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MAINSTREAMING CLIMATE CHANGE ADAPTATION IN AGRICULTURAL EXTENSION

A Training Manual on the Use of Climate Information and Vulnerability and Capacity Assessment for Agricultural Extension Staff in Zimbabwe

Funded by:

Nuffield Foundation

Foreword

This manual is a product of collaboration between the Department of Agriculture Technical and Extension Services, Practical Action and the University of Reading with funding from the Nuffield Foundation.

Despite Climate change being a topical issue across the globe, very little had been done to mainstream it into agricultural extension in Zimbabwe. This manual is set to help the extension worker provide best available advice to farmers so that they optimise productivity without endangering their lives and the resource base they derive their livelihoods from.

This manual takes cognisance of the fact that for extension staff to provide useful and appropriate advise they should fully understand the livelihoods and resources that the community they serve has. Hence it touches on issues such as livelihoods and disaster risk reduction. Our goal in agricultural extension is to see food secure households with improved livelihoods. At the heart of all this is the recognition that rural people themselves are the owners and shapers of their own development.

Rain-fed farming is risky because one can never be sure of how a particular season will be like and as such it is important for farmers to understand the extent of the risk they will be taking in certain activities like deciding when to plant, what crops and what varieties. It is our hope that if farmers have knowledge of how risky it will be to perform certain crop and livestock management activities at a particular time they will make better informed decisions.

Analysis of the growing season of an area can be done using modern statistical methods. Extension staff should be trained in the use and interpretation of the analyses done for their areas. This brings in the importance of record keeping both at farmer and extension worker level. Extension staff should strive to keep records of parameters such as rainfall for the areas they serve so as to analyse the growing seasons.

The winds of change (economic, social, and environmental) that are inevitable in life bring with them major challenges, not only for the communities themselves, but also for the institutions which advise and support them. This manual is a major step for AGRITEX in overcoming the challenges that climate change/ variability brings to the communities whom they serve.

Bernard Mache

Acting Director – Technical Services

Department of Agricultural, Technical and Extension Services

ACKNOWLEDGEMENTS

The project entitled “Mainstreaming climate change adaptation in Zimbabwe’s agricultural extension system” aims to integrate climate change adaptation in the Department of Agricultural, Technical and Extension Services (AGRITEX); whose professional staff are mandated to deliver agricultural extension in Zimbabwe. With increased knowledge and awareness of climate change issues, AGRITEX staff at all levels will be able facilitate decision-making and planning by smallholder farmers in adapting and coping with climate variability and change.

An initial manual was developed based on the content of four training workshops each attended by 30 AGRITEX staff drawn from Head Office and the three provinces; Matabeleland South, Midlands and Masvingo. The training workshops were interactive, included several exercises and a community-based trial. All participants were encouraged to comment on the suitability, content and style of the training. Thanks are due to all the participants who provided valuable suggestions which have been incorporated into a revised draft of the training manual.

In the initial “roll out” phase of the project, the revised draft of the manual was then used by a team of 15 AGRITEX staff, who had attended one or both of these earlier workshops, to themselves train 20 new colleagues. Feedback from this workshop has shaped this version of the manual.

Thus many people have contributed to the writing and final production of this manual. The initial course content was developed and delivered by Dr Peter Dorward and Dr Roger Stern (Reading University), Henry Muchedzi and Kudzai Marovanidze (Practical Action Southern Africa), Rutendo Nhongonhema (AGRITEX), John Mupuro (Meteorological Services Department (DMS)), Dr Leonard Unganai (UNDP) and Dr Piet van den Ende (for Practical Action UK),

Special thanks must be extended to Rutendo and John for their sterling work, often under considerable pressure and at very short notice, to analyse locally relevant climatic data. The willingness of the directorate of the Department of Meteorological Services to make climatic data available to AGRITEX must be acknowledged. It would have been impossible to deliver meaningful training without access to local meteorological data.

A special vote of thanks is extended to all who participated in the workshops and who provided valuable feedback on different aspects of the training. Thanks must also be extended to the communities and individuals who willingly took part in the field activities that were part of the training. All the comments and suggestions received have helped to shape this manual.

