

# CLIMATE CHANGE AND THE WATER SECTOR IN HAITI

A TWO-EXTREME PERSPECTIVE ON  
VULNERABILITY FROM DROUGHT TO FLOODS

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# Vulnerability of Haiti at a Glance

- Degree of inability of its natural system to cope with the negative effects of Cl. Change.
- Vulnerability= fonction (exposition, sensitivity and adaptive capacity).
- Haiti's most populated cities are all nestled in the valleys along the coast.
- Haiti's territory is 75% mountainous, with 50% of the mountains with a slope of 40%.
- Haiti is located on the trajectory of the hurricanes.
- Response capacity from local institutions is low.



## Major Climate Processes:

- El Niño Drier and hotter conditions
- La Niña Colder and Wetter conditions)
- Cyclones in Atlantic Heavy rainfall in wet season
- Sea Level Rise is a major concern for Gonaives & les Cayes

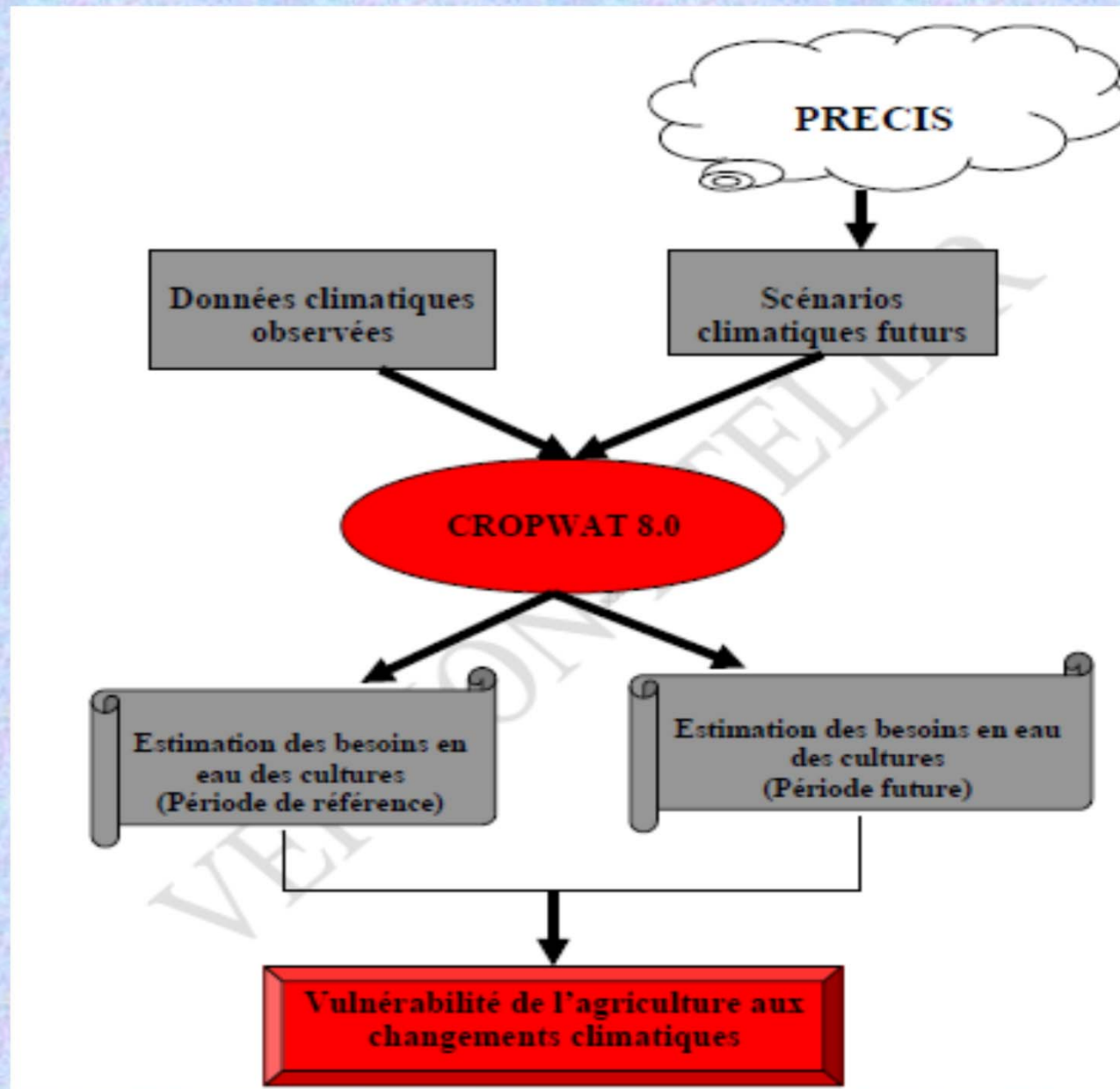


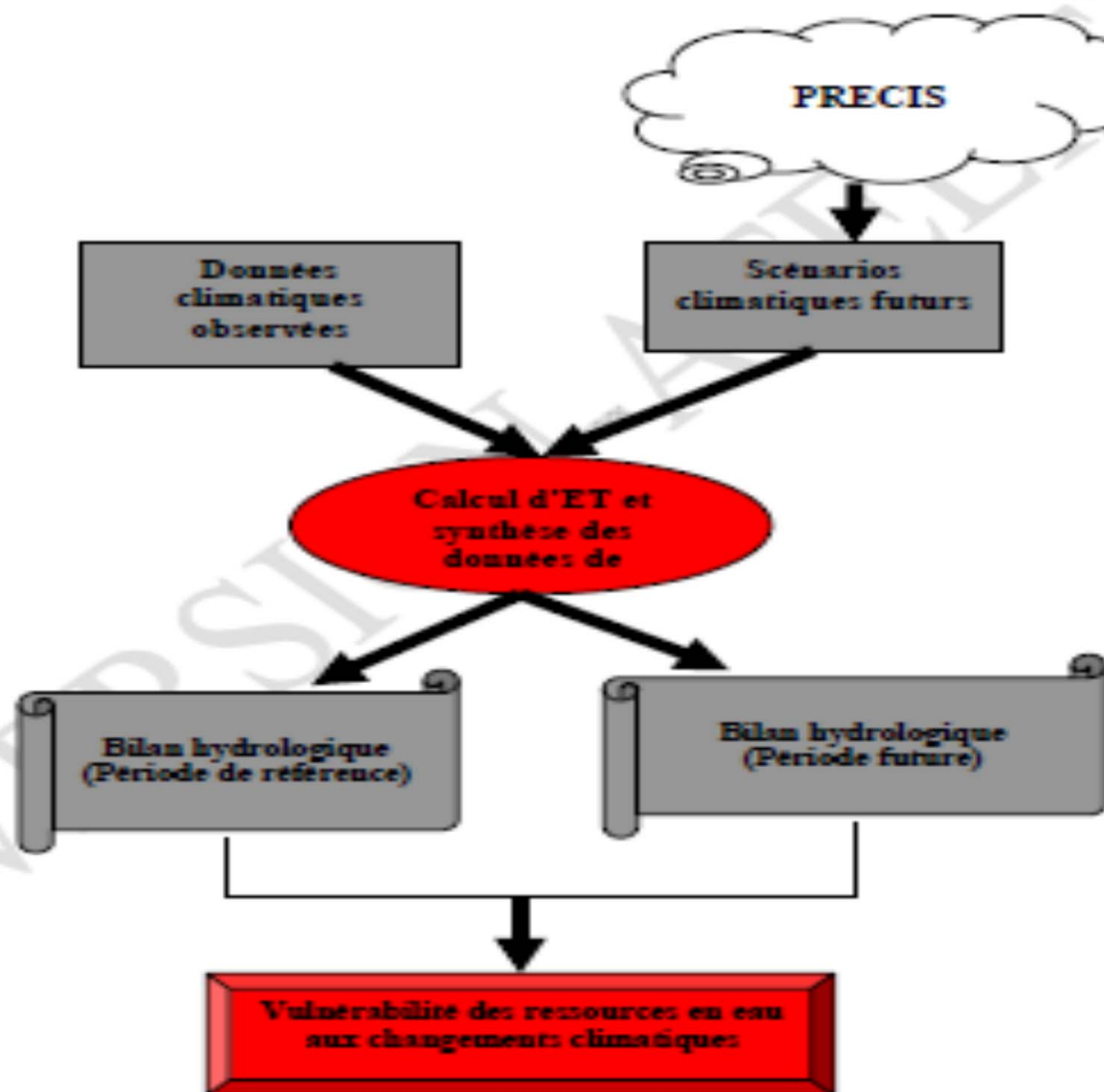
# The First Extreme

Water Deficit and Drought



# Artifices for forecasting

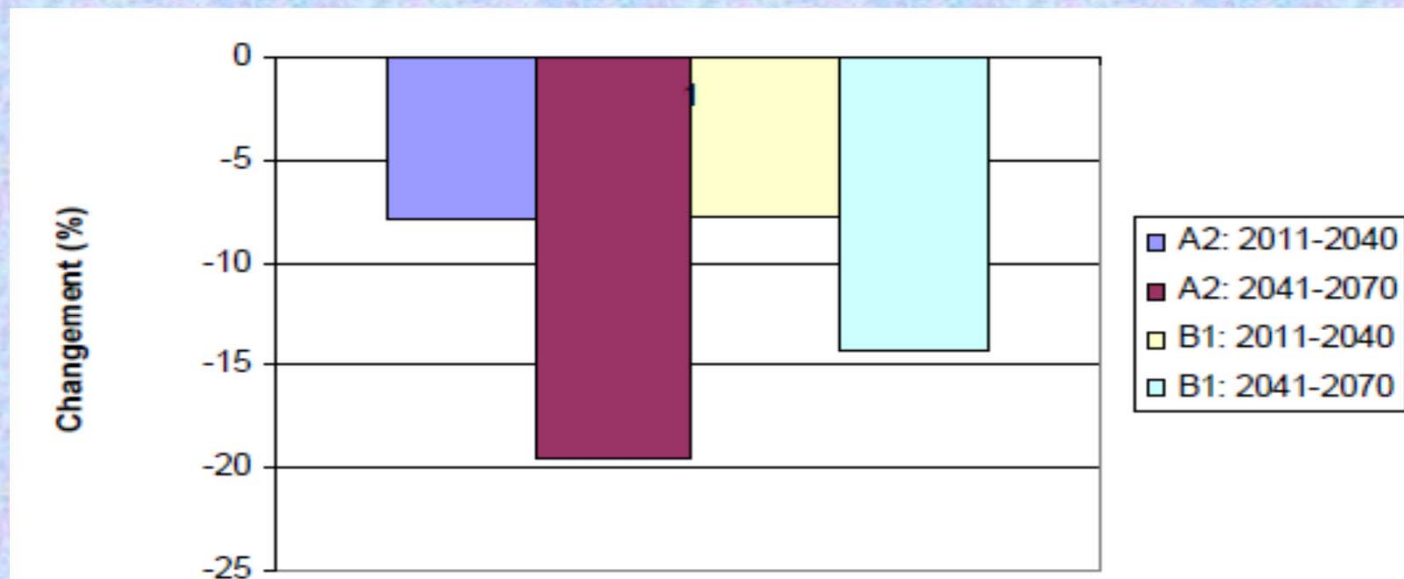






