Opportunities and constraints for Seasonal Rainfall Forecast application to agricultural decisions in Burkina Faso

Improving seasonal forecast information for managing on-farm decisions
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Why Seasonal climate forecast?

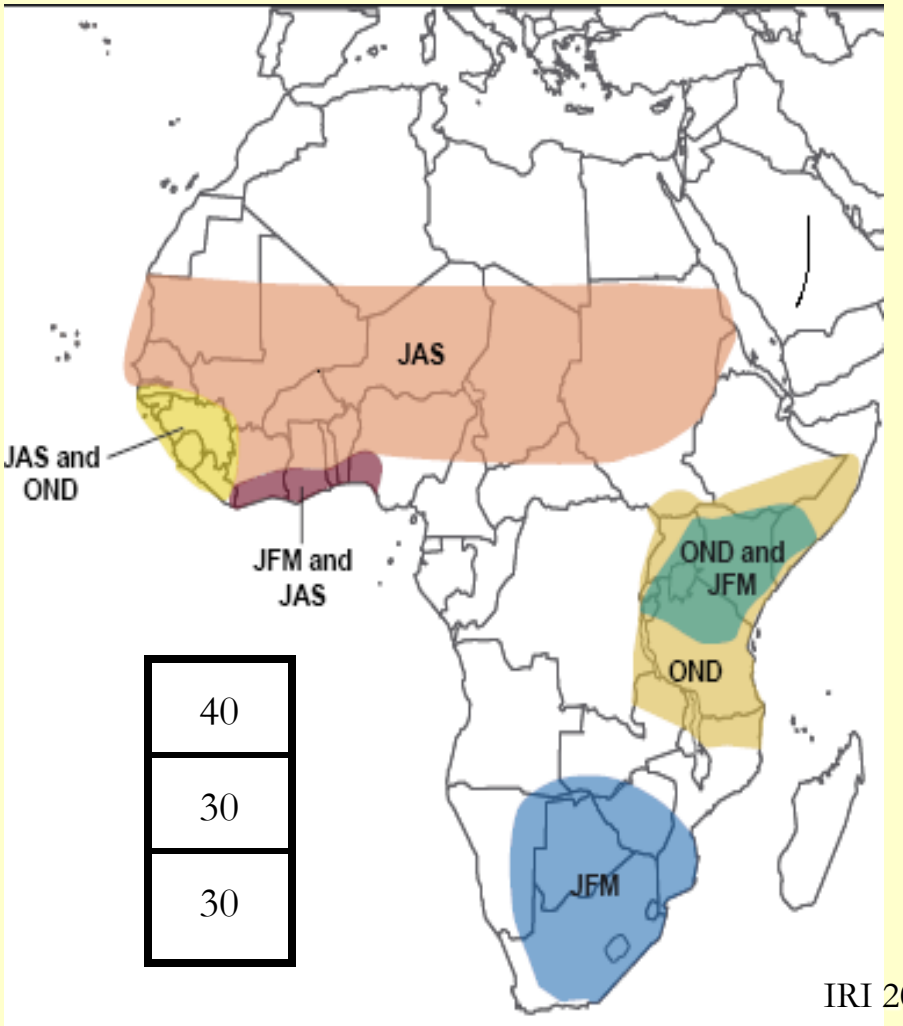
- Africa is one of the most vulnerable continents to climate change & variability, a situation aggravated by the interaction of multiple stressors occurring at various levels

- African farmers have developed several adaptation options to cope with current climate variability but such adaptations may not be sufficient for future changes of climate

- Agricultural production and food security in many African countries and regions are likely to be compromised by climate change & variability

IPCC Chapter 9, Fourth Assessment Report 2007

Why Seasonal climate forecast?



IRI 2007

« There is a need to improve and continue to assesss the means by which scientific knowledge and advanced technological products (e.g. early warning systems, seasonal foreasts) could be used to enhance the resilience of vulnerable communities in Africa »

IPCC 2007, Ch9, p,459

Climate Forecasting & Agricultural Resources Project (CFAR)