The support and encouragement of the Directorate and staff of AGRITEX is acknowledged as is the valuable contribution made by the staff of the several training facilities used.

A final vote of thanks must be extended to Luke Herman, who undertook the unenviable task of formatting the original documents. He has done a great job!

This manual has been produced as a component of the project “Mainstreaming climate change adaptation in Zimbabwe’s agricultural extension system” funded by the Nuffield Foundation, Africa Programme. While the financial support of the Nuffield Foundation is gratefully acknowledged, the contents of this manual are the responsibility of the contributors and do not necessarily reflect the position of the Nuffield Foundation.

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SECTION 1.0

INTRODUCTION

This manual has been produced as part of the project entitled “Mainstreaming climate change adaptation in Zimbabwe’s agricultural extension system” funded by the Nuffield Foundation Africa Programme. The project aims to integrate climate change adaptation in the Department of Agriculture, Technical and Extension Services (AGRITEX) by training professional staff. The manual has been developed based on lessons learned during four earlier training workshops held for AGRITEX staff.

The project is being implemented by Practical Action in partnership with the University of Reading (UoR) with the support and collaboration of the Zimbabwe Ministry of Agriculture, Mechanisation and Irrigation Development (MAMID). AGRITEX training branch have actively participated in the workshops and the planning and allocation and provision of training facilities. Staff travel costs and benefits have been covered by AGRITEX.

The manual contains material designed to assist in the training of AGRITEX staff to integrate climate change adaptation into their professional activities. These trained staff will in turn roll out the training to further AGRITEX staff who will eventually cascade the training down to Agricultural Extension Workers (AEWs), who will in turn be able to improve the capabilities of smallholder farmers to respond to both current climate variability and future climate change.

The manual is in two parts.

The first section describes activities for communicating with farmers about climate and weather in order to help them in their planning and decision making.

The second section describes livelihoods, vulnerability and capacity analysis; a systematic diagnostic method for identifying, estimating and ranking local risks and possible solutions.

This manual contains material specifically designed to assist trained staff in the training of professional colleagues. It is complementary to the “Step by step guidelines” designed to be used by Agriculture Extension Workers working at the community level.

SECTION 2.0

BACKGROUND

Small-holder farmers in Zimbabwe are increasingly under pressure. While they have been dealing with the vagaries of the weather (Climate Variability) for generations, changing their farming practices and adopting various coping strategies as determined by the prevailing conditions, their previous experience and their access to resources; they are finding it increasingly difficult to cope in the face of rapid change and the occurrence of events that they have not previously experienced. Their vulnerability is increasing in the face of greater uncertainty and unpredictability. Farmers need help and support in order to deal with increasingly uncertain weather patterns.

It is now considered “unequivocal” that the global climate is changing, primarily as a result of global warming, with a number of “knock-on” effects such as rising sea levels and more unpredictable weather events (IPCC 2007). At the same time, it is important to distinguish between **Climate Change** and **Climate Variability** (see definitions attached). Meteorological records show that while the earth’s temperature is increasing, the analysis of rainfall patterns for several sites in Zimbabwe, and for many sites elsewhere in East and Southern Africa, show no clear trends so far, but remain variable from season to season.

Many of the problems that farmers are experiencing are **not** the result of Climate Change alone. Climate Change and Variability is not a stand-alone hazard but rather a multiplier of risk, interacting with existing and future hazards to produce unusual situations that might not have been previously experienced. For example, increased rainfall intensity (a not uncommon event) may be said to have caused increased soil erosion – the result of “Climate Change”! But an increase in population, with more livestock, increased grazing pressure and the cutting of trees for firewood resulting in more rapid run-off is most likely the **underlying cause**. The weather is a contributing factor; **not the cause**. Nonetheless, rising temperatures, variable rainfall and more severe floods and droughts are already having drastic consequences for the livelihoods and food security of resource poor people – particularly small-holder farmers (TNA Guidebook Series. “Technologies for Climate Change Adaptation – Agriculture Sector”. GEF and UNEP, 2011).

