

Climate change impacts on fisheries production in Land-Water interface

by

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Major Environmental Challenges for the 21st Century

- • **Depletion of Natural Resources**
- – Degradation of Land
- – Loss of Biodiversity
- – Deforestation
- – Over-exploitation of Fisheries



Major Environmental Challenges for the 21st Century... contd

- • **Disposal of Solid and Hazardous Waste**
- • **Water Pollution**
- • **Air Pollution**
- • **Global Changes in the Chemical Composition of the Atmosphere**
 - – Greenhouse Effect
 - – Stratospheric Ozone Depletion
 - – Tropospheric Ozone and Particulate Matter



PRELUDE

Several African countries identified the need for the development of vulnerability assessment guidance for fisheries resources in Africa, particularly when the fisheries represent a major food or economic resource.

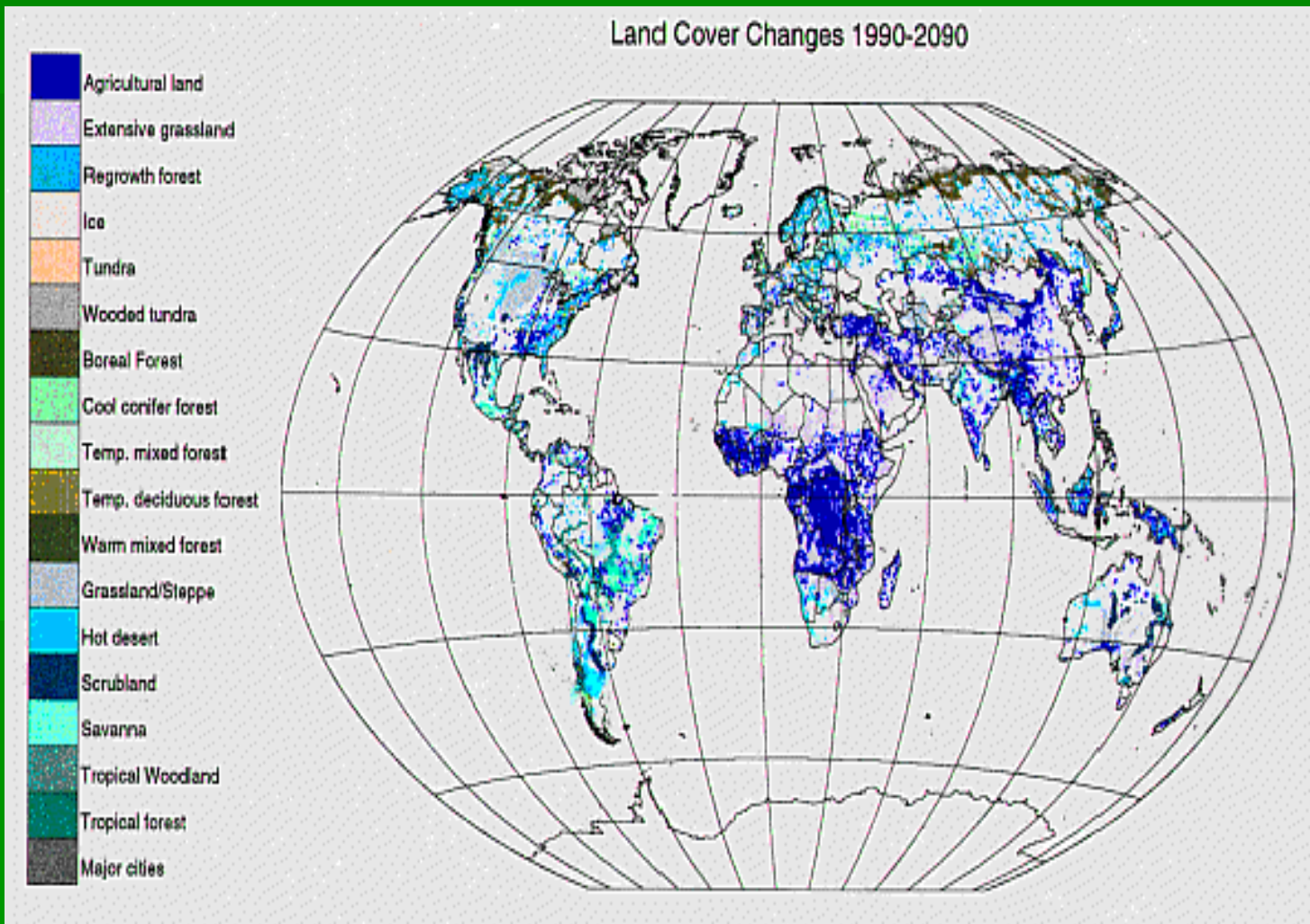
The vulnerability of fishes to climate change is dependent on the nature of the predicted change as well as the nature of the fishery and its species and habits.

