Climate Models, Projections and Downscaling Implications for Adaptation in Agriculture and Water Sectors

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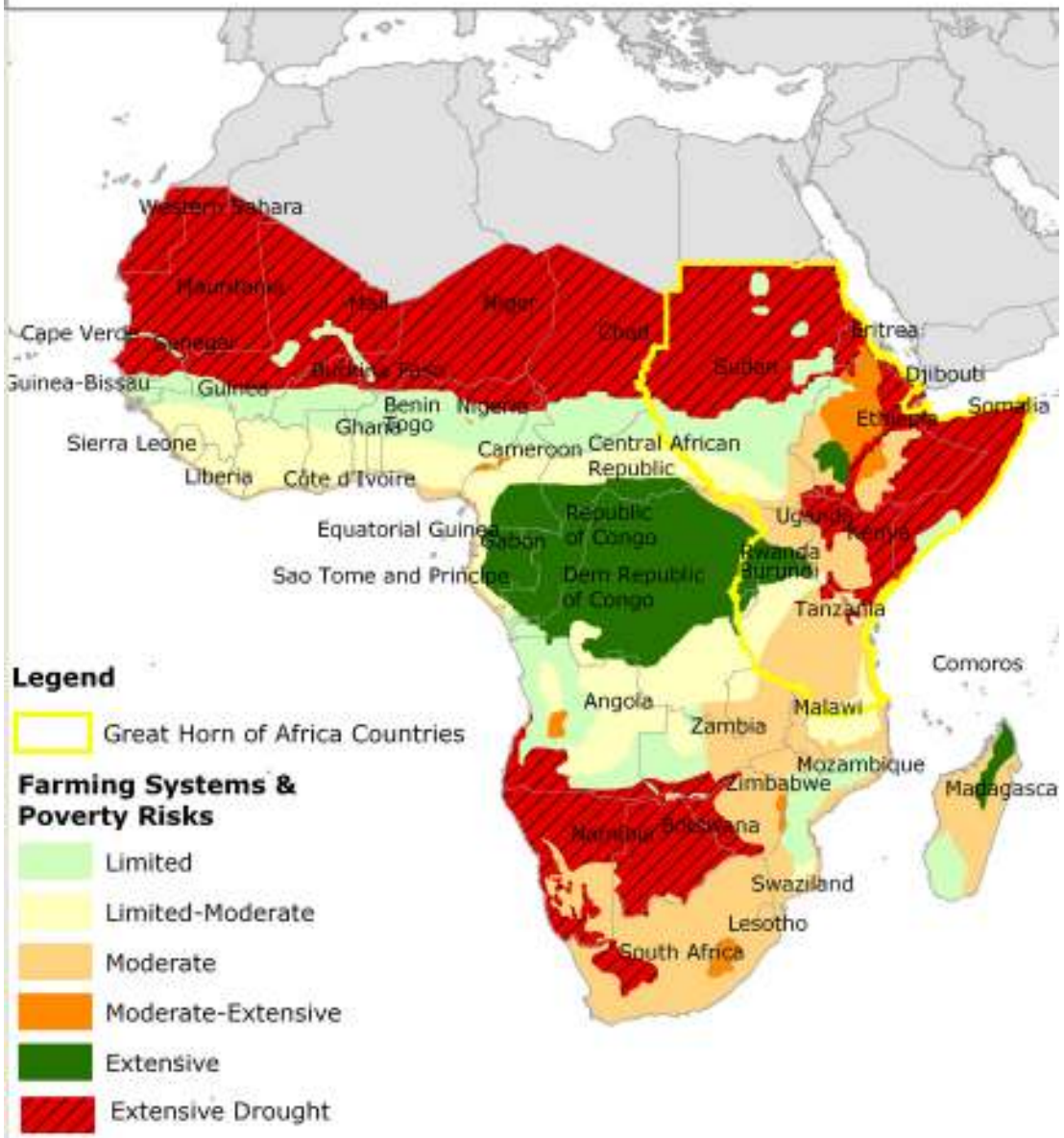
Definition of Terminologies

- Weather
  - Weather is the sum total of atmospheric conditions for a given place at a given time
  - It changes very rapidly from hour to hour, day to day, e.t.c
  - It is what happens in the atmosphere at any given time
  - It is what you get on any day

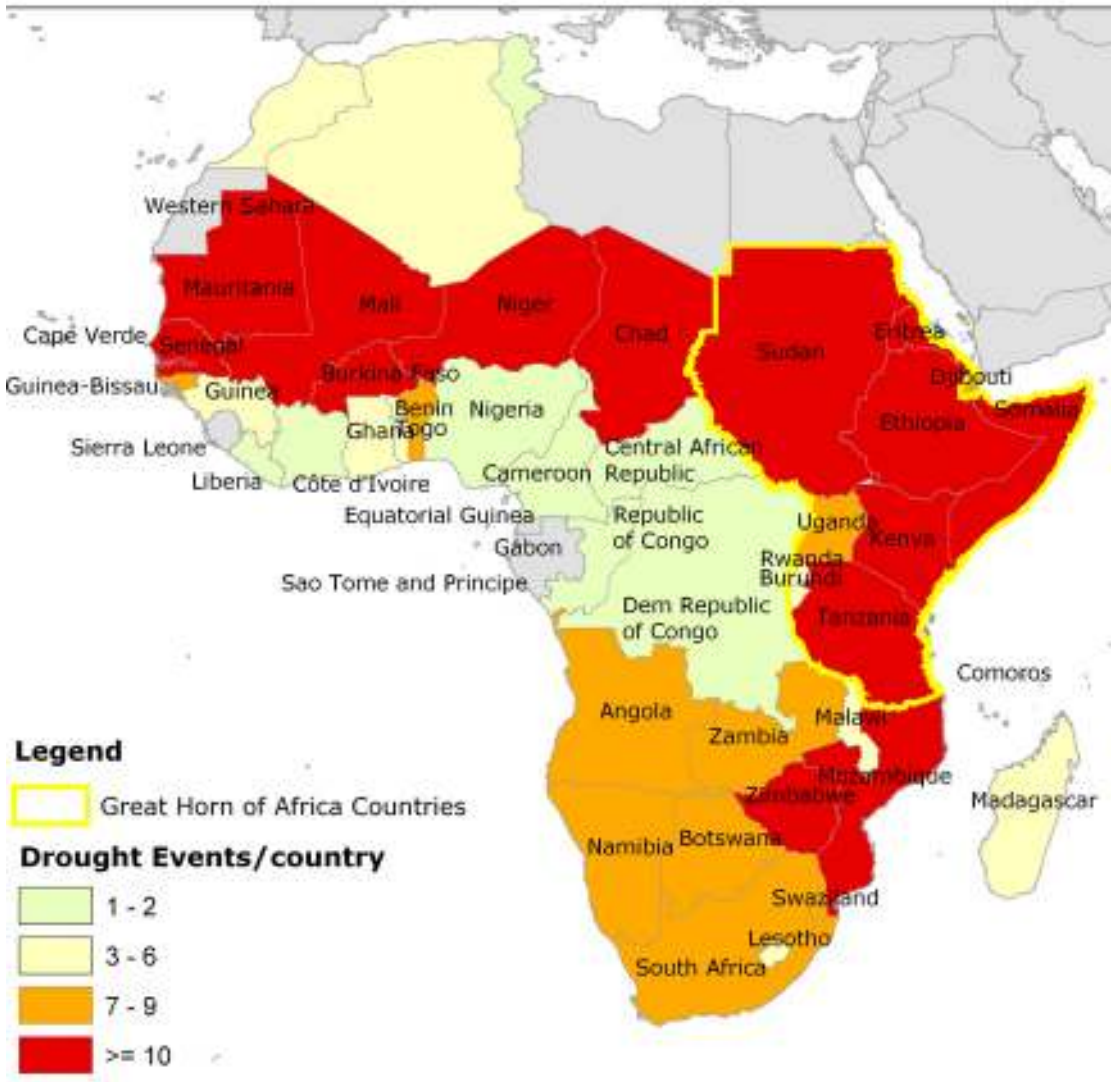
- Climate
  - Mean weather conditions averaged over a long period of time, preferably 30 years
  - It is more stable compared to the weather
  - It is what you expect to happen in any given place at certain times
  - It therefore controls the distribution of the world’s resources
    - Water
    - Vegetation
    - Animals/insects /diseases

Main Farming Systems & Poverty Risks



Data Source: "Farming Systems and Poverty, Improving Farmer's Livelihoods in a changing world". FAO-World Bank, 2001.

Drought events/country from 1970 till 2004 within Sub Saharan Africa



Data Source: EM-DAT. The OFDA CRED Disaster database. Universitè Catholique de Louvain La Neuve, Brussels, Belgium.

- Climate Variability
  - Variations (ups and downs) in climatic conditions
  - time scales of
    - months,
    - years,
    - decades,
    - centuries, and millennia
  - This includes droughts and floods


July 18, 1993

- Climate Change
  - A statistically significant change in climate
  - characteristics over a long period of time
    - From one 30-year period to another
    - From one century to another
    - From one millennium to another
  - You can’t have climate change over less than a 30-year period
  - Climate change can be seen in the change in
    - the mean
    - extremes, or
    - frequencies

EXAMPLES OF CLIMATE CHANGE

- Change in the annual mean

- Constant mean with change in extremes

- Constant mean with change in frequency of extremes

Possible causes of CC

- The energy balance determines the processes within each component of the climate system
  - (e.g. atmosphere, water bodies, glaciers, soils, land surface etc)
- For the climate to remain in steady state the energy balance must therefore remain in steady state

- This balance can be offset by:
  - Natural factors such as increasing intensity of solar radiation reaching the Earth because of the change in the orbital distance of the Earth from the sun
    - This has been taking place very slowly
  - Human factors mainly through the increasing concentration of greenhouse gases in the atmosphere
    - Generation and consumption of fossil fuel energy

- The warming by greenhouse gases is taking place very rapidly because of increasing emissions of the gases through human activities.
- This global warming results in changes of other climate conditions such as atmospheric moisture, rainfall, mountain snow, and ocean temperatures among others.