Long-term Climate Change is expected to lead to more frequent, more extreme or more unpredictable occurrences of existing natural hazards (such as the timing, frequency and distribution of rainfall, floods, droughts and cyclones). It can also result in the emergence of new hazards which did not occur previously in a particular location (such as new pests and diseases) due to changing

environmental conditions or rising temperatures. This puts livelihoods dependent on natural resources under increasing pressure.

Pictures: Overgrazed land. In the two scenarios runoff increases, biodiversity and soil will be lost during the rainy season. And this is one of the most likely underlying causes of many of the farmer's challenges

As farmers are already experiencing production problems related to current climatic constraints, as well as facing the prospect of coping with greater uncertainty, we need a two-pronged approach to **future** Climate Change - the "Twin Pillars of Adaptation":

1. In the short term: helping farmers to cope better with current risks

2. Developing options for adaptation to future (largely unknown) risks due to climate change – Adaptive Capacity.

Building livelihood resilience now will contribute to longer-term adaptive capacity. Many of the strategies which will enable farmers to achieve food security and increased well-being under current climatic conditions will directly contribute to increasing their ability to cope with future uncertainty. They will contribute to adaptive capacity.

In order to be able to deal with current hazards (including Climate Variability) and rapidly changing circumstances, farmers' need to be empowered (capacitated) to analyse and understand what is happening. They need to be aware of the risks, hazards and shocks that they face, how these impact on their livelihoods, what strengths or capacities they have that they can use to minimise or avoid these risks and what they can do to make their lives and livelihoods

more resilient to change. In order to identify potential risks and adaptive strategies, we need context specific analysis that identifies the causes of peoples' vulnerability.

In addition farmers need access to reliable information about the weather and how the climate is changing and what they can do to adapt to both current variability and predicted long-term changes. A considerable volume of meteorological data exists in Zimbabwe, much of which covers a period of more than 50 years. Rainfall and temperature records for many localities exist, but remain largely unavailable to farmers. The analysis of meteorological records from a small number of sites has already been shown to provide useful information which when combined with weather forecasts can assist farmers in making informed decisions regarding crop production.

SECTION 3.0

WHAT IS CLIMATE CHANGE AND CLIMATE VARIABILITY?

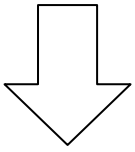
Note to the facilitator: This is quite a long presentation with a lot of detail. It normally takes about 50 minutes. If you are running short of time or think that there is too much detail then one can leave out slides 10, 11, 12, 16 and 19 without missing the main points of the session.

The complete slideshow can be found in Appendix 1

SLIDE 1 – Title

We have all heard a lot about climate change and its effects. But what is it and what is it caused by? This session aims to provide us with a scientific explanation of what climate change and variability are. It is an important starting point for this course.

In this session we will cover the following:



SLIDE 2 – Overview

- What is climate
- The green house effect
- Affect on weather
- Is it man-made or not?
- Impacts of climate change
- Climate 'myths' (some things that are not true)
- Where you can find out more

SLIDE 3 – Some definitions

- Weather is the state of the atmosphere at a specific time in a specific place.

E.g. temperature, cloudiness, rain, wind, thunderstorms, tornadoes, monsoons..

- Climate is the average state of the atmosphere over a long period (normally > 30 years)

E.g. Addis Ababa normally has dry winters and rainy summers

SLIDE 4 – Some definitions

- Climate variability refers to variations in the current state of the climate

e.g. El Nino causes lower rainfall ~ every 7 years

Or e.g. the amount of rainfall we receive varies from year to year

- Climate change is a shift in the current state of the climate over at least several decades

E.g. The Sahara used to have a rainy climate and now has a dry one.

- Both of these will have an impact on day to day weather conditions

Check that everyone is clear about these definitions

Let us now look at a cause of climate change. The 'greenhouse effect' is understood to be the main cause of climate change in recent decades and is predicted to be what will cause changes in climate. The term 'greenhouse effect' is used simply because the process is a bit similar to the way a greenhouse heats up. In other words we can think of the world and its atmosphere as being similar to a big greenhouse which the sun heats up.