Population growth is accompanied by increasing demand for food fish, with direct human consumption of fish reaching an estimated 103 million tons in 2003.

Fish is the main source of animal protein for a billion people worldwide. As well as providing a valuable protein complement to the starchy diet. Common among the global poor, fish is an important source of essential vitamins and fatty acids.

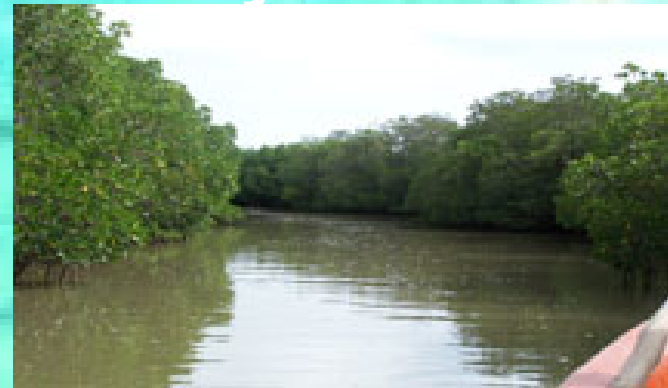


Projection of global land cover change from 1990 to 2090 by the IMAGE 2.1 model. Colored areas depict regions projected to change from one cover type to the cover type indicated.



Many coastal and island communities, where poverty is widespread and livelihood alternatives limited, depend heavily on fish resources.

Small-scale inland fisheries are especially important to food security, and much of the fish caught is consumed locally.



So, why am I here today? What is the issue to discuss in this presentation??

- ***Climate change! Climate change!! Many things have been said about Climate change !!!***
- ***Climate change is a major threat to sustainable growth and development in Africa and achievement of the MDGs.***



Why am I here today.....contd

.....here is the “known” News.....

Africa is the continent which contributes least to global emissions of greenhouse gases (GHG) – yet is the most vulnerable to its effects, particularly due to its high dependence on rain-fed agriculture, widespread poverty and weak capacity.



Why am I here today.....contd

The effects of climate change – reduced agricultural production, worsening food security, increased flooding and drought and an increased risk of conflict over scarce land and water resources – are already evident.

Fish as food (the only affordable source of protein) in rural Africa is disappearing.....

Methodology

The primary tool used for the assessments is 'information'. This information was culled from various sources:

- Existing International documents and ongoing studies
- UNFCCC Reviews, Papers and Reports
- IPCC 3rd Assessment report & other relevant IPCC document



Key messages....1

- **Significance of fisheries and aquaculture.**

Fish provide essential nutrition and income to an ever-growing number of people around the world, often where other food and employment resources are limited. Many fishers and aquaculturists are poor and ill-prepared to adapt to change, making them vulnerable to impacts on fish resources.



Key messages.....2

- **Nature of the climate change threat.**

Fisheries and aquaculture are threatened by changes in temperature and, in freshwater ecosystems, precipitation. Storms may become more frequent and extreme, imperilling stocks, infrastructure and livelihoods.



