and Water treatment **0.7%**.

• **97 %** water uses in Libya are from ground water.

- Hydrogeological studies indicate huge fossil water reserves in desert basins (i.e. Kufra, Sirt, Hamada and Murzug).
- **Per capita availability of land 50 years ago 0.9 ha, is only 0. 14 ha in 2050.**
- Agricultural Gross Domestic Product (GDP) in 1958 was 30% It has rapidly fallen to less than 5% in 2003
- 17% of Libya's total employment has declined to reach about 3% in 2012 of total employment (FAO)
- population density in the country as whole is about 3 %; in some areas it drops to less than 1 percent.



Where does the water come from in Libya?

- Groundwater Man Made River
- New dams - inter-basin transfer
- -Demand Management
- Water savings - increase in efficiency, reduce evaporation.
- Water productivity - increases in crop per drop
- Trade (virtual water), import food.

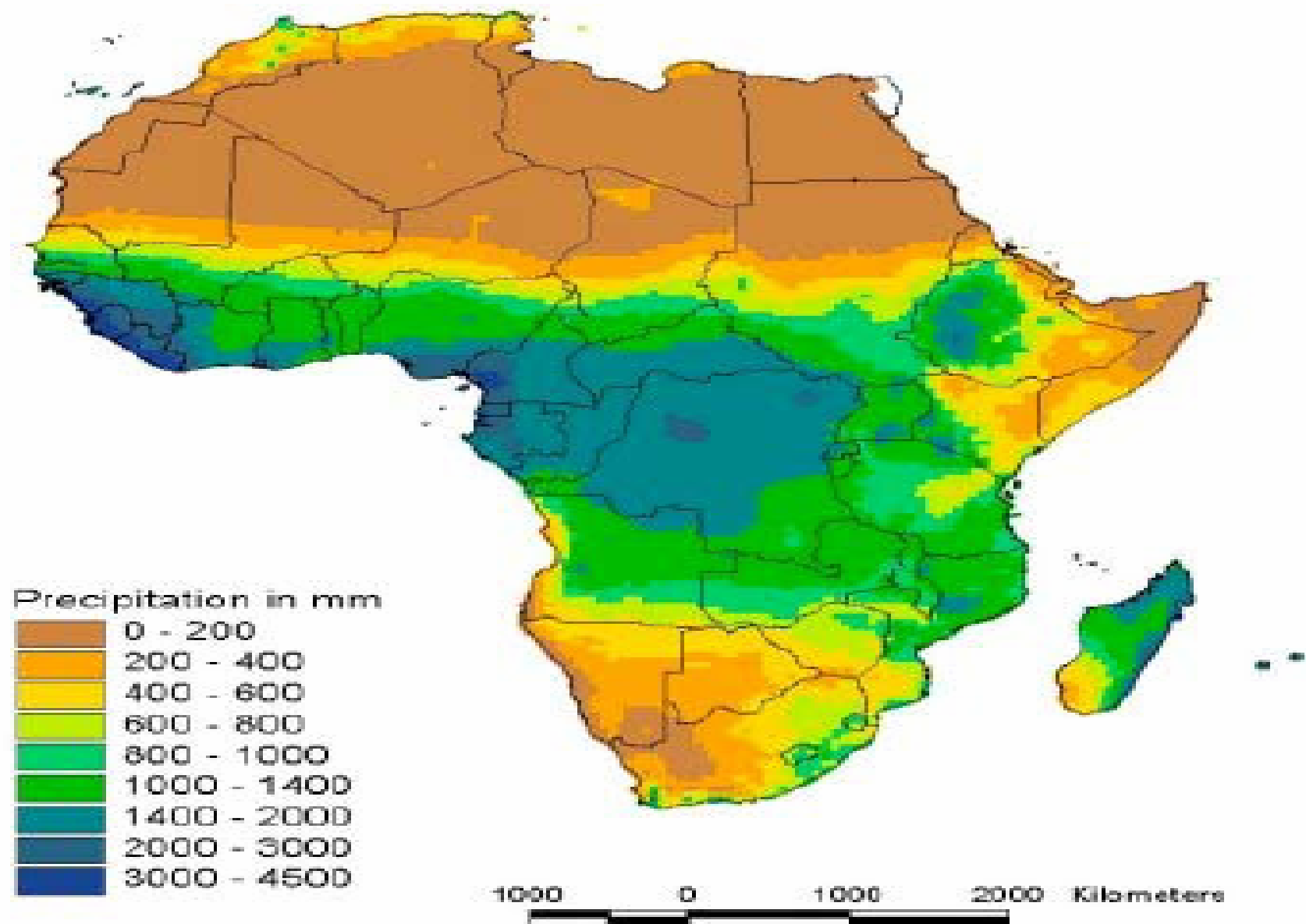
FAO's (2005), Libyan total volume of fresh water is around 3820 Million m^3 per year. Of this amount, 170 Million m^3 comes from surface water, and 650 Million m^3 comes from the annual recharge to groundwater aquifers.

Depletion rate of the nonrenewable aquifers is estimated at about 3 000 Million m^3 per year.

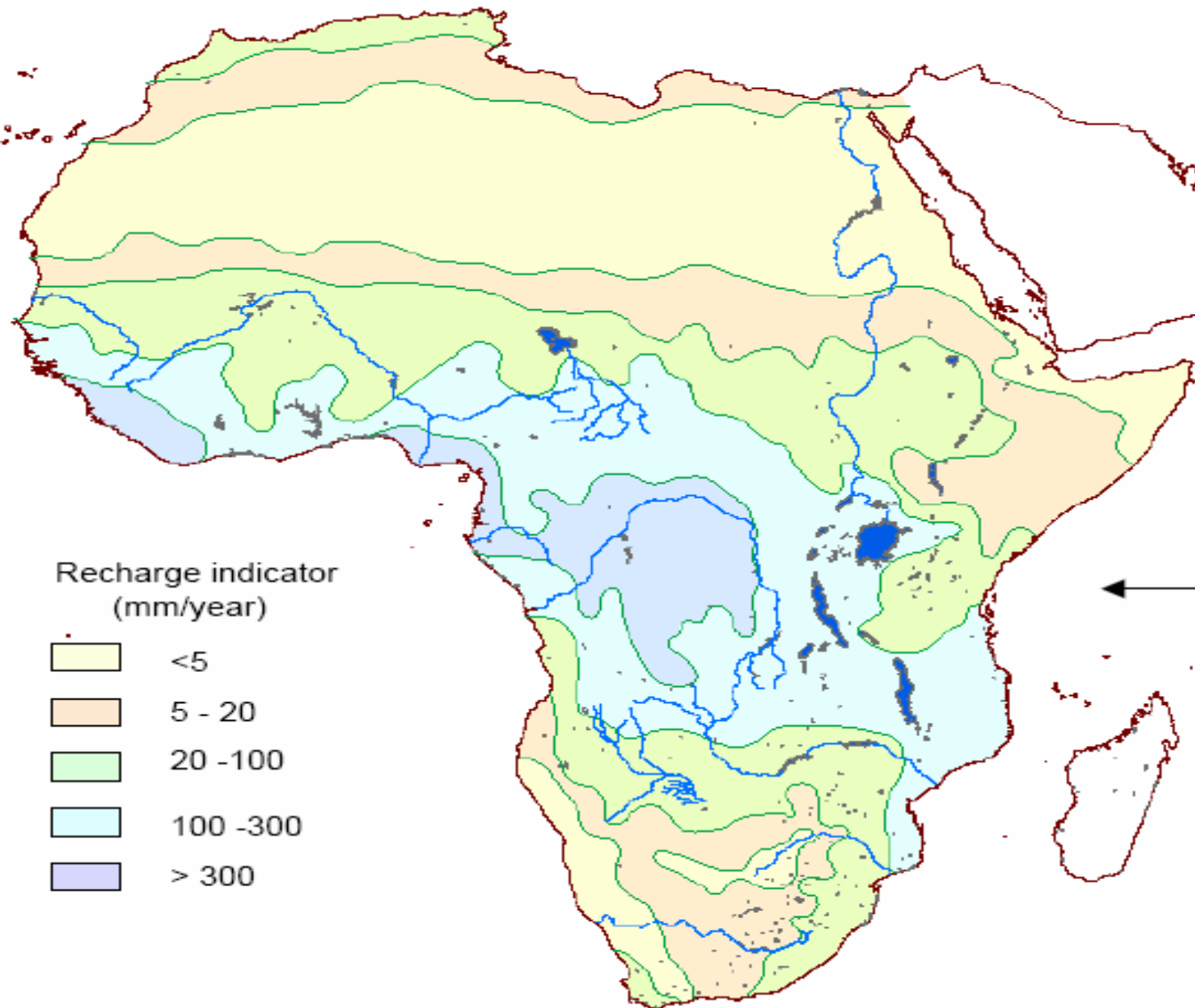
Because of the predominantly dry conditions, most of the estimated 200 Million m^3/year of annual runoff in Libya evaporates.

Little of it recharges the underlying aquifers, thus limiting the regular renewable surface water resources to about 100 Million m^3 per year.

Average annual precipitation



Groundwater replenishment



Main recharge sources:

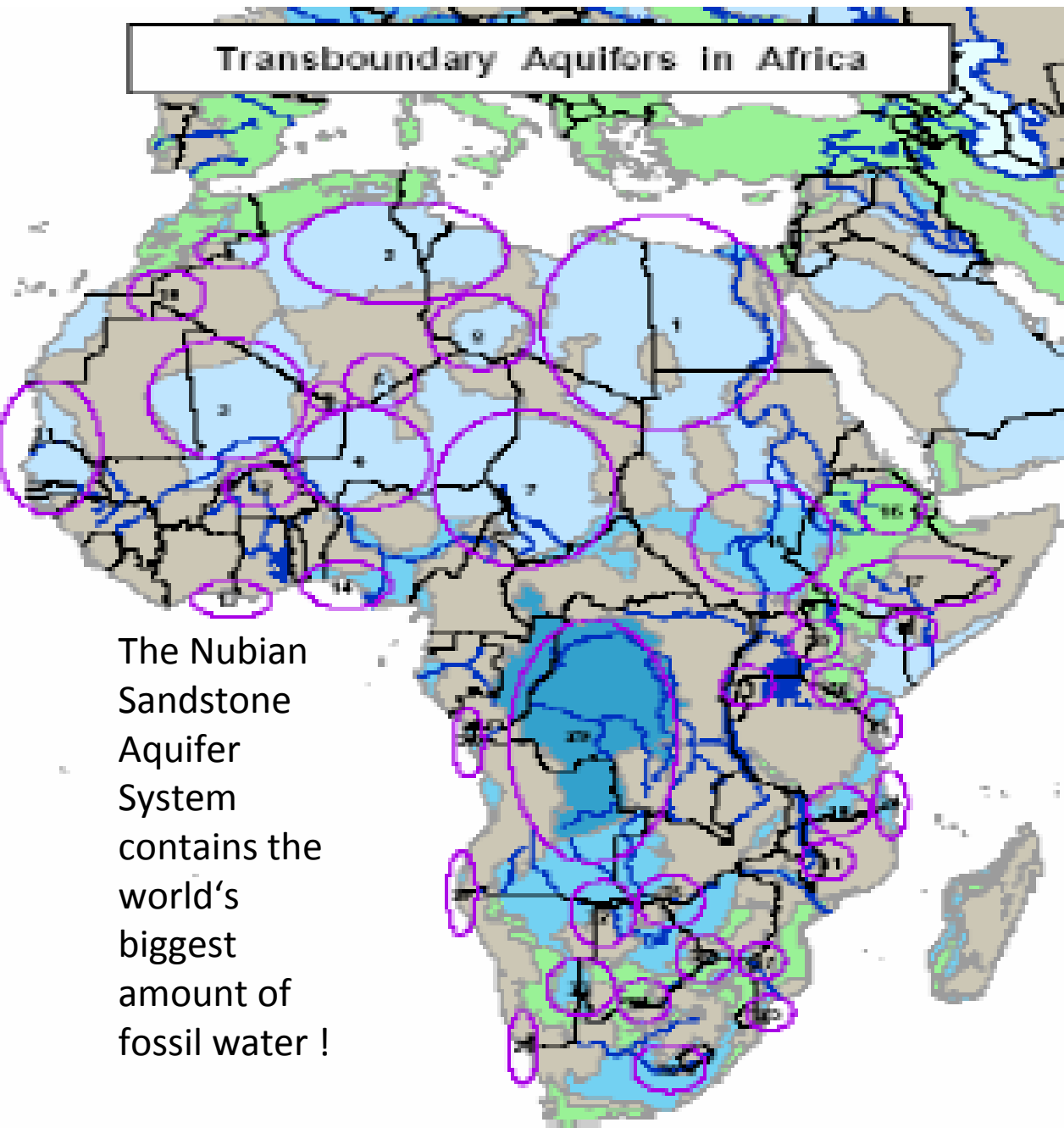
- occasional rainfalls and flash floods
- groundwater flow from southern and eastern mountainous belt

