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# TERRESTRIAL ECOSYSTEM DYNAMICS IN CENTRAL-EASTERN SENEGAL'S AGRO-SILVOPASTORAL ZONE, 1950-2000

## SUMMARY

The establishment of a colonial capitalist system in early twentieth century Africa resulted in unprecedented changes in socio-ecological systems that have accelerated since the mid-20th century in Senegal. In the agro-silvopastoral Center-East region of Senegal, a diachronic approach combining spatial analysis, biogeography and socio-economic surveys has highlighted important ruptures in socio-economic and environmental systems since the 1950s. Terrestrial ecosystems have become imbalanced due to radical changes in perception and valuation of the environment as traditional subsistence (extensive) natural resource management practices were replaced by commercially-oriented agricultural systems of land exploitation. These changes are directly associated with the integration of Senegal's people and ecosystems into global systems in the late 20th century.

## INTRODUCTION

In Senegal several studies have concluded that socio-ecological systems underwent major transformations during the second half of the 20th century (Gonzalez, 2001; Tappan et al., 2004). However, few studies focus on land systems and the relationship between the introduction of colonial capitalist modes of production and radical changes to socio-economic structures and ecosystems, particularly in coveted areas. This presentation explores and assesses socioecological changes during the last half of the 20th century in the agro-silvopastoral Center-East region of Senegal resulting from the implantation of colonial economic systems.

## METHODOLOGY AND SOURCES

A diachronic analysis of land cover in the Senegalese Agro-silvopastoral Centre-East (SACE) region was conducted based upon balance and imbalance environmental indicators of ecosystem components. These indicators were used to identify sustainable and radical perturbations leading to changes in structures and functioning in ecosystems (after Lapointe, 1999).

### Sources:

- » aerial photographs from 1954 and 1982, and satellite images from 1999;
  - » topographic and thematic maps from 1954 and 1986;
  - » households and biogeographic surveys conducted in 2004-2005.
- The study focuses on three distinct ecosystem types in the SACE:
- » Koumbidia Soce (predominantly agricultural area);
  - » Fadiyacounda (predominantly logging area);
  - » Wouro Seeno (predominantly pastoral area).

## RESULTS

### SOCIO-ECONOMIC CHANGES

- » **Fragmentation of socio-economic units of natural resource management:** households have replaced concessions;
- » **Environmental representation:** lands formerly revered with spiritual significance have become materially debased due to a capitalist logic of continued growth of production;
- » **Economic vocation of agricultural systems** changed from a subsistence "meet local needs agriculture" to a "meet international needs agriculture";
- » **Institutions and policies of land management** promoting a productivist logic of exogenous market production;
- » **New methods and techniques of exploitation** jeopardizing ecological regeneration:
  - » **Abandonment of long fallow:** now only practiced by 1.52% of farmers;
  - » **More mechanization:** deep and frequent tillage and animal traction is practiced by 98.04% of farmers;
  - » **Onset of pruning practices of fodder trees** in order to meet the growing needs of increasing herds;
  - » **Onset of logging** has become a dominant practice to meet urban demands for charcoal.