Key messages.....3

- ***The need to adapt to climate change.***

Greater climate variability and uncertainty complicate the task of identifying impact pathways and areas of vulnerability, requiring research to devise and promote coping strategies and improve the adaptability of fishers and aquaculturists.



Key Messages..... 4.

- **Strategies for coping with climate change.**

Fish can provide opportunities to adapt to climate change by, for example, integrating aquaculture and agriculture, which can help farmers cope with drought while boosting profits and household nutrition. Fisheries management must move from seeking to maximize yield to increasing adaptive capacity.



Importance and vulnerability of small-scale fisheries

The majority of the world's 200 million full and part-time fisherfolk (fishers, fish processors, traders and ancilliary workers) and their dependents live in areas vulnerable to human-induced climate change, or depend for a major part of their livelihood on resources whose distribution and productivity are known to be influenced by climate variation.

Importance and vulnerability of small-scale fisheries....2

The fisheries sector makes important contributions to local development in coastal, lakeshore, floodplain and riparian areas, through employment and multiplier effects. Maintaining or enhancing the benefits of fisheries in the context of a changing climate regime is an important development challenge.



Importance and vulnerability of small-scale fisheries....3

Information has been lacking on the areas and people that are likely to be most vulnerable to climate-induced changes in the fisheries.

This information is required for the effective prioritisation of development interventions to reduce vulnerability to the impacts of adverse climate change on the fish and fisherfolk living in poverty.

Conclusions about climate change – IPCC

- ⇒ Over the past 100 years, the global temperature has increased approximately 0.6 °C, at an accelerated rate not seen in past trends
- ⇒ Temperature increases are projected to rise at an accelerated rate
- ⇒ Exposure to greater levels of variation in freshwater and marine ecosystems
- ⇒ Altered frequency of extreme weather events

Conclusions about climate change – IPCC.. 2

⇒ Unpredictable environment / habitats –
loss of optimal fisheries habitats, invasive
species, food web interactions

⇒ Compounded with existing threats to
aquatic species abundance and population
success

⇒ Sensitivity and concern about
vulnerability and threats to traditional and
cultural lives dependent on aquatic
resources



Conclusions about climate change – IPCC..... 3

⇒ Rapid rate of changes are expected to strongly influence ecosystems, resource productivity and availability

⇒ Unpredictable opportunities for economic development and loss



Fisheries and Aquatic Resources – Observations

Economic Value: Sub-Saharan Africa

- Freshwater Resources sector: \$10 billion
- Sports and Recreation Fisheries: \$2.7 billion
- Fisheries Commercial Great lakes exports: \$2.1 billion
- Aquaculture : \$102 million

Economic Value: Sub-Saharan Africa

African Community

- **Nearly all Africans are influenced by freshwater & marine resource issues**
- **Fish and fisheries are integral components of coastal peoples' lives and culture**



Impacts on Coastal (Land-Water) Fisheries

★ Rising Sea Levels and Increased storm frequency may:

..... Destroy crafts, gears and infrastructure

... Hinder access to fishing grounds and markets

... Reduce fish supply and Fishers Income

Impacts on Coastal (Land-Water) Fisheries

- ★ Loss of fragile and critical habitats (mangroves, reefs, beaches and nursing/spawning/feeding grounds).
- ★ Warming of the marine habitats may impact on fish population

Coral Reefs, food security and CC

..... Two-thirds of reefs are in developing countries

.....Tens of millions in 100 countries depend on reefs

...30 million people directly involved in reef fisheries and aquaculture (Nicholas et al, 2005)



Impact on River Fisheries

Expanded irrigation needs will exacerbate on rivers and other water bodies

..... affect hydrological and ecological regimes and floodplain-river fisheries



Impact on River Fisheriescontd

Elevated discharge rates may impact negatively on:

.....recruitment and yield of fish species

.....disrupt spawning in some species



Impact on River Fisheries... contd

Adaptive Agricultural strategies (Dams, Irrigation and Flood control) around rivers may further exacerbate these impacts

Prolonged Dry season declines may rob off gains from extensive flooding



Impacts on Lake Fisheries..

e.g. Lake Chad in West Africa

...Changes in Lake water levels

...Hyper water temperature and diminishing water quality

...Depending on location and region, impacts and effects on hydrological and ecological Regimes will vary

Some positive, some negative.

