Republic of Benin

SECOND NATIONAL COMMUNICATION OF BENIN ON CLIMATE CHANGE

by

Sylvain AKINDELE

Coordinator of Benin' SNC Project

(00229) 97 60 20 31/ akisylva@yahoo.fr

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INTRODUCTION

The Republic of Benin is a coastal country, located in West Africa with an area of 114,763 km ².

Democratic country since 1990 (22 years ago)

Ratification of the UN Framework Convention on CC by Benin in June 30th , 1994

First Communication of Benin developed in 2001 and presented at the 8th COP, in New Delhi, in 2002.

TNC is developed between 2008 and 2011
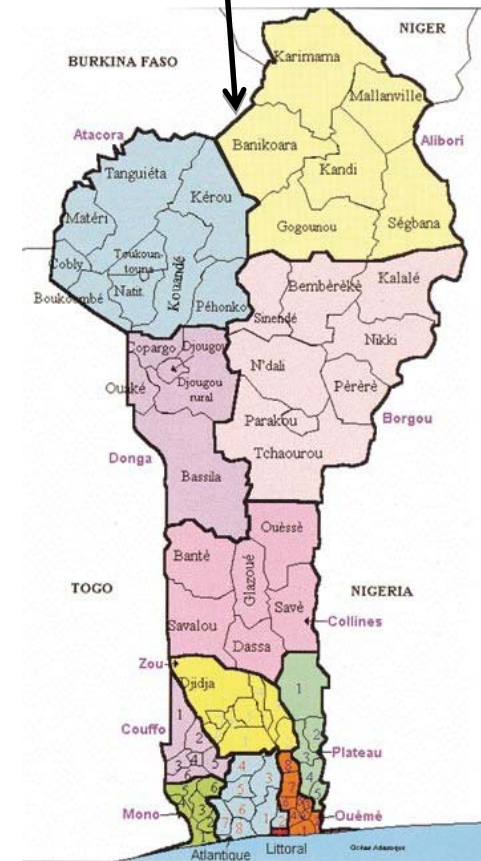
1. NATIONAL CIRCUMSTANCES

- **Physical environment**

The relief is of few extremes throughout the country, some hills and mountains in the centre and north
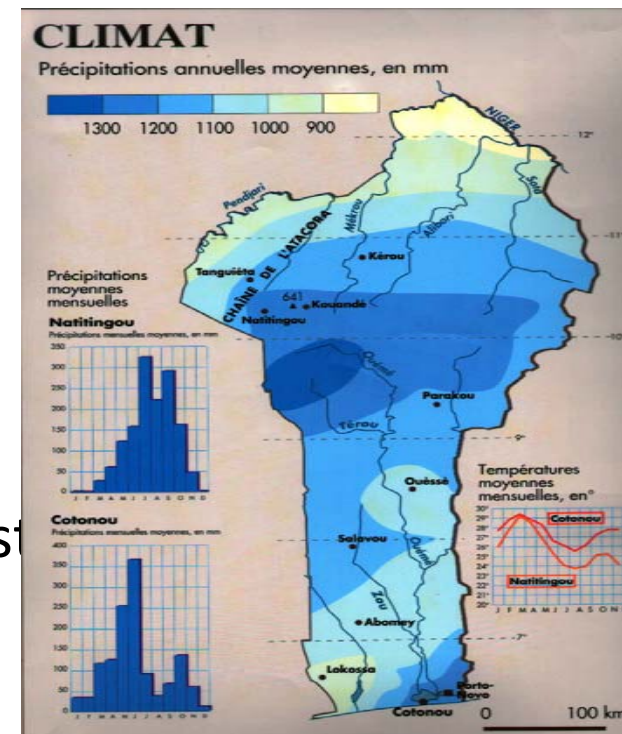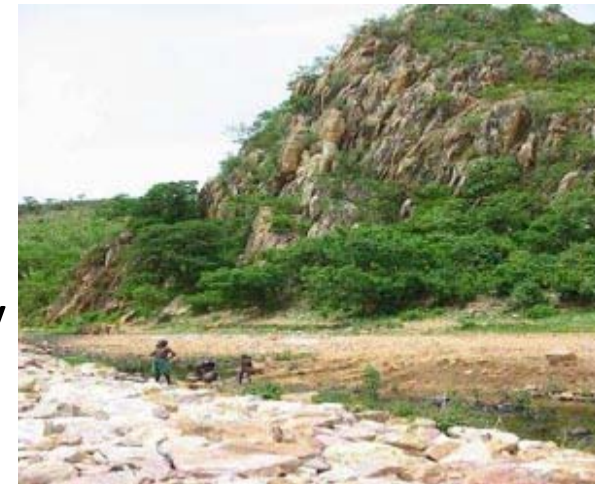
Continental tropical climate in the North (1 dry season, 1 rainy season)