Funding agencies

US Universities

Host-country partners

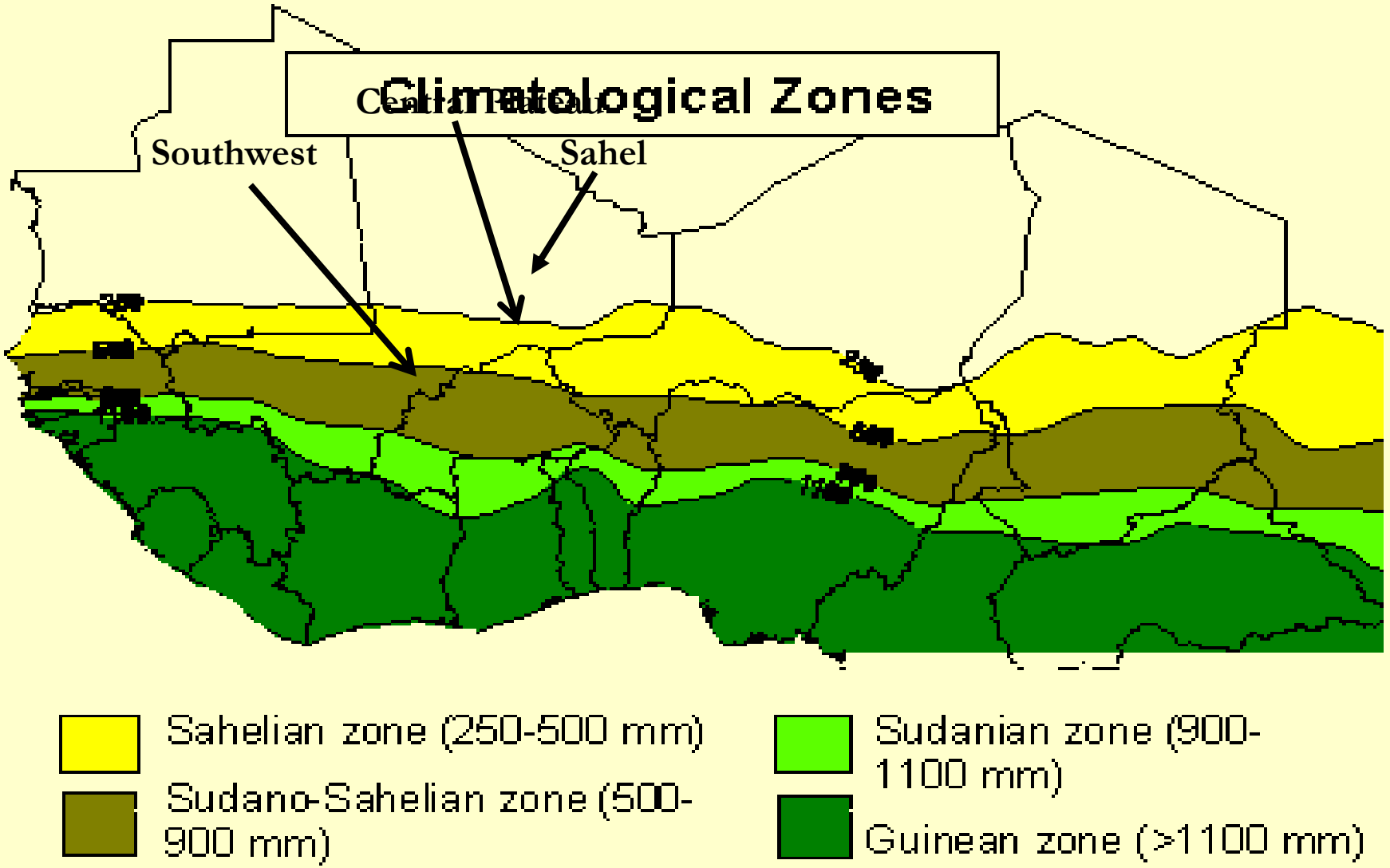
DM (meteorological service)

INERA (ag research)

Regional instititutions

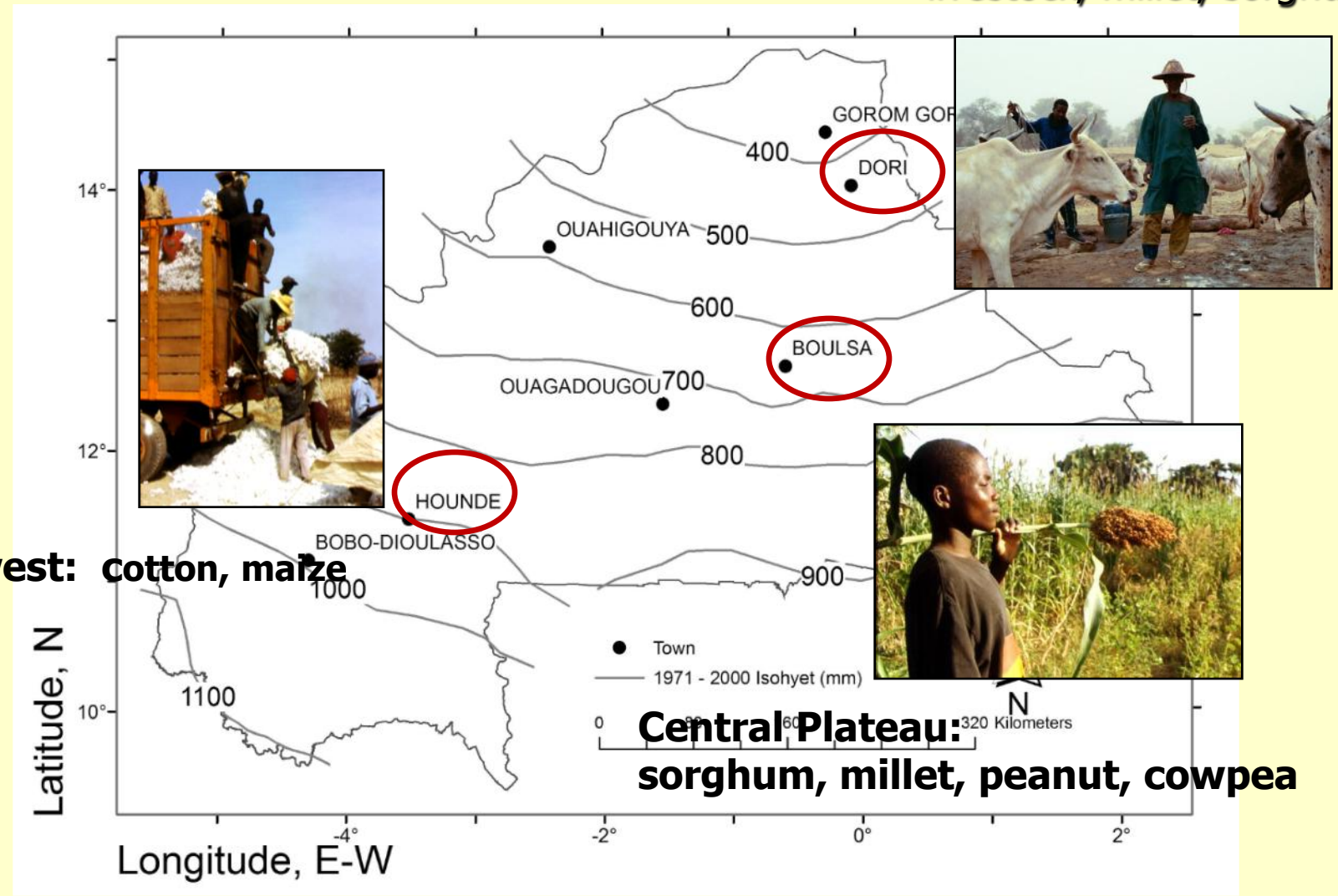
http://www.fao.org/WAICENT/faoinfo/economic/giews/english/esahel/sah983e/esah-cl.htm