Modeling atmospheric Processes

- The processes that lead to global warming through the change in the earth’s orbital distance from the sun and greenhouse effect are now known quite well
- The amount of heat the global oceans absorb has been sufficiently quantified
- The interactions between the different components of the climate system are now fairly well understood

- When all these factors and others are incorporated into models and through comparison with observations, where they exist, it has been possible to obtain model results that are consistent with past climate changes up to the present time
  - These models are known as General Circulation Models (GCMs)

Climate Change Modeling

- Predictability of any change is based on the issue of cause and effect
- In the case of climate change the specific question that has to be answered is:
  - How much will the climate factors change for a given amount of change in atmospheric concentration of greenhouse gases?
    - This is what is known as climate sensitivity

- The GCMs are used to make projections of future climate changes through scenario development
  - Process of making plausible and consistent assumptions of global and regional socio-economic developments that lead to the emissions of greenhouse gases and the resulting global warming
    - Changes depend on the development paths taken by the global communities and the associated emissions of greenhouse gases.

- However, for many climate change studies, scenarios of climate change derived directly from GCM outputs are of insufficient spatial and temporal resolution
  - The current spatial resolution of GCMs means that the representation of, for example, orography and land surface characteristics, are much simplified in comparison with reality, with consequent loss of some of the characteristics which may have important influences on regional climate

Downscaling

- The development of a number of methodologies for deriving more detailed regional and sector-specific scenarios of climate change for impacts studies
- These downscaling techniques are generally based on GCM outputs and have been designed to bridge the gap between the information that the climate modeling community can currently provide and that required by the impacts research community

Spatial Downscaling

- Techniques used to derive finer resolution climate information from coarser resolution GCM output
- Based on the assumptions that:
  - It is possible to determine significant relationships between local and large-scale climate (thus allowing meaningful site-scale information to be determined from large-scale information alone)
  - and that these relationships will remain valid under future climate conditions

- The spatial resolution of most GCMs is between about 250 and 600km
- The forcings and circulations which affect regional climate generally occur at much finer spatial scales than these and can lead to significantly different regional climate conditions than are implied by the large-scale state

- Spatial downscaling techniques can be divided into:
  - empirical/statistical
  - statistical/dynamical methods
  - and higher resolution modeling, e.g., regional climate modeling

Temporal Downscaling

- Refers to the derivation of fine-scale temporal data from coarser-scale temporal information, e.g., daily data from monthly or seasonal information
- Its main application is in scenario studies, particularly for the derivation of daily scenario data from monthly or seasonal scenario information

- Monthly model output is available from many GCM experiments, whilst only a small number of experiments have archived daily model output
- The daily model output is generally not considered to be as robust as model output at the monthly or seasonal time scales and so is not generally recommended for use in scenario studies without more detailed investigations being undertaken

Adaptation

- Even where the impacts of climate change are not yet obvious, scenarios of future impacts can, in many cases, justify ensuring that adaptation responses are built into planning
  - It can be more cost- effective to implement adaptation measures early, particularly for long-lived infrastructure
  - Current development activities may irreversibly affect future adaptation to the impacts of climate change.

- Adapting to climate change entails taking the right measures to reduce the negative effects of climate change (or exploit the positive ones) by making the appropriate adjustments and changes
- Options include:
  - Technological - increased sea defenses or flood-proof houses on stilts
  - Behaviour change at the individual level
    - reducing water use in times of drought and using insecticide-sprayed mosquito nets
  - Early warning systems for extreme events
  - Others

Challenges for Adaptation

- For better understanding of local climate and thus be able to predict local climate change:
  - Adequate operational national systematic observing networks is essential
  - Access to the data and information available from other global and regional networks is necessary
  - Capacity and necessary skills to analyze, interpret and use the data and information

- A sure knowledge base from systematic observation and forecasting services is essential to:
  - monitor climate
  - detect and attribute climatic change
  - improve the understanding of the dynamics of the climate system and its natural variability (EWS)
  - provide input for climate models
  - and thus plan adaptation options

- The resolution of models used to determine climate change in developing countries is too course and often relies on data from sources in other countries
  - There are efforts along these lines– e.g. PRECIS model
- There is disparity in outputs from different models – better understanding required
- A major problem encountered when using models to get national results is the need for readjustment and downscaling to suit a country's individual needs

- However, it is not just climate data that is needed for effective vulnerability and adaptation assessments to climate change
  - Equally as important, and very much lacking at present, is the need for accurate socio-economic data
  - This data needs to come from across sectors and is an important complement to existing assessments, particularly given that poverty has been recognized as a major factor in vulnerability
  - Capacity and skill for socio-economic scenario development needed

- Communication between users of climate change model output (e.g. decision makers, practitioners and impact researchers) and producers of data (climate sci-entists) is not perfect
  - build the capacity of users to appropriately interpret and apply climate change projections
  - improve climate scientists' understanding of the information needs of different user groups, enabling them to more effectively target output

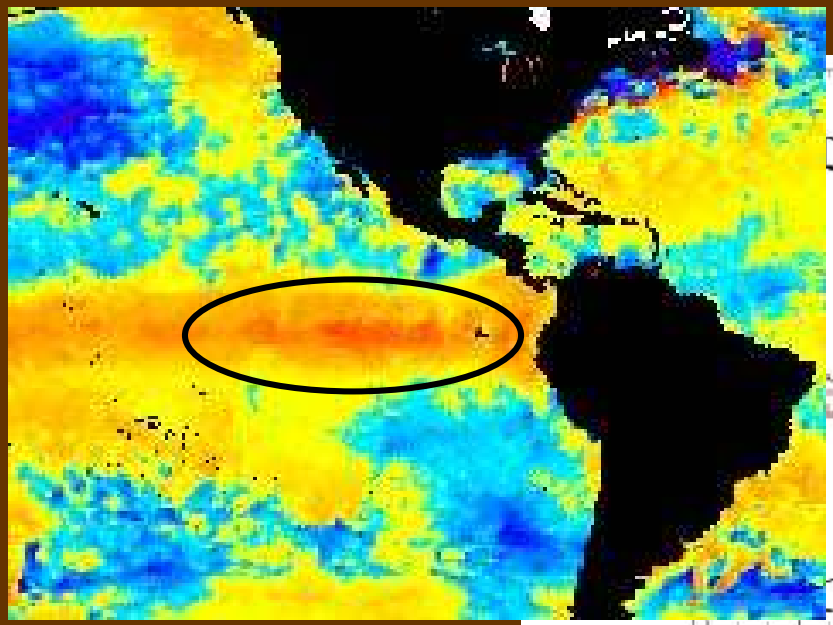
- Train and make use of “connectors” - individuals and organizations who understand the challenges to both users and producers
  - translate scientific concepts—without distorting them—into language that users can understand and apply
  - act as information conduits between the two groups
  - requires skills that many of those engaged in climate change adaptation have not developed
  - also requires indepth understanding of users’ needs and the potential uses of climate change projections
- Develop accessible “knowledge sharing” platforms for collaborative action, mutual learning, e.t.c.
  - E.g. AfricaAdapt and weADAPT

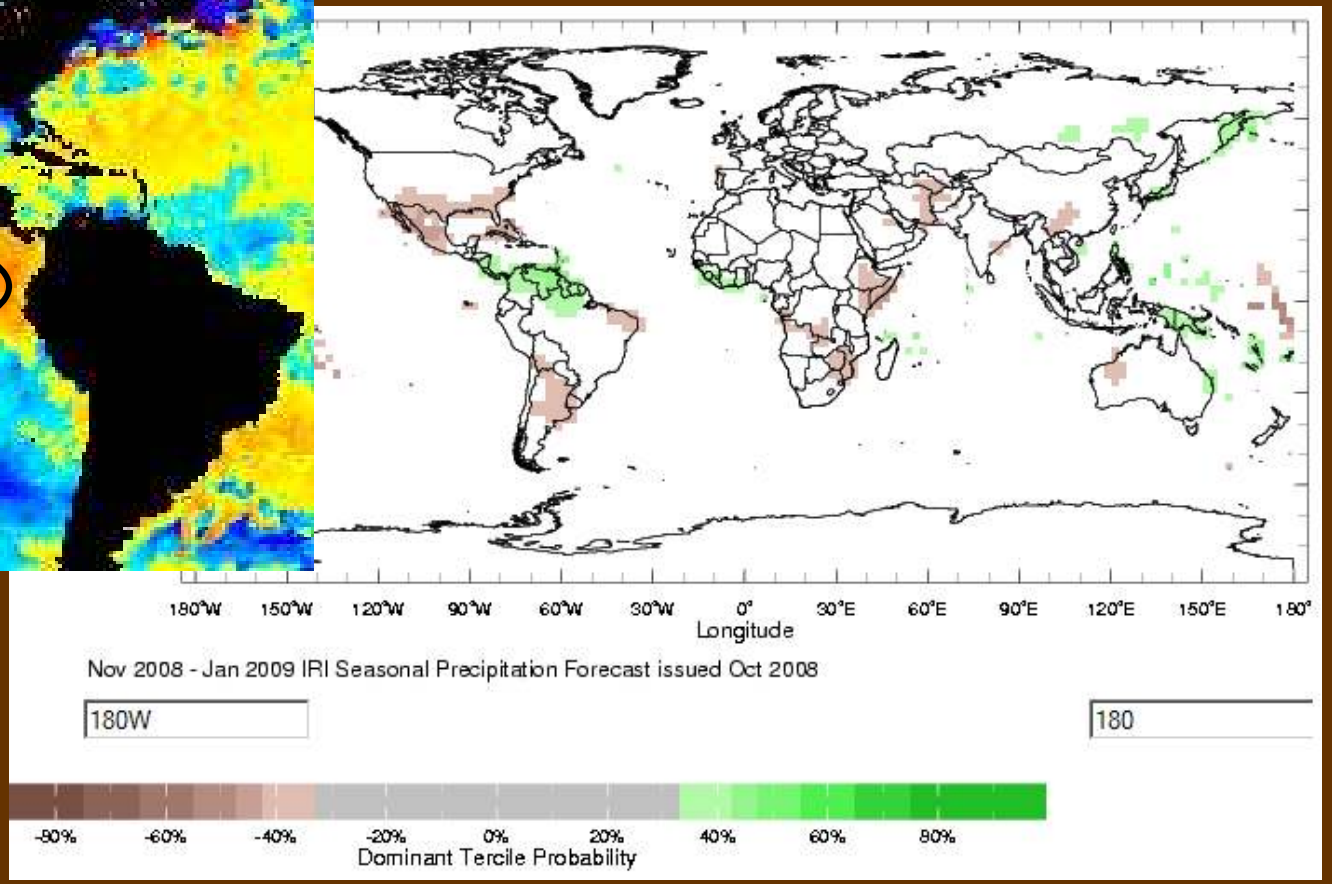
Communicating Climate Forecasts to African Rural Communities

Sanon, Roncoli, Hoogenboom, Kirshen, Some, Sanfo, Jost

Bonn, November 26-27, 2008

SEASONAL CLIMATE FORECASTS





40

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Zebiak S & M Cane 1987 A model for El Niño Southern Oscillation. *Monthly Weather Review,* 115, 2262-2278.