Sub-equatorial climate in the South (2 dry season, 2 rainy season)

Average annual rainfall of 700mm (north) to 1400 mm (southeast)

Average annual temperature about 27.2 ° C with absolute maxima exceeding 45 ° C in the extreme north.

Benin's vegetation is dominated by open forest and savanna.

CLIMAT
Précipitations annuelles moyennes, en mm

1300 1200 1100 1000 900

Précipitations moyennes mensuelles
Natitingou

Cotonou

Températures moyennes mensuelles, en°

100 km

1. NATIONAL CIRCUMSTANCES

Socio-économic parameters		
Economic secto 38% 13,2% du PIB 48 rs	Primary sector (38% of GDP)	Agriculture is dominated by cotton, corn, cassava, pineapple Animal husbandry , traditional with 1 857 000 cattle, 2 216 000 small ruminants
	Secondary sector (14 %)	Dominated by food processing, textiles, cement factories
	Tertiary sector (48 %)	Services and trade
GDP	2-6% between 1990-2006	GDP <7% Country has many challenges to overcome to achieve the MDGs
Incidence of poverty	40,3%	Periode 2006/2007
Rate of population growth	3,25% per year	

2.1 GREENHOUSE GASES (GHG) INVENTORY

Methodological Aspects	
Sectors	Energy, industrial process, agriculture, LULUCF, waste
Base year for SNC GHG Inventory	**2000**
Tools used	Revised 1996 IPCC Guidelines; IPCC Good Practice Guidance 2000 IPCC Good Practice Guidance 2003 LULUCF Use of emission factors and other default emission parameters of IPCC
Level of analysis	Tier 1
Quality control / Quality Assurance	QC: by sector QA: by Peer review and international review (through the financial support of NCSP)
recalculation	1995 inventory for INC was recalculated with new methodological guidelines

2.1 GREENHOUSE GASES (GHG) INVENTORY

GHG emission (excluding LULUCF) estimated to 6251.03 Gg CO_2-e

GHG emissions (including LULUCF) estimated to - 5082.11 Gg CO_2-e

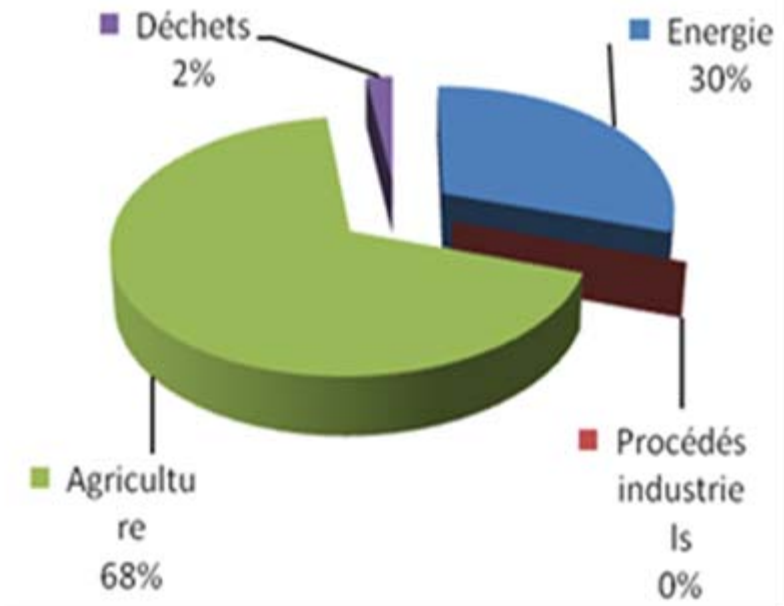Agriculture and energy sectors are the largest contributors to the 2000 GHG inventory at 68% and 30% respectively