Climate Forecasting & Agricultural Resources Project (CFAR)



Climate Forecasting & Agricultural Resources Project (CFAR)

Sahel: livestock, millet, sorghum



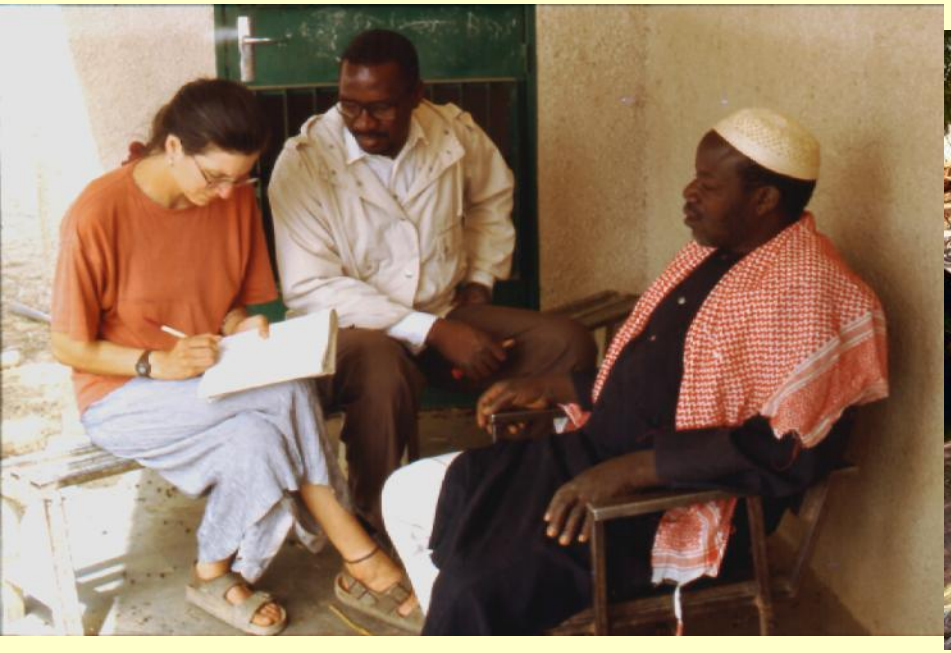
Southwest: cotton, maize

Central Plateau: sorghum, millet, peanut, cowpea

CFAR Phase I: 1998-2001

Ethnographic & participatory research

Traditionnal local knowledge
Information networks
Adaptive strategies



CFAR Phase II: 2002-2004

Experimental dissemination of seasonal forecast

Participatory workshops
Radio announcements
Intermediaries (extension, relay farmers)

Ethnographic Research

Cultural understandings of rain

Scientists: ***measurable amount***

Farmers: ***unfolding process***

Ethnographic Research

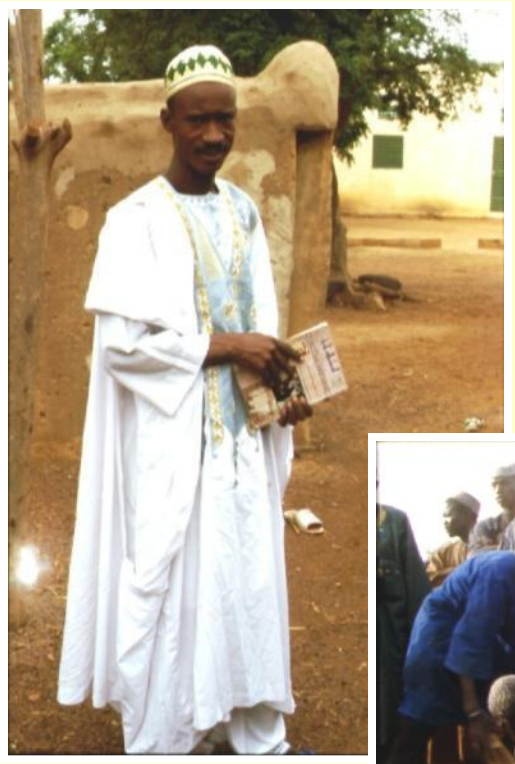
Cultural understandings of rain

Name	Nature	Timing	Duration	Other Phenomena	Impacts/use	Beliefs
Sa kenga	Big rain	Jul-Aug	Several hrs			
Sa serdem	Fine rain	Any time	Variable			
Sig saaga	Abundant steady	At night	6-8 hrs. falls steadily, but not violently	Wind blows before (but not after)	Leaves soil moist for several (5+) days.	Marks onset of season
Sa sika	Localized, from few clouds	Anytime of day, mostly in Aug	very short	No wind or cooling of temp	Does not penetrate soil	Marks poor rainy season
Sa nyanga	Heavy	Mornings or nights, mostly in July-Aug, rare in recent years	Lasts several hours	Gentle thundering	Good infiltration, moisture lasts long time	Marks favorable rainy season and brings good harvest
Sa raogo	Thunder storm	Early morning or at sunset Mostly in July-Aug, more frequent in recent years	Short violent downpour	Violent wind, sharp thunder, lightening	Damages crops, homes, kills animals, causes floods and erosion	Believed to be invoke or attracted, brings bad luck
Bind saga	Moderate	Anytime of the day, April	1-2 hrs	Wind,	People use to make mud for house repair, also stimulate growth of roofing grass	

Typology of rain events among the Mossi of the Central Plateau, Burkina Faso

Ethnographic Research

Farmer forecasting knowledge



***Pluralistic, dynamic systems*, drawing from:**

Environmental observations
Moon and star cycles
Traditional divination
Islamic scriptures

