

# Climate-smart agriculture:



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Climate Change,  
Agriculture and  
Food Security



## the solution to food security in Africa



Led by  
 **CIAT**  
International Center for Tropical Agriculture  
Since 1967 / Science to cultivate change

Strategic partner

 **futurearth**

 **ICRISAT**  
Science with a human face

**Dr Robert Zougmore**  
Regional Program Leader West Africa

# Outline

- 1. Key challenges**
- 2. Future scenarios for agriculture**
- 3. Needs for climate-smart actions at all levels**



# Key challenges



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# Natural Resource Endowment in WA



10.3 % exploited  
in West Africa



10 % developed



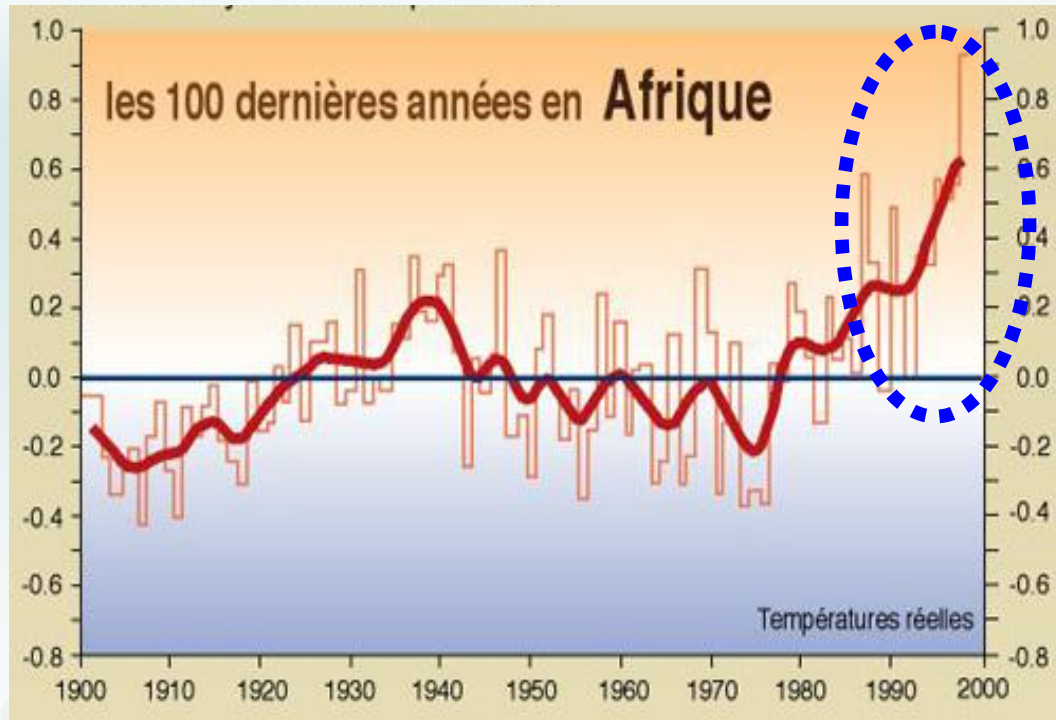
Significant  
pastoral and  
fisheries  
resources