Fig: Contribution of each sector to total GHG emissions in 2000

2.1 GREENHOUSE GASES (GHG) INVENTORY

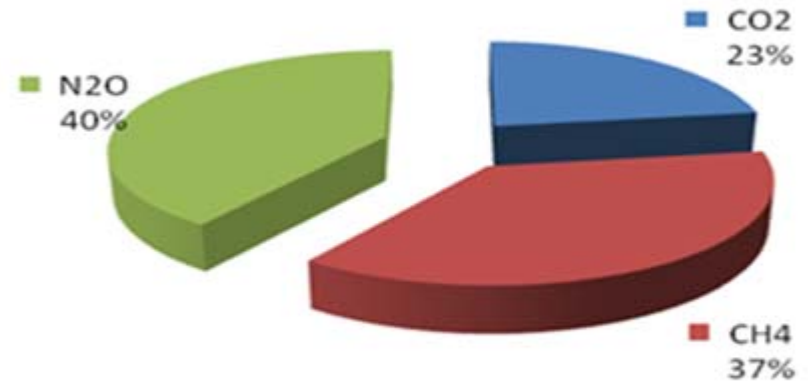The most emitted gases are N_2O and CH_4 in the proportion of 40% and 37% respectively

Fig: Contribution of each gas to the total emission in 2000

From 1995 to 2000, the GHG emission increased from 4797.74 Gg CO2-e to 6251.03 Gg CO2-e),
But Benin remains a carbon sink

2.2 VULNERABILITY & ADAPTATION TO CC

METHODOLOGY

IPCC's scenarios A1B and B1 chosen for projections at the global level for years 2025, 2050, 2100
Local data derived from the global level by downscaling

Tools and Software used:

- MAGICC / SCENGEN 5.3
- DIVA software 1.5 which analyzed the vulnerability in coastal areas
- DSSAT 4.2 model to assess future changes in crops yield
- IPCC technical guidelines for impact assessment and adaptation strategy
- UNEP Handbook on vulnerability and adaptation to CC

2.2 VULNERABILITY & ADAPTATION TO CC

CLIMATIC & OCENOGRAPHIC SCENARIO

- In southern Benin, the annual rainfall may be invariable in 2100 compared to the reference period 1971-2000
  In the North , a possible increase of annual rainfall by 13% (NorthWest) to 15% (Northeast)