Ethnographic Research

Farmer forecasting knowledge

Place-based, contextualized

Grounded in daily experience

TABLE 1 Local Trees Bonam Farmers Use as Indicators for Forecasting Rainfall

Moré	French	Scientific[a]	Fruits ripen	Indicates
kankanga	figuier	*Ficus gnanphalocarpa* (Miq.) Steud. ex A. Rich.	May/June	Water table near ground surface
sibga	raisinier	*Anogeissus leiocarpus* (DC) Guill & Perr	May/June	Abundant fruit yield = abundant rainfall
lenga	citronnier de mer	*Xymenia Americana* L.	May	Abundant fruit yield = abundant rainfall
taanga	karité	*Butyrospermum parkii* (G. Don) Kotschy	June	Abundant fruit yield = abundant rainfall
roanga	carroubier africain	*Parkia biglobosa* (Jacq.) R.Br. ex G. Don f.	March/April	Abundant fruit yield = abundant rainfall
pusga	tamarinier	*Tamarindus indica* L.	June	Abundant fruit yield = abundant rainfall
sabtuloga	bouleau d'Afrique	*Lannea acida* A. Rich.	April	Abundant fruit yield = scarce rainfall
nobga	prunier	*Sclerocarya birrea* (A. Rich.) Hochst.	May	Abundant fruit yield = scarce rainfall

Roncoli et al. *Society and Natural Resources*, 2002

Ethnographic Research

Adaptive strategies

Sorghum Varieties

Name	Cycle	Appearance	Requirements	Consumption	Storage
belko	120-150	white grain, black husk	old variety, grown in lowlands, needs fertile soils, good land prep, abundant rainfall	makes best *toh*, (milky white, smooth texture, most filling); hard heavy grains (contain more flour)	7-10 yrs
balinga	120	white grain, black husk, long heads, smaller grain than *belko*	old variety, still grown in fertile valley bottoms or manured, managed fields (*zai*, mulching)	makes very good *toh*: flour swells when cooking, heavy texture, nutty flavor; also known as *saomui* (= "better than rice")	2-4 yrs
gambré	120	dark gray grains, black husk, compact heads	as above	some dislike color (grey) for *toh* but like its buttery texture, highly nutritious	6-7 yrs
yadega	70-90	white grain, black or red husk, compact head	cluster of varieties imported from the North (Yatenga)	same as *piswopoi*	new (yet to be tested)
kazemiiga *kazemiuugu*	70-90	red grains, red husk	less demanding of water and fertility than white varieties, less responsive to manure, needs well drained soils	people dislike *toh* because of red color, used mostly for *dolo* beer, used for customary rituals and traditional medicine	>1 yr
piswopoi *pieolgo* *fibmiugu* *kurbulli*	70-90	long heads (up to 50cm) white grain, black husk white grain, red husk white grain, black husk	cluster of shorter-term varieties, adopted because of shortening of rainy season; productive if it rains adequately, withstand water deficits after grain formation, suffer if rain is heavy	less preferred than traditional varieties, but generally accepted *pielogo* makes thick white *toh*, similar to maize	>2 yrs *fibmiugu* loses grains, stores poorly
magadje[13] *mwaga*	60+	round heads, double grained	interplanted with maize on manured fields; may derive from varieties tested by INERA on local farms	unpalatable, stores poorly when threshed, vulnerable to termites	<1 yr
pisnu	50	white grain, black husk	recovers well from water deficit, but needs better soils, susceptible to weeds (hence higher labor input); also vulnerable to pests before and after harvest; grown around compound together with maize (to be eaten before other varieties are harvested); planted in case of late onset of rains (after other varieties failed)	difficult to cook, flour does not swell when cooking, needs good sauce to accompany unpalatable *toh*, not filling, weak texture, does not keep (remainder must be sold after one year) market sellers deny that the sorghum they are selling is *pisnu* since nobody would buy it	<1 yr