# Changes in Precipitation (A2 Vs. B1)

- All scenarios show a clear trend to a decrease in precipitations, however, that would be more important with the emission scenario of GES A2.
- Changes will be between -8% and -19% for A2 versus -8% and -14% B1)

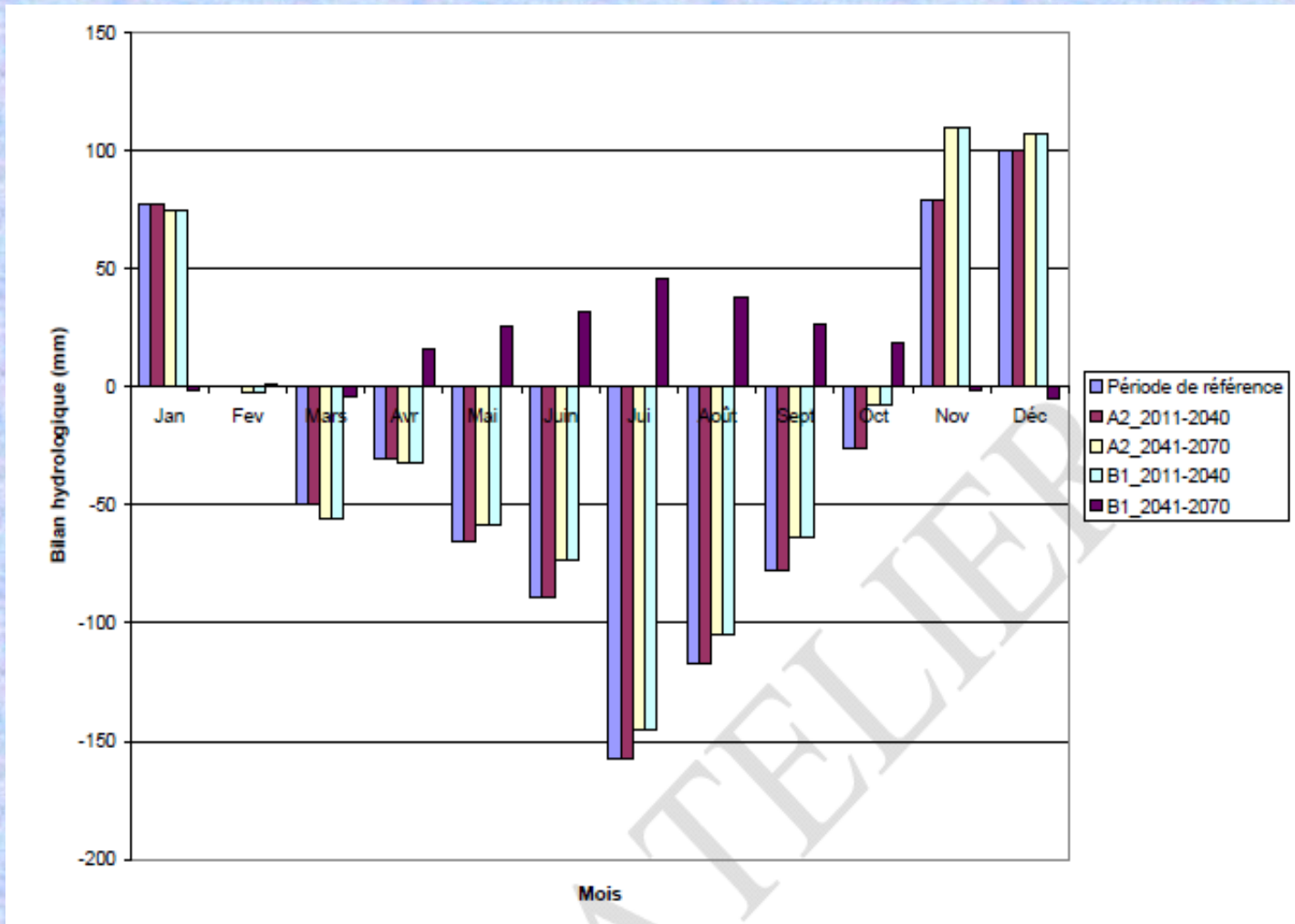


# Impacts of Climate Change on Water Demand in Agriculture: 2 crops/2 regions

Cultures	Changements (%)		Changements (%)	
	2011-2040		2041-2070	
	A2	B1	A2	B1
Maïs	36	17	27	33
Riz	7	0.2	3	5