Recent annual recharge negligible

Stored water volume:

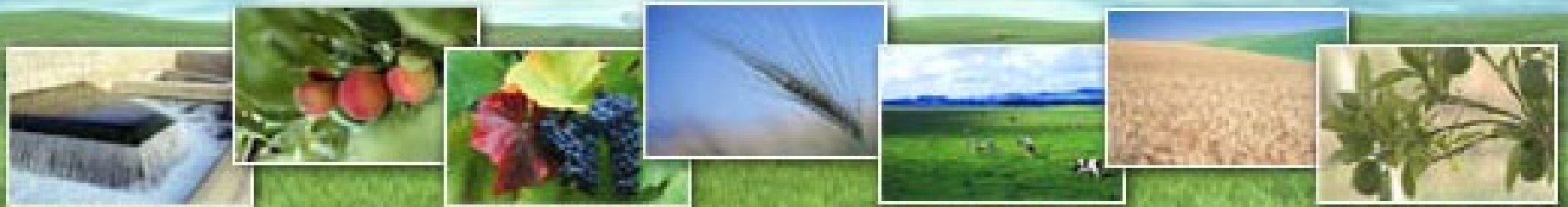
150,000 km³

Transboundary Aquifers in Africa

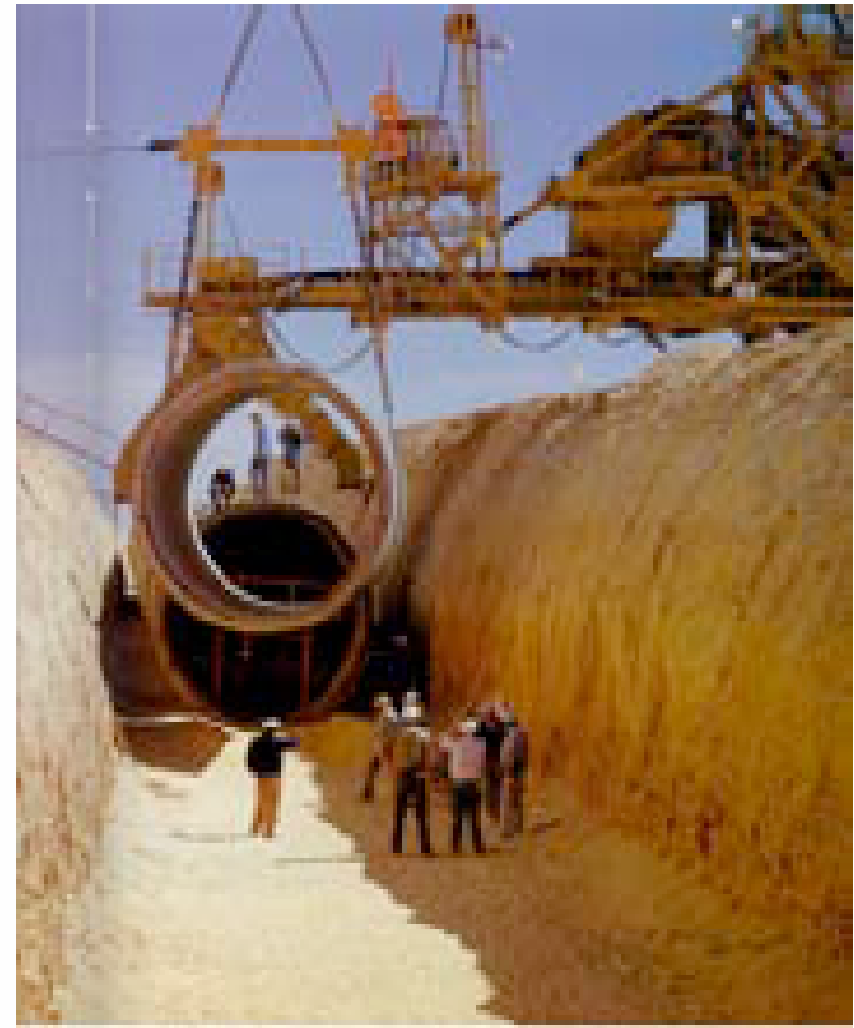


The Nubian Sandstone Aquifer System contains the world's biggest amount of fossil water !

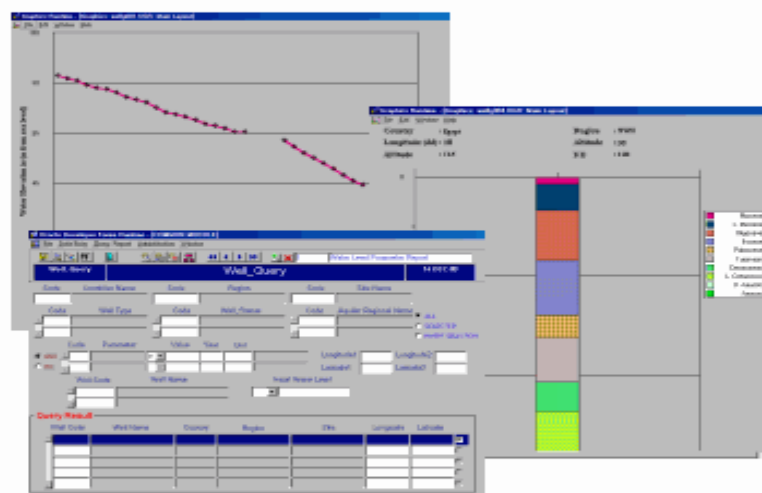




The Great Man-made River Project (GMRP)



Version 1.0



Programme for the Development of a Regional Strategy for the Utilisation of the Nubian Sandstone Aquifer System

CEDARE

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The Libyan Sahara

- ☐ Largest desert in the world, covering most of North Africa
- ☐ Very dry, so very few people live there
- ☐ Nearly every settlement in the Sahara is located near an **oasis**, a wet and fertile area in a desert where a spring or well provides water.
- ☐ Common features in the Sahara include broad gravel plains, tall sand dunes, and dry streambeds.

Main Idea 2:

The climate of Libya in North Africa is hot and dry, and water is the region's most important resource.

Climate

- Three main climates:
 - Desert: very dry, with temperatures ranging from mild to very hot
 - Mediterranean: found along the coast; mild winters and warm summers
 - Steppe: found between the coast and the desert

Resources

- Because rain is rare, water is a valuable resource.
- Oil and gas are found in Libya, Algeria, and Egypt.
- Morocco has iron ore.
- Coal, oil, and natural gas are found in the Sahara.

Close-up

A Sahara Oasis

The largest desert in the world, the Sahara, spans almost 4 million square miles across North Africa. From ancient times to today, traders crossing the Sahara have relied on the desert's oases. These oases provide water and shade.

Date palms thrive on the banks of this natural spring, which provides water to travelers and irrigated fields.

Shelters like this one provide a place for travelers to rest.

By carrying supplies, camels help the nomadic Tuareg people travel from oasis to oasis.

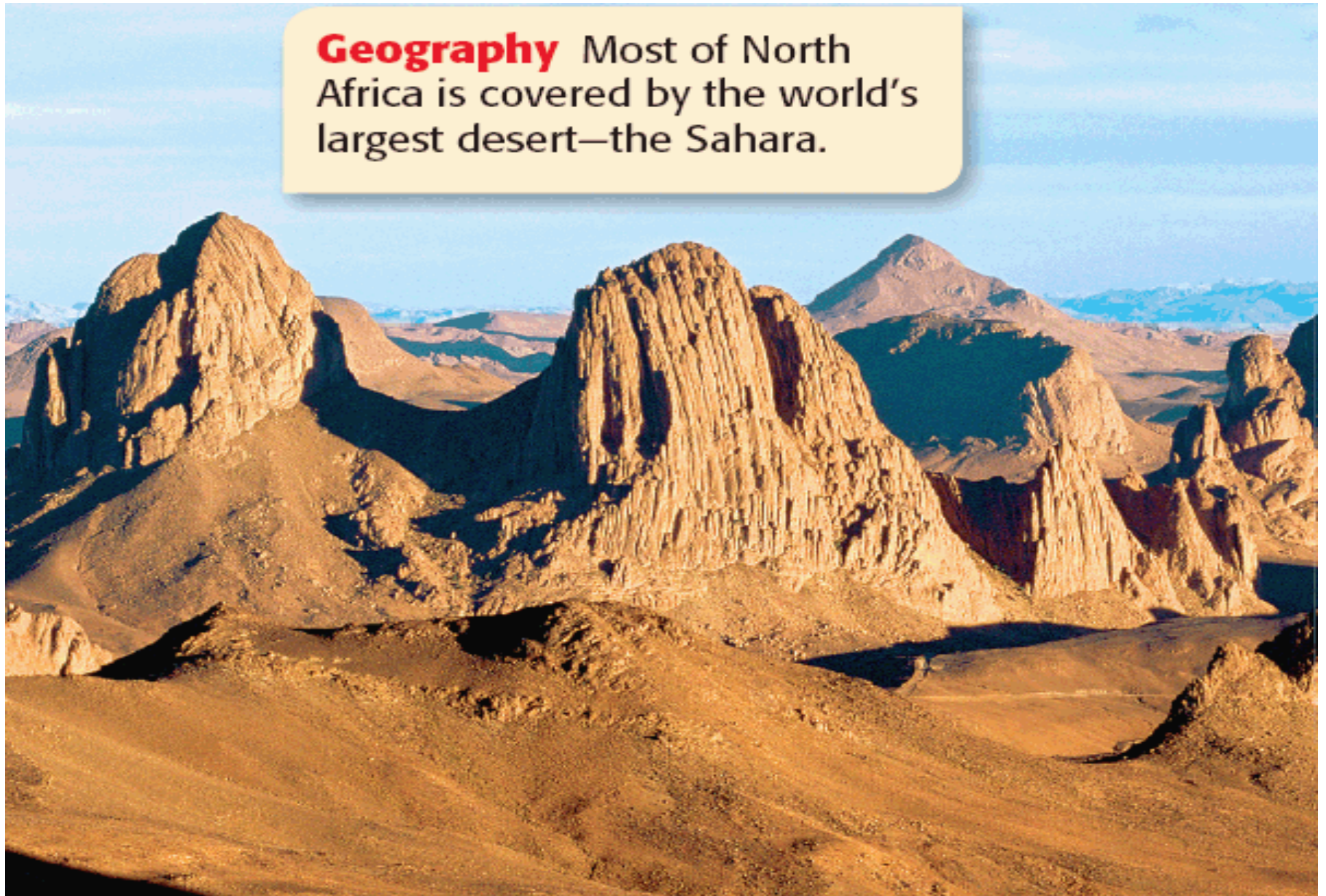
**ANALYSIS
SKILL**

ANALYZING VISUALS

Why do you think an oasis would be important to people traveling through the Sahara?