Ethnographic Research

Agricultural adaptations

Location & size of planted areas

Crop & variety selection

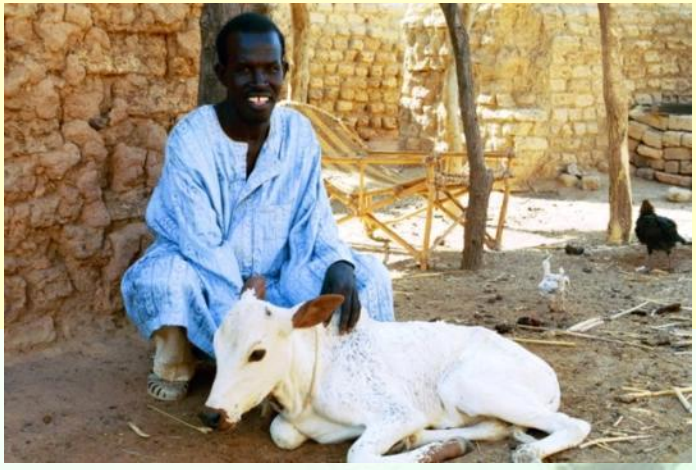
Land management

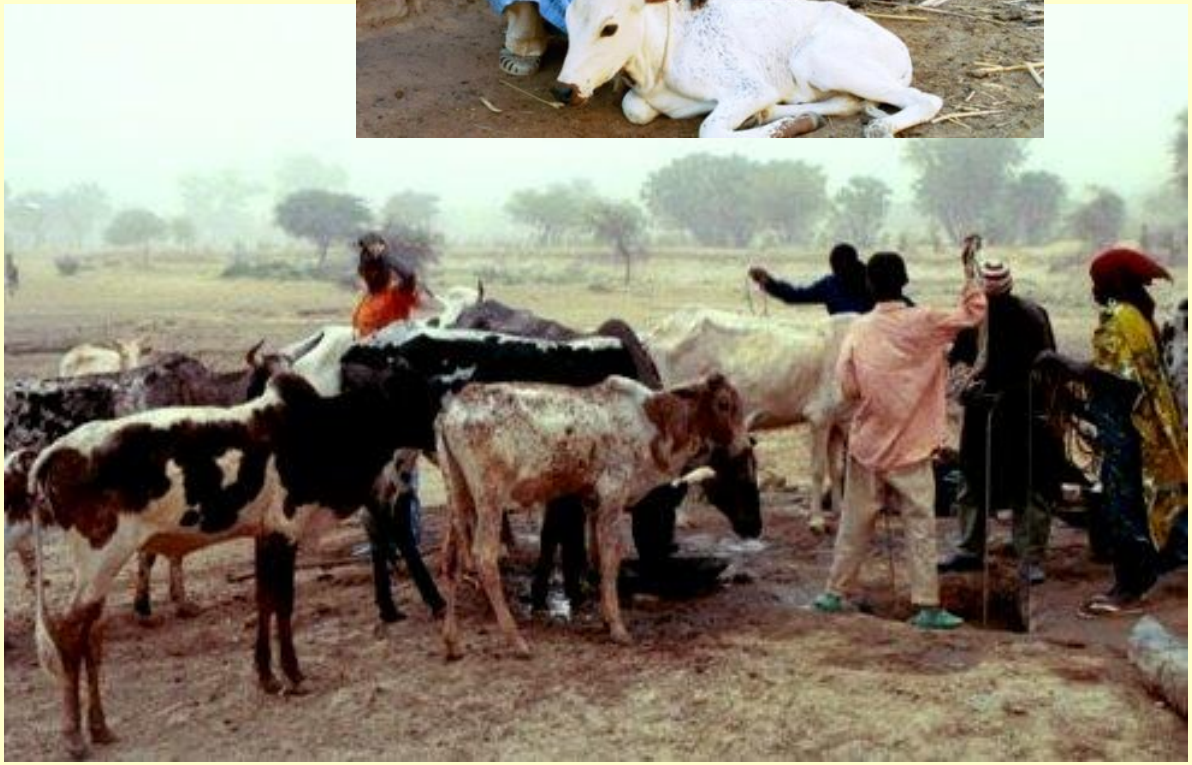
Labor allocation

Input application

Ethnographic Research

Livestock adaptations
Placement of corrals
Transhumance decisions
Feeding regimes
Vet treatments
Marketing





Experimental dissemination

Participatory workshops

I. Discussion of farmers' own forecasts

II. Presentation of forecast

How the forecast is produced
Comparison of forecasts and rainfall for last 5 years
Limits of forecasts (scale, parameters)
Practical exercises (probabilities explinations)
Presentation of forecast

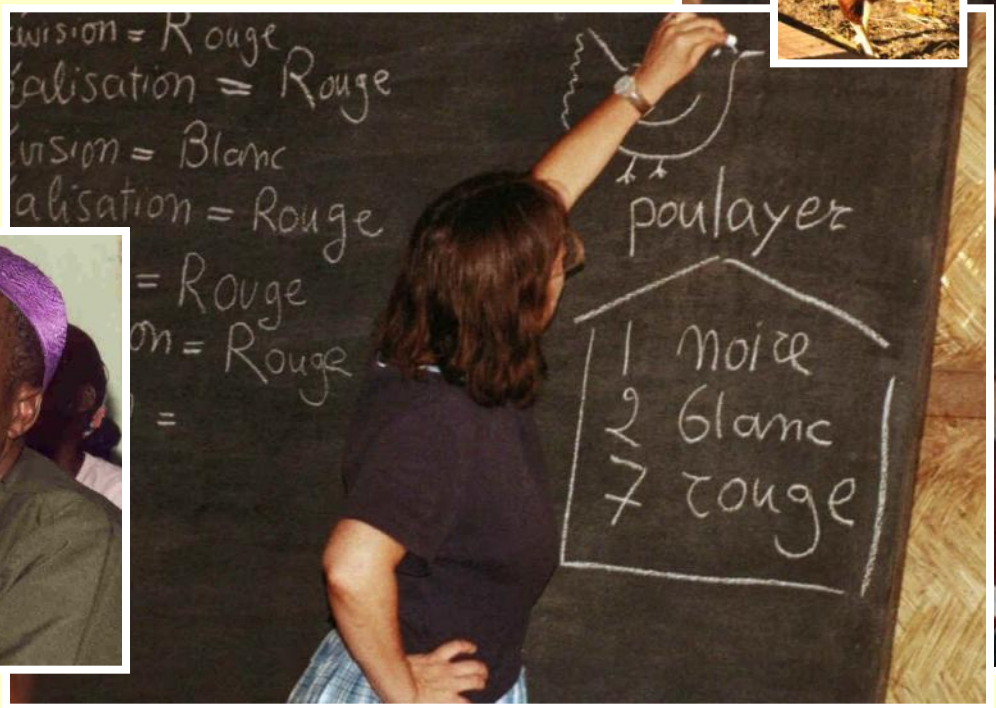
III. Group discussions

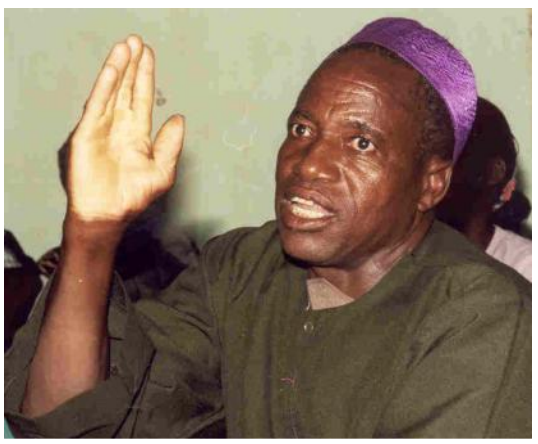
Potential adaptive strategies
Village-based dissemination

