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## MAPPING THE SPATIO-TEMPORAL OCCURRENCES OF BUSHFIRE IN THE CENTRE OF BENIN REPUBLIC

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**Dolidon**, 2007

## **Bush fire situation in Benin**



• Burning is a cultural tradition, which is not easy to overcome.

Fires serve for land clearing for agricultural purposes, pasture management for breeding, and animal tracking for hunters.

• 95% of wildfires in forestland are human-caused.

## **Bush fire situation in Benin (cont)**





- Habitual period for lighting fires: November and May.
- The majority of damaging fires are observed from January onwards, due to
  - High temperatures (30 to 35 °C)
  - Influence of *Harmattan* winds flowing from North to South between December and March.

### FIRE DAMAGES IN THE CENTRE OF BENIN

• 30 to100 ha of plantations are devastated by fire per district every year

 Cost of damages: 1 800 000 à 6 000 000 FCFA every year (Alimi, 2010).



### Map the spatio-temporal variability of vegetation fires in the Central part Benin and provide adequate information for decision makers

## **STUDY AREA**



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## DATA AND METHODS

### • Data

- MODIS (Moderate Resolution Imaging Spectroradiometer) hotspots acquired from November 2000 to December 2010
- Landsat ETM+ (Enhance Thematic Mapper) of 2000 and NigeriaSat1 of November 2006.

# Hotspots data processing and trend analysis

- Analysis of the spatial distribution of hotspots locating and presenting area of dense or less dense fire occurrences using Kriging techniques.
- Logarithmic trend of the evolution of fire hotspots to clearly show years where the frequency fire occurrences was high
- Augmented Dickey Fuller Test to appreciate the stability in time and the existence of a trend in vegetation burning using STATA statistical software.

## **Results and Analyses**

### Temporal occurrence of vegetation fires



Years 2002, 2003, 2004, 2005, 2007, 2008 and 2009 recorded a high number of fires largely above the annual average estimated at 4411 hotspots. The highest number was observed in December 2002

## Temporal occurrence of vegetation fires (Cont')

- According to the monthly and decennial variations showcased, fires are intensified in January and December.
- This is an evidence that fire activities are related to the dry season which extends from November to March in the centre of Benin.

## Trend of vegetation fires: ADF Test

- The augmented Dicker Fuller test shows that fires are not stationary in time.
- Calculated Z(t) value (-6,309): no uniformity in time, of the fire activities.

Augmented Dickey-Fuller test for unit root				Numb	er of obs =	112	
	Test Stati sti c	Inter 1% Critical Value		polated Dickey-Ful 5% Critical Value		% Critical Value	
Z(t)	-6. 309	-4.036		-3. 448		-3. 148	
MacKinnon approximate p-value for Z(t) = 0.0000							
D. freq	Coef.	Std. Err.	t	P> t	[95% Conf.	Interval]	
freq L1. LD. L2D. _trend _cons	758569 . 31472 . 0545981 1. 343444 206. 7966	. 1202422 . 1014908 . 0965349 1. 973266 134. 4577	-6. 31 3. 10 0. 57 0. 68 1. 54	0. 000 0. 002 0. 573 0. 497 0. 127	9969351 . 1135263 136771 -2. 568327 -59. 75016	5202029 . 5159137 . 2459673 5. 255214 473. 3434	

The test of the existence of trend shows an increase in fire activities in a non significant way (t=0.68, which is lower than 1), confirming the quiet logarithmic trend observed







#### **FACTORS**

Factors	Frequency %		
Hunting	29.8		
Cattle breeders	29		
Agricultural system	20.6		
Children and smokers	16		
others	4.6		
Total	100		

## ACTORS TO CONSIDER FOR SENSITIZATION

### HUNTERS

### • FARMERS

### PASTORALISTS

### • CHILDREN AND SMOKERS

## CONCLUSION

- Serrated variability in the occurrences of vegetation fires in the central region of Benin,
- Bassila district mostly affected by fires between November 2000 and December 2010.
- Fires play a role in vegetation degradation in the study area but this is significant when combining it with other factors (agriculture, hunting, charcoal production, wood extraction etc.)
- Intensive sensitization of actors involved in order to limit the impact of these fires on vegetation especially when they are used lately in the dry season.
- Early fires necessary to control the biomass and avoid propagation of fire risks into farms and other properties<sub>18</sub>

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