CLIMATE FORECASTING & AGRICULTURAL RESOURCES (CFAR)

Funding agencies

US Universities

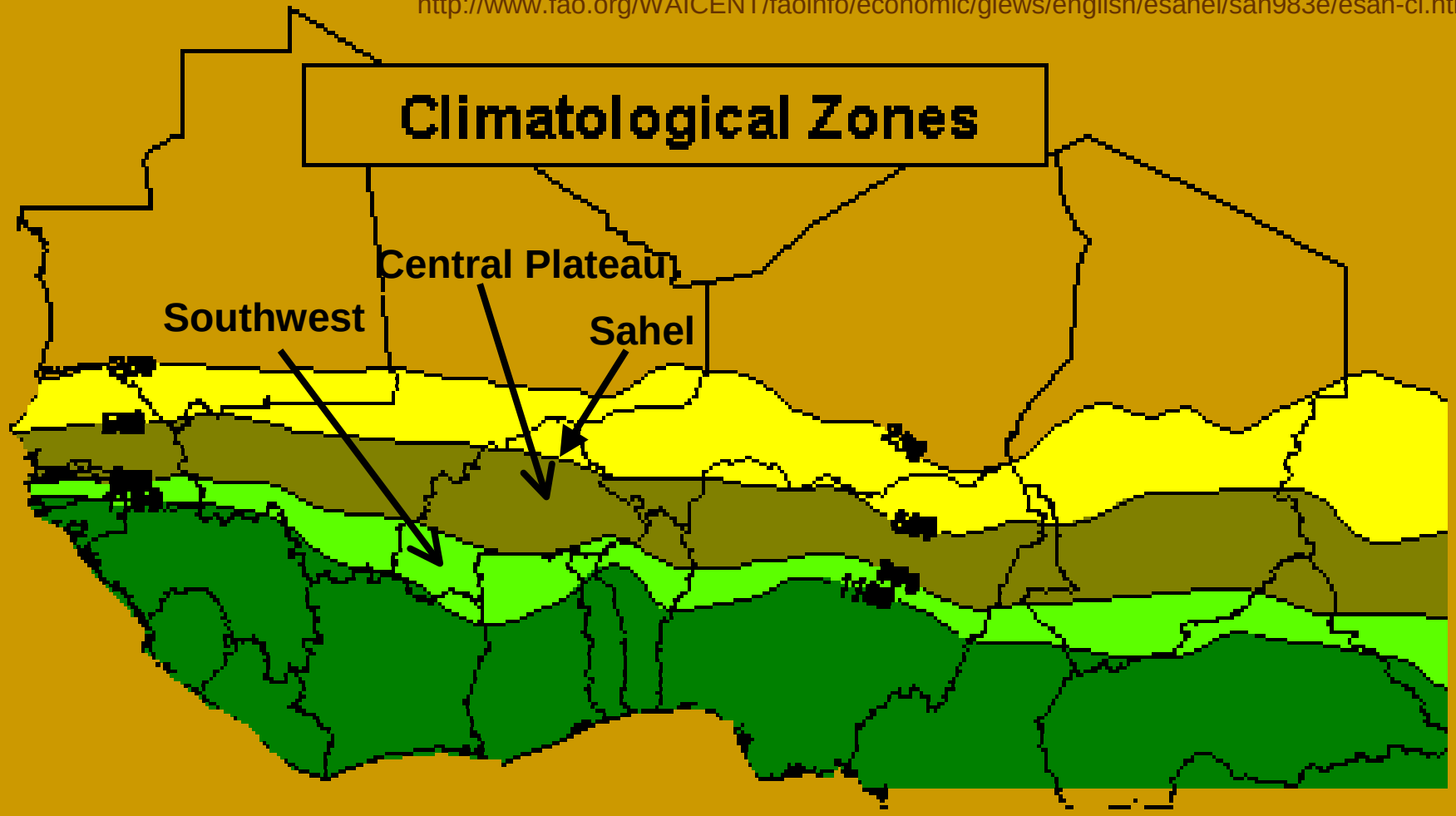
Host-country institutions

DM (met service)

INERA (ag research)

Regional instititutions

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



Introduction

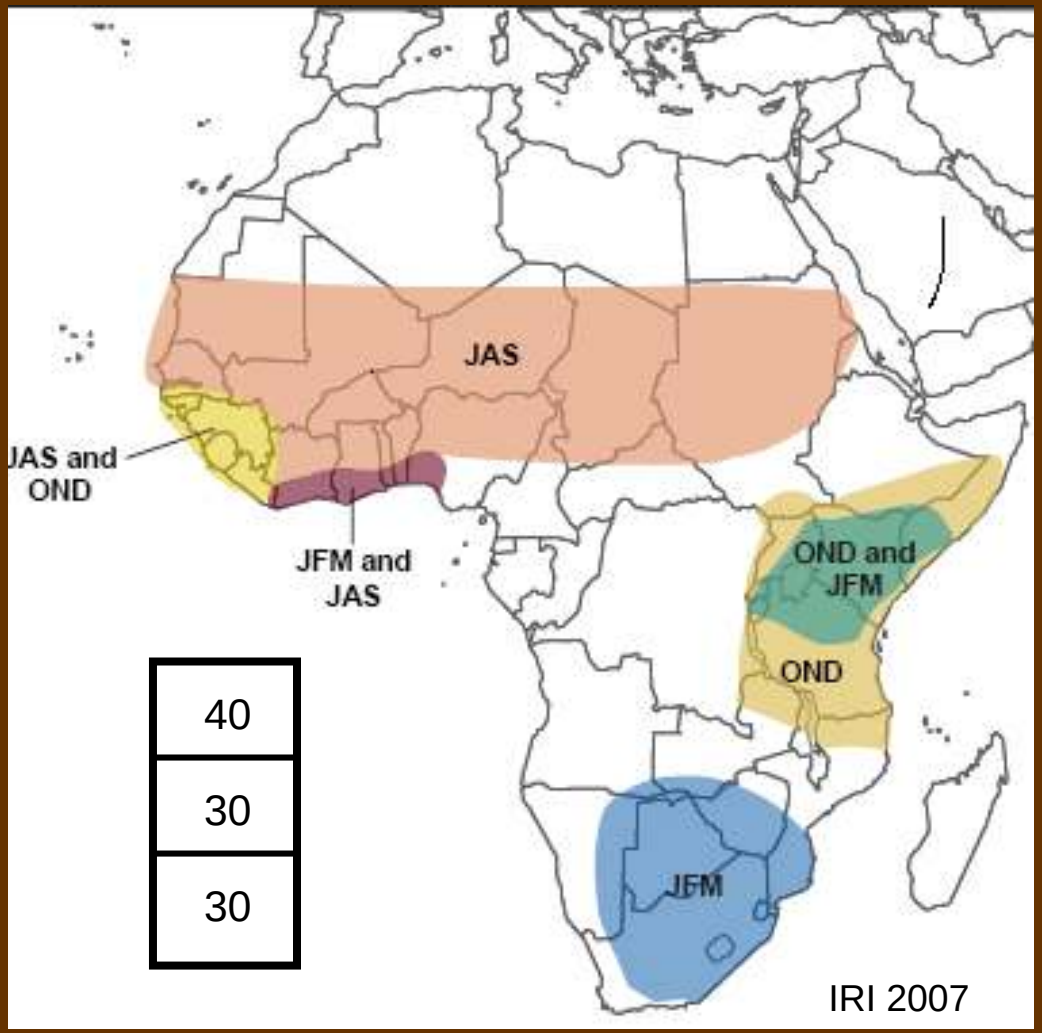
- Africa is one of the most vulnerable continents to climate change & variability, a situation aggravated by the interaction of multiple stressors occurring at various levels

- 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

Seasonal Climate Forecasts



« 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

Research sites: Burkina Faso

Sahel: livestock, millet, sorghum

Southwest:
cotton, maize

Central Plateau:
sorghum, millet, peanut, cowpea

CFAR Phase I: 1998-2001

Ethnographic & participatory research

Indigenous knowledge
Information networks
Adaptive strategies

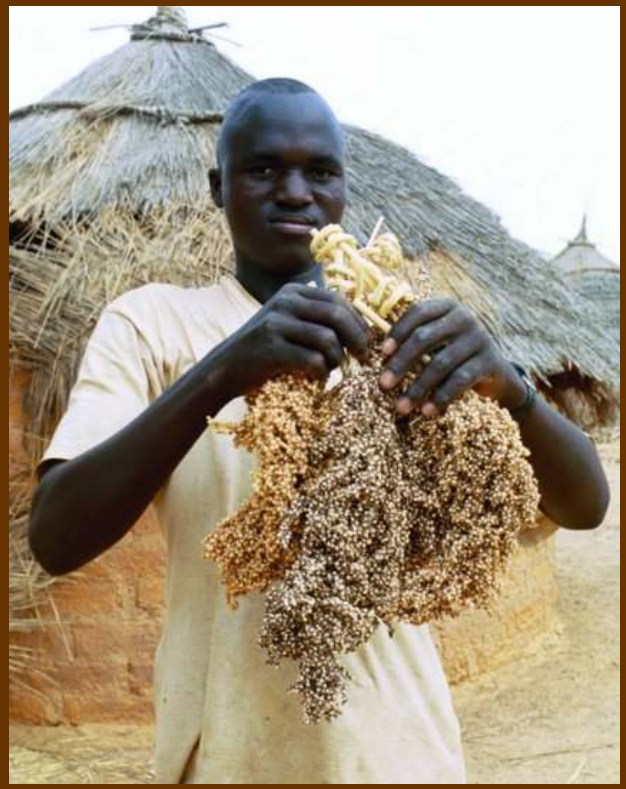
CFAR Phase II: 2002-2004

Experimental dissemination

Participatory workshops
Radio announcements
Intermediaries (extension, relay farmers)