Experimental dissemination

Representing & learning probabilities

- Simulation games
- Narratives and metaphors
- Group discussions



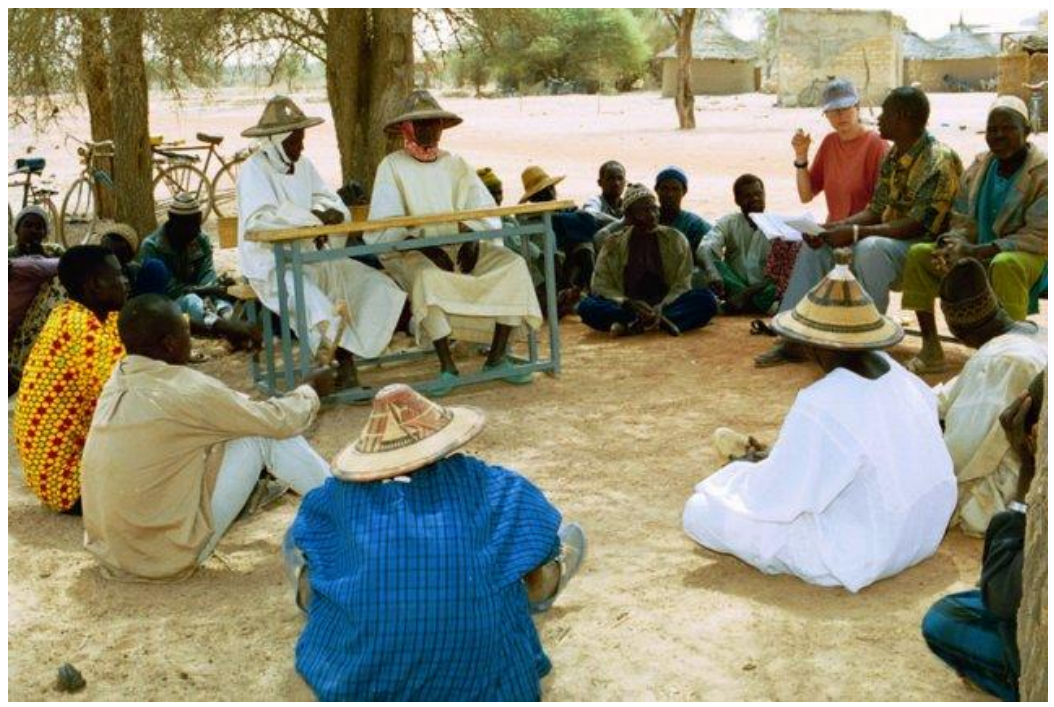


Experimental dissemination

Assessing the role of participation

How does group interaction affect the understanding & uptake of uncertain climate information?