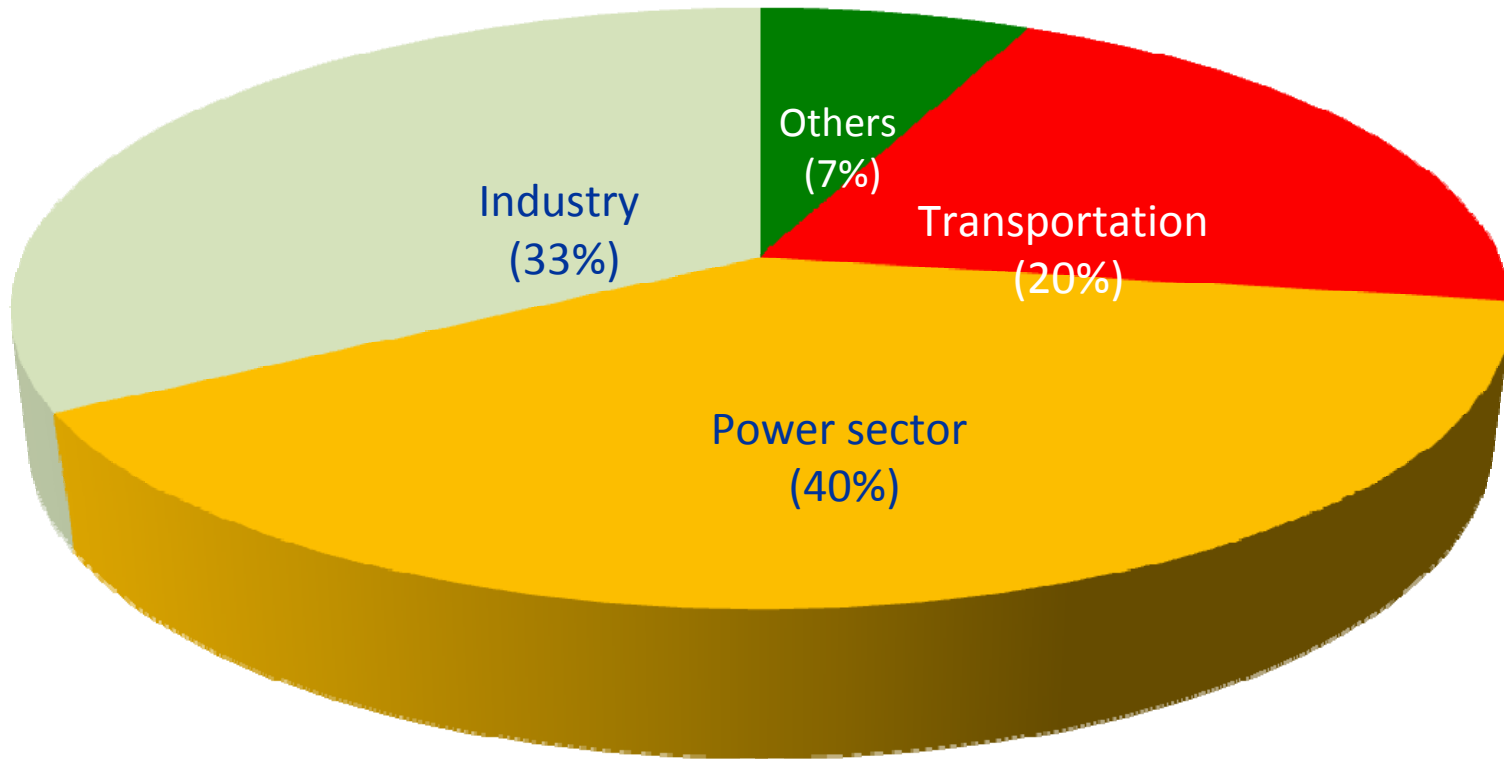


Geography Most of North Africa is covered by the world's largest desert—the Sahara.



Environment key figures:

The total CO₂ Emissions in Libya is around 60.7 million tCO₂e
45% due to N.G) ,(55% due to oil



Source: Libyan energy data profile- September- 2007

Environment key figures of Libya:

| | |
|--------------------------------|-------------------------------|
| CO2 Emissions in Libya | 60.7 Million tCO ₂ |
| Emissions share of world total | % 0.2 |
| CO2 emissions per km | 31.54 tCO ₂ |
| CO2 emissions per capita | 10 tCO ₂ |
| CO2 emissions per MWh | 0.87 tCO ₂ /MWh |

| | |
|---|-------------|
| Libya is a Non-Annex I country under the United Nations Framework Convention on Climate Change (UNFCCC) | |
| Ratification of the UNFCCC | June 1999 |
| Ratification of the Kyoto protocol | August 2006 |
| Establishment of designated national authority(DNA) | July 2010 |

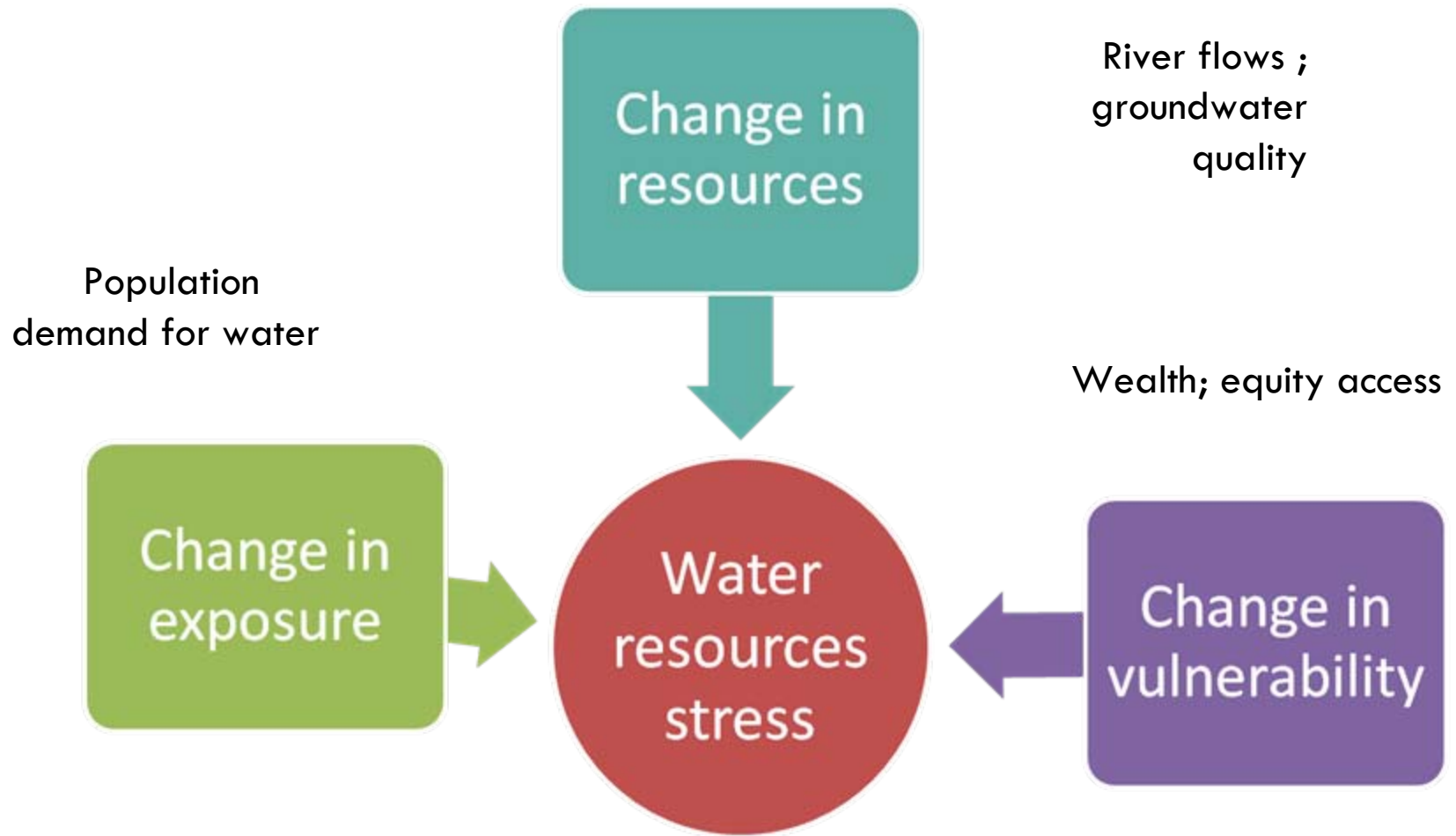
BACKGROUND

- Third Assessment Report of the Intergovernmental Panel on Climate Change (IPCC 2001) identified Libya as the most vulnerable to current and future climate change impacts.
- This vulnerability stems from low adaptive capacity , because of neglected development in past 42yrs.

- In the face of climate change, an assessment of impacts and vulnerability to changing climatic conditions is a critical component of Libya's response to the United Nations Framework Convention on Climate Change (UNFCCC).

- The vulnerability and adaptation assessment illuminates the potential impacts of climate change on water. Libya's ecological zones indicates that the majority of its water is quite vulnerable to changes in temperature and precipitation.