- Projection of a rise in sea level by 0.81 m over the period 2000-2100

SECTORS CONSIDERED

I. Coast area

II. agriculture

III. Water resources

IV. forestry

2.2 VULNERABILITY & ADAPTATION TO CC

Coastal area

the east (Grand-Popo) and the western part (Seme-Kpodji) of Benin' coast are particularly vulnerable to sea level rise by 2050
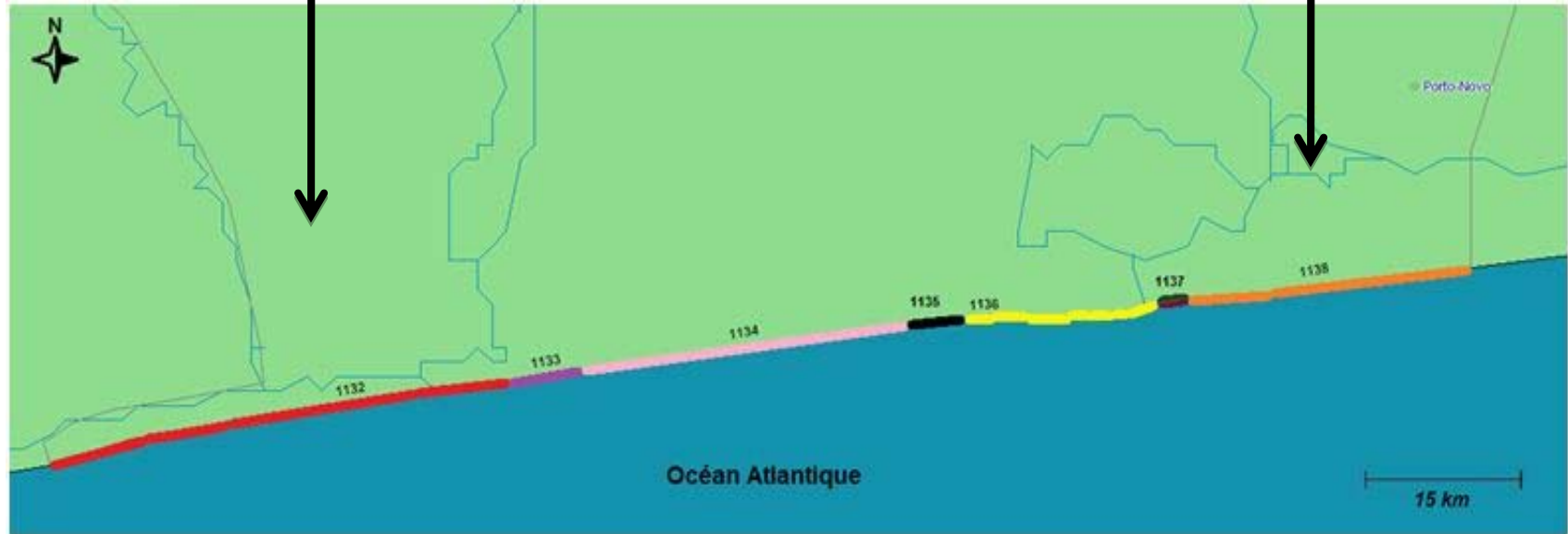

Fig: segmentation of the coast of Benin by DIVA software
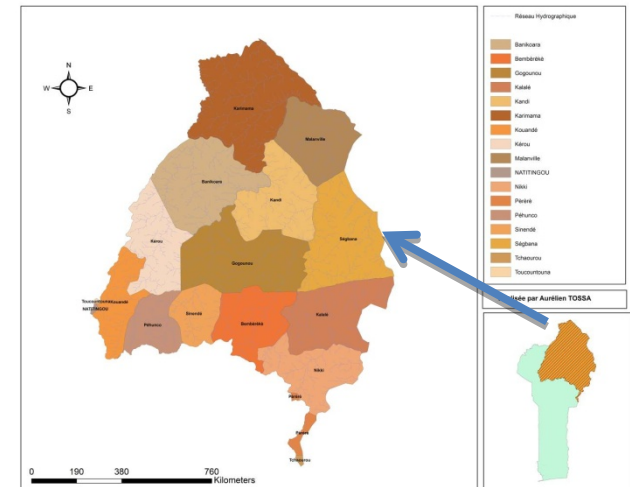
2.2 VULNERABILITY & ADAPTATION TO CC

Water resources

According to the projections by
years 2050:
The likely increase in rainfall in
the
north and central regions will
result in a likely occurrence of
high water and floods
downstream of the river Oueme

the significant decline in rainfall in
seasonal scale could introduce a
shift of the flood periods in the
Niger River Basin
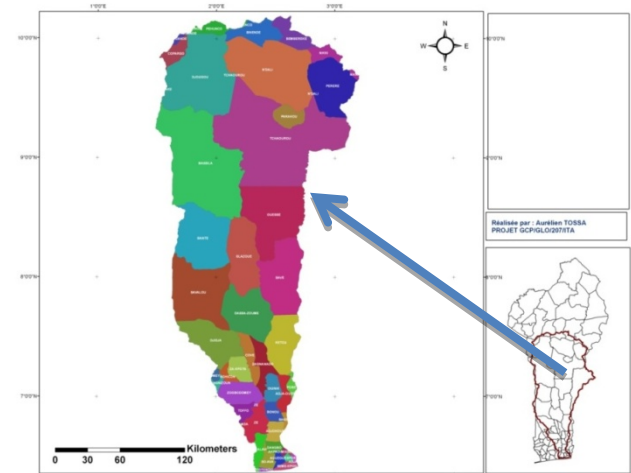
River basin Ouémé

