

# COMBATING CLIMATE CHANGE AND LAND DEGRADATION IN THE WEST AFRICAN SAHEL: A MULTI-COUNTRY STUDY OF MALI, NIGER AND SENEGAL

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# PRESENTATION OUTLINE

- Objectives of presentation
- Climate change in the West African Sahel: Causes and Consequences
- The State of Land Degradation in West African the Sahel
- Climate Change and Land Degradation in Mali, Niger and Senegal: A Comparative Analysis
- Conclusion and Recommendation

# OBJECTIVES OF PRESENTATION

The major objectives of this presentation are to:

- Shed light on the emergence of **Climate change in the West African Sahel**
- **Examine its causes and consequences**
- **Establish the nexus between climate change, desertification and land degradation in Mali, Niger and Senegal**
- **Proffer recommendations**

# THE EMERGENCE OF CLIMATE CHANGE IN THE WEST AFRICAN SAHEL

- The West African Sahel is a region vulnerable to climate change. The ecological zone is a hot, semi-arid-climate; characterized by very high temperature year-round, ranging from 21.9° - 36.4°C
- The late 20<sup>th</sup> century witnessed a dramatic change in the region's climate profile, with incessant droughts in the 1970s and 1980s; fueled by a 30% reduction in rainfall.
- During the past four decades, the West African Sahel has witnessed below-average annual precipitation, with two severe drought periods in 1972-1973 and 1983 – 1984
- The intergovernmental Panel on climate change (IPCC, 2007) revealed a decline in annual rainfall in West Africa since the end of the 1960s, with a reduction of 20 to 40% observed in the periods 1931-1960 and 1968 – 1990.

# CAUSES AND CONSEQUENCES OF CLIMATE CHANGE IN THE WEST AFRICAN SAHEL

- A combination of natural and anthropogenic factors has been blamed for global climate change phenomenon.
- However, most experts believe that the emergent climate change is fueled by anthropogenic factors, with the consumption of fossil fuel as the major culprit.
- The phenomenon is exacerbated in the West African Sahel through such activities as agricultural intensification, pastoralism, emergent demographic explosion and unsustainable urbanization (Hummel, Doevenspeck and Samimi, 2012).
- The long-term decline in precipitation has triggered a 25-35 kilometer southward shift of the Sahelian, Sudanese and Guinea ecological zones during the latter half of the 20<sup>th</sup> century, with grave consequences for the loss of biodiversity
- Climate change has manifested in the region, with more than 30% variation in the length of rainy season, complemented by rising atmospheric temperatures, estimated between 0.2 and 0.8°C since the end of the 1970s.

# THE STATE OF LAND DEGRADATION IN THE WEST AFRICAN SAHEL

- In a detailed study of land degradation in the Sahel, Hammer (2005) classified the phenomenon with the following ecological factors: (i) temporal and spatial rainfall variability; (ii) declining groundwater level; (iii) highly vulnerable soils; (iv) infertile soils; (v) high evapo-transpiration; (vi) sparse vegetation cover; (vii) declining soil fertility and production of biomass; (viii) strong winds and dust storms; and (ix) intensive rainfall.
- The study also classified the driver of land degradation into two: internal and external factors. The former includes abandonment of traditional land use systems; stagnancy of rural production and resource management systems; pressure on resources through livestock; land and soil scarcity; wood as a main source of energy; loss of innovative young people to migration; inadequate irrigation; consumer-oriented agricultural policy; apathy to change; population growth and land rights uncertainty. On the other hand, the latter include colonial legacy; globalization; negative terms of trade; national debt; export-oriented production; and increasing technological gap between Africa and the North.