CFAR Phase II: 2002-2004

Development of decision support system (DSSAT)



On-farm rain-gauges
On-farm test plots
Capacity building

Participatory workshops
(2002-2003)

Discussion of farmers' own forecasts

Presentation of forecast

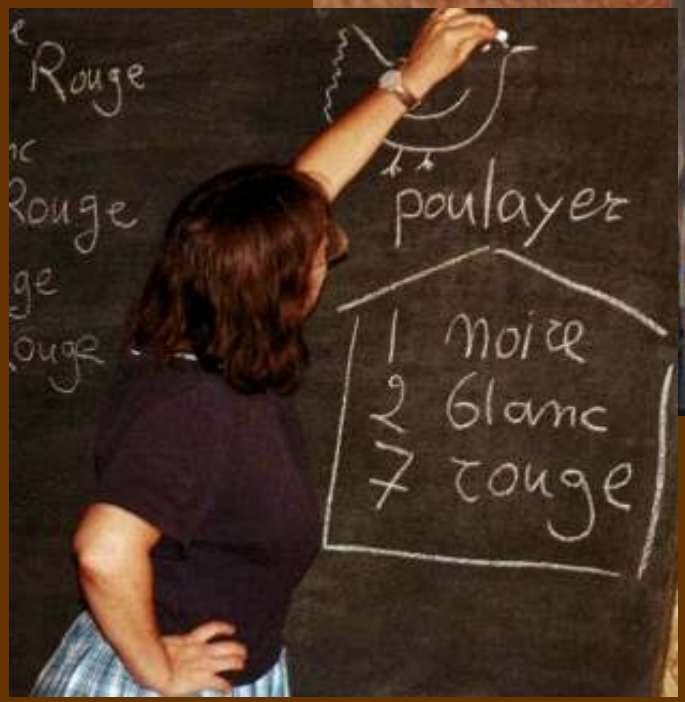
- How the forecast is produced
- Comparison of forecasts and rainfall for last 5 years
- Limits of forecasts (scale, parameters)
- Practical exercises
- Presentation of forecast

Group discussions

- Potential adaptive strategies
- Village-based dissemination

Representing probability

Daily life examples more effective than ‘probability games’



Representing probability

Messages from different sources can influence people's interpretation

07/06/02 07:18 FAX 226973908 DDPC BOBO 01

SOCIETE BURKINABE DES FIBRES TEXTILES

Société Anonyme d'Economie Mixte au Capital de 4.400.000.000. de Francs CFA
Siège Social : BOBO-DIOULASSO - R.C. N° 1566 B

S.P. 147 - BOBO-DIOULASSO
Téléphone : 97-00-24 Direction
97-00-20 Usine
Télégramme SOFITEX - BOBO
Télex : SOFITEX - BOBO 8208
Télifax: 97-00-23
C.C.P. 10474 OUAGADOUGOU
Cpte BIB N° 36.012.837 G - BOBO

Reçu, le 10/06/02

Bobo-Dioulasso, le 06 juin 2002

SOFITEX HOUNDE
Arrivé le : 07-06-02
Enregistré S/N° 337/7002
Classement

LN° 2002/0064/DDPC/GY/KDB

NOTE TECHNIQUE D'INFORMATION SUR LA CAMPAGNE 2002/2003

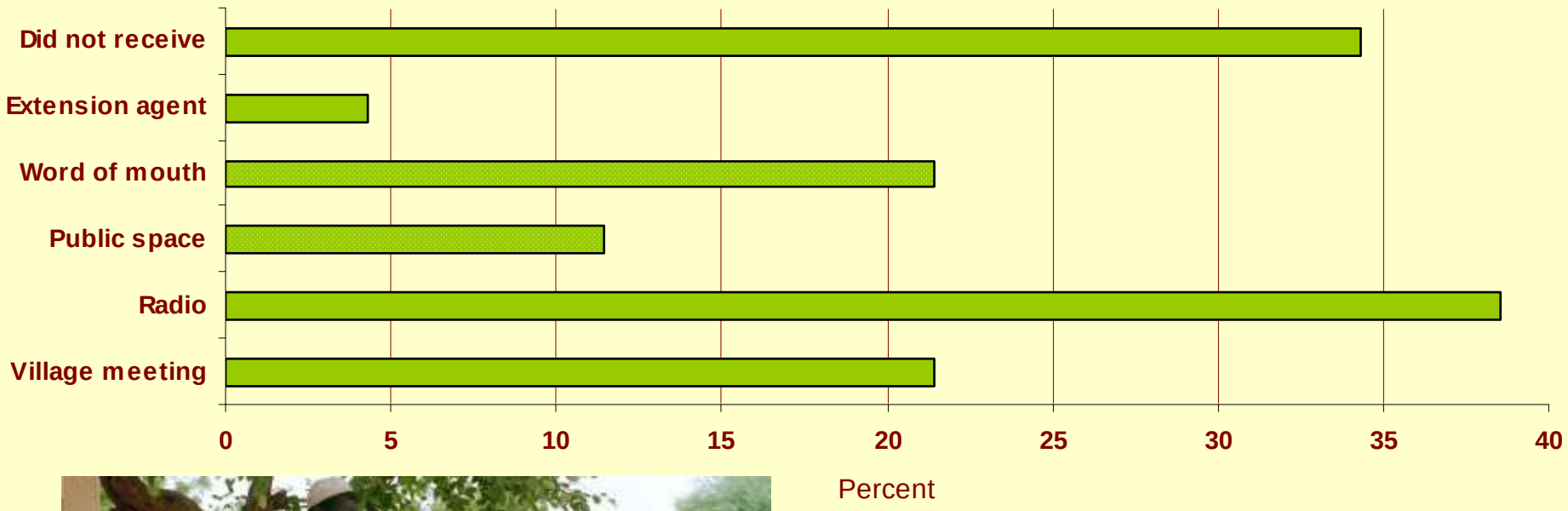
Campagne cotonnière 2004-2005

«Dieu nous gratifiera d'une bonne pluviométrie»

La Société burkinabè des fibres textiles (SOFITEX) est à pied d'œuvre pour atteindre six cent mille (600 000) tonnes pour cette campagne de 2004-2005. Une campagne qui selon la Direction générale de la SOFITEX se déroulera dans des conditions nettement plus favorables que celles écoulées.

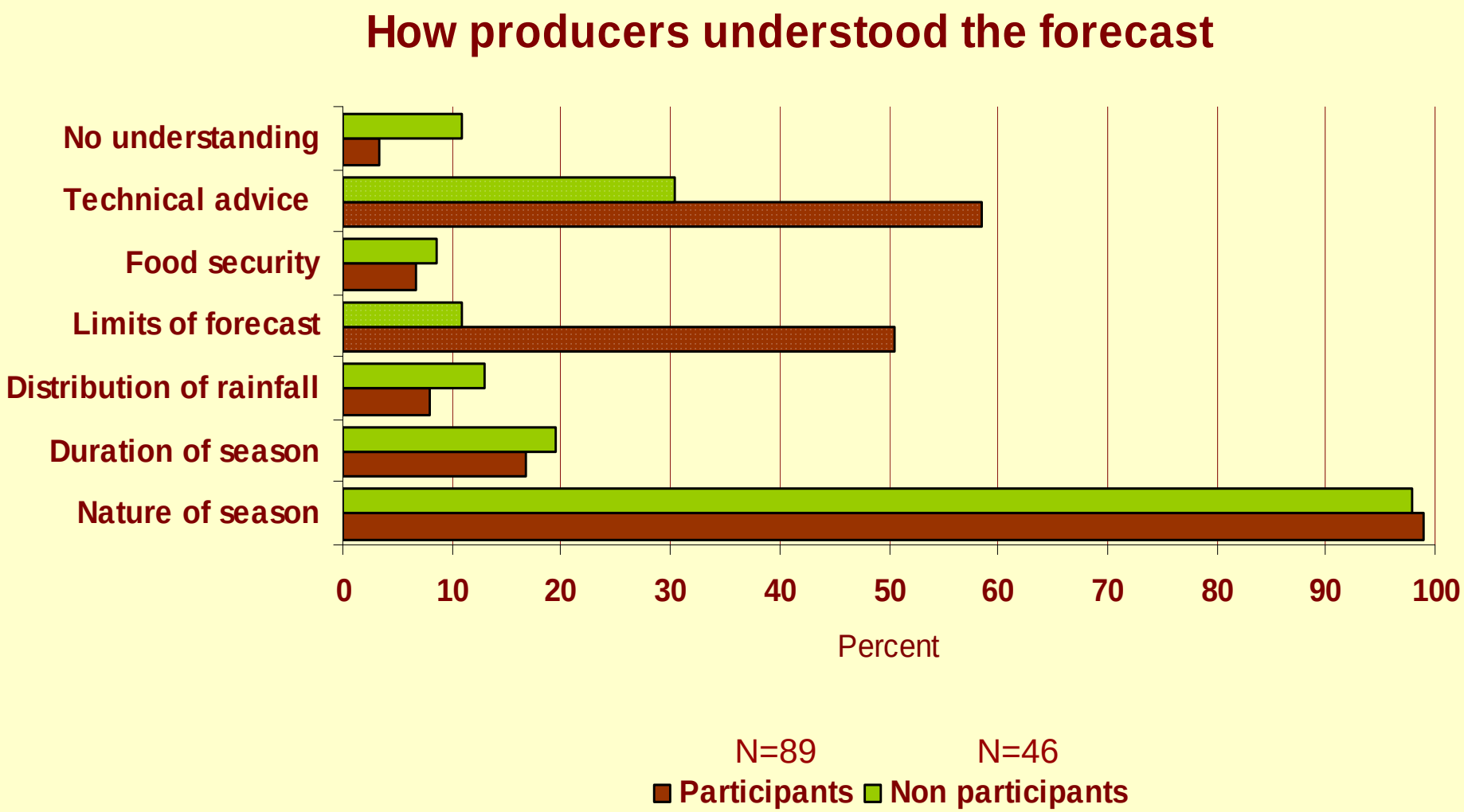
Face à cette dure situation, nous ne devons pas nous décourager mais nous armer d'ardeur et de courage pour informer les producteurs de cette situation générale, de leur remonter le moral et de leur donner des indications techniques surtout que les prévisions météorologiques semblent indiquer une bonne saison hivernale.