River basin Niger

2.2 VULNERABILITY & ADAPTATION TO CC

AGRICULTURE SECTOR

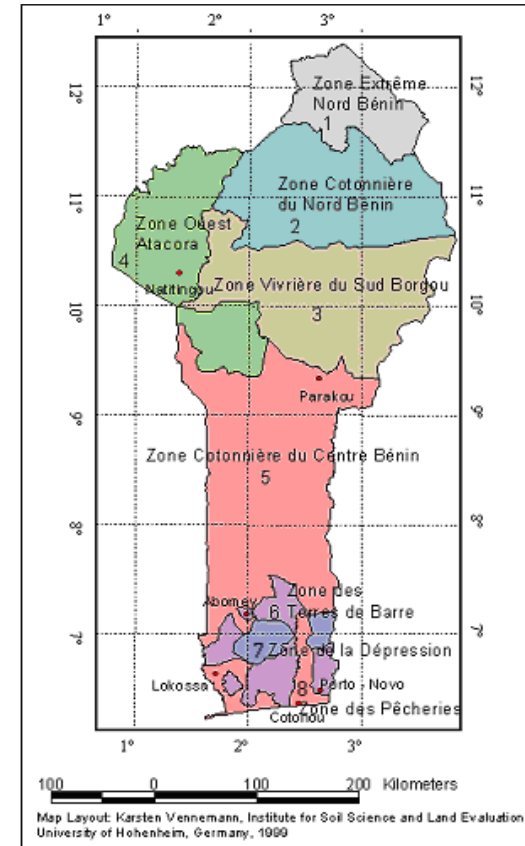**3 sub-sectors** : crop production, livestock and fisheries

3 Crops: maize, cowpea, cotton

By 2025, a probable decrease in the yield of maize up to 6% in agro ecological zone located in the south

In agro-ecological zone 1, 2, 3, 4 (in the north) cowpea and cotton showed a tendency to improve their yield of up to 15% and 6% by 2025

The CC may affect production and the spatial distribution of fisheries resources and the people who depend on fishing

The three agriculture sub-sectors are vulnerable to CC, but to different degree.

Map Layout: Karsten Vennemann, Institute for Soil Science and Land Evaluation University of Hohenheim, Germany, 1999

Agro-ecological zones
1 Zone Extrême Nord Bénin
2 Zone Cotonnière du Nord Bénin
3 Zone Vivrière du Sud Borgou
4 Zone Ouest Atacora
5 Zone Cotonnière du Centre Bénin
6 Zone des Terres de Barre
7 Zone de la Dépression
8 Zone des Pêcheries
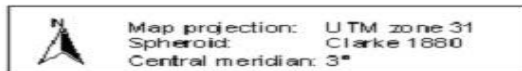
Map projection: UTM zone 31
Spheroid: Clarke 1880
Central meridian: 3°

Map Layout: Karsten Vennemann, Institute for Soil Science and Land Evaluation University of Hohenheim, Germany, 1999

2.2 VULNERABILITY & ADAPTATION TO CC

Some adaptation options and measures proposed

Sectors	Adaptation options
Coastal area	**Protection (human settlement and activities) against sea levels rise** Development of hydro-agricultural and aquaculture Flood management
Agriculture	**Development of agricultural systems adapted to climate change** Water control in agricultural systems
water resources	**Management of water demand (water demand for irrigation and by human settlements)** Improvement of water supply Conservation of water resources.
Forestry	**Strengthening the system of ecological monitoring of flora, fauna and forest ecosystems** Promotion of large-scale of plantations Management of bushfires

2.3 MITIGATION OF CLIMATE CHANGE

METHODOLOGY

- Areas : Agriculture , Energy and Forestry , Waste
- Assessment of national policy & actions likely to reduce GHG emissions
- Evaluation of policies and measures that aim to cut down GHG emissions
- Attempt to use LEAP and other tools but unsuccessfully, due to lack of data and quantified objectives by sector
- Methodology for mitigation study based on experts judgment

2.3 MITIGATION OF CC

Mitigation option & mesures by sector

sectors	Mitigation meseares	Level of implementation
ENERGY	Development of pilot project to disseminate 365,000 compact fluorescent light bulbs (CFLs) in 8 cities	on progress
ENERGY	2 station of gas turbines 10MW 2 hydropower of 188 MW and 147 MW to be built from 2011 -2015	Planned in the strategy of energy sector for 2009 - 2017
TRANSPORT	Project replacing two-stroke engine with four-stroke engine by tax a exemption on 4T	On progress

