Assessment of Impacts and Vulnerability to Climate Change: Opportunities for using Remote Sensing Technology

By

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Introduction

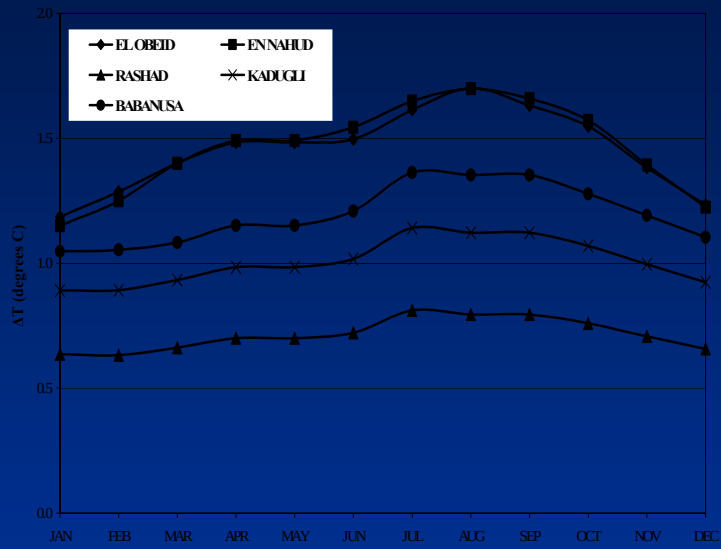
- The Third Assessment Report of the IPCC (2001) Identified Africa as the continent most vulnerable to current and future climate change impacts.
- This vulnerability stems from low adaptive capacity , which is a result of poor development.

Introduction (2)

- In the face of climate change, an assessment of impacts and vulnerability to changing climatic conditions was a critical component of Sudan's response to the United Nations Framework Convention on Climate Change (UNFCCC).
- The purpose of a vulnerability and adaptation assessment is to illuminate the potential impacts of climate change on critically important sectors. An examination of Sudan's ecological zones indicates that the majority of its land is quite vulnerable to changes in temperature and precipitation

Changing climate

- Climate scenario analyses conducted as part of the preparation of Sudan's First National Communications indicated that average temperatures are expected to rise significantly relative to baseline expectations. By 2060, projected warming ranges from 1.5°C to 3.1°C during August to between 1.1°C to 2.1°C during the month of January. Projections of rainfall under climate change conditions also shows sharp deviations from baseline expectations. Results from some of the models show average rainfall decreases of about 6 mm/month during the rainy season.