Drivers of change





Libya Sustainability Principles

- ◆ *Fresh water is a **finite and vulnerable** resource*
- ◆ *Water development and management based on a **participatory approach***
- ◆ ***Women role** in the provision, management and safeguarding of water*
- ◆ *Water has an **economic value***

Major challenges in Libya

Population growth

Water constraints

Land scarcity

Climate change

Biofuels/energy

Food price volatility

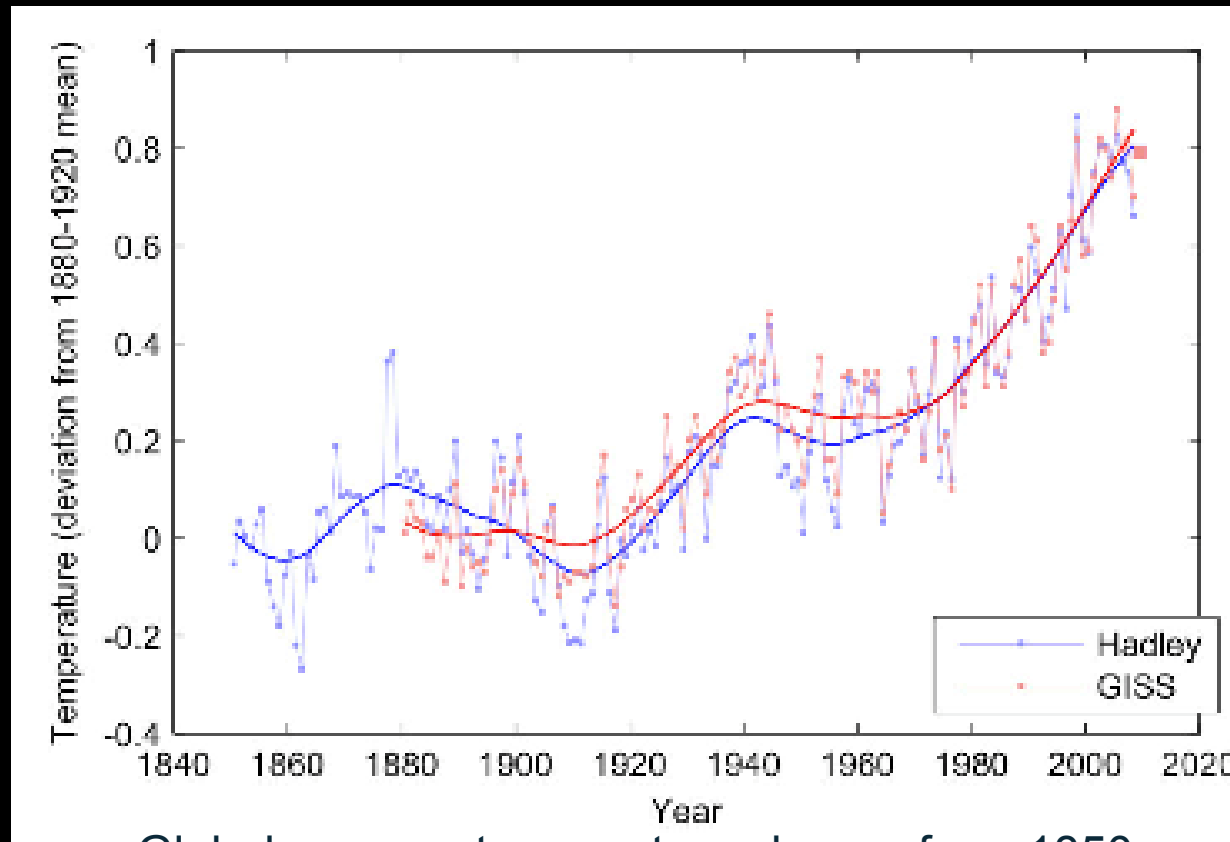
Sustainable Libyan Water Resources Development **problems:**

- high population growth rates, 3.3%
- rapid land degradation.
- weak national institutions,
- outdated legal frameworks,
- centralized structures,
- low levels of civic participation, and
- undersized business sector
- Climate Change is affecting Air temperature,
Precipitation timing and quantity, Sea level rise,
Runoff timing and quantity

The background of the slide is a close-up photograph of parched, cracked soil in shades of orange and brown. A large, white, right-pointing arrow is superimposed over the center of the image, serving as a backdrop for the text.

**We know climate
change is real.**

We also know the Earth is warming up quickly (because we can measure it)

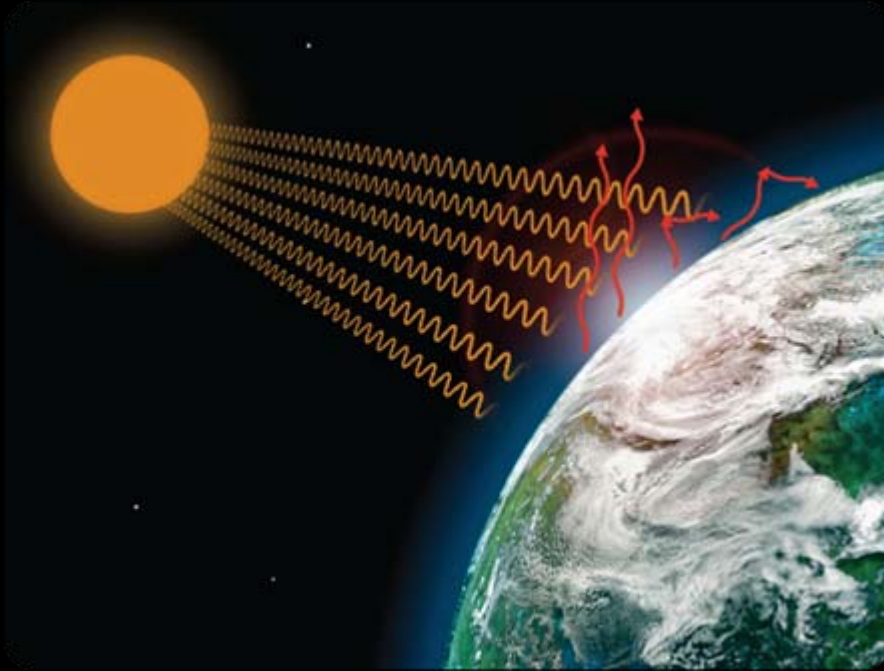


Global average temperature change from 1850

Source: Copenhagen Diagnosis, Figure

12.http://www.ccrcc.unsw.edu.au/Copenhagen/Copenhagen_Diagnosis_HIGH.pdf

Why is the Earth warming? The Greenhouse Effect



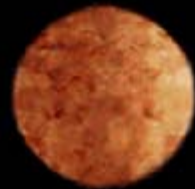
There are many greenhouse gases

Carbon dioxide (CO_2) —•
most abundant
Methane•
Nitrous oxide•
CFCs•
Ozone•

The gases in the atmosphere that trap heat in the earth's surface are called greenhouse gases and they occur naturally in our atmosphere, in small amounts.

Global warming is caused by releasing heat-trapping greenhouse gases into the atmosphere. The most common greenhouse gas is carbon dioxide. Many of the activities we do every day like turn the lights on, cook food, or heat or cool our homes rely on the combustion of fossil fuels like coal, natural gas, and oil, which emit carbon dioxide and other greenhouse gases when

Some greenhouse gases are good – they allow our planet to be warm enough to support life.



Mercury



Venus



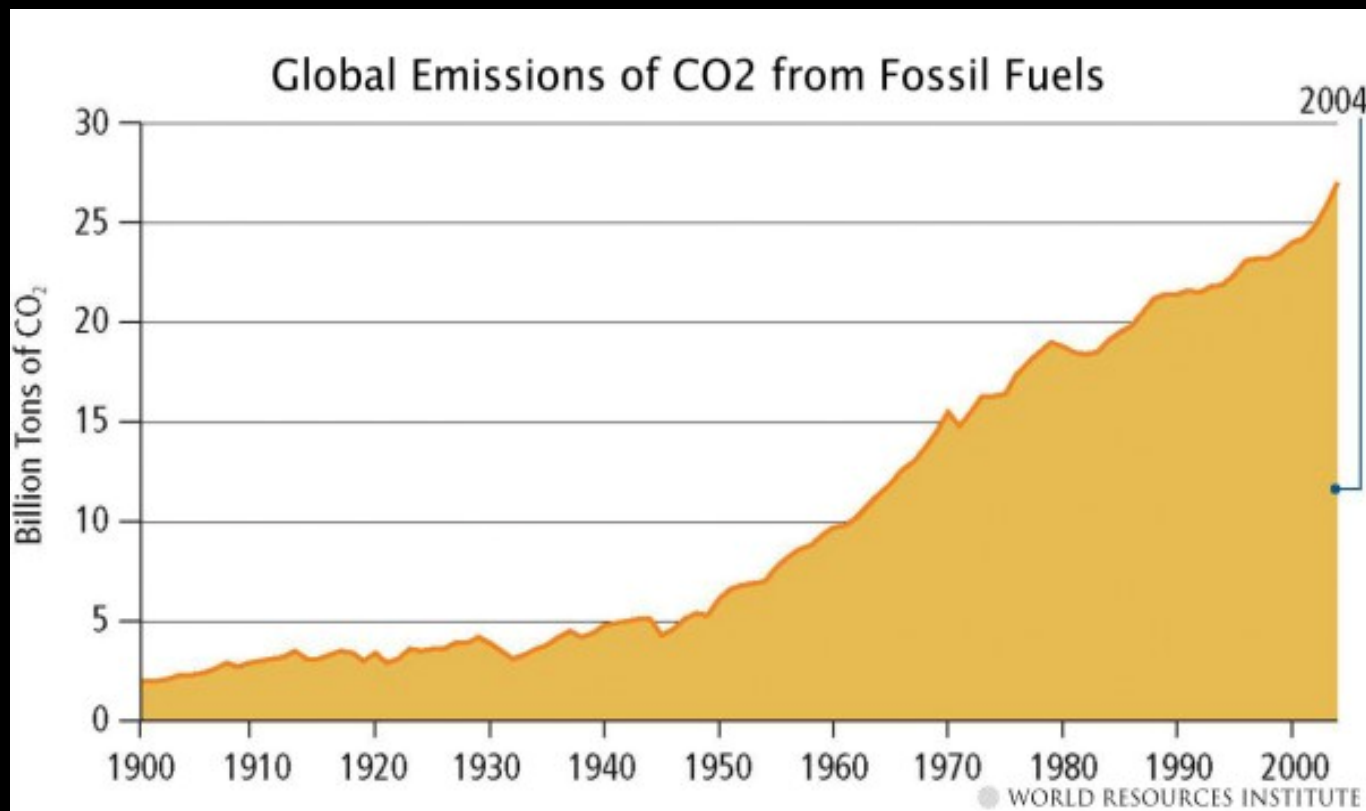
Earth



Mars

| | | | | |
|---------------------------|--------------|---------------|--------------|----------------------|
| Temperature: | 167°C | 464°C | 15°C | -65°C |
| Greenhouse Effect: | none | ~470°C | ~30°C | a few degrees |