Par conséquent, les producteurs devront redoubler davantage d'efforts pour ne pas céder à la panique et à travailler à rattraper le retard enregistré.

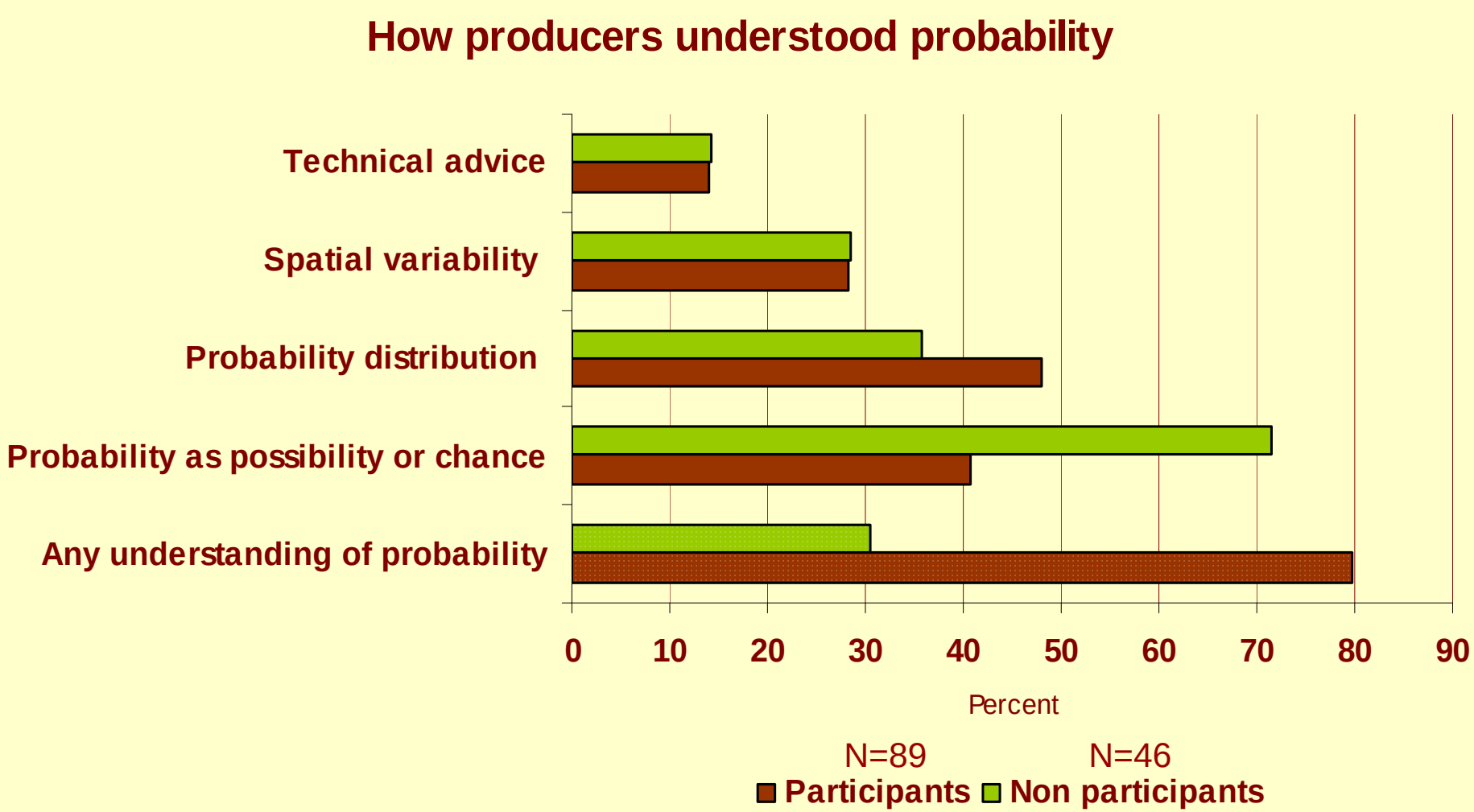


Rural radio is effective, but farmer-to-farmer communication also plays a key role

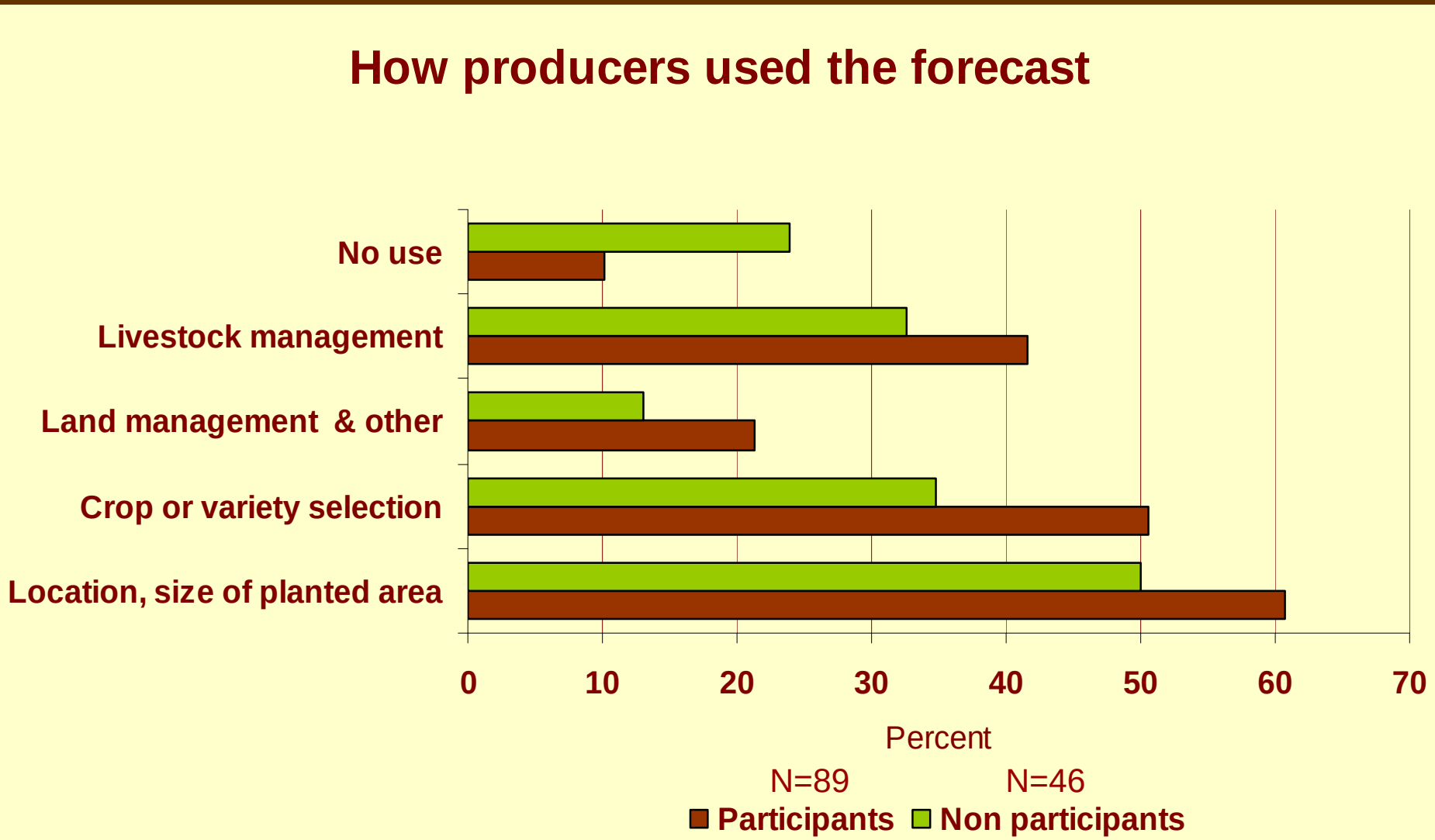
Workshop participants better understood the forecast and its management implications



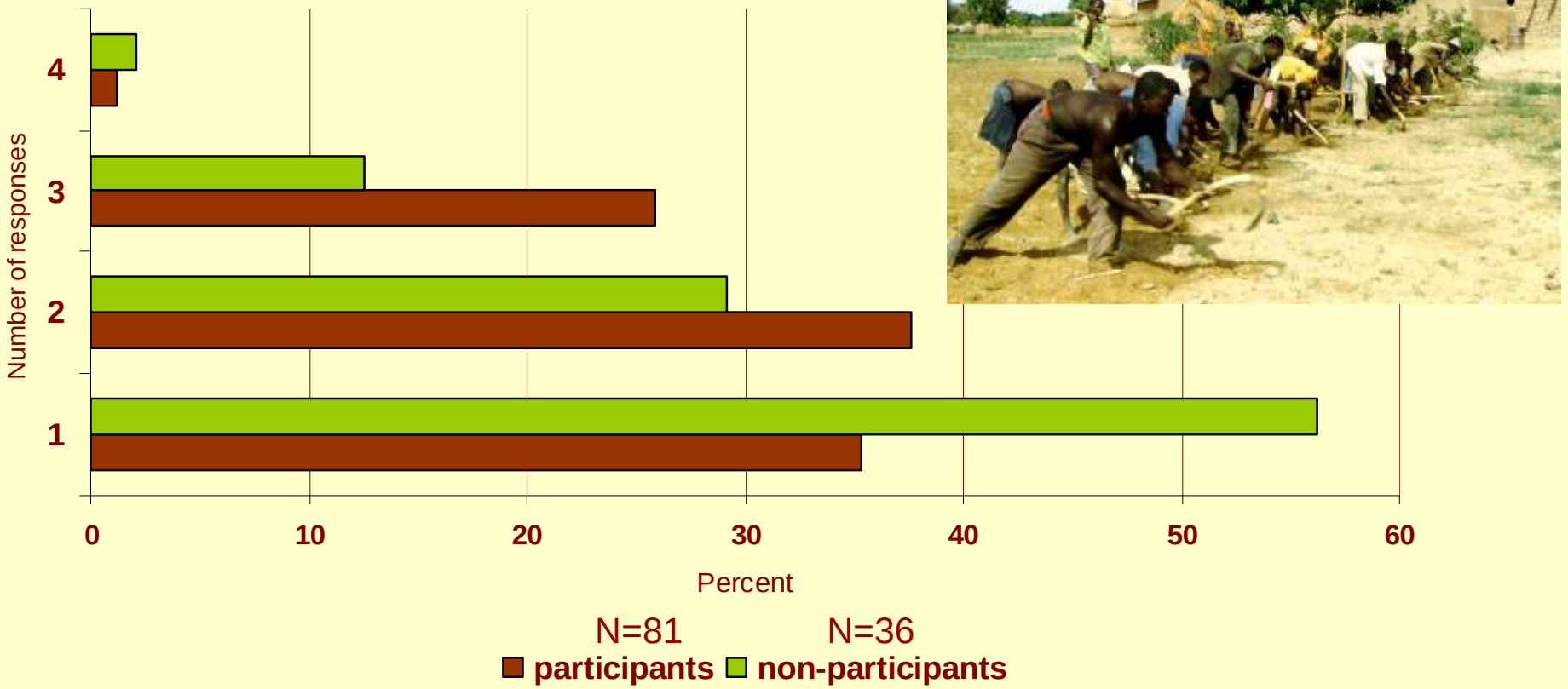
Workshop participants better understood the probabilistic nature of the forecast