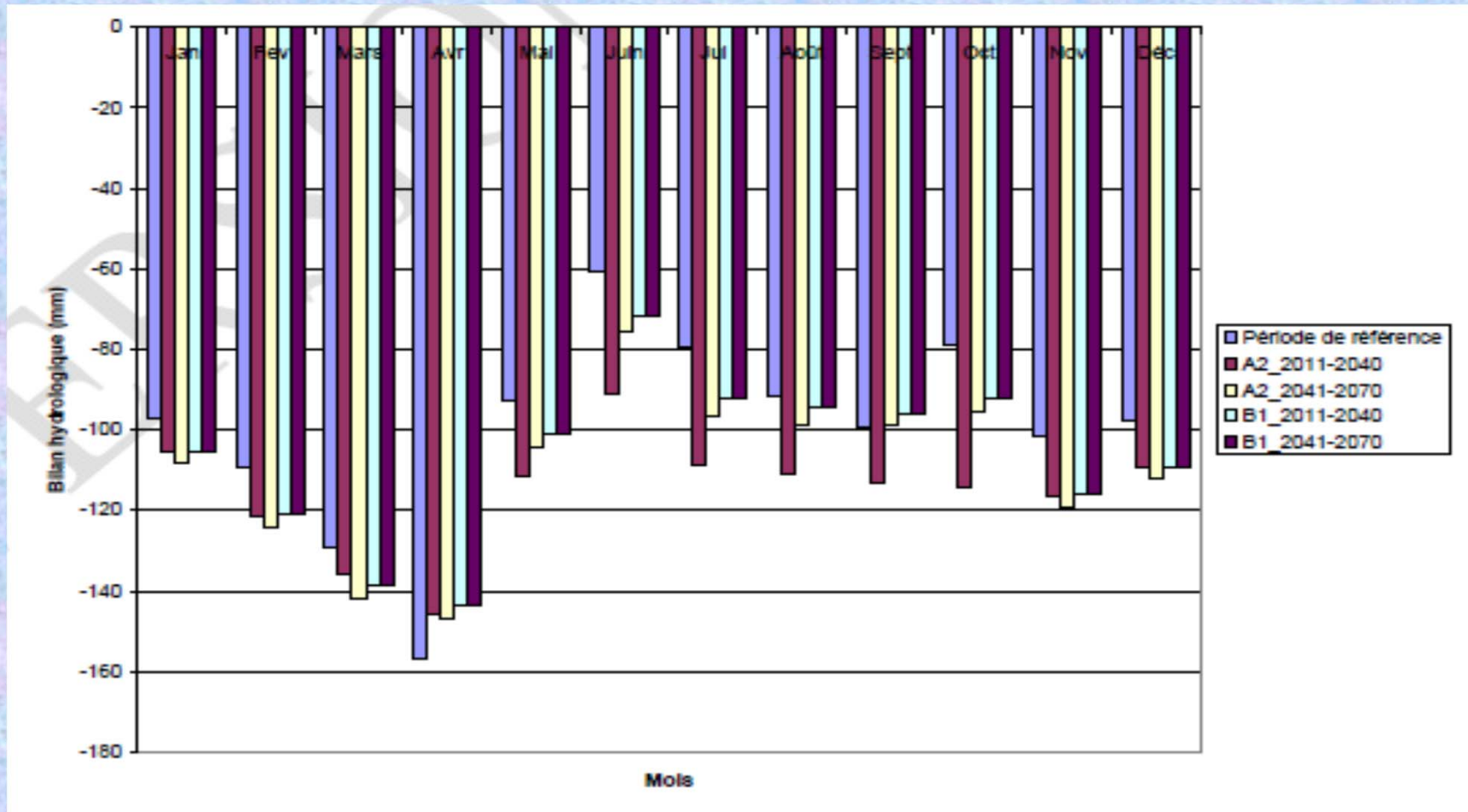
# Hydrological Balance



Cap-Haïtien



# Hydrological Balance



Gonaïves: Hydrological deficit for all months



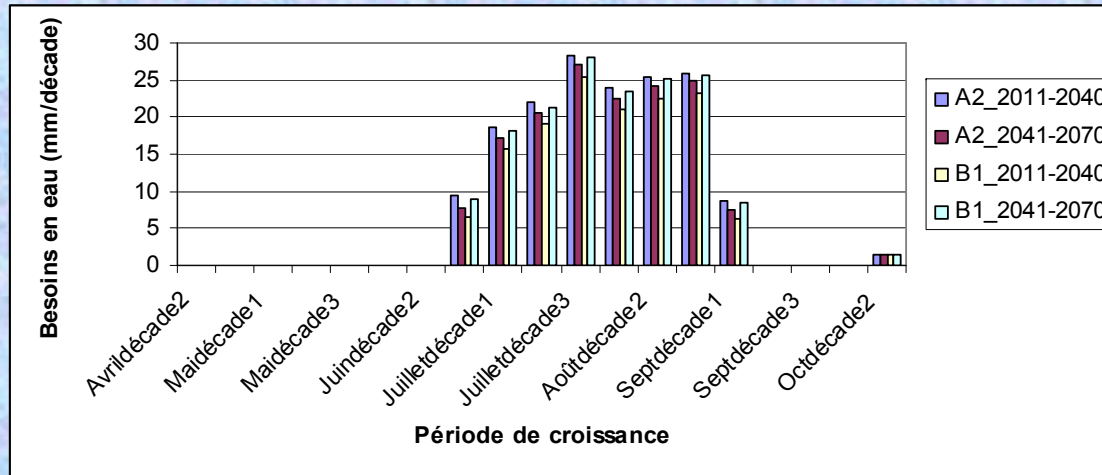
- **The climate scénarios drawn from PRECIS anticipate a warmer and dryer climate for the country.**
- **For both emission scénarios A2 et B1, T maxima will experience an increase that would vary between 0.7°C and 1.7°C during the horizons 2011-2040 and 2041-2070.**
- **Precipitations: all the scénarios show a full decreasing pattern.**
- **The decrease would be more important with emission scenario GES A2 and vary as well on a monthly basis.**