Ozone gas (O_3) is found mostly at altitudes of 20-35 km in the Stratosphere – forming the ozone layer. At ground-level it is extremely dangerous to humans, damages plants and is a greenhouse gas.
However, in the Stratosphere it plays an essential role in enabling life by filtering the Sun's harmful ultraviolet radiation (UV). This protective layer was becoming damaged by chemicals such as Chlorofluorocarbons (CFC's). An international agreement called The Montreal Protocol was created to prevent any further damage. This was signed in 1987 and in 1990 a complete phase-out of these harmful substances was adopted.

SLIDE 5 – The greenhouse effect

- Sunlight (short wave radiation) passes through the atmosphere and warms the Earth's surface. This heat is re-radiated out towards space as long wave radiation
- Most outgoing heat is absorbed by greenhouse gas molecules and re-emitted in all directions, warming the surface of the Earth and the lower atmosphere
- Greenhouse gases include $C0_2$, Methane, N_20

Gases that we call Greenhouse Gases (GHG's) behave differently to other gases. They block some outgoing long-wave infrared from easily leaving our atmosphere. So some heat cannot escape from the atmosphere back out to space. The GHGs act a bit like a blanket and the atmosphere warms up.

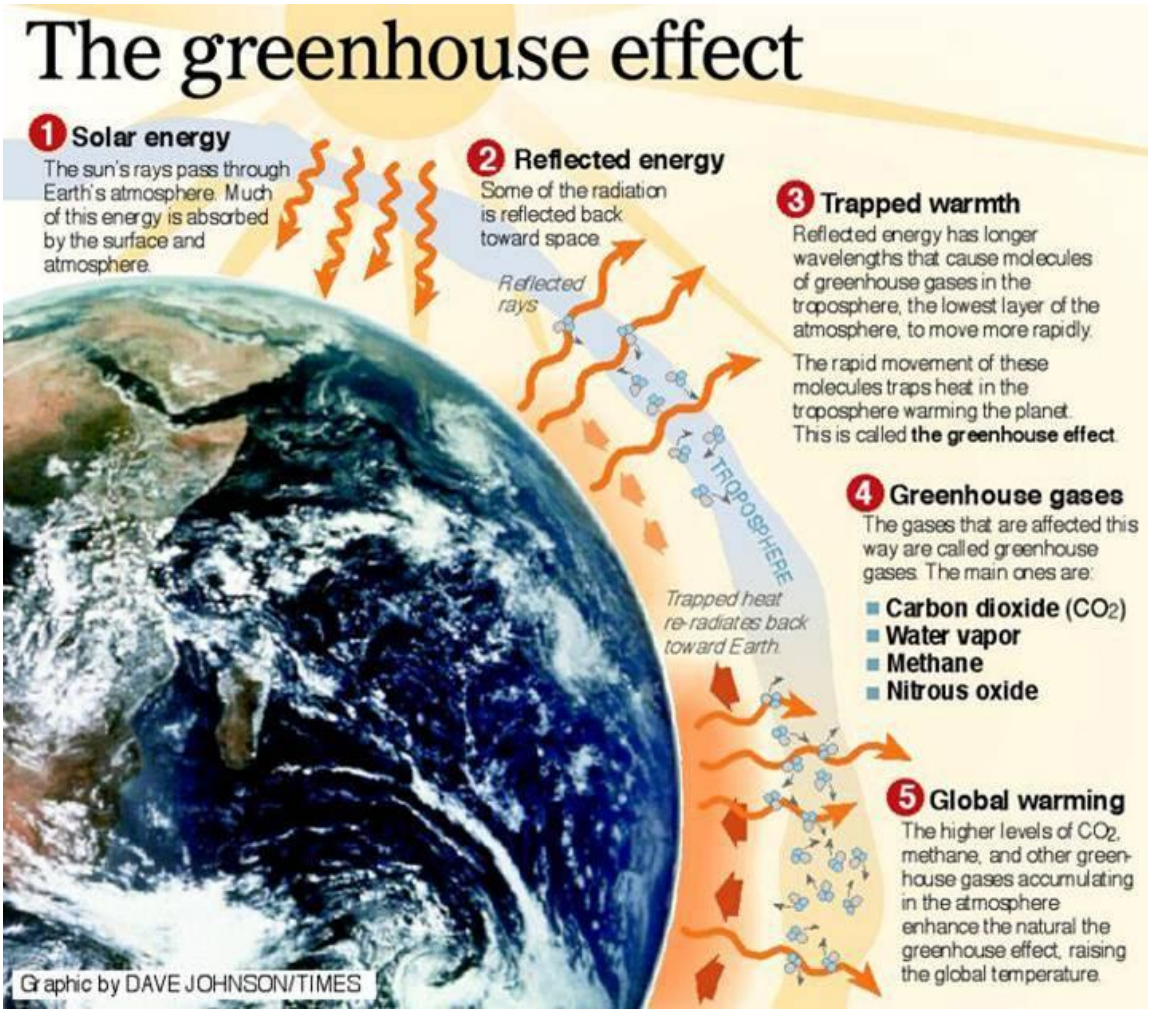
Simply put, without greenhouse gases, or the greenhouse effect, the earth would be a frozen planet - incapable of sustaining life as we know it. There would be no plants, no trees, no animals, just frozen ice and stone. Greenhouse gases are essential to sustain life as we now know it. With no (or just a little) change to