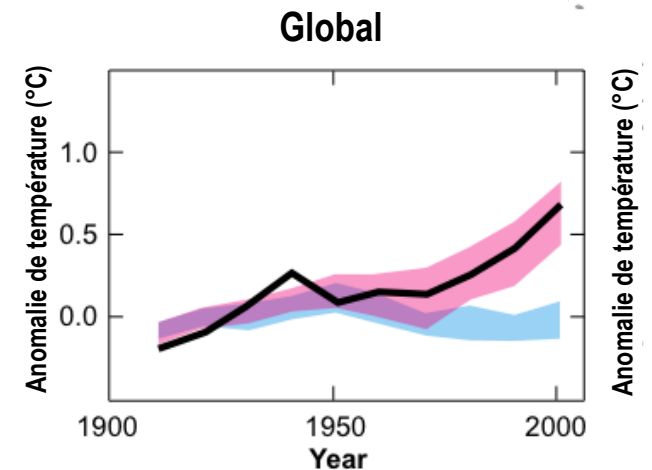
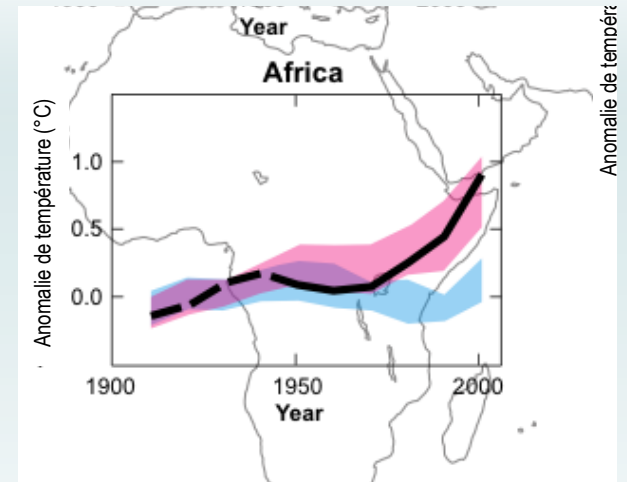
However,  
West African  
economies  
are especially  
vulnerable to  
**climate  
change** as a  
result of their  
heavy  
**dependence  
on rainfed  
agriculture.**

# Climate variability & change : facts!

For the last 100 years: Unequivocal temperature rise



- Temperature rise of  $\approx 0.6-0.7$  °C since late 70's
- Largely higher than the global increase
- Sea level rise of 18 cm during the 20th century