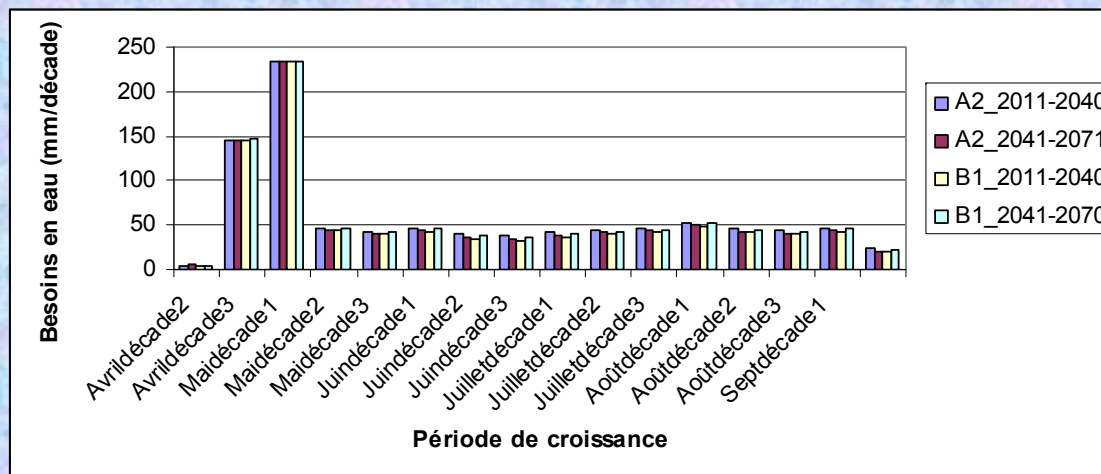
- **The yield of corn and rice production , two major Haitian staples haven't really changed significantly over time.**
- **An increase of water needs for both crops is expected for the time horizons that span between 2011-2040 and 2041-2070.**
- **Even under B1, the water needs for corn would increase between 17% and 33% during 2011-2040 and 2041-2070 respectively.**
- **However water demand for rice production is expected to increase between 0.2% and 5% for the same periods and B1. This is caused by T increase and EvTranspiration**