SLIDE 6 The affect on the weather

- The sun can only heat part of the atmosphere at any one time, so the atmosphere is constantly trying to readjust
- Plus the Earth is spinning & the atmosphere and ocean can interact
- Everything mixes together into a highly complex, chaotic system to give day to day weather systems

the amount of GHGs in the atmosphere the temperature remains fairly similar for

decades. BUT man has been increasing the amount of GHGs in the atmosphere and so the atmosphere warms! The dominant natural greenhouse gases are H20 (water), CO2 (carbon dioxide), CH4 (methane), and Nitrous oxide (N2O). There are also industrial CFC's (Chlorofluorocarbons). CO2 (carbon dioxide) is emitted every time we burn something (fuel in cars, wood, coal etc. for industry or in our homes), CH4 (methane) is produced from several sources including cattle.



SLIDE 7 - What is happening to the amount of greenhouse gasses in the world's atmosphere?

Show people the graphs – there are three graphs for three different GHGs

These show the amount of them in the atmosphere (on the y axis ie the line going up) AND how these have changed over many years (on the x axis ie the line going from left to right).

Look at the overall pattern – This shows that the amount of each of the GHGs has gone up hugely SINCE MAN STARTED BURNING FUELS IN LARGE AMOUNTS (the industrial revolution)

(if people want to know, ppb stands for parts per billion, ppm stands for parts per million)

SLIDE 8 – What can influence the greenhouse effect

- The Sun

- Solar *cycles*

- How reflective the Earth is (its albedo)

i.e. how much energy gets absorbed in the first place

- The composition of the atmosphere

- We can measure these independently, so we can make a computer model of them and see if they agree with observations

Solar cycles – the sun goes through periods of giving out more or less heat

How reflective the earth is – eg much of the far north and south are covered in snow and ice. Snow and ice reflect back the light and heat. As these melt and become sea water or land, less light and heat is reflected back and so the earth heats up more.

The composition of the atmosphere

As we have already explained - Greenhouse gases warm the atmosphere by stopping some of the heat escaping back to space.

We can measure these independently, so we can make a computer model of them and see if they agree with observations. *In other words we can see how much effect each of these different causes is having on temperature.*

SLIDE 9 - Climate with natural forcings

This is a very interesting graph. Natural forcings are simply the effects of natural things on temperature eg solar cycles, volcanoes. So it is things that are not caused by man's actions

The top line shows the actual (real) change in temperature (based on measurements from all over the world) over the years

The bottom line shows the change in temperature calculated by the model if we take out the effects of mans effects eg greenhouse gases. So the bottom line is the change in temperature WITHOUT MAN'S influence but WITH NATURAL EFFECTS (solar cycle, volcanoes etc).