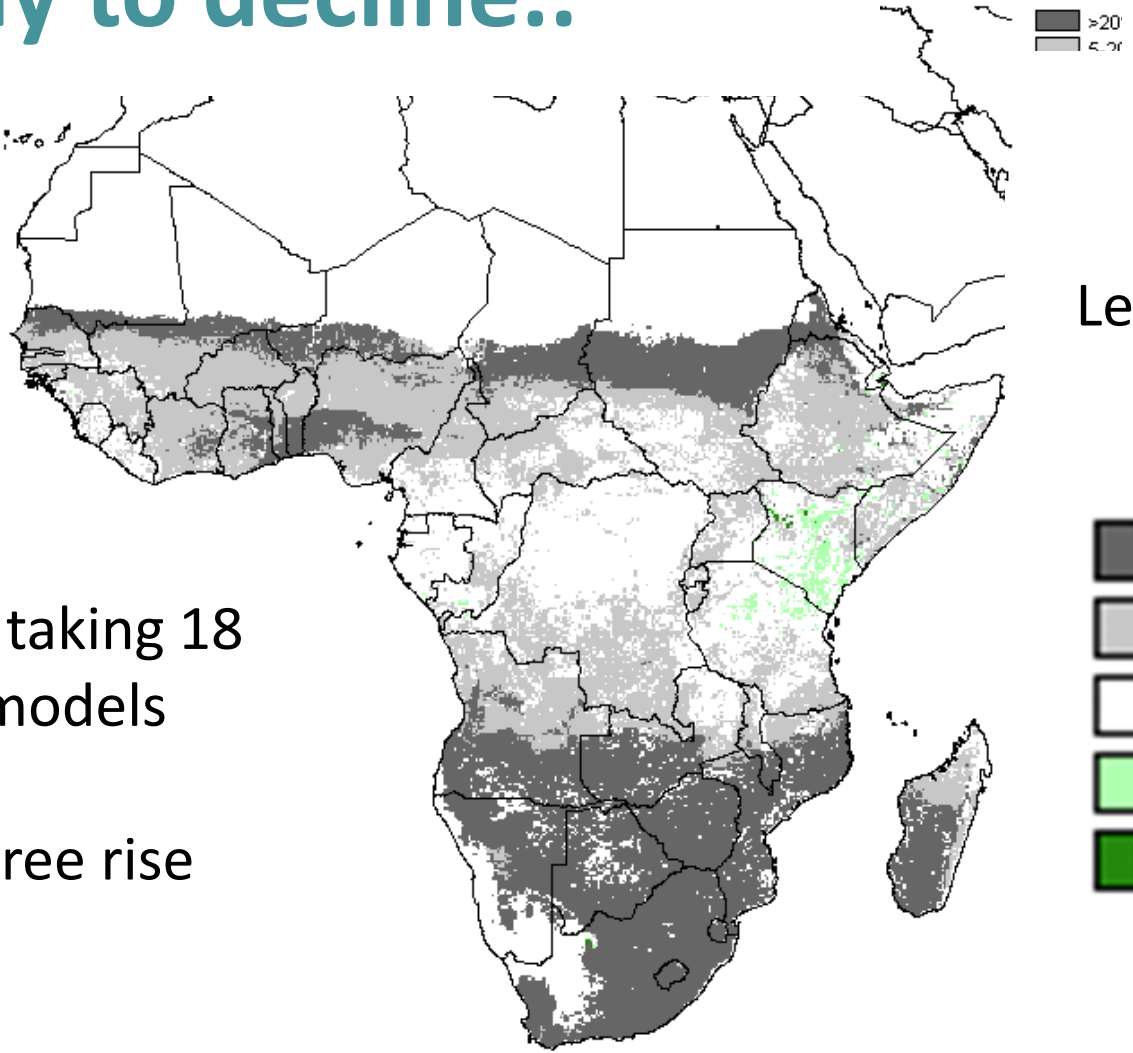
After Benoit SARR, Aghrymet



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# Length of growing season is likely to decline..



To 2090, taking 18 climate models

Four degree rise

Length of growing period (%)

- >20% loss
- 5-20% loss
- No change
- 5-20% gain
- >20% gain



# Regional/landscape implications

## Coastal West Africa



## Sahelian region



Drought and floods could affect productivity and even threaten the existence of plants and animals along the coast and the Sahel, respectively

Possible increase in pests and diseases of crops, animals and humans.  
Spread of malaria and trypanosomiases in hitherto dry areas in the Sahel

Heavy rains could pose a serious challenge to unpaved feeder roads, vital for transport of inputs to farming areas and produce to market

**Farmers and pastoralists may have to contend with new farming cultures including land tenure and changing food habits**



# How can farmers achieve food security under a changing climate?

A photograph showing a person's arm pointing towards a landscape. The landscape features a large, dark, rocky volcano in the middle ground, with a town or village visible in the background. The foreground is a dry, hilly area with sparse vegetation and some young trees. The sky is clear and blue.

**We need climate-smart agriculture actions at all levels !**



# Agriculture must become “climate-smart”

1. sustainably increases **productivity** and enhances the achievement of national food security and development goals
2. Increases **resilience** (adaptation)
3. reduces **greenhouse gases** where possible

**Farm and  
community:  
climate-smart  
practices,  
institutions**



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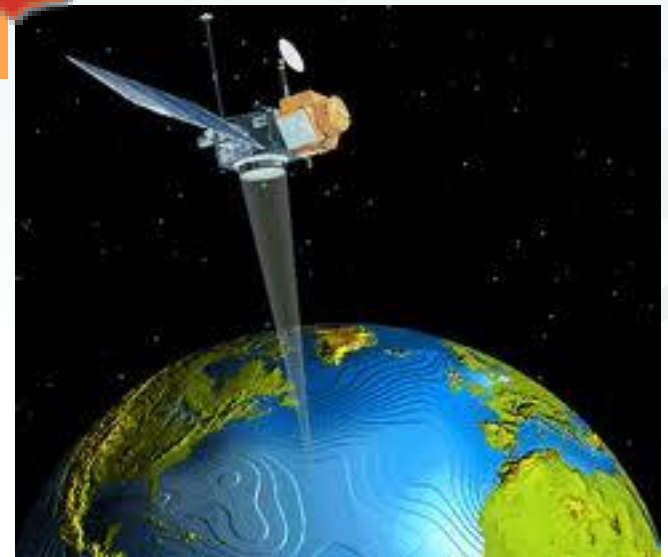


**National and  
regional:  
enabling policies,  
extension,  
support,  
research, finance**



**Climate-smart agriculture happens  
at multiple levels**

**Global: climate models,  
international agreements,  
finance**





# Examples of Successful CSA options

# Climate information for better planning and management in Senegal



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Climate information  
(indigenous & scientific)  
help to improve planning  
and management of  
farms by smallholder  
farmers





# Climate risk management in Kaffrine : using probabilistic seasonal forecasting

- **Since 2011:** piloting communication of downscaled seasonal forecasts and; evaluating impact on farmers' management and livelihoods (CIS design + GTP)
- **2013:** testing Kaffrine protocol in 3 more regions (Thies, Louga and Diourbel)