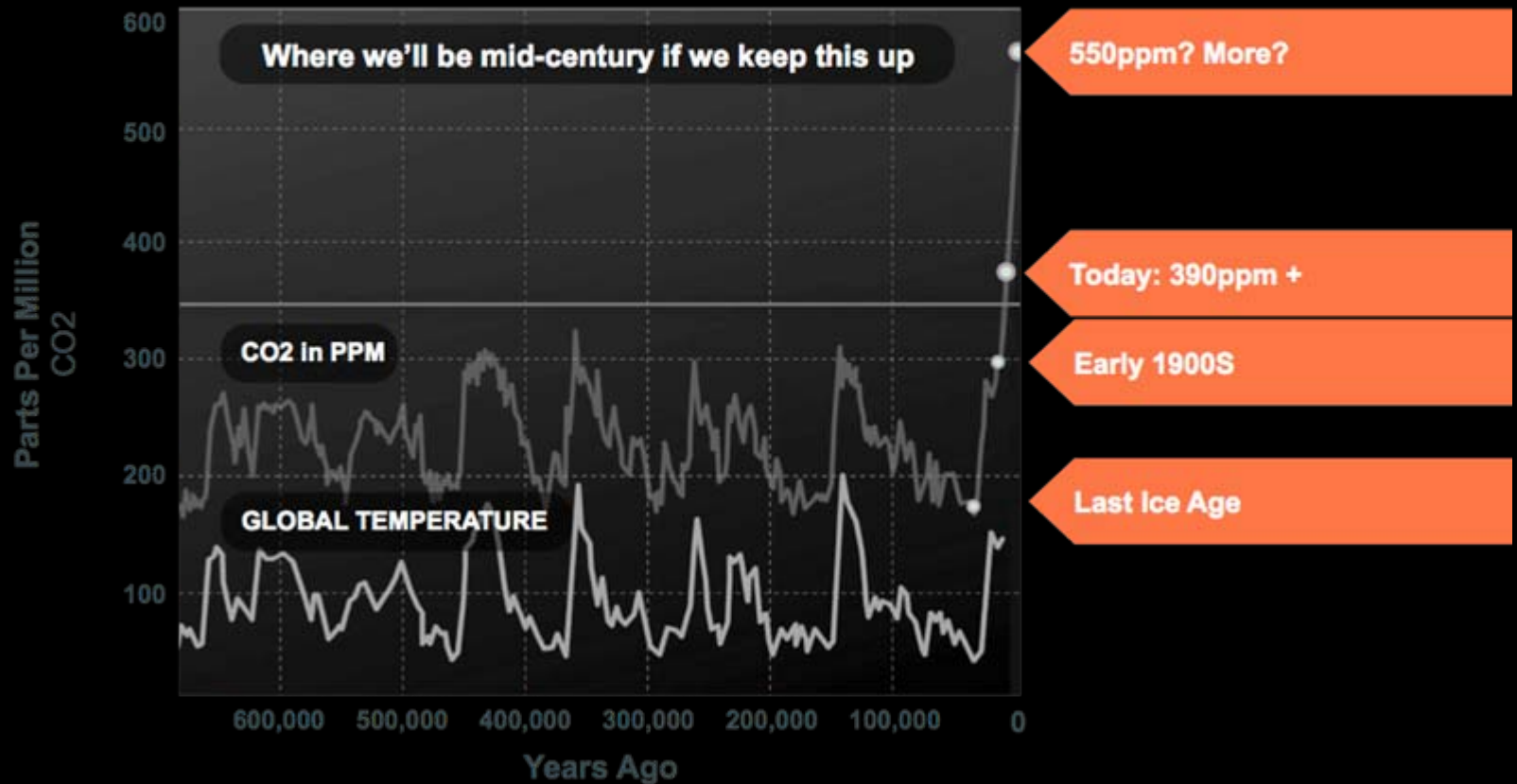
Source: James Hansen, NASA



There is no debate that burning fossil fuels releases greenhouse gases into our atmosphere, or that we have burned a lot of fossil fuels since the industrial revolution.

Source: World Resources Institute

Throughout our history, global temperature has followed greenhouse gas concentrations



Currently we are already in the danger zone:

“If humanity wishes to preserve a planet similar to that on which civilization developed and to which life on Earth is adapted, paleoclimate evidence and ongoing climate change suggest that CO₂ will need to be reduced from its current 387ppm to at most 350ppm.”



NASA climatologist

Dr. James E. Hansen, 2008

The largest research project in history

ipcc
INTERGOVERNMENTAL PANEL ON climate change



The largest research project in history:

In 1988, the IPCC was created to “provide the decision-makers and others interested in climate change with an objective source of information about climate change”

**2,000 Scientist, New reports
every 4 years**





Literature Search: The numbers speak for themselves...

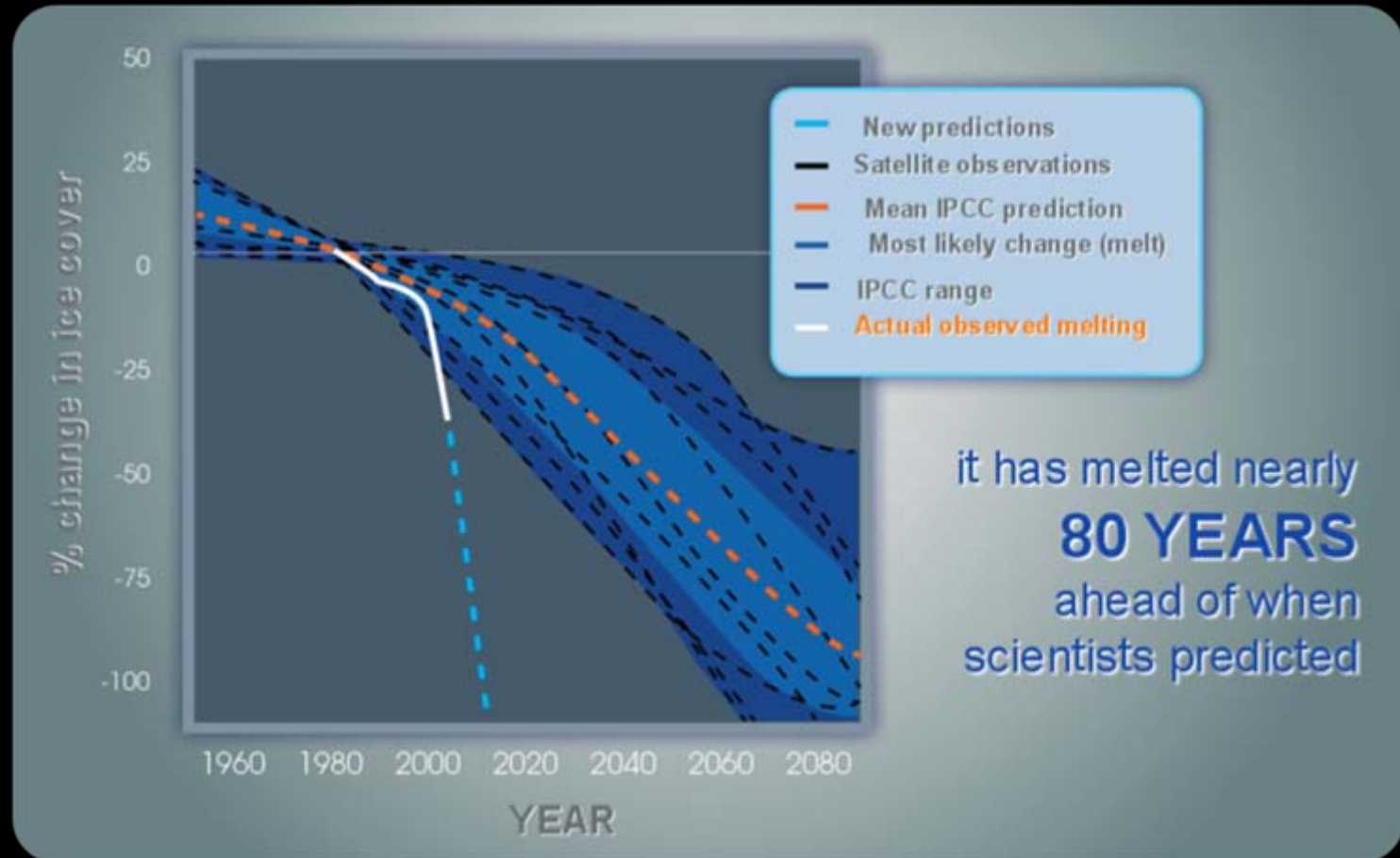
Number of scientific studies dealing with “climate change” published in scientific journals between 1993 and 2003:

928

Number disagreeing with the global consensus that greenhouse gas pollution has caused most of the warming of the last 50 years:

0

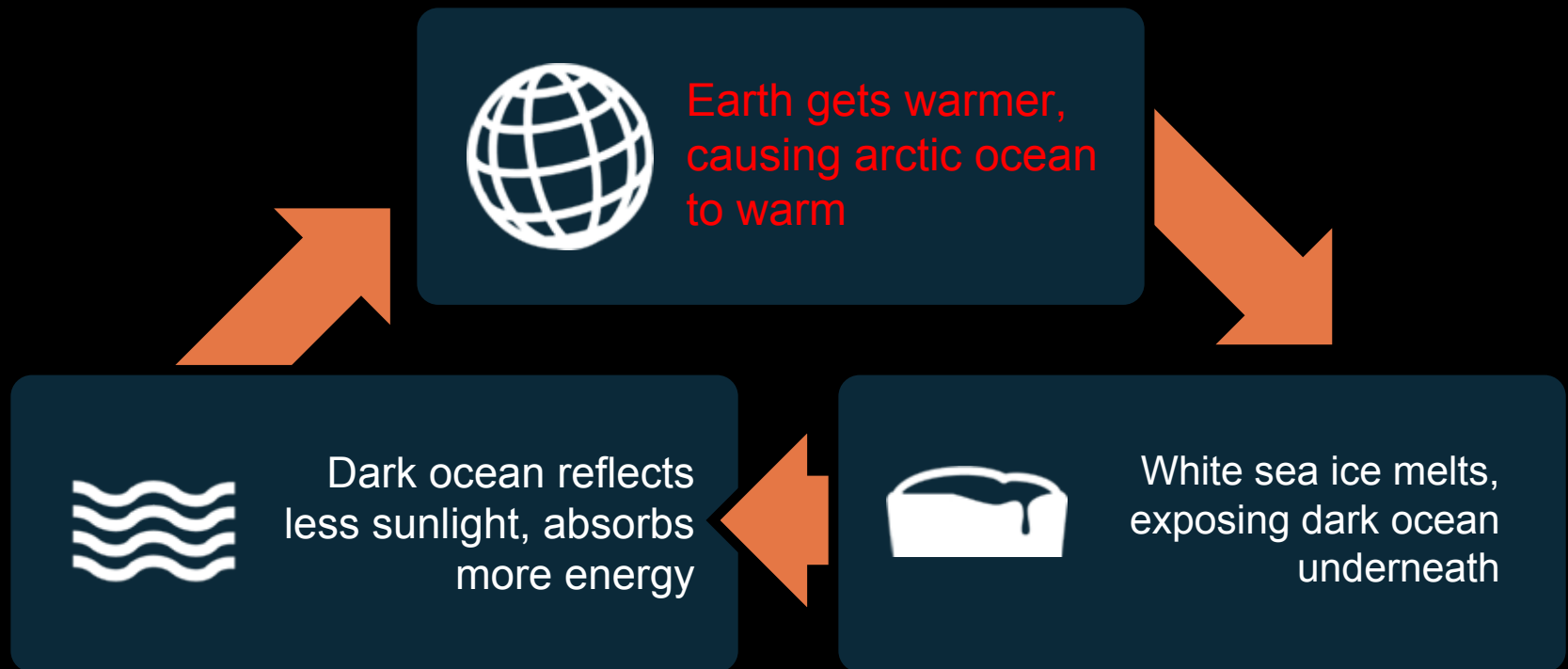
Example: Melting of the arctic




Source: Climate Safety report

Much of the uncertainty is due to “feedback loops”, when climate impacts reinforce and amplify each other, which can be hard to model

Example: The Albedo feedback loop



A background image of green, needle-like branches, possibly from a cypress or juniper tree, covered in water droplets. The image is split into two horizontal sections by a white arrow pointing to the right. The top section shows the branches in sharp focus, while the bottom section is blurred, creating a bokeh effect with the water droplets.