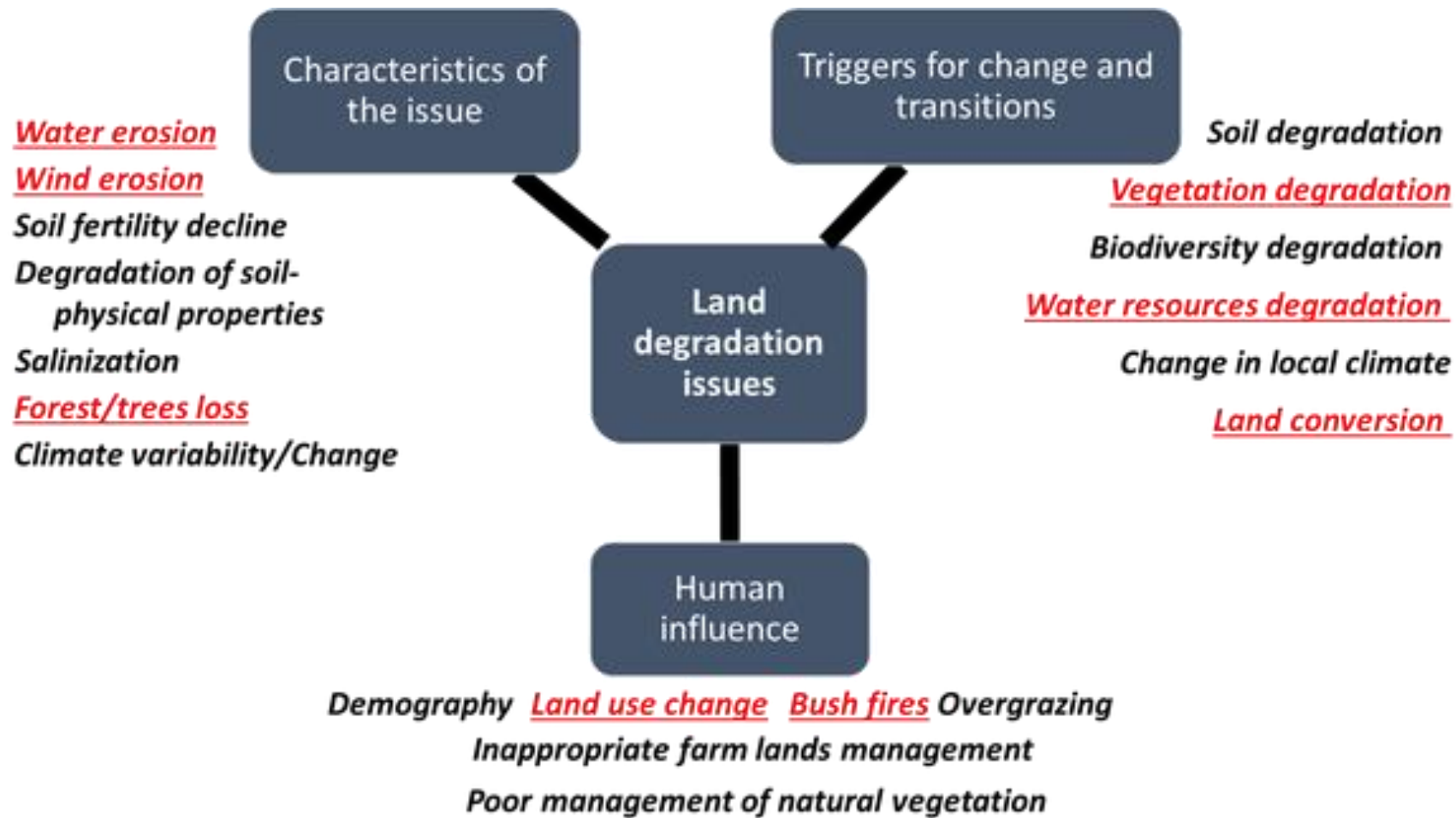


Figure 1: Factors Triggering Land Degradation in the West African Sahel

# THE EMERGENCE AND IMPACT OF CLIMATE CHANGE IN MALI

- Mali is a land-locked country, situated in the Sahelian ecological zone of West Africa, and largely prone to climate variability and change. Climate impact and vulnerability in Mali include (USAID, 2012): Increase in average temperatures, estimated at 0.7°C since 1960, or an average of 0.15°C per decade;
- Annual average precipitation ranging from 100 – 1,700mm, with little rainfall throughout the year in the North; In the early 1960s, late 1990s and early 2000s, annual rainfall reversed earlier trends; with higher rainfalls, while the early 1980s were particularly dry; and Increase in the incidence of long drought periods.



## Table 1 Top-Ten (10) Natural Disasters in Mali, 1984 -2013.

| Disaster | Date       | Number of people affected |
|----------|------------|---------------------------|
| Drought  | 2011       | 3,500,000                 |
| Drought  | 2005       | 1,000,000                 |
| Drought  | 06/2010    | 600,000                   |
| Drought  | 03/1991    | 302,000                   |
| Flood    | 04/07/2007 | 47,255                    |
| Flood    | 22/07/2007 | 41,603                    |
| Drought  | 08/2006    | 25,000                    |
| Flood    | 26/07/2002 | 22,519                    |
| Flood    | 05/2009    | 20,406                    |
| Flood    | 11/08/2010 | 16,000                    |

Source: EM-DAT: The OFDA/CRED International Disaster Database, 2016.

# THE STATE OF LAND DEGRADATION IN MALI

- Mali has witnessed land degradation over the past several decades, triggered by incessant droughts and increasing desertification.
- Currently, about 60% of the population is living on degraded land.
- While Mali is not endowed with substantial forest resources, the little is has is subject to reckless consumption, with 7,000 million tons of wood harvested annually.
- Available data reveal that 20.66% of Mali suffers from land degradation, of which 11.74% is classified as severely degraded, comprising 146.787km<sup>2</sup> and affecting 22.9% of the population (Hummel et al., 2012).
- The high incidence of land degradation is a major cause of agricultural intensification in Mali, with an annual increase of 4.7% in land cultivation.