The graph clearly shows us that the increases in temperature in the world are due man's influence and are not explained by natural effects

SLIDE 10 – Climate change with natural forcings and man-made emissions

This slide simply backs up the previous slide. It shows us how accurate the computer model is. The top black line is the same as in the previous slide. It is the actual (real) change in temperature over the years. The other line next to it is the computer model calculation of what the temperature changes are over the years if you include BOTH man made effects and natural effects together (which is what has actually happened). The fact that the two lines are so close shows that the model is very accurate in its calculations.

If people are not clear about the second graph they shouldn't worry. The first graph shows the point that human activities (emissions of GHGs caused by man) explain the real temperature changes that have been measured in the world.

SLIDE 11 – Climate change with natural forcings and man-made emissions

This slide shows us the same thing as the previous graphs. Many models have been made and used to try and see what the effects of manmade emissions are on temperature in comparison to the effects of natural causes. The graphs are the results from different models run for different parts of the world.

SLIDE 12 – But isn't it just the sun?

The previous graphs have already shown us that temperature changes can only really be explained by man's emissions. If we want further proof we can look at the effect of solar activity.

The top line shows us the temperature change (based on measurements from all over the world and shown as an 11 year average). We can see that the graph goes up and the change has increased over the years. BUT if we look at the solar irradiance (a measure of the energy that the sun has been producing) which is the bottom line, over the years, it does not go up. So it does not explain the increase in temperatures.

SLIDE 13 – What would one expect to happen with global warming?

- A shift in the mean state of the atmosphere → climate change
- A warmer atmosphere means a warmer ocean
  Ice melt leads to sea level rise
- The complex weather system is shifted into a new state
  The weather will change (i.e. some places wetter/some drier, some warmer and some cooler)

SLIDE 14 – What is going to happen in the future?

- We are still emitting green house gases, so the atmosphere will continue to warm
- How much it warms depends on the future scenario you choose

This slide shows us the predictions, combined from a large number of computer models, that have been used to predict the future temperature increases. The different lines are basically for different amounts of emission that the world might produce. The amounts produced will depend on what man does e.g try to limit the amount of GHGs produced (eg through switching to renewable forms of energy, using less fuel, population not continuing to expand rapidly etc) or man not attempting to limit GHG production (see the steeper lines). If people want to know the exact scenarios that each line is for please see the IPPC report (IR4 available on the www).

SLIDE 15 – Predicted effect on temperature

This graph shows the predictions in colour form and for the different parts of the world

SLIDE 16 – Predicted effect on sea level rise

This shows the amount that the sea level is predicted to rise before 2100. Sea level rise is caused by the ice caps melting and by expansion of the sea with temperature.

SLIDE 17 – Predicted effect on precipitation

Much more uncertain due to the complex weather systems on Earth

- Some areas expected to get wetter & some drier but climate models disagree about regional effects.
- A warmer atmosphere in general will intensify the water cycle, leading to more intense storms.
- *This is the cutting edge of climate science!*

SLIDE 18 – Predicted effect on precipitation

This slide shows the predictions for changes in precipitation. The darker the brown colour the greater the reduction in precipitation. The darker the green colour the greater the increase in precipitation (see the key on the right hand side).

Notice that you have three graphs in the top line. Going from left to right the graphs are for total rainfall for a) a whole year b) December, January, February c) June, July, August. The key on the right hand side

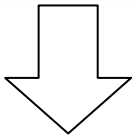
The bottom row of graphs show how much the different model predictions of what will happen agree / disagree with each other. The areas in white show areas that none of the models agree with each other. Precipitation is difficult to predict.

SLIDE 19 – What are the likely impacts on development and poverty?

This diagram shows the main big changes and relationships

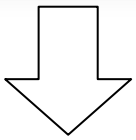
Starting at the top left corner you can work your way round the diagram pointing out what effects what eg Climate change (top left) will effect Human and natural environments (top right). There are also feedbacks to point out.