**SUMMARY:1. Climate
change is real and it's
happening now:
what are some examples?**

Some things are already changing in very real and measurable ways, like:

Temperature•

Arctic sea ice•

Glaciers•

Sea level rise•

Extreme weather•

The top ten hottest years on record have all been in the past 15 years

The hottest years on record

Deviation from 1961-90 global average temperature, °C

| Rank | Met Office Hadley Centre and Climatic Research Unit | | NOAA National Climatic Data Center | | NASA Goddard Institute for Space Studies | |
|------|--|-----------|---------------------------------------|-----------|---|-----------|
| | Year | Deviation | Year | Deviation | Year | Deviation |
| 1 | 2010* | 0.52 | 2010* | 0.54 | 2010* | 0.58 |
| 2 | 1998 | 0.52 | 2005 | 0.52 | 2005 | 0.56 |
| 3 | 2005 | 0.47 | 1998 | 0.50 | 2007 | 0.51 |
| 4 | 2003 | 0.46 | 2003 | 0.49 | 2009 | 0.50 |
| 5 | 2002 | 0.46 | 2002 | 0.48 | 2002 | 0.49 |
| 6 | 2009 | 0.44 | 2006 | 0.46 | 1998 | 0.49 |
| 7 | 2004 | 0.43 | 2009 | 0.46 | 2006 | 0.48 |
| 8 | 2006 | 0.43 | 2007 | 0.45 | 2003 | 0.48 |
| 9 | 2007 | 0.40 | 2004 | 0.45 | 2004 | 0.41 |
| 10 | 2001 | 0.40 | 2001 | 0.42 | 2001 | 0.40 |
| 11 | 1997 | 0.36 | 2008 | 0.38 | 2008 | 0.37 |
| 12 | 2008 | 0.31 | 1997 | 0.38 | 1997 | 0.32 |
| 13 | 1995 | 0.28 | 1999 | 0.32 | 1995 | 0.30 |
| 14 | 1999 | 0.26 | 1995 | 0.31 | 1990 | 0.29 |
| 15 | 1990 | 0.25 | 2000 | 0.29 | 1991 | 0.28 |
| 16 | 2000 | 0.24 | 1990 | 0.28 | 2000 | 0.26 |
| 17 | 1991 | 0.20 | 1991 | 0.24 | 1999 | 0.25 |
| 18 | 1983 | 0.19 | 1988 | 0.20 | 1988 | 0.24 |
| 19 | 1987 | 0.17 | 1987 | 0.20 | 1996 | 0.22 |
| 20 | 1994 | 0.17 | 1994 | 0.20 | 1987 | 0.20 |

Source: Met Office

*Jan-Oct

The Arctic is currently warming at twice the rate of the rest of the world

Between 1979 and 2007, the Arctic lost over 40% of its ice

1979



2007





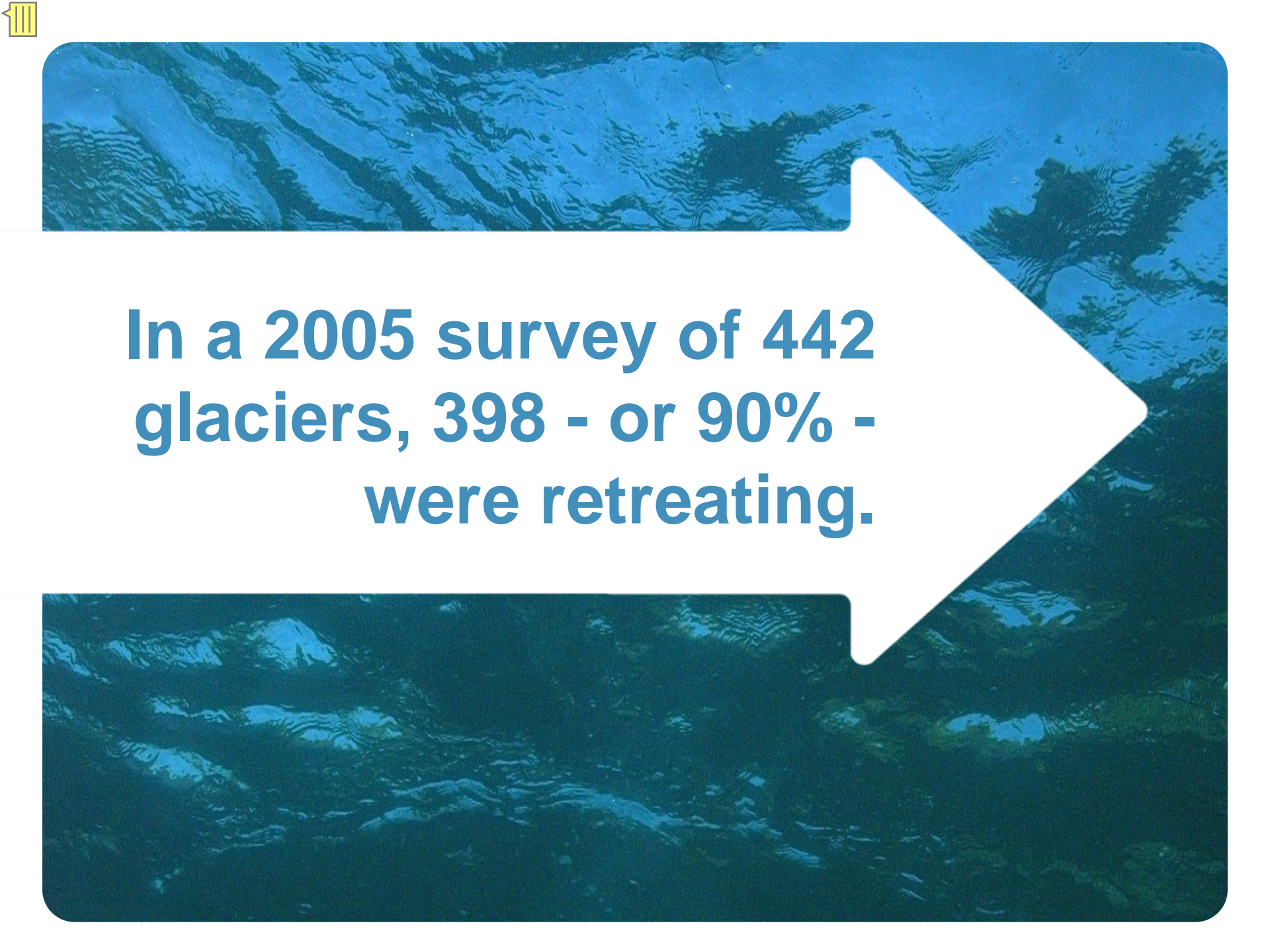
Glaciers are melting before our eyes



Muir & Riggs Glacier **1941**

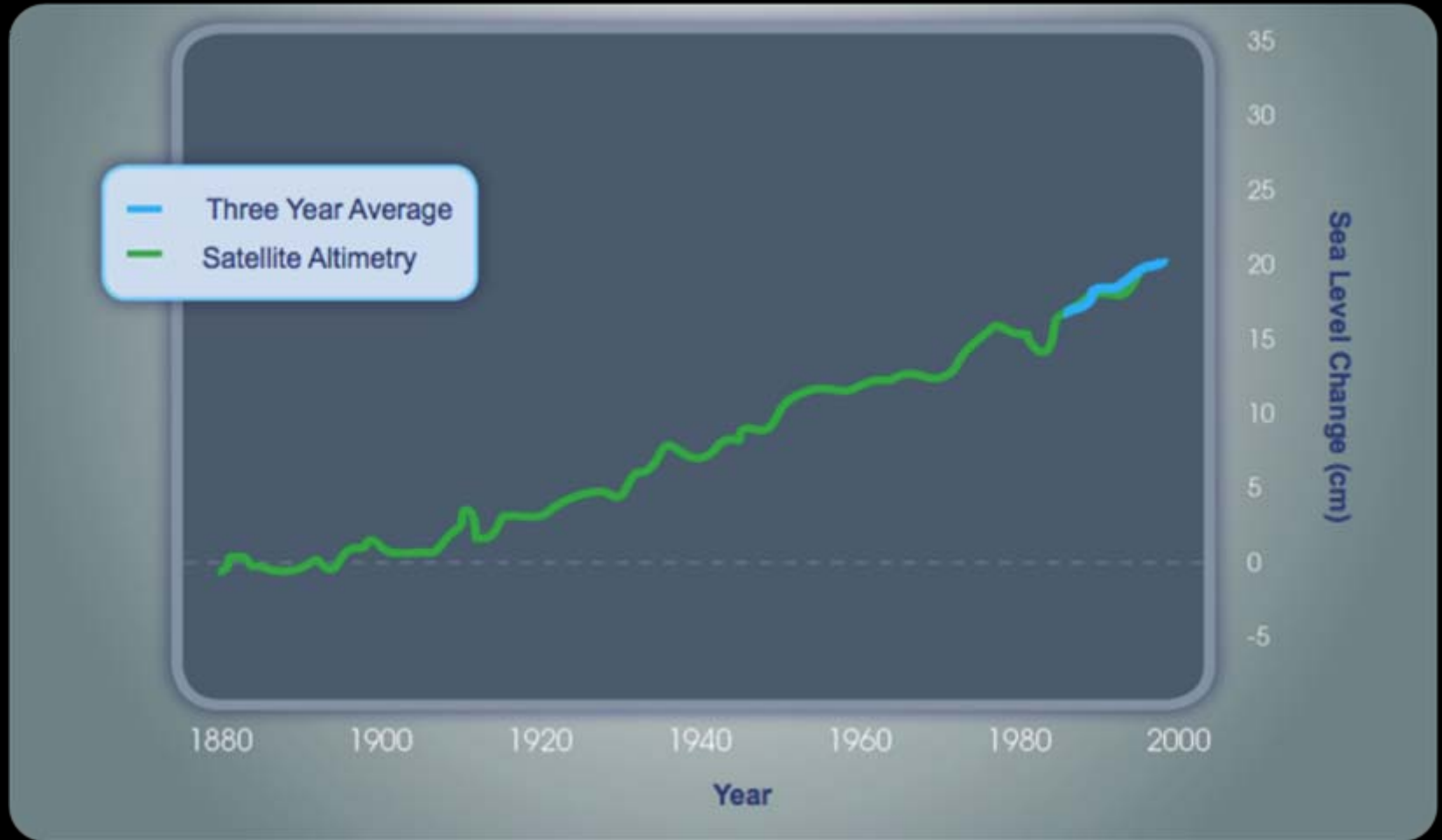


Muir & Riggs Glacier **2004**

The background of the slide is a photograph of a glacier, showing its textured surface and deep blue color. A large white arrow points from the left towards the text.