## Corn Water Needs



## Rice

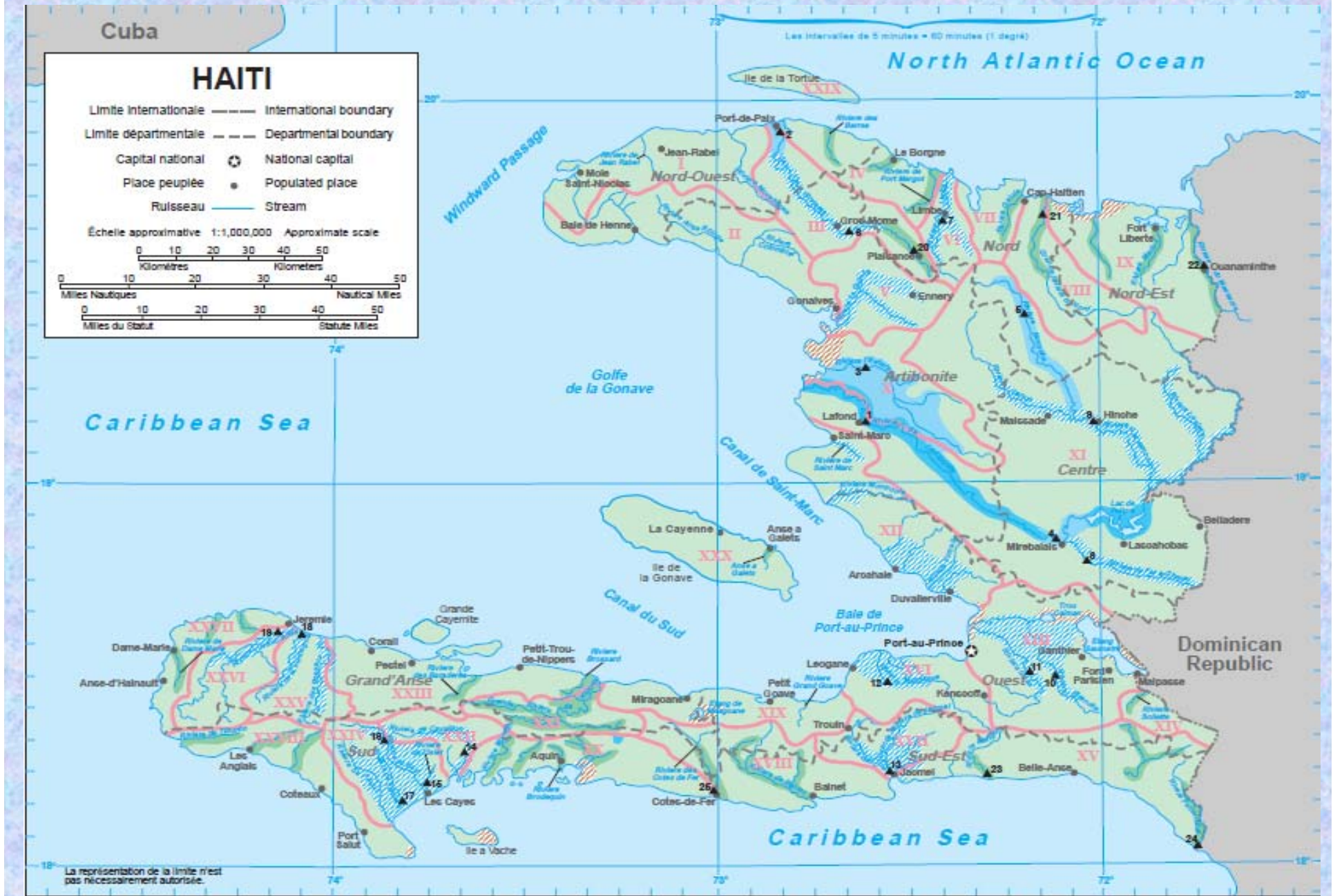




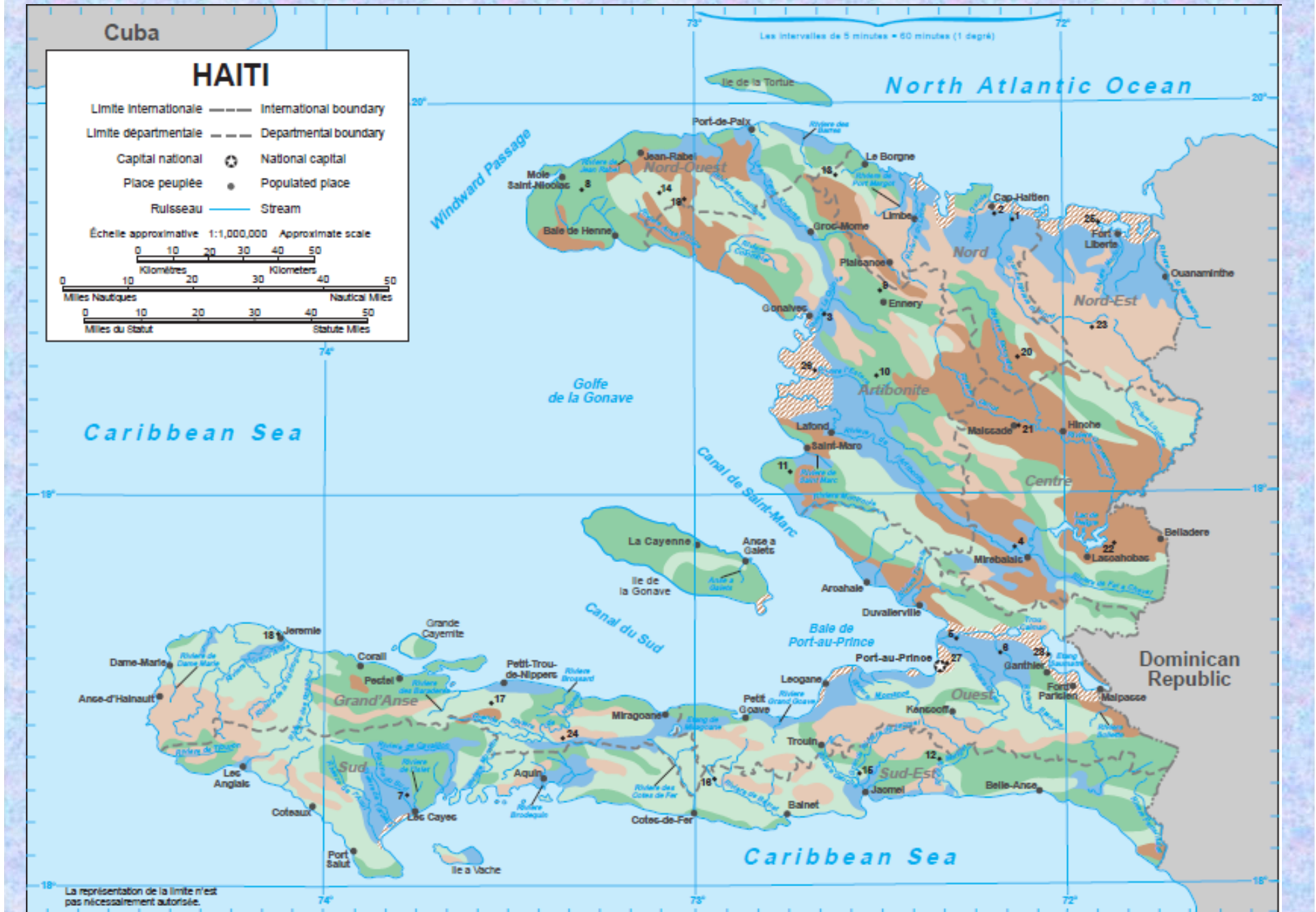
- **The predicted vulnerability of water resources to climate change is quite similar in trends to those expected for the agricultural sector.**
- **In general terms, Gonaïves and Cap-Haïtien would experience an hydrological deficit that would translate into a higher pressure on the water reserves (Underground).**