What and where to plant were the most common adaptive strategies (also livestock management)



Workshop participants more likely to respond to forecast by more than one adaptive strategy



Enabling factors

Technical

- Seed varieties
- Soil & water conservation

Institutional

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

Conclusions:
Priorities for Action

- Participatory approaches can facilitate farmers' ability to use climate forecasts and should be a central part of climate change adaptation
- Farmers' ability to select among climate change adaptation options can be improved by effective climate-based decision support systems (DSS)
- Supportive policies are needed to improve the diversity and flexibility of adaptive options whereby farmers can respond to climate forecasts

Conclusions:
Future Research Questions

- How do perceptions of climate change affect the attitudes and responses of users (ex. rural producers) to seasonal forecasts?

- What are the institutional frameworks (ex. Rural Communes, farmer organizations, NRM committees) that can best facilitate the equitable and effective communication of climate forecasts?

Thank for your attention

APPLICATION OF METEOROLOGICAL PRODUCTS FOR IMPROVING AGRICULTURAL PRODUCTION:EXPERIENCES STRENGTHENING CAPACITIES OF FARMERS IN MALI

Bonn,26-27November 2008

Birama DIARRA, chief division research and development DNM

PLAN

- Observed changes in the climate in Mali
- Impacts of climate change on local agriculture
- Development of information to assist farmers
  - -Needs for assistance of the rural world
  - -Methodologies for assistance
- Socio- economic results and advantages of the assistance
- Cooperative actions to improve the assistance
- Research gaps and priorities for action
- Conclusion

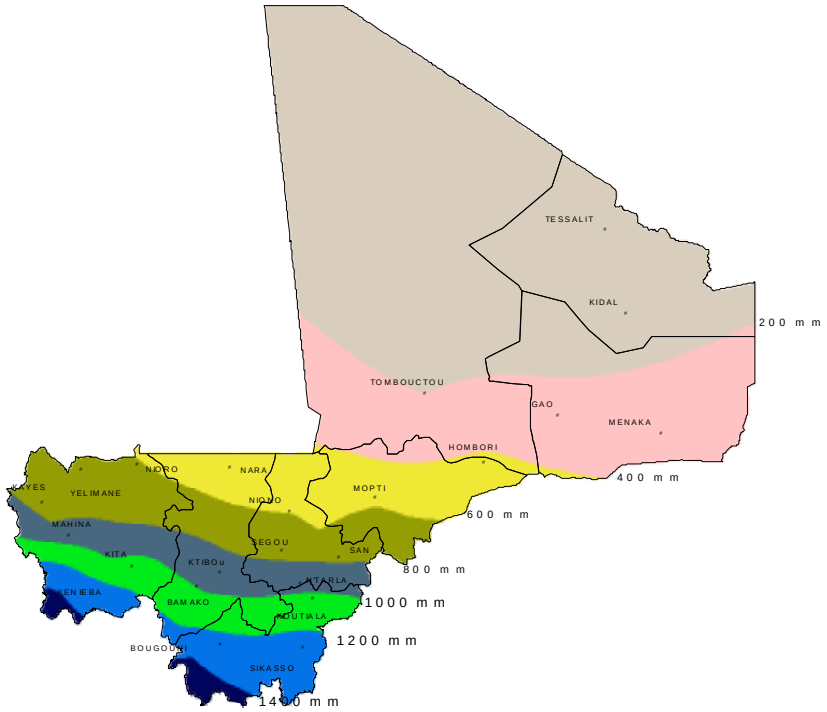
1. Observed changes in the climate in Mali

In Mali, isohyets movement from north down to the south

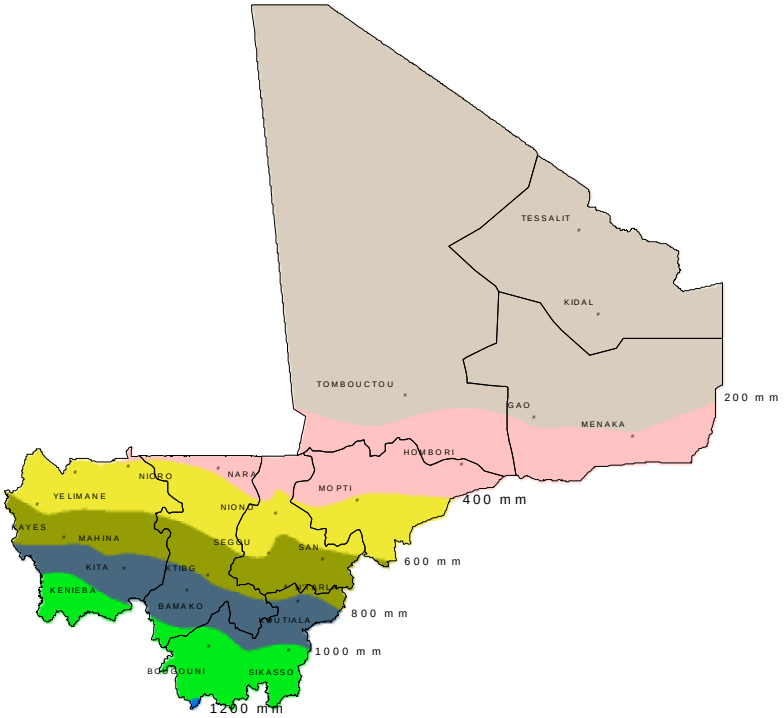
the isohyet 1200mm has disappeared from the map of Mali

1951-1970 **1971-2000**

PLUVIOMETRIE ANNUELLE MOYENNE (mm) : 1951 -1970



PLUVIOMETRIE ANNUELLE MOYENNE (mm) : 1971 - 2000



2.Impacts of climate change on local agriculture

- Reduction of the rainfall of more than 20%
- Downward trend of rainfall
- Reduction of cycle of the cultures
- Starting and random end of the rainy season
- frequent dry periods and presence of locust
- Recurring dryness and climate variability since the years 1970.
- Disappearance or disturbance of the reference marks for the rural world.
- Disturbance of the farming calendars available to the level of the agricultural services.

Consequences: lower agricultural production, famine, rural migration

SWARM OF ADULT LOCUSTS in 2004

3.Development of information to assist farmers

Need for taking into account weather information and climate change in the technological package of research in order to reduce climate risks on the production and to increase crops yields

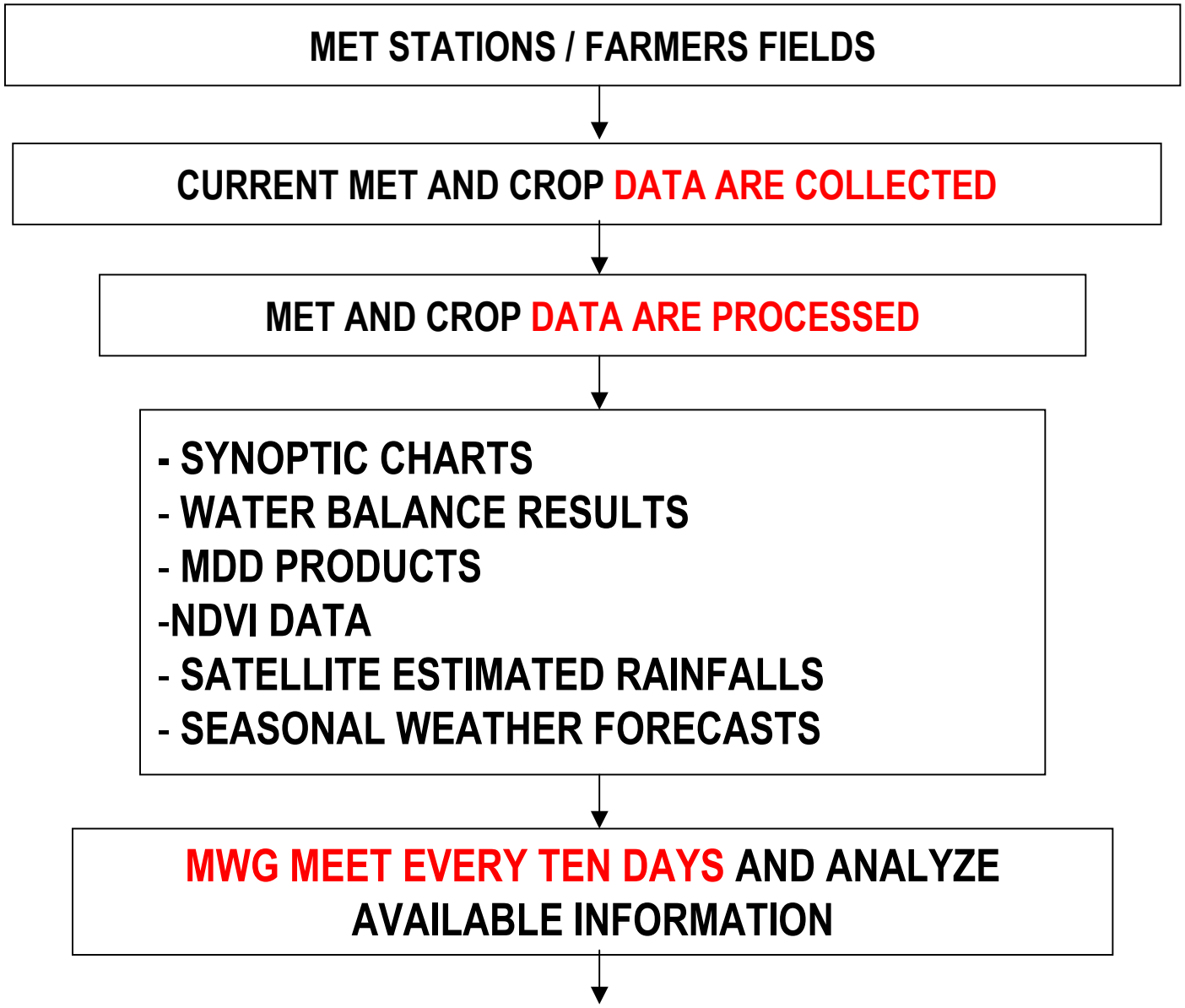
- Needs for assistance of the rural world