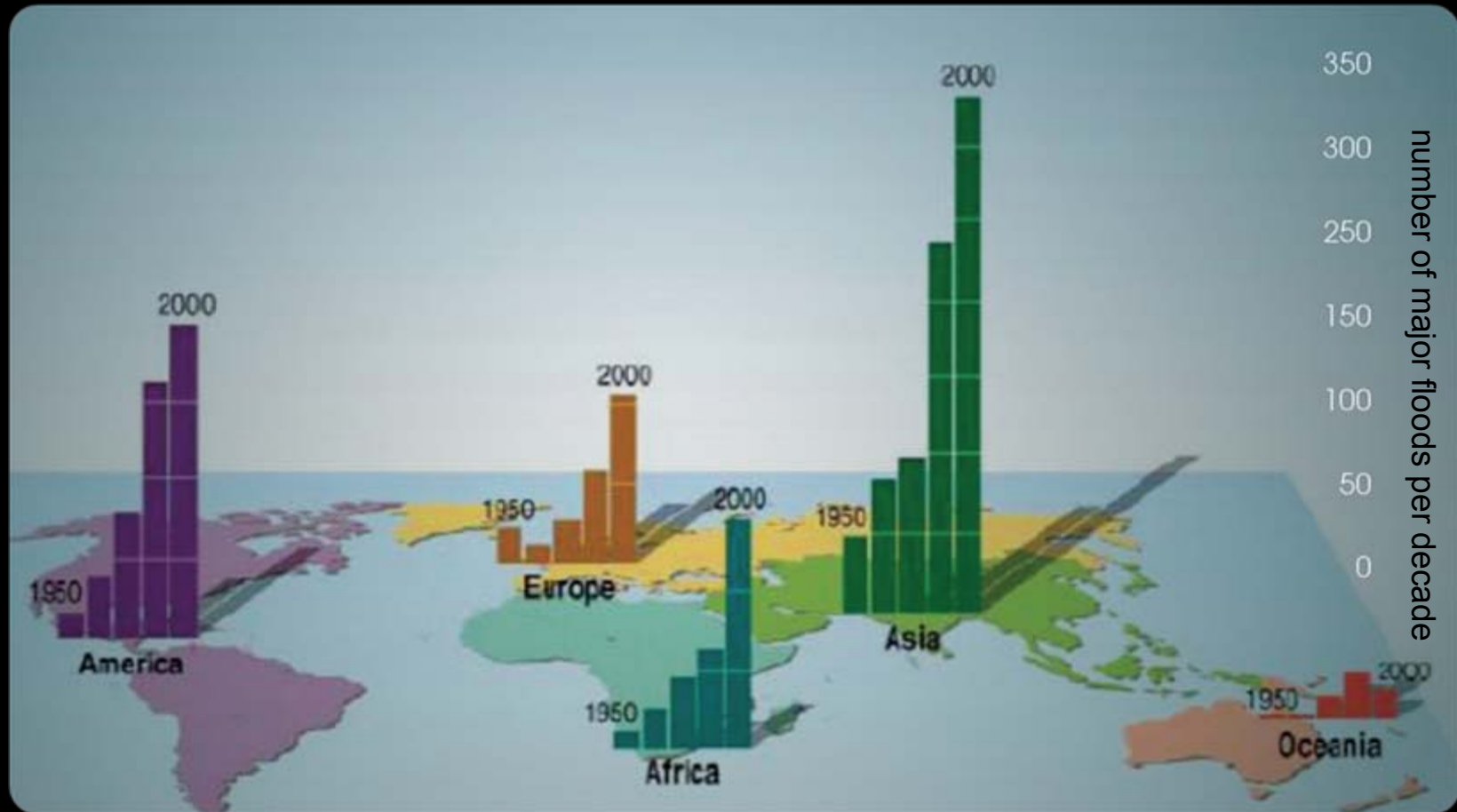
**In a 2005 survey of 442
glaciers, 398 - or 90% -
were retreating.**

Sea levels are already rising



We are already seeing an increase in sea levels which is impacting coastal communities across the globe. Houses are literally falling into the sea in some coastal areas of Alaska.

Major floods per decade



But many effects of climate change can be seen at the global level such as flooding and drought.

- Between 1950 and 2000, almost all continents saw a skyrocketing increase in major floods

In other words...



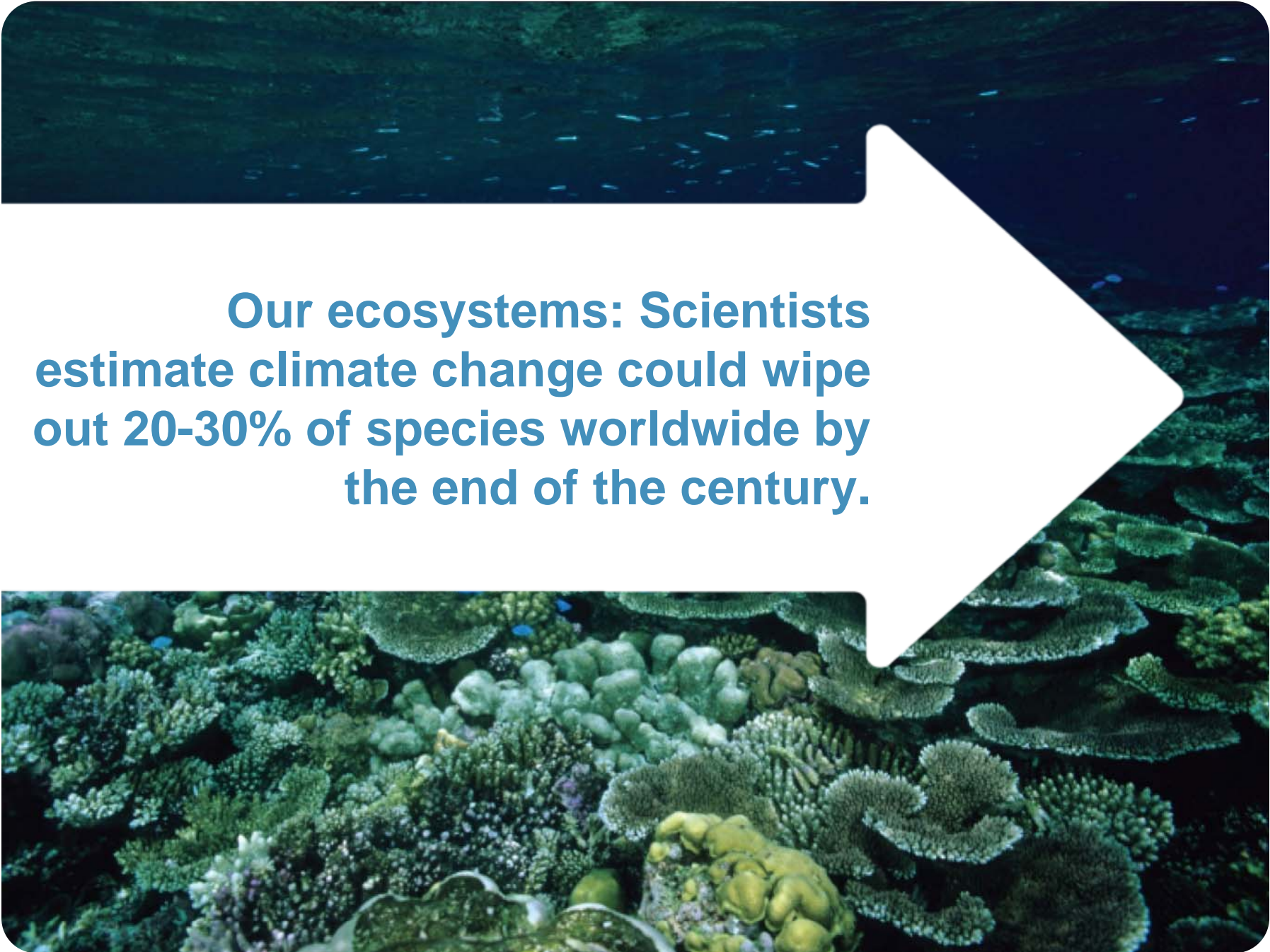
As the atmosphere
heats up...



It holds more
moisture



Causing more
frequent and intense
storms

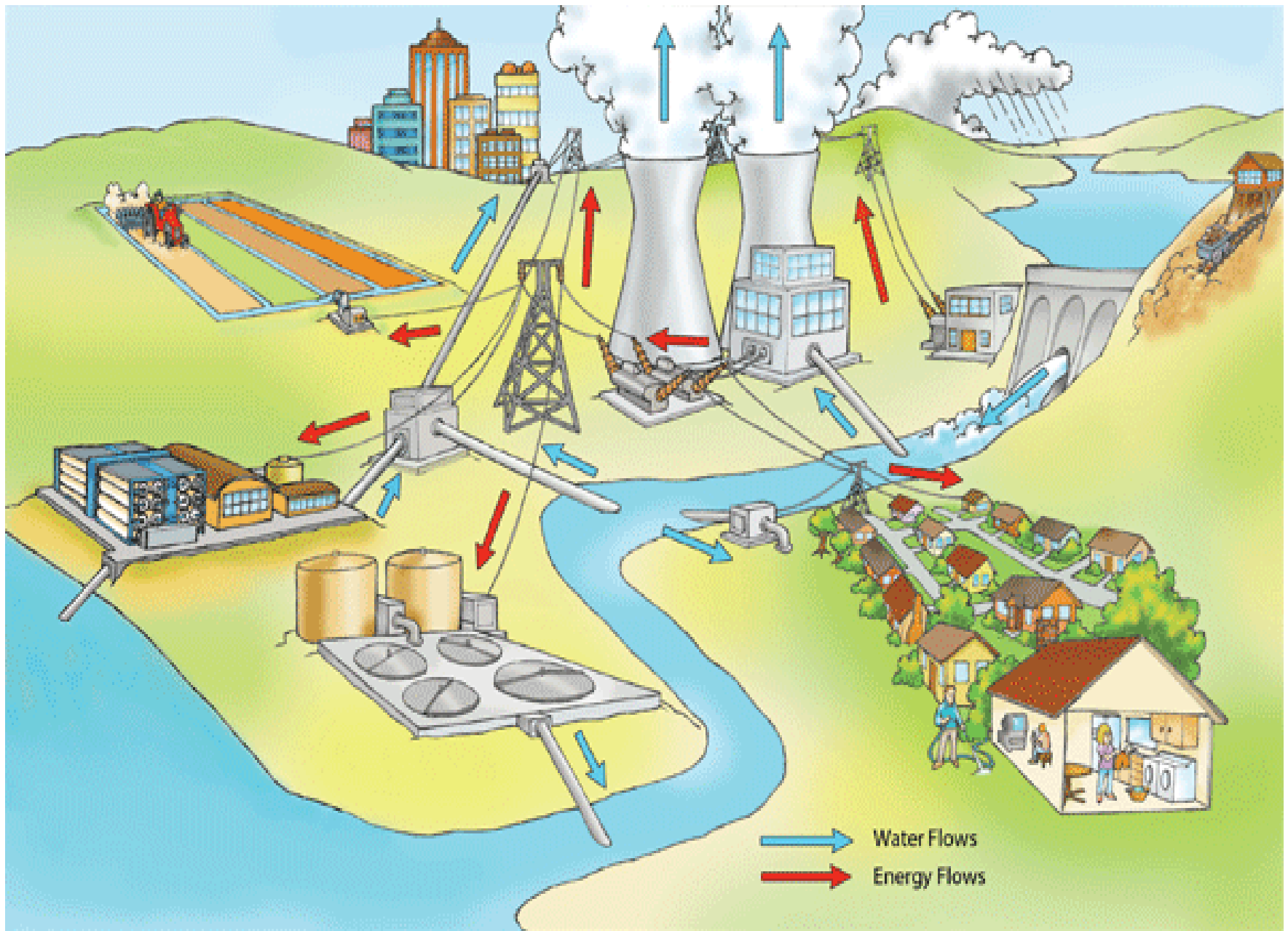
The background of the slide is a composite image. The top half shows a dark, deep-sea environment with a large school of small, silvery fish swimming in a dark blue water column. The bottom half shows a vibrant, shallow-water coral reef with various types of coral in shades of green, yellow, and brown. A large, white, right-pointing arrow is superimposed over the right side of the image, pointing towards the text.