### TERRESTRIAL ECOSYSTEMS CHANGES

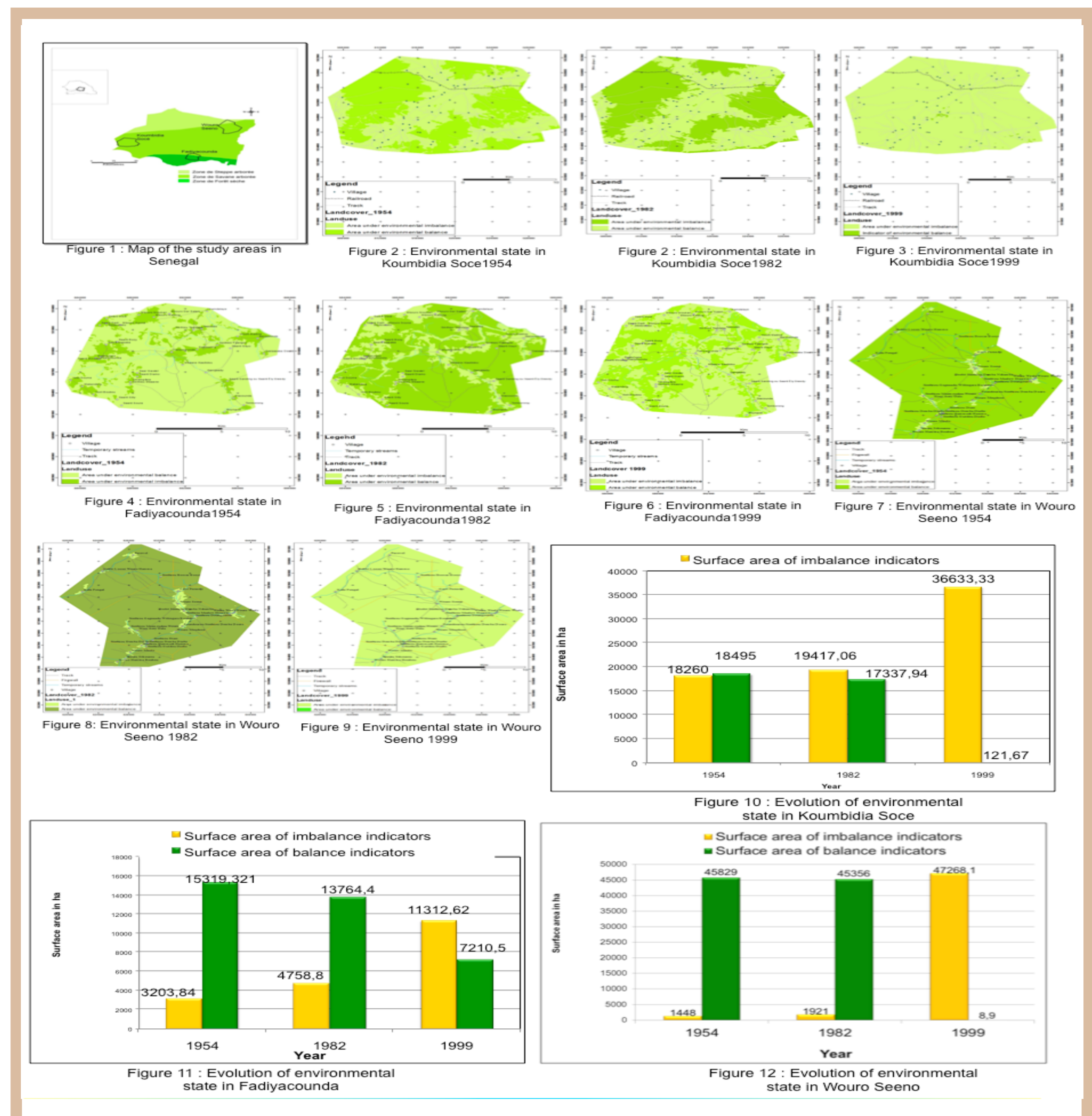
Area under environmental imbalance have been significantly extended in all three areas of study:

Area of study	Average rate of annual progression of environmental imbalance area	Main factors driving average annual change
Koumbidia Soce	308 ha	280 ha (farming)
Fadiyacoumba	180 ha	103 ha (vegetation degradation)
At Wouro Seeno	1018 ha	880.8 ha (vegetation degradation)

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## DISCUSSION

### The results indicate:

- » Local agricultural systems and practices have become increasingly driven by external factors over the last 60 years. This is consistent with Bassett (2001) and Göbel (2006);
- » Despite increasing market production, land exploitation has retained its traditional extensive characteristics;
- » The ecological results show a major trend towards environmental degradation in the region:
  - » At Koumbidia Soce area, environmental imbalance is associated with vegetational changes.
  - » At Fadiyacounda and Wouro Seeno, environmental imbalance is associated with vegetational changes.
  - » Anthropogenic factors are driving directly environmental degradation at Koumbidia Soce.
  - » At Fadiyacounda and Wouro Seeno, although ecosystems are regulated by climatic factors, reduction of density of vegetation is associated to natural resource management that implies logging, pruning and bush fires practices - thus human activities are a primary cause of vegetation degradation.
  - » Local and international anthropogenic factors drive environmental degradation in the region.

## CONCLUSION

- » Globally, the establishment of colonial capitalist modes of production in the 20th century, and especially since 1950, have resulted in a socio-ecological rupture as subsistence activities were replaced by market-oriented modes of production resulting environmental degradation in the SACE.
- » Acceleration of environmental degradation since the 1950s is due to a combination of extensive methods of production linked to a productivist logic resulting from the linking of the SACE to international economic systems and markets.

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