Experimental dissemination



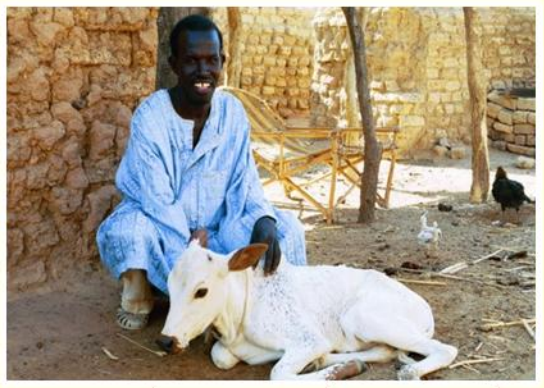
Social exclusions

- Gender
- Ethnicity
- Caste
- Faction
- Village

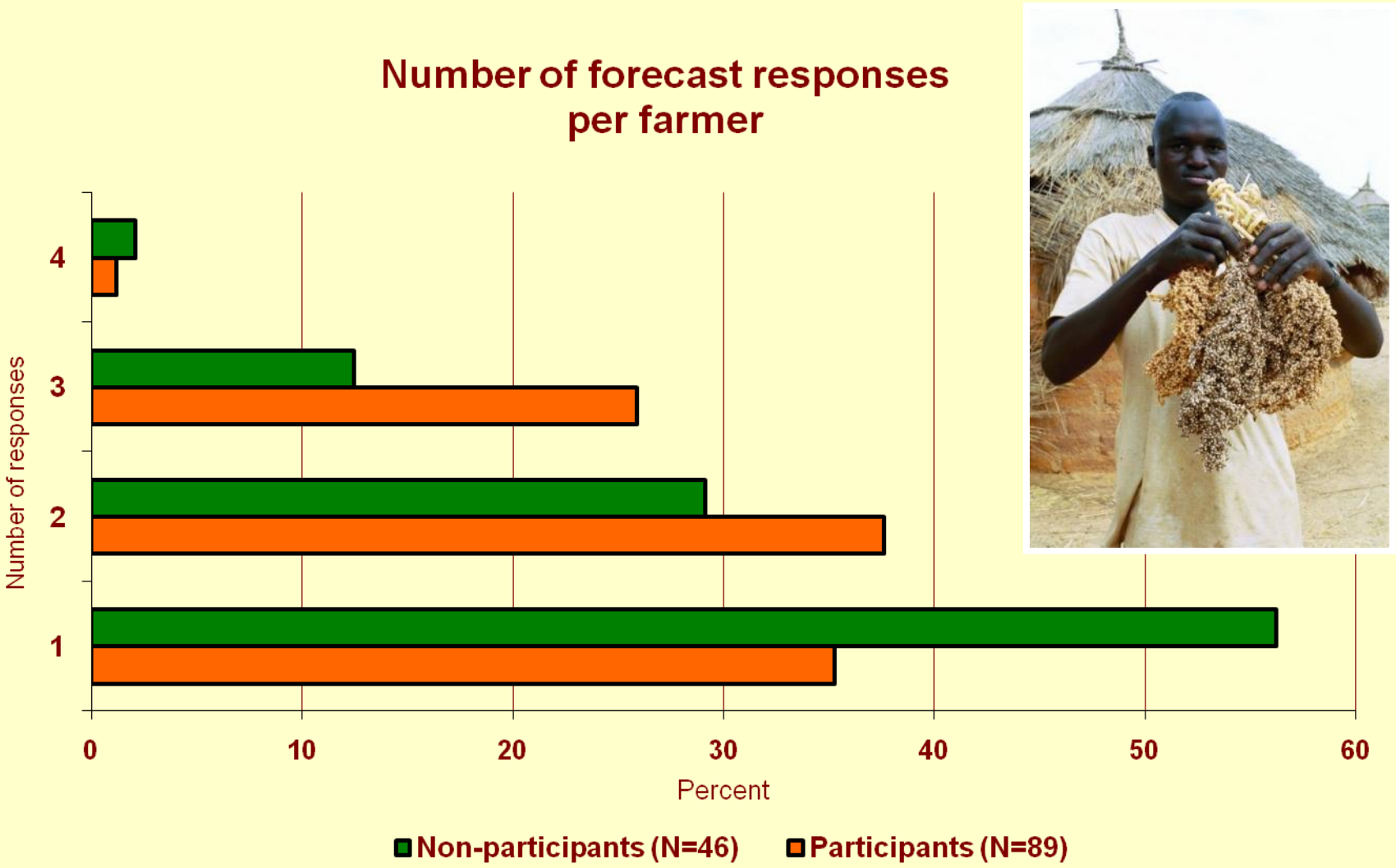
Dissemination assessment

Dissemination assessment

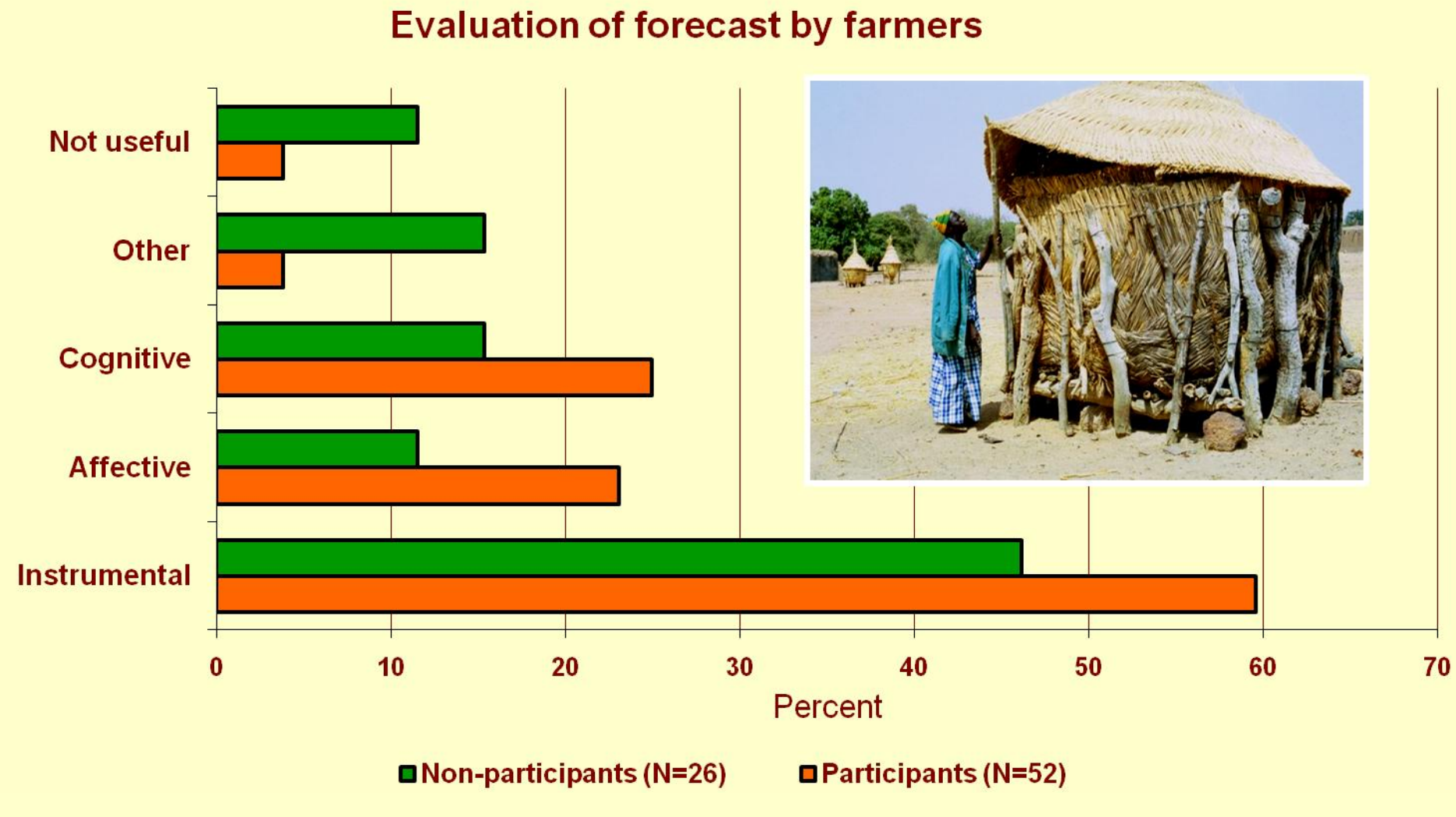
Dissemination assessment



Dissemination assessment



Dissemination assessment



Some Feedback

I used the forecast in choosing seed varieties. I started with *kurbulli* (70-day sorghum variety), and after the workshop I continued with the same variety. The forecast gave me assurance to keep doing so. Otherwise I would have planted *pisnu* (50-day variety) because it was late. The problem with *pisnu* is that the weight of the harvest is less and it spoils easily. That is why we prefer planting *kurbulli* if we know that the rains will be enough.