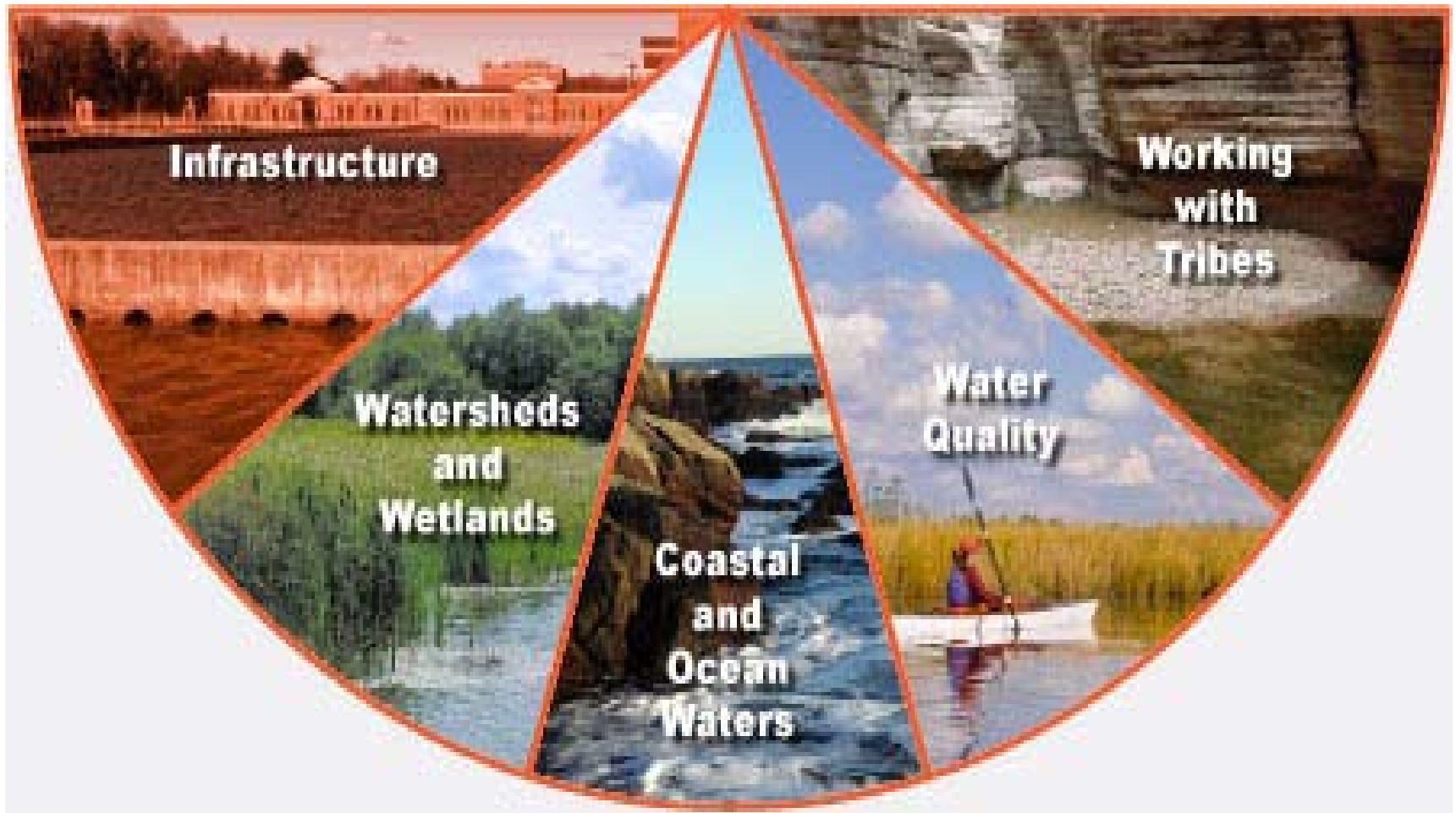
Our ecosystems: Scientists estimate climate change could wipe out 20-30% of species worldwide by the end of the century.

.he task of collecting water falls to womenT
Caroline Penn /WaterAid :Credit



Water and Energy Connections



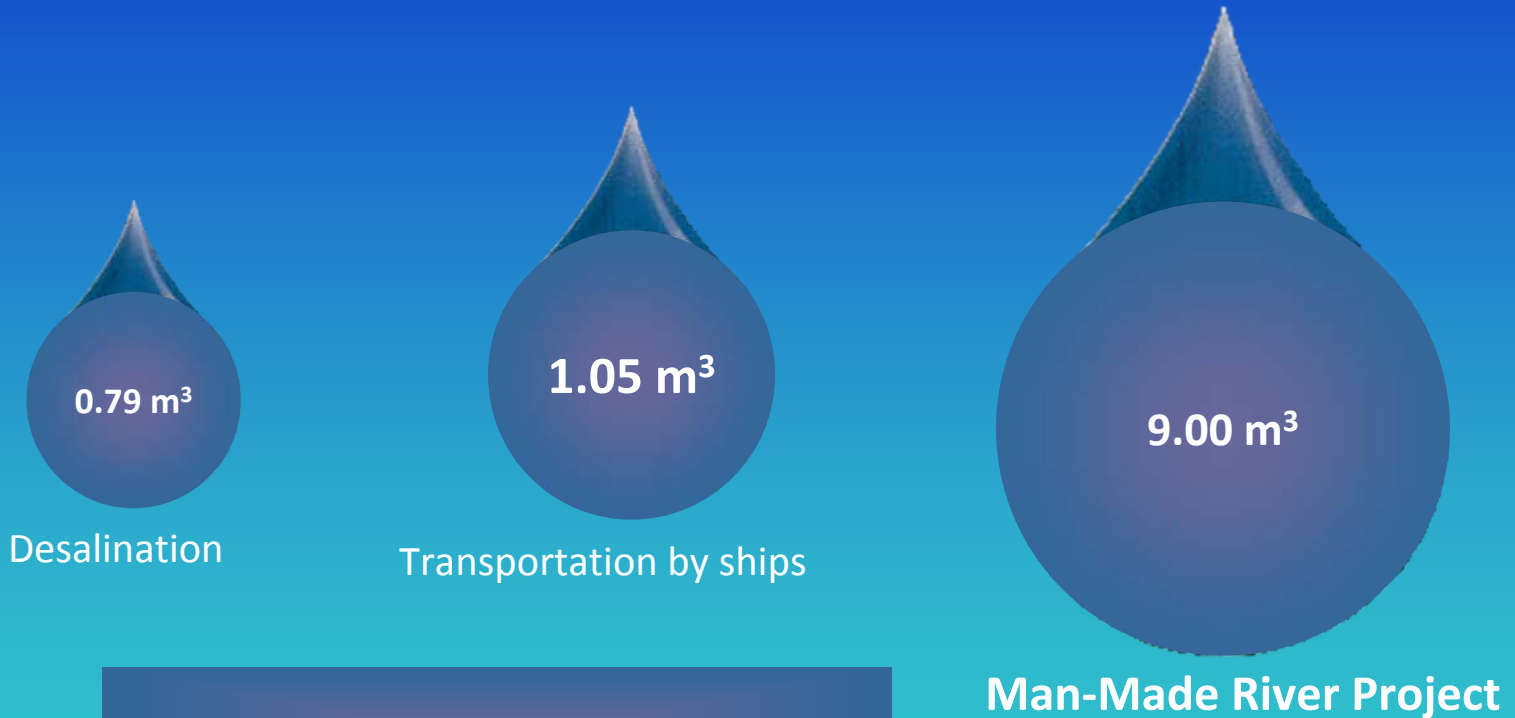


The "[Response to Climate Change](#)" strategy presents five long-term visions designed to shape Libya's future work on climate change and water issues based on the growing understanding of climate change. Each of these vision areas identifies a range of long-term goals and the strategic actions that need to be taken in the coming years to achieve those goals

Key Libyan UNCSD Rio+20 Focal Point Programs and Initiatives

- Climate Ready Wave Energy
- Climate Ready Water Utilities
- Green Infrastructure
- Healthy Watersheds
- Sustainable Infrastructure
- Water Sense

Cost Comparison Between Different Water Supply Alternatives



Quantity of water per One Libyan Dinar

Man-Made River Project

0.74 m³

Pipeline from South
Europe to Tripoli

Policy Recommendations

Develop clear national water, energy, food and nutrition policies and strategies

Reduce subsidies for water, food, and energy,

Increase joint public-private partnership

Focus crop and agricultural research along the food-water-energy nexus

Create markets and trade solutions

RECOMMENDATIONS: adaptation:

- Conserving water and minimizing runoff with climate-appropriate landscaping, such as xeriscaping
- Using water barrels
- Protecting valuable resources and infrastructure from flood damage
- Managing rainfall on-site to limit contamination and protect water quality
- Limiting development within vulnerable watersheds



BEST PRACTICE WAY FORWARD:

In Line with UN ILO Best Practice a Task Force on water resources management, energy savings and environmental measures to draft a Libyan strategy to achieve climate neutrality.

Recommendations

- For purposes of assessing the impacts of climate hazards and future change in the context of integrated water development planning, it is necessary to use remote sensing technology for monitoring and mapping areas of potential exposure to natural hazards through tracing their past and current conditions and identifying mechanisms to prevent or mitigate the effects of those hazards .

Recommendations (in relation to use of RS)

Climate change is a global issue having global, regional or local impacts.

Remote sensing can be utilized and shared by several countries for assessing vulnerability and impacts of climate change in geographical regions e.g. MENA & EURO-MED region in a cost effective manner.



National Water Conference
(Potentials and prospects)

5-7 November 2013

Organized by

General water Authority

Man Made River Implementation and management Authority

General Company for Desalination

Regional Centre for Shared Aquifer Resources Management (RCSARM)

**Information is the 1st. step
towards adaptation**

Thanks