In Lake Chad, West Africa:

- ▶ Fewer fish species,
- ▶ Smaller fish size
- ▶ Lower fish diversity
- ▶ Shallow lake depth

In Lake Chad, West Africa...contd:

- ▶ More man-hours on the lake with less fish to catch
- ▶ Depleted ecosystem
- ▶ Loss of jobs for fishermen

Impacts of Adaptive strategies

Intensive agricultural activities such as fertilizer and pesticide application to mitigate CC impacts will affect :

water quality \Rightarrow fisheries \Rightarrow aquaculture

Impacts of Adaptive strategies

In the face of declining catch, income and food security, fishers will seek alternative livelihoods which will:-

place pressures on other sectors of resources.

Summary of Expected changes

- ⇒ Sea level rise
- ⇒ Change in precipitation (higher intensity)
- ⇒ Warmer temperatures (means and maximums)
- ⇒ Greater variability (storminess)
- ⇒ Occurrence of Extreme events

Concluding facts

- ✓ *The size of Africa and its amplitude of Climate variability is of major concern*
- ✓ *Africa has 17 rivers with catchment areas greater than 160,000 km², 160 lakes larger than 27km² all around the equatorial/ sub-humid East African highlands*

Concluding facts... contd

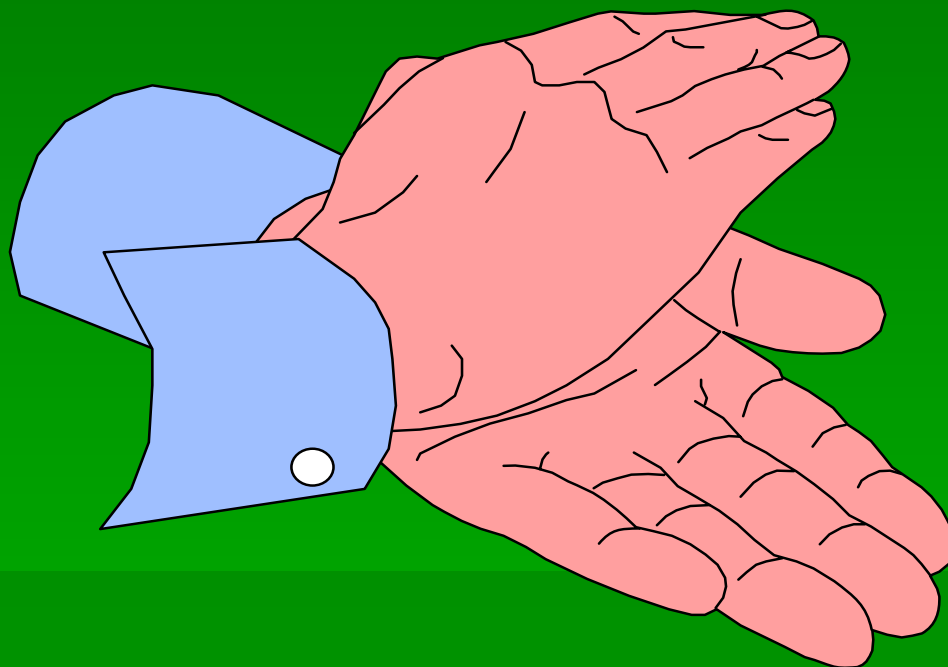
- ✓ *Groundwater represents 15% of Africans water resources, used by more than 75% as drinking water supply*
- ✓ *Understanding current and future Climate variability in Africa is difficult due to lack of observational Climate data*



Concluding facts ...contd

⌚ *Africa is already under pressure from climate stresses which increase vulnerability to future climate change and reduce adaptive capacity.*

THANK YOU



FOR LISTENING