# THE EMERGENCE AND IMPACT OF CLIMATE CHANGE IN NIGER

- Niger is highly prone to climate vulnerability and change, characterized by declining annual precipitation between 1950 and the mid-1980s, which was partially reversed during the 1990s and 2000s.
- However, the average rainfall in Niger's crop growing districts between 2000 and 2009 was 8% lower than the 1920 – 69 mean.
- The trend is also complemented by rising atmospheric temperatures, which have increased by more than 0.7°C in Niger, with average rates of warming greater than 0.15°C per decade (USGS, 2012).
- Dwindling rainfall in Niger, like other countries across the Sahel, has been fueled by recurrent droughts in the 1960s, 70s and 80s, and accompanied by catastrophic crop failures, malnutrition and starvation.
- Repeated droughts, fuelled by climate change, have devastated farmers' livelihoods, which depend on rain-fed agriculture.

# THE STATE OF LAND DEGRADATION IN NIGER

- With two-thirds of the country lying within the Sahara Desert, Niger is vulnerable to land degradation, aggravated by wind-erosion.
- Over the period 1975 – 2013, cultivated land increased from 12.6% in 1975 to 18.1% in 2000 and 24.5% in 2013- for a total increase of 94.2%.
- Farming activities have increased mainly on Sandy soils in the Tillaberi region, encroaching on traditional pastoral lands.
- In addition, an increase of 50% in irrigation agriculture has emerged along the Niger River over this period.
- However, sustainable agriculture is threatened by sandy soils, which have risen by 24.8% since 1975. The trend is an indication of declining soil stability; accompanied by loss of vegetative cover in parts of Niger, with the trend becoming more acute since 2000.
- In a detailed report on the economics of land degradation and improvement in Niger; Moussa, Nkonya, Meyer, Kato, Johnson and Hawkins (2015), reveal severe land degradation over the period 2001 – 2009.
- The associated cost of degradation was estimated at 0.75 billion USD, equivalent to 11% of the 2007 Nigerian GDP of 6.773 billion USD.

# THE EMERGENCE AND IMPACT OF CLIMATE CHANGE IN SENEGAL

- Senegal has witnessed, in recent times, climate vulnerability and change, characterized by recurring natural disasters, especially floods and droughts.
- Indeed, the country suffered prolonged droughts between 1970 and 2000, undermining rural livelihoods and fueling rural-urban migration (USAID, 2017).
- Rainfall in Senegal has varied considerably over the past several decades; declining rapidly between 1950 and the mid-1980s and partially recovering in the 1990s.
- However, recovery has slowed down between 2000 and 2009, with the average precipitation over this period estimated at 15% lower than that for the period 1920 – 1969.
- Dwindling rainfall patterns have been complemented by rising atmospheric temperatures in Senegal.
- Indeed, temperatures have risen steady by almost 0.9°C across the country since 1975, accounting for 63% of the magnitude of climate change, according to a USGS report.
- The impact of climate change on Senegal is severe. The nation's farming practices, which rely on rain-fed agriculture, are particularly vulnerable to climate variability and change.

# THE STATE OF LAND DEGRADATION IN SENEGAL

**Table 3: Type and Extent of Land Degradation in Senegal, 2001.**

|  | Share of total land area (%) |
|--|------------------------------|
| Water erosion                            | 50.30                        |
| Wind erosion                             | 1.94                         |
| Chemical degradation (e.g. salinization) | 5.80                         |
| Anthropogenic erosion                    | 7.15                         |
| Non-degraded soils                       | 34.59                        |

**Source: Sow et al., 2016**

# CONCLUDING REMARKS

- Characterized by semi-arid vegetation, the West African Sahel is one of the most environmentally degraded ecosystems in the world. The region faces severe and recurring bouts of droughts since the 1980s, jeopardizing environmental sustainability.
- Land resources have been degraded, with arable soils turned into marginal lands, and rendered vulnerable to such anthropogenic activities as over-grazing, agricultural intensification and deforestation, which are common practices across the region.
- Compounding the multi-dimensional challenges associated with the fragile environment in the Sahel is the emergence of global climate change, which has fueled desertification, land degradation and drought (DLDD).

# RECOMMENDATIONS

- **Integrate Climate Change mitigation and adaptation policies in national development planning**
- **Formalize Land Rights for Farmers**
- **Subsidize agricultural inputs for farmers**
- **Provide grazing reserves for pastoralism**
- **Deepen Poverty Reduction Strategies**
- **Embrace novel agricultural technologies**
- **Develop human capital**
- **Build conflict management institutions**



**As researchers or practitioners what are the possible interactions/collaboration with practitioners resp. researchers to improve/upscale your activities**

- ▶ **Networking**
- ▶ **Exchange program**
- ▶ **Research funding**
- ▶ **Publications**

## What are the potential aspects of the research that can be transformed into practice?

- ▶ **Climate change adaptation and mitigation policies**
- ▶ **Natural resources management**
- ▶ **Renewable energy technologies**

**THANK YOU**