# Using climate information for early warning

## Before

### Seasonal forecast

- crop variety
- varieties

### Onset forecast

- farm preparation
- optimum planting

## During cropping season

### Nowcasting

- flooding saving life (thunder)

### Daily forecast

- use of fertilizer / pesticide

### Ten-day forecast

- weeding, field work

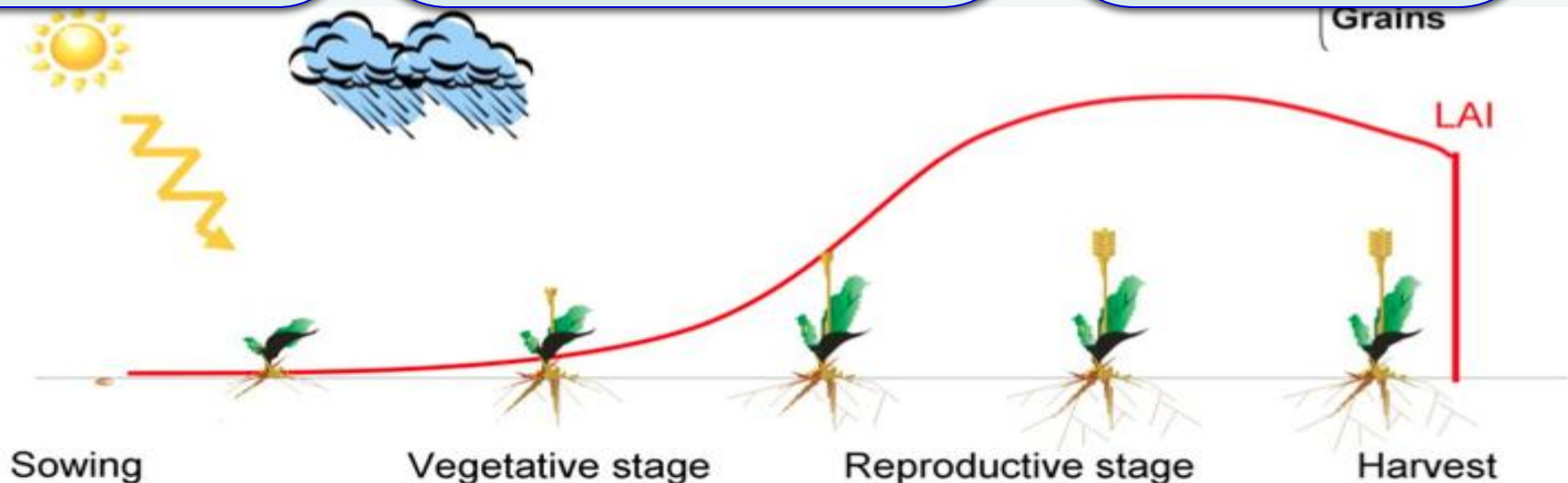
### Updating seasonal forecast

- second cropping

## Maturity/end season

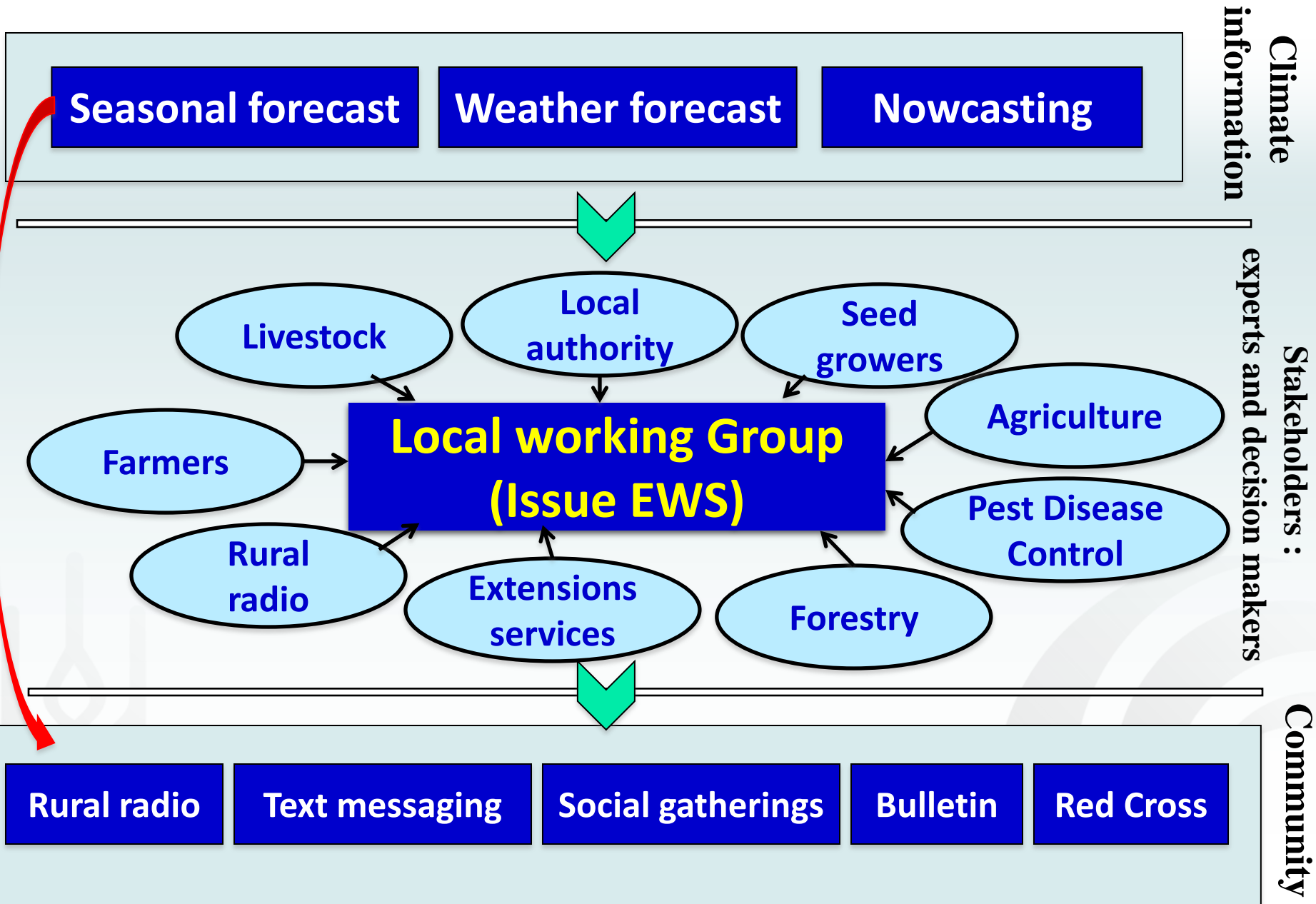
### Ten-day forecast

- optimum harvesting period
- rain during dry season





# Partnership for Senegal Early warning system



# COMMUNICATION & COMMUNICATION

## partnership with union of rural radio (URAC)



### Target: 3 million farmers



Localisation des radios communautaires membres de l'URACS.

#### Présentation

Oxyjeunes FM

Afia FM

Jokko FM

Coorkat FM

Voix du Jeguem

Bamtaaré FM

Gabou FM

FM AWAGNA

Mbour FM

Ferlo FM

Blouf FM

Ndef Leng FM

Penc mi FM

Pkumel FM

Kondafé FM

Kassoumay FM

Manooré FM

Baol FM

Tewdu FM

Gassane FM

CMC de Niodior

Djolof FM

# Climate information affects inputs use and farm productivity of cowpea and sesame sectors in Burkina Faso



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## Evaluation using With-and-Without Comparison

- (i) 110 experimental farmers (11 villages) who are exposed to climate information
- (ii) 60 controlled farmers (6 villages) who are not exposed to climate information.

## Effect of climate information use on farm inputs

	Cowpea			Sesame		
	Exposed	Not exposed	Difference	Exposed	Not exposed	Difference
Number of farmers	56	32		55	29	
Local seed (kg/ha)	17	45	-28**	6	11	-5.23*
Improved seed (kg/ha)	7	1	6**	8	7	1
Organic manure (kg/ha)	15	23	-8	8	42	-34*
Fertilizers (kg/ha)	30	31	-0.40	23	4	19.04*
Insecticides (l/ha)	2.45	3.03	-0.57	1.27	0.47	0.80
Area (ha)	0.26	0.22	0.04	0.34	0.29	0.05

\* Significant at 10%; \*\* significant at 5% level.