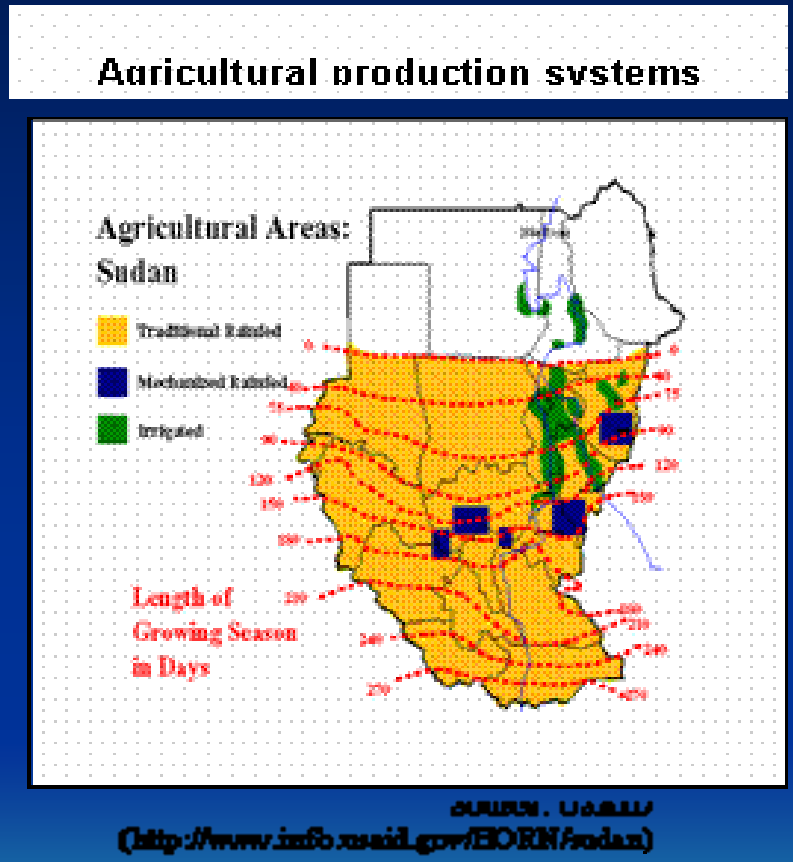


Vulnerability analysis

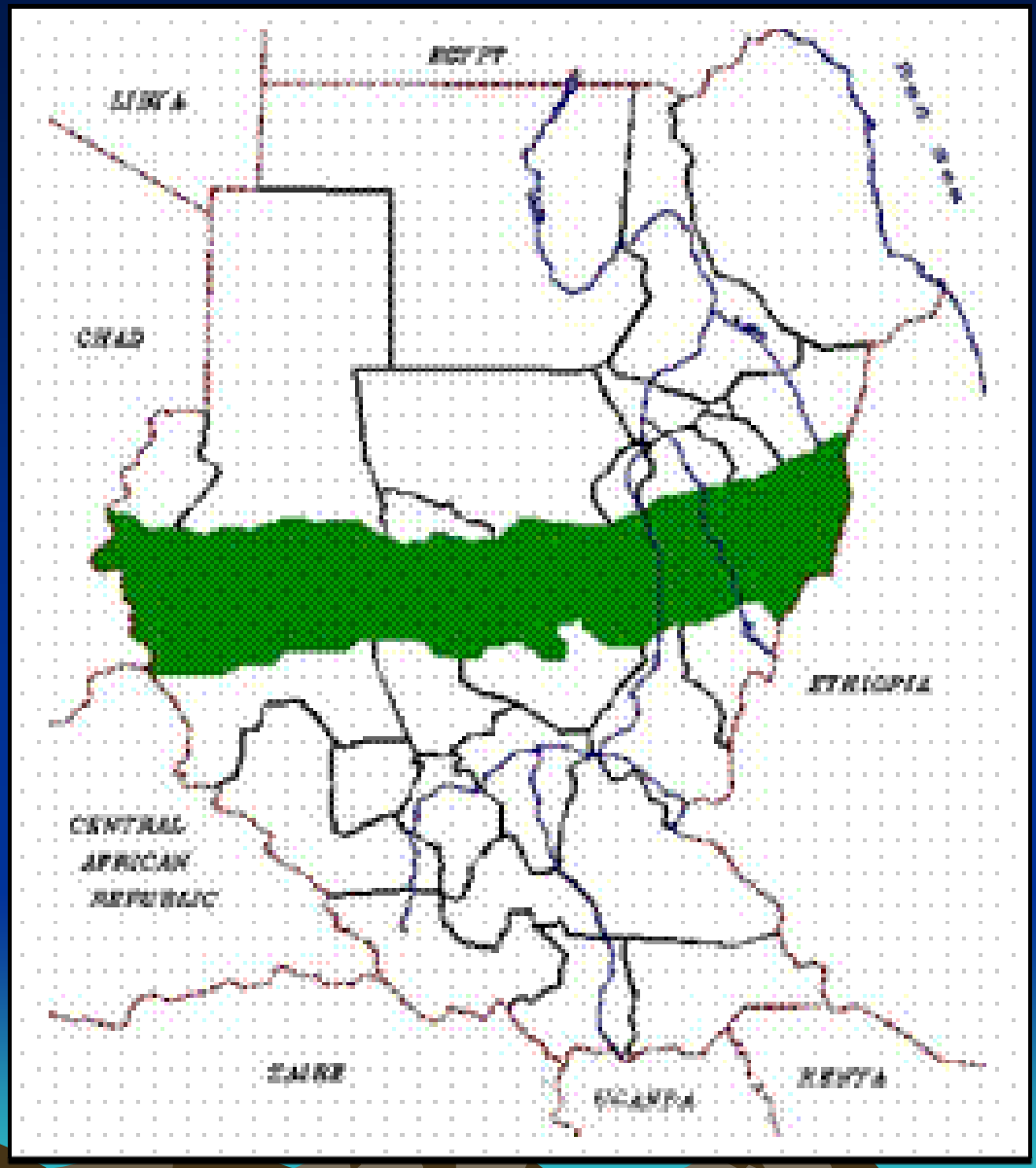
- Objective:
  - uncover the types of challenges that may likely be facing in the not too distant future with regard to food security, water resources, and human health

Specifically the study aimed at:

- Assess the potential impacts on:
  - Traditional rainfed agriculture and forestry (millet, sorghum & gum Arabic).
  - Water resources
  - Human health (malaria)



Sudan's Gum Arabic Belt:



Sudan's Gum Arabic Belt

Impact Assessment approach

- The study area - is the large central region of Kordofan, located in central Sudan between latitudes 9° 30’ and 16° 24’ North and longitudes 27° to 32° East. (24% of Sudan’s total area).
- The main focus is to identify and gauge the severity of climate change impacts ,identify and propose possible adaptation options of traditional agriculture and gum arabic production.