# Surface Water



# Ground water





# The Other Extremes

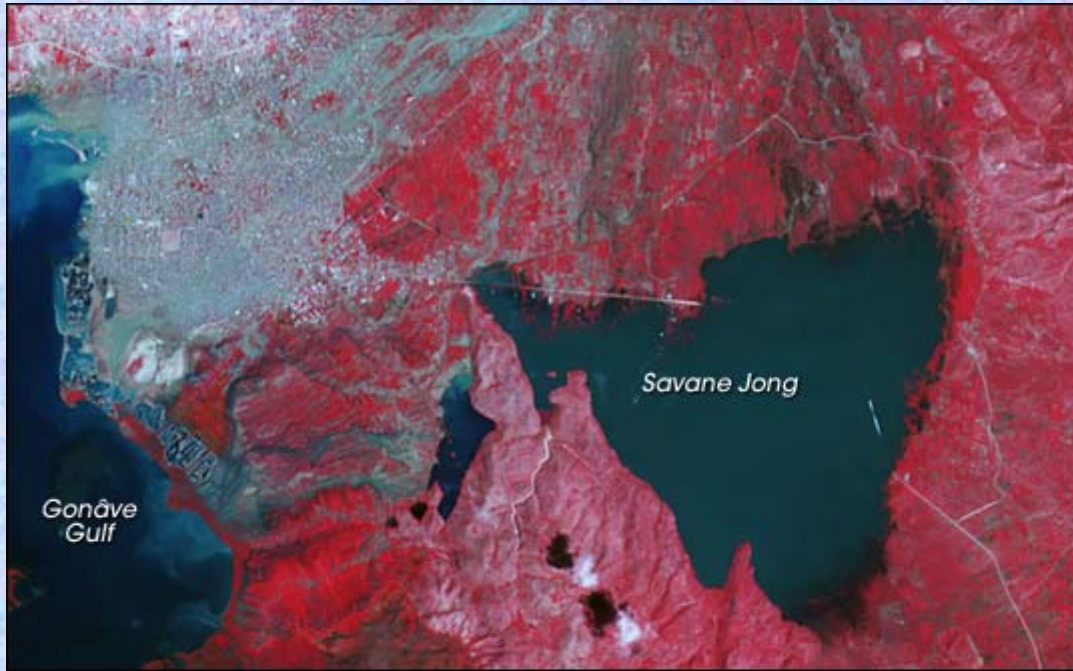
Water Excess and Floods



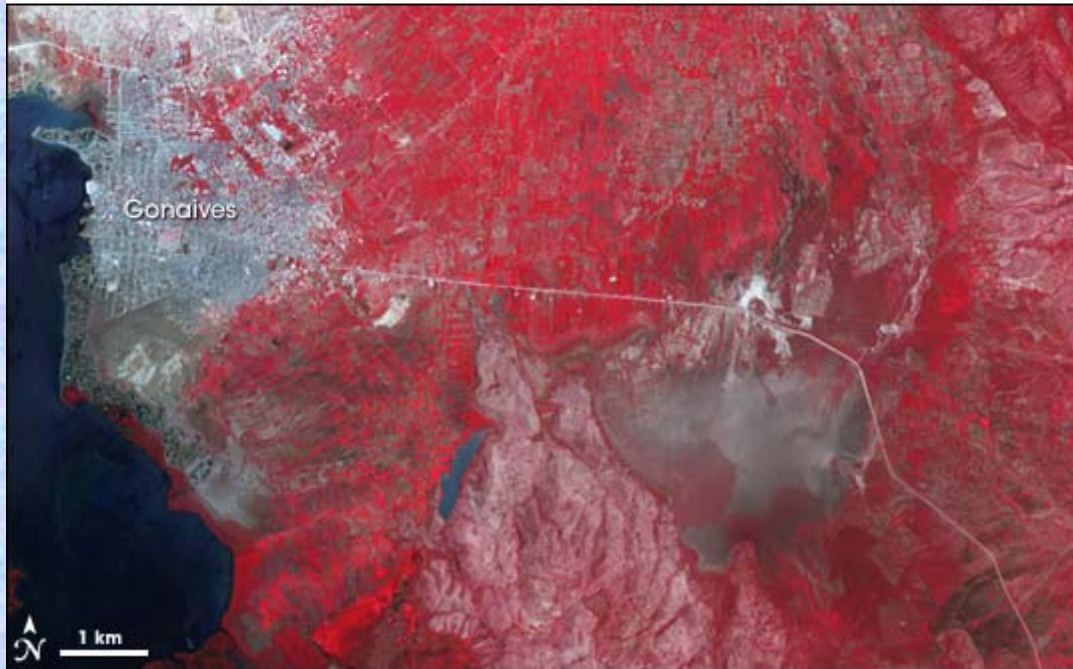
# Gonaives: A landmark of Haiti's vulnerability to Storms