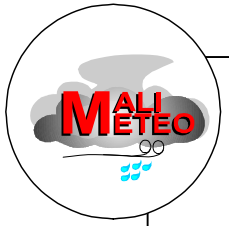
- Agroclimatic Calendar(planning of the agricultural activities).- crops cycle
- Dates for ploughing, seeding
- Date of maintenance of the fields (thinning, weeding, use of manure and pesticids)
- Dry period through the rainy season
- Period of appearance of crops diseases
- Period of onset of the rainy season
- Period of end of the rainy season.

- Methodology of the assistance

- The assistance is implemented by using the existing organizations in the rural world.
- The setting up of a multidisciplinary team which meet every ten days.
- The Building capacity of farmers to use information and test
- **The implementation of a appropriate communication system**

SCHEMATIC REPRESENTATION OF THE INFORMATION SYSTEM





ISSUANCE OF A TEN – DAY AGROHYDROMET BULLETINS

EARLY WARNING COMPONENT

- **RAINFALL** SPATIAL AND TIME DISTRIBUTION OVER THE COUNTRY
- HYDROLOGICAL INFO FOR MAIN WATERWAYS IN THE COUNTRY
- CROPS PESTS AND DISEASES
- PASTURES
- LIVESTOCK
- MET, AGROMET AND HYDRO OUTLOOKS

- NATIONAL RADIO AND TV BROADCAST
- WRITTEN PRESS, LOCAL RADIOS

DISSEMINATION TO DECISION MAKERS

AGROMET ADVICE COMPONENT

- APPROPRIATE TIME FOR AGRI-CULTURAL PRACTICES (PLANTING, WEEDING, APPLICATION OF FERTILIZERS INSECTICIDES, PESTICIDES….) (COMPLETED BY DAILY WEATHER FORECASTS,12 HRS-3 DAYS)

- NATIONAL RADIO AND TV BROADCAST
-LOCAL RADIOS
- OBSERVERS/EXTENSION PEOPLE

DISSEMINATION TO FARMERS

FOR THE AGROMET ADVICE COMPONENT WE PREPARED IN LOCAL LANGUAGES PRACTICAL PLANTING DATE GUIDES THAT CAN BE DIRECTLY USED BY FARMERS.

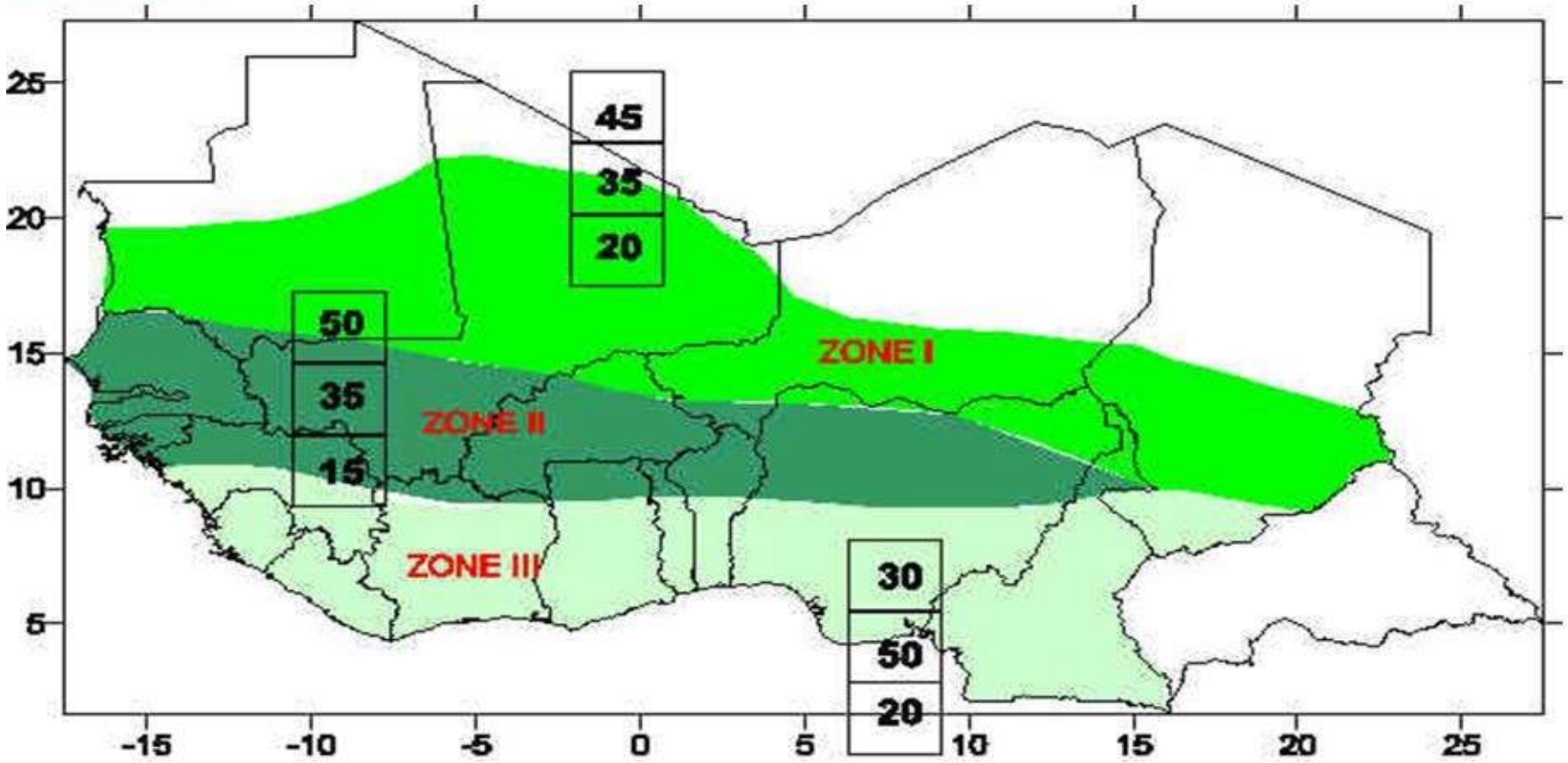
IN THIS REGARD FARMERS ARE TRAINED TO CARRY OUT RAINFALL MEASUREMENTS AND PHENOLOGICAL OBSERVATIONS BY USING BROCHURES EDITED IN LOCAL LANGUAGES.

A SPECIAL RAINGAUGE (cost 5 euro vs about 200 euro at international level) THAT FARMERS CAN AFFORD IS MANUFACTURED IN MALI TO FACILITATE THE USE OF THE GUIDE

SIMPLIFIED LOCALLY MANUFACTURED RAINGAGE

ACMAD

PREVISION SAISONNIERE
VALABLE POUR JUILLET-AOUT-SEPTEMBRE 2008



Zone 1 : Humide ; Zone 2: Très Humide; Zone 3: Normale

NB: La possibilité de déficit pluviométrique est très négligeable.

On s'attend a une activité pluvieuse proche de 1999.

Methodology (cont.)

- Examples of test and control plots(Farmer field in Banamba)

Methodology (cont.)

- Building capacity of farmers to use information(rainfall measurement…..)

PROFESSIONAL RAINGAUGE

4 Economic results and social advantages of the use of the weather products

- **Raising awareness of the rural world and the decision makers**
- **Reduction of the losses of seeds from 40% to 5% (impact on food security)**

-on average the cost of an avoided loss of seeds for millet/ sorghum/mais is approximately estimated at *5millions Euro*.

-Taking into account of the daily forecasts allows to avoid additional treatments.

For example an additional treatment on cotton would cost approximately *110 millions euro* in Mali.

-In addition it allows to rationalize the use of the insecticides and fertilizer which contribute to pollute the environment.

- **Increase in yields millet/sorghum/maize between 20 to 30%. If this increase were applied to the fields in the whole country the surplus of production millet/sorghum/maize would cover on average the food needs for approximately *3,5millions people (1/3* of the population of Mali). This is equivalent to approximately 165 millions Euro**

The cost /benefit ratio of this assistance was estimated at *1/21*

5 Cooperation actions to improve assistance

Mali benefited technical and financial support from development partners :

- **WMO,Regional AGRHYMET CENTRE and ACMAD for the staff training, equipement,and the development of products in particular seasonal forecast.**
- **Italian Co-operation through IBIMET (Florence) for the Follow-up of the agricultural season and the identification of the zones at risk within the framework of food security**
- **Swiss co-operation for the implementation of the agrometeorological assistance in the rural world since 1983 which is considered today in the world as a means of building adaptive capacity of the rural world to face climate change**

Co-operation (cont.)

- **Netherlands Co-operation** for the development of the climate change scenarios and vulnerability and impacts studies of climate change in Mali.
- **England Co-operation** for to improve the dissemination of met information in TV in Mali
- **European Commission, French Co-operation and the IRD** through AMMA and RIPIECSA projects for the improvement of weather forecasting to the benefit of users
- **African Desk and IRI (the USA)** for building capacity of the personnel of the national met service.

Co-operation (cont.)