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## Effect of climate information use on farm productivity

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Number of farmers	56	32		55	29	
Area (ha)	0.26	0.22	0.04	0.34	0.29	0.05
Yield (kg/ha)	<b>875</b>	<b>683</b>	<b>193*</b>	544	568	-23.59
Gross product (F CFA /ha)	102 613	108 585	-5 973	416 986	495 258	-78 272
Cost of inputs (F CFA /ha)	<b>40 169</b>	<b>55 669</b>	<b>-15 499</b>	33 599	32 521	1 077
Gross margin (F CFA /ha)	<b>62 443</b>	<b>52 916</b>	<b>9 527</b>	383 387	462 395	-79 008

\* Significant at 10%; \*\* significant at 5% level.

Farmers exposed to climate information have changed their farm practices based on the information they received. Changes in agricultural inputs used increase farm productivity including yield and gross margin.

# To conclude:



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- **Better preparedness**

- Better climate science and understanding of climate
- Forecast based planning and management (allocation of land, selection of crops, varieties and investments on inputs)

- **Better responses**

- Planting primed seed/transplanting
- Contingency plans
- Water harvesting and Irrigation

- **Better recovery**

- Safety nets/Insurance
- Employment/migration

- **Developing good partnership to scale-up and achieve impact to benefit end-users**





# Info Note

Climate change, food security and small-scale producers

Analysis of findings of the Fifth Assessment Report (AR5) of the Intergovernmental Panel on Climate Change (IPCC)  
 By Sergio Ramirez, in consultation with Pramod Agrawal, Bruce Campbell, Edward Casey, Shagu Ghaughe-Josef and Xingqun Yao

### AR5, 2014

- 1. The IPCC AR5 has led to several initiatives for small-scale producers, including:
  - AR5 has shown that climate change is affecting food security, and we need to speed up the pace of adaptation and to achieve ambitious climate change mitigation goals.
  - Investment is needed to increase the production of climate-resilient crops and livestock, and to secure a mix of resources to enhance and diversify small-scale producers' resilience.
  - Climate change will need creative finance and business models to improve soil and water management and access to credit for adaptation, access, research and innovation.
  - Value chains are needed to pay more attention to how food value chains are managed, to deal with climate risk, reduce emissions and increase the resilience of small-scale producers to climate change, whether as a result of climate change.
  - Knowledge and climate change is not static, and we continuously need to generate and share new knowledge, extending the information provided in the AR5 and beyond.
  - Resilience is needed to meet both the immediate and long-term needs of small-scale producers and to ensure that they are resilient to climate change.

farmers, business and governments around the world. The "Working Group II" of climate change on Agriculture, Forestry, and Land Use (AFLU) is trying to find ways to speed up the pace of adaptation to reduce the negative impacts of climate change on food security and livelihoods. AR5 has led to several initiatives for small-scale producers, including:
 

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- Resilience is needed to meet both the immediate and long-term needs of small-scale producers and to ensure that they are resilient to climate change.

The draft note offers an overview of what AR5 has to say on the impact of climate change on food and farming – particularly the food and farming of the world's small-scale producers, livestock rearing and forests and on the immediate adaptation of agriculture systems to that challenge. It is based on the Working Group II contribution to the IPCC AR5, Chapter 7 on Food Security and Food Production Systems and on the Working Group II Policy Studies. The IPCC Working Group II is focused on assessing the complexity of socio-economic and natural systems to climate change, and on the consequences of climate change, and on the adaptation.

The draft note starts with where we are at with climate change in the 2010s, then looks ahead 10 years to 2020 and beyond, in the 2020s, before looking further on in the 2030s and beyond.

2010s: How climate change is affecting today's food security and, looking at the impact of climate change have been understood largely as a system of 'of' future, that will benefit from climate change. A key finding of AR5 is that climate change impacts on food security are



SUCCESS STORIES

# Climate-smart agriculture SUCCESS STORIES

FROM FARMING COMMUNITIES AROUND THE WORLD



Thanks for your attention