- A flood-prone city victim of topography
- Situated in a valley, it is surrounded on 3 sides by hills and mountains; on the fourth side, the city abuts the Caribbean Sea.
- Water running out of the mountains is channeled to the city and into the neighboring Savane Desolee.
- This topography caused deadly flooding in both 2004 and 2008 from tropical storms in the North-East.





September 12, 2008



August 8, 2001

*ASTER on NASA's Terra satellite*







- In September 2004, more than 2,500 people died when Tropical Storm Jeanne unleashed torrential rain on northeastern Haiti.





- In September 2008, a string of storms—Gustav, Hanna, and Ike—drenched Haiti:

- as of September 15th, 423 people had been reported dead, 50 were missing, and more than 100,000 were in shelters, said the US Agency for International Development (USAID).

- Gonaives has been almost entirely cut off by Hanna's floodwaters and virtual lakes have formed over every road.







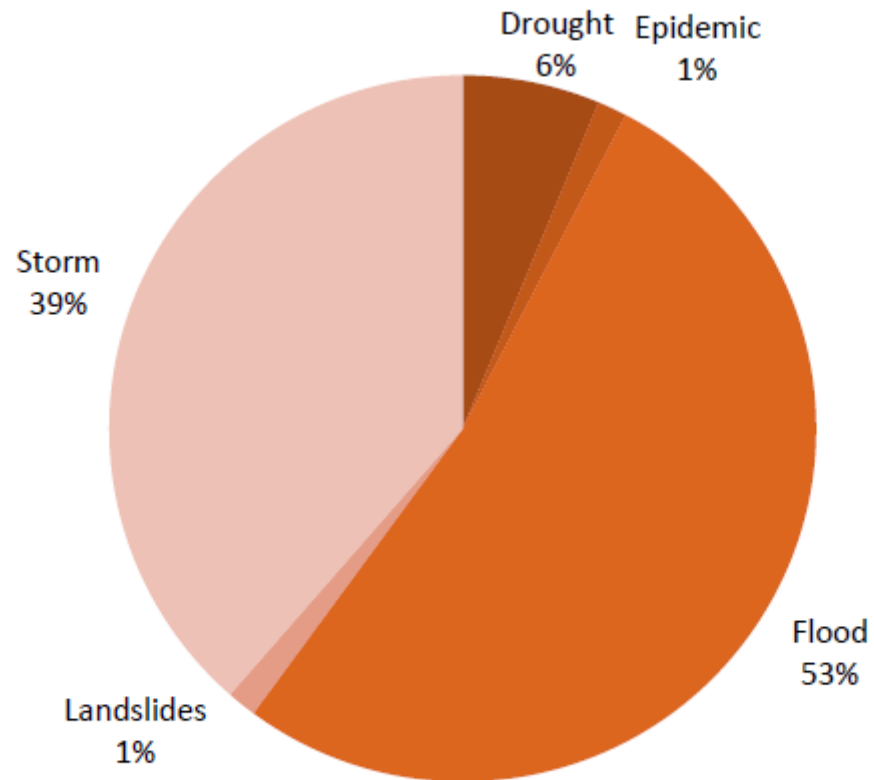
# Southern Part of Haiti: Les Cayes



@ Le nouvelliste



Floods are the leading factor of vulnerability in Haiti.



**Figure 3: Reported natural disaster distribution in Haiti**

Source: EM-DAT- Source of data: "EM-DAT: The OFDA/ CRED International Disaster Database, Université Catholique de Louvain, Brussels, Bel." Data version: v11.08 .



## An Outlook of the Damages Caused by Extreme Events in Haiti (Hanna 2008)

NUMBERS AT A GLANCE		SOURCE
<b>Total Affected Population</b>	850,000	GOH – September 15, 2008
<b>Dead</b>	423	OCHA – September 15, 2008
<b>Missing</b>	50	GOH – September 11, 2008
<b>IDPs<sup>1</sup></b>	151,072	GOH – September 10, 2008
<b>IDPs in Shelters</b>	111,391	OCHA – September 15, 2008
<b>Other Damage</b>	10,842 houses destroyed, 35,125 houses damaged	GOH – September 11, 2008

**TOTAL USG HUMANITARIAN ASSISTANCE TO HAITI FOR HURRICANES IN FY 2008      \$30,021,660**

Ref. Bureau For Democracy, Conflict, And Humanitarian Assistance  
(Dcha)/Office Of U.S. Foreign Disaster Assistance (Ofda) 2008. Haiti  
Storms. Fact Sheet #10, Fiscal Year (Fy) 2008



# References:

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**EXPERT REPORT ON V&A FOR THE 2ND NATIONAL COMMUNICATIONS.**