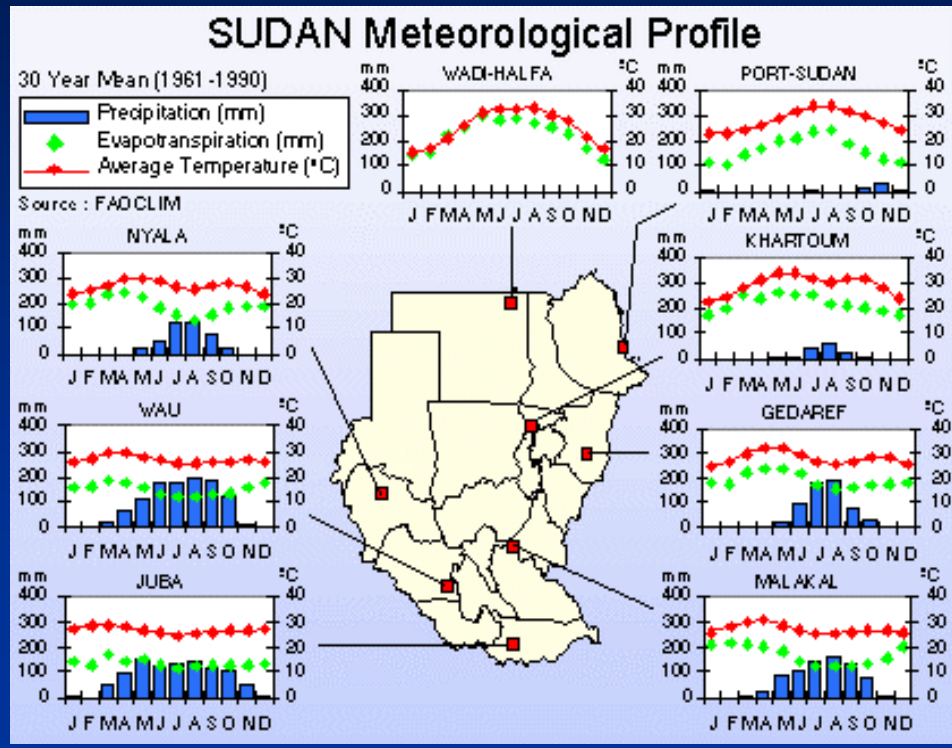
The longer-term objectives

- **Identify the possible adaptive responses for reducing adverse effects**
- **Inform and advise the policy-making process**
- **Highlight the linkages between agriculture, forestry sector impacts and other environmental and socioeconomic consequences of climate change**

Methodology:

- key variables: agroclimatic zones, crop yield, and gum arabic production
- Use of projections of two climate scenarios:
  - Baseline scenario (non-climate change)
  - Climate change scenario

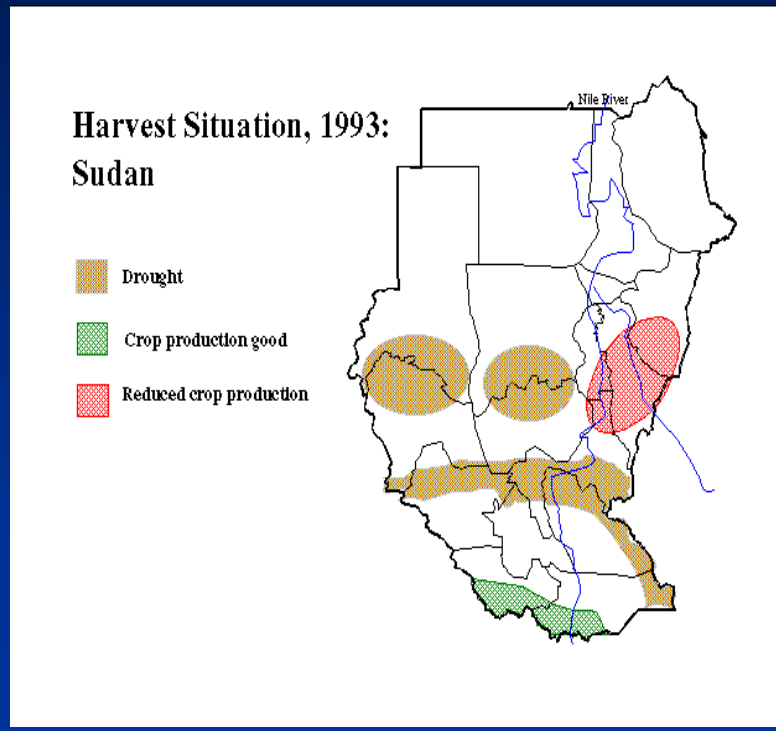
The assessment derives potential impacts on Kordofan's agroclimatic zones and on the yield of sorghum, millet and gum arabic produced in these zones