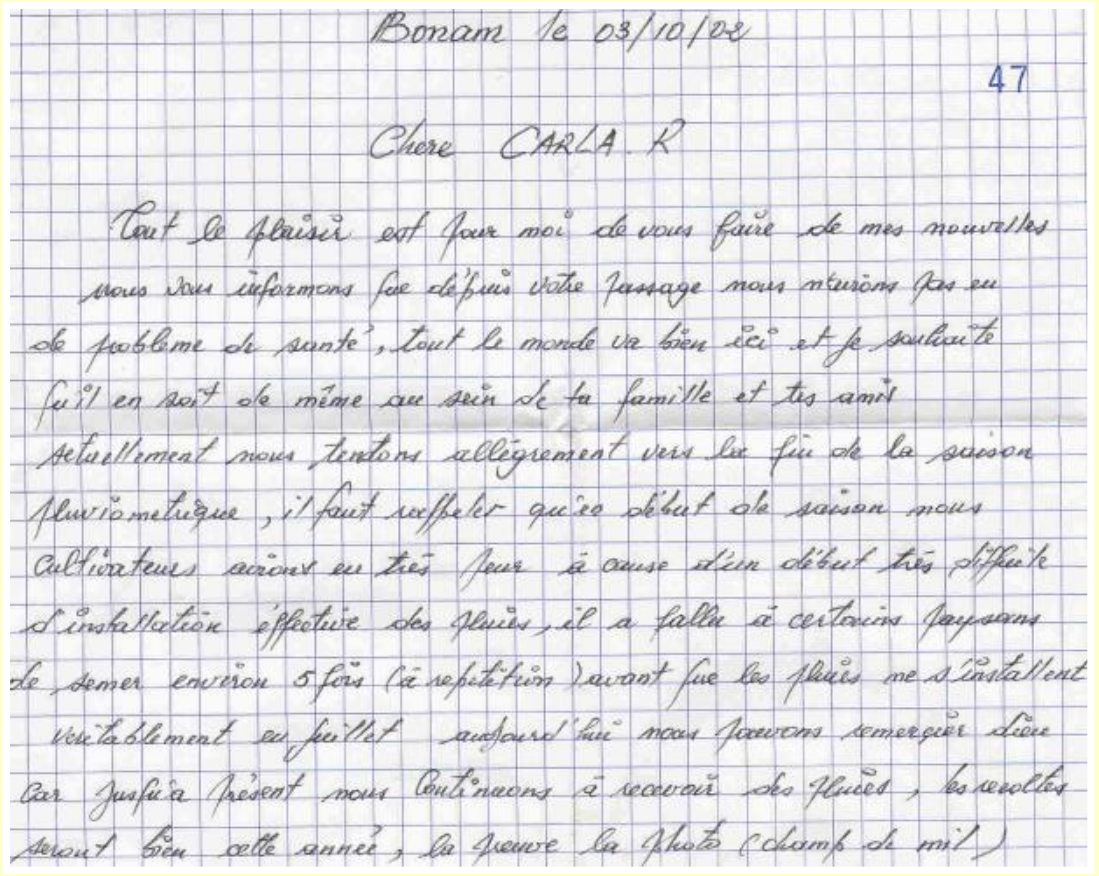
Some Feedback

By late June I was afraid to keep planting because I thought it was too late, but the forecast gave me courage. So I was not afraid of planting late and continued planting till the end of the planting period, because I had seen the signs of a good season and the forecast confirmed them. For instance the trees were already flowering in April and there were many ants and mosquitoes after each rain in May.

Some Feedback

The forecast encouraged me to plant more sorghum. I chose sorghum because it was the end of the planting period and I was not sure that maize would make it. At first I doubted the forecast but then it started to rain well. The decision was based mostly on the fact that it had started to rain well, but it was supported by the forecast.

Some Feedback



Bonam le 03/10/02

47

Chere CARLA. K

Tout le plaisir est pour moi de vous faire de mes nouvelles nous vous informons que depuis votre passage nous n'avons pas eu de problème de santé, tout le monde va bien ici et je souhaite qu'il en soit de même au sein de ta famille et tes amis

Actuellement nous tendons allégrement vers la fin de la saison pluviométrique, il faut reconnaître que le début de saison nous cultivateurs avions eu très peur à cause d'un début très difficile d'installation effective des pluies, il a fallu à certains paysans de semer environ 5 fois (à repétition) avant que les pluies ne s'installent véritablement en juillet aujourd'hui nous pouvons remercier Dieu car jusqu'à présent nous continuons à recevoir des pluies, les recoltes seront bien cette année, la preuve la photo (champ de mil)

… it must be noted that at the beginning of the season us farmers were afraid because of a difficult onset of the rains, some farmers had to plant five times before rains got established in July. Today we can thank God that we continue to receive rain and the harvest will be good this year, there is the proof…

General Impact on SCF on Farmers in Burkina

Evaluation criteria included both material and non-material considerations allows that :

- ❖ **significant differences were found between farmers who had attended workshops and farmers who had not attended.**
- **participants were more likely to share the information with others,**
- **to understand the probabilistic aspect of the forecasts and their limitations,**
- **to use the forecast in making management decisions,**
- **to use forecast in a wider range of responses.**

- ❖ **Also for the farmers who had not participated in the workshop (albeit in a more limited way than participants)**

- **they received the forecasts through various means**
- **They shared it with others through various means,**
- **They understood the forecast and modified their production strategies in response to it**

- ❖ **Interviews reveal that most farmers were satisfied with their decisions and found the forecasts to be accurate and useful.**

Limiting factors - should improve research on :

Technical

- Seed varieties
- Soil & water conservation
- Timing of onset
- Timing of end
- Dry spells within season
- Number of big rains

Institutional

- Land access
- Farmer organizations
- Rural communication
- Farm credit
- Markets
- Diversification options

Conclusions

Participative workshop can facilitate farmers' ability to use climate forecasts and should be a central part of adaptation policies and plans

- **Social capital and social learning are key to adaptive management and should be reinforced by policies and integrated into plans**

- **Farmers' ability to select among adaptive options can be improved by effective climate-based decision support systems (DSS)**

- **DSS must be grounded in an understanding of how people use information in making adaptive decisions and what options and constraints they face**

- **Supportive policies are needed to improve the diversity and flexibility of adaptive options and the effectiveness of climate-based DSS**

Thank you!

Funding agencies

US Universities

Rural communities

Host-country partners

Institut de l'Environnement et des Recherches Agricoles (INERA)
Direction de la Météorologie, Burkina Faso

Regional institutions