- **German co-operation through the GTZ/Climate Protection Project and the Ministry of economic Cooperation and development _BMZ (July 2007 to June 2008)**:

The implementation of this Project has contributed to enhancing the awareness on the stakes of climate change for:

- 50 teachers, and 5000 students both at primary and secondary schools level,

- Communication specialists (setting up of a network),

- Public in general and in particular the rural world (more than 200 farmers), the women and 90 NGOs

- and decision makers (60 local elected people and 50 parliamentaries) .

Also 3 documents have been elaborated and translated in local language and distributed to farmers.

6-Research gaps and priorities for action

- **Strengthen network collect data for improve database.**
- **Seasonal forecast outputs are only expressed in percentage.**
- **Need for more localised (village level) weekly and daily weather forecasts**
- **Building capacity of experts and facilitate access to satellite data.**
- **Development of downscaling methods to perform climate change scenarios at country level in Africa.**
- **Building capacity for information and communications technology_ICT**

7. CONCLUSION

- **The use of weather information contribute to influence the decision-making process by the farmer for planning and execution of the agricultural activities (choice of varieties, the moment convenient for the various farming interventions: ploughing, seeding…),**
- **Control by the farmer of the "calendar of seeding" of his location, minimizing the risk of failure of seeding, for various speculations based on rainfall thresholds that he will measure himself.**
- **There is a need to continue technical and financial support in order to generalize the assistance to the whole country while filling the identified gaps**

Finally the agrometeorological assistance in the rural world is considered today like an effective tool of strategy of adaptation to climate change.


THANKS YOU

AGRICULTURAL EXTENSION SERVICES IN AFRICA AND EFFECTIVE COMMUNICATION TOOLS: SUCCESS FACTORS, PITFALS AND RESEARCH NEEDS

Objectives

Impacts of climate change in Africa

Mitigation/ adaptation strategies

Role of extension and communication in strengthening capacities

Success factors and pitfals

Research needs and priorities for action

CONTEXT OF CLIMATE CHANGE

- Climate change as pattern of weather- averages, extremes and variability, timing and spatial distribution of weather patterns
- When climate changes, the patterns of weather changes
- Climate governs all aspects of sustainability of our livelihood systems
- It is talking livelihoods and welfare

ADAPTATION TO CC

- GoK-IWRM & WE 2008 projects less rainfall in ASALs and climate variability in Africa
- CC will affect water availability for livestock and agriculture- reduce agricultural productivity
- CC will affect livelihoods , worst for the poor
- Migration in search of food and fodder
- Construction of water harvesting structures
- Reduced livestock numbers, stocking capacity

EXTENSION SERVICES AND ADAPTATION TO CC

- Extension is about getting to know from an informed source- for development
- Know about agricultural drought- and technologies to combat it
- Invisible agricultural drought prevent farmers from achieving high yields, and
- Makes farmers vulnerable to major droughts
- Extension is as continuous as the invisible agricultural droughts- hence can be mainstreamed

EFFECTIVE COMMUNICATION

- Process that informs and educates target audience
- It comprises the source/ message, the media/ channel, sender, receiver and feedback mechanism
- Effective if message reaches intended target audience and creates the required impact, and when it is
- Reliable, cost effective and timely
- Comprises both message and its aesthetics- attractive presentation

AFRICA

- Most economies are agri- based- small scale farmers using rain fed agriculture- 75%
- Any effect on natural resources affects the economy and welfare of Africa
- Has suffered periods of extreme drought and floods such as El nino and La nina in late 90s
- Climate change is real and predicted impacts are serious and far reaching
- The question is, could Africa just be a victim?

AGRICULTURE AND WATER

- Rainfall variability- amounts, seasonality and onset influence agric productivity
- Africa has vast unexploited potential for irrigation due to low investment in RWH and storage infrastructure
- Major CC impacts exacerbates the situation created by invisible agricultural droughts
- Water and agriculture directly related
- Extension services done for agric and water

STUDIES

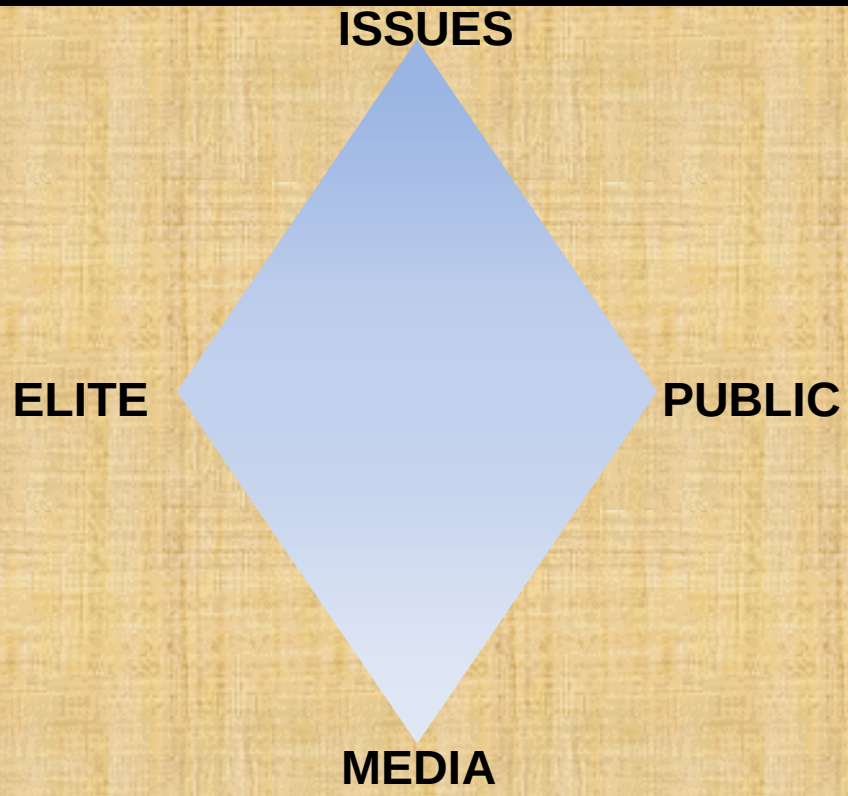
- Series of studies done on extension methods/ approaches in Africa
- Who provides extension services- is it a public / private good or both
- Appropriateness of specific extension methods depends on several factors
- Communication tools/ media such as radio, Tv and newspaper examined for preference and impact on agriculture- based on listenership/readership

METHODOLOGY

- Sample surveys – both national and region specific
- Tv and radio- targeted listeners for vernacular FM stations, over 40 in Kenya
- Baseline study on extension done in 2005
- Evaluation study done on 2008
- Results analysed around the kite co orientation model and research extension- farmer linkages
- Emphasis on message, sender, receiver and feedback

COMMUNICATION PROCESS/MODEL

THE KITE CO-ORIENTATATION MODEL



Research- Extension- Farmer linkages

- RESEARCH ⇄ EXTENSION ⇄ FARMER

- Research -Extension Linkages
- Extension - Farmer linkages
- Farmer - Research linkages
- Extension looked at not in isolation but part of the value chain
- Model describes flow of information along the chain

RESULTS/ FINDINGS

- Various extension methods applicable to different situations- such as ASALs
- Include FFS, Field days, Demos, shows, baraza, workshops, seminars, film shows, exchange visits, trainings, etc
- Radio popular with rural people, especially vernacular FM Stations
- TV powerful because it uses variety of human senses- audio- visual
- Newspaper outreach limited to elites

EVOLUTION OF EXTENSION SERVICES-Kenya

- State sole provider of services up to 1985
- SAPs brought a paradigm shift- pluralism i.e more non-state extension service providers
- Group approaches as opposed to Training and visit / face-face contact given prominence
- However, prominence of State in provision of extension services to the poor still vital
- Plurality and privatization of extension services taking centre stage, together with
- Collaboration, partnerships in extension
- Number of farmers reached public extension p.a is above 50%

RESEARCH- EXTENSION-FARMER LINKAGES: Research-Extension Linkages

Seem to be far apart, yet too close in the chain

- Extension staff need further training in CC to grasp technical terms and re-package
- Series of joint meetings/ forums planned but not regularly attended
- Develop attitudes to wards each other- forgetting the farmer as focal point
- Few joint forums imply limited feedback involved

EXTENSION- FARMER

- Not in regular touch as one would expect- extension farmer ration of 1; 1200 reported in Kenya in 2006
- Group approach has been adapted – formation of common interest groups, eg tea
- Extension message covers adaptation to climate change but not pronounced
- Extension limited in mobility and equipment support- projects to empower farmers to run extension already initiated
- Blanket messages-Replication of messages to different farmer situations, a challenge

RESEARCH AND FARMER

- Have a connector- that is, extension
- Needs vary depending on circumstances, local packages as opposed to imported or imposed
- Extension attempts to bridge gat thro’ joint meetings like field days
- Blame extension when things don’t work- few cases of research doing extension evidenced
- Research assumes farmers’ local knowledge as a result of limited time together to share – forums

SUCCESS FACTORS

- Cost of extension services/ affordability
- Appropriateness of message to farmers needs
- Type of enterprises- crop, livestock, etc
- Timeliness in delivery of CC message
- Interesting/ convenient
- Number of human senses used – sight, smell touch, hear and taste
- Capacity of personnel, equipment and skills
- Farmer empowerment- to challenge & advice research

PITFALS

Conflicting CC extension messages

Climate change not adequately mainstreamed in extension messages

Specialized extension approaches needed for ASALs

Limited skilled manpower in CC

Research agenda setting not inclusive

RESEARCH NEEDS

- Cost impact analysis for various extension methods/ communication tools
- Potentials of folk media and African traditional communication systems
- Factors influencing feedback in communication process
- Research –extension- farmer linkages: the missing links
- Pluralism, collaborations and partnerships in extension- will state have a role?

PRIORITIES FOR ACTION

- Build alternative livelihood strategies- for messages to make sense, plant trees but no food
- Proper forecasting- accurate data/ messages on CC
- Enhance public awareness thro' environmental education & campaigns
- Create local, national regional platforms & empower farmers
- Train more manpower/ farmer groups , journalists for sustainability
- Tailor messages to invisible droughts/ floods

CONCLUSION

- Poor Africa are more vulnerable to climate changes, hence need for adaptation ability
- Extension can act as a catalysts to adaptation by addressing the impacts of invisible agric droughts, floods, etc
- Effective communication will ensure feedback and appropriate messages for adaptation
- Build more capacity in Africa- in livelihood strategies and extension services provision