Analysis Approach

The study utilized a combination of existing tools, including :

- Expert judgment,
- Analogue methods (historical and spatial trends),
- GIS techniques (for mapping and analysis of data on Kordofan states),
- statistical methods (used to generate crop yield forecasts), and crop impact models (soil water balance models.

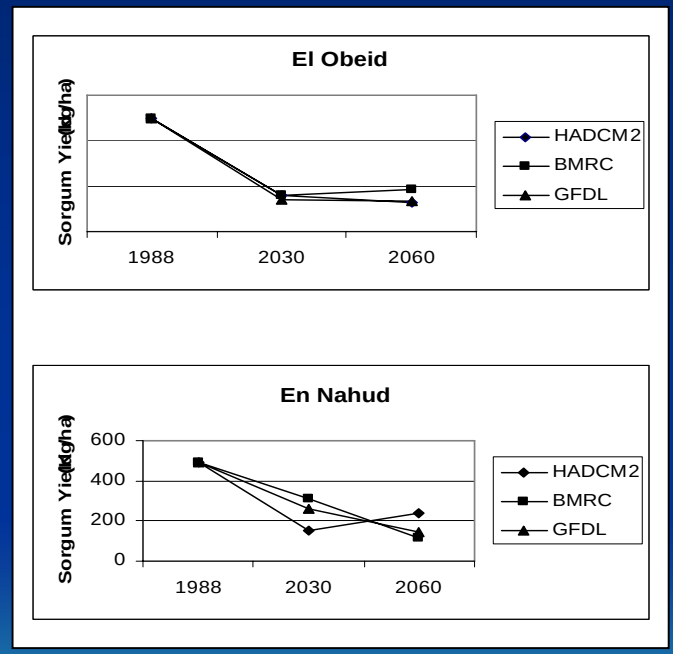


time frames used in the analysis are :

- *Baseline scenario:* According to IPCC recommendations, a normal period of 1961-1990 is used.
- *Climatic change scenario:* Based on a doubling of CO2 emissions (IS92A scenario), milestone years 2030 and 2060

Potential Impacts under future climate change

- A southward shift in moist agroclimatic zones is seen, indicating a shrinking area of crop production.
- Food crop yield showed a decline from baseline yield of between 13% and 82% for sorghum and between 20% and 76% for millet.
- Of the three exposure units, sorghum is most heavily affected.
- Gum arabic yield, region-wide, is predicted to decline between 25% and 30%. .



Conclusions

- A number of impacts on livelihood systems projected through this work are strikingly negative, suggesting a significant decrease in Kordofan's agricultural productivity and a reduction in its primary cash crop
- Given the projected increases in population, desertification and associated environmental and socioeconomic pressures, these preliminary findings may provide a warning signal to stakeholders and decision-makers.

Conclusion Cont..

- Timely assessment of impacts can assist in the planning and development of appropriate long-term mitigation and adaptation strategies for the management of natural resources, rather than simply reacting to offset negative impacts of global changes after they occur .

Conclusion Cont

- The potential impacts of the future climate change are evaluated but there is no good representation (spatial quantitative and qualitative) that could provide for effective communication of potential impacts to the public and decision-makers and enable decision makers to integrate climate change aspects in the planning process.

Recommendations

- **Similar studies should be undertaken in Darfur and Kassala regions, as they share many characteristics with Kordofan, and may face similar levels of vulnerability.**
- **The findings of this study should be used as a platform for interaction, research and discussion among the triad of policy makers, scientists and stakeholders.**
- **The issue of climate change and its potential impacts on the exposure units should be shared and explained within government ministries, in schools and universities, at the local community level, etc., as part of a broad awareness building exercise**

Recommendations

- For purposes of assessing the impacts of climate hazards and future change in the context of integrated 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)

- Since Climate change is a global issue , that can have global, regional or local impacts , then remote sensing can be utilized and shared by several countries for the purpose of assessing vulnerability and impacts of climate change in the same geographical region e.g. Africa Sahelian region in a cost effective manner.

Recommendations Cont..

Suggestions please!!!

Thanks

Information is the 1st. step towards adaptation