2.4 CROSS- CUTTING ISSUES

**Technology needs:** Benin is a country characterized by low level of technological development in almost all sectors

Sector	Technology needs
Agriculture sector	Producing biogas from manure Short cycle varieties
Energy sector	Engine with low energy consumption low-power electrical equipment improved stoves

2.4 CROSS- CUTTING ISSUES

Systematic observation system

the climatological network composed of the synoptic network (6 stations) and climatological stations (21 stations), so it is sparse in view of the requirements for monitoring and forecasting of weather and climate at national level

Hydrological network is composed of 46 monitoring stations covering 40 sub-watersheds while there are a total of 86 sub-basins
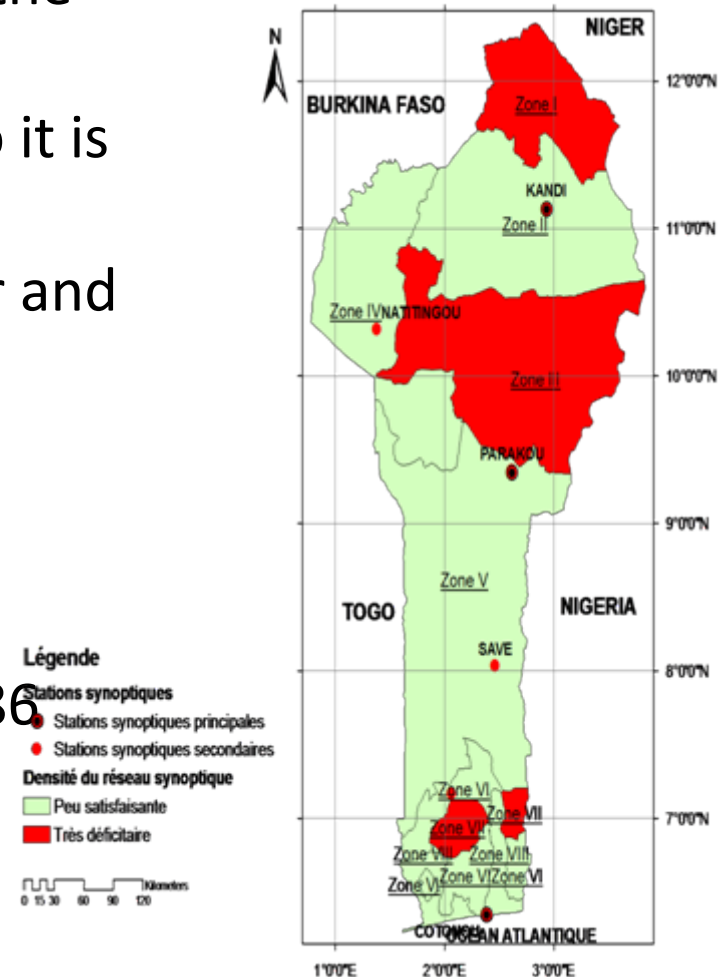
3. KEY CHALLENGES

- Absence of specific data to make appropriate assessment on CC

- data gaps and low temporal and spatial coverage

- lack of tools to do some analysis

- Limited technical expertise (skilled human resources)

- Lack of efficient equipment to run models

- Difficulty to assess impact costs and response measures on adaptation and mitigation)

4. Good Practices

- Development of Learner's Manual on V & A and GHG inventory based on the IPCC methodology guidelines

- Training of professionals from sectors and researchers in GHG Inventory and also in the V & A assessment , involved in SNC studies

- validation of study report in all sectors by the National Committee on Climate Change, interdepartmental and multidisciplinary (Ministry, NGOs, private sector, civil society, university)

Projects emerged from the SNC

1. Development of emission factors specific to Benin
2. Capacity building in climate observation system
3. Establishment of database on climate change
4. Adaptation of agricultural calendars to new climate realities
5. Improvement of production technology of wood charcoal

CONCLUSION & PERSPECTIVES

The SNC has advanced significantly over the INC (range of thematic covered broader/ better methodological tools)

However the level of assessments made has been limited because of the constraints mentioned

The TNC must be preceded by capacity building actions in order to increase technical expertise, to improve systematic observation