The amount of ADAPTATION that occurs will influence how severe the effects of climate change are. The amount of mitigation that occurs will influence how much the climate changes. This may be the first occasion that course participants come across these terms. It may be useful to have definitions of them already written e.g. on flipcharts on the wall to refer to at this point. (See the section on definitions of terms).



SLIDE 20 – Common climate myths

The slide lists some common myths (stories that are not true) about climate change. Looking at the scientific evidence and logic it is clear that they are not true. See the web page if you have access to the internet and want to find out more about them http://www.skepticalscience.com/



Slide 21 – Where to find out more

- Huge amount of resources on the internet.
- Most of these plots (graphs) come from the Intergovernmental Panel on Climate Change 4th assessment report (IPCC AR4)
- Look at http://ossfoundation.us/projects/environment/global-warming for a good overview of the topic
- Look at

http://www.newscientist.com/article/dn11462-climate-change-a-guide-for-the-perplexed.html for common questions & myths about climate change

SECTION 4.0

THE IMPACT OF CLIMATE CHANGE ON LIVELIHOODS

Farmers in Zimbabwe are facing a range of problems.

Ask participants to identify some of the problems farmers are facing. List their suggestions on a flip chart.

The complete slideshow can be found in Appendix 2

The following problems were identified at an earlier workshop:

SLIDE – Problems farmers are facing

- Delayed onset of rains, poor distribution, intensity
- Increased length & frequency of mid-season drought
- Increase in temperature
- Reduced yields
- Increased runoff and erosion
- Leaching of nutrients
- Heat stress of livestock -> reduced yields, mortality
- Increased costs of production

Discuss possible causes of the identified problems

Many of these changes were said to have been caused by Climate Change. These opinions are largely based on farmers' perceptions, backed by the press.

Many of these problems are more likely to be due to other factors such as population increases leading to farming of more marginal lands, degradation of lands due to deforestation, and over-grazing, people living in more exposed or previously uninhabited areas, poor land management, shortage of inputs and others.

What are the outcomes or results of these problems?

Overall these problems are having a major impact on peoples' livelihoods.

What do you understand by the term "livelihood"? Discuss.

A "livelihood" is not just earning an income, but includes health, well-being, happiness, access to information, knowledge and skills and the existence of societal structures and support.

People's livelihood choices and strategies are often complex, sometimes opportunistic, and generally governed by a number of factors. Some of these factors are beyond the control of the affected individual.

SLIDE - Livelihoods

- A livelihood comprises the assets, skills, technologies and activities required to make a living and have a good quality of life.
- The strategies employed to make a living are complex, location specific and have often evolved over generations.
- People's livelihoods strongly determine their level of vulnerability. People with secure and diversified livelihoods will be better equipped to cope and recover than people with a single productive activity and poor access to resources and knowledge.
- It is important to understand how people make a living, why they chose the strategies they do and what makes them vulnerable to the hazards that affect them.

Exercise

Consider the following two families:

Family Number 1

Gilbert and his family are subsistence farmers eking out an existence on a small farm in a semi-arid area. They have a few chickens and two goats and no savings. Without draught animals they are forced to cultivate their land by hand, limiting the area they can plant. They have few skills, never having attended any training or had contact with the extension services.

They have two small children.

Luckily the man of the house, Gilbert, is able to supplement their farming income with casual labour on nearby road-works. They are struggling, but surviving from day to day.

Then Gilbert loses his job – the road works are completed and no other labouring jobs are available. They are reduced to eating two meals a day and as they can no longer afford the fees, the eldest child is forced to leave school. But they are still surviving albeit under extreme hardship.

While out gathering firewood, Gilbert's wife is injured and requires treatment at the nearest clinic. Despite selling their remaining chickens, transport and medicine costs force them to borrow from a local money lender who charges exorbitant rates of interest.

They are now in debt and the wife is unable to work.

Without access to local veterinary advice, and unable to afford the drugs needed to routinely treat their goats for worms, one goat dies and the other is rapidly losing condition.

A drought comes: Crops fail. The family have no reserves and despite resorting to eating only one meal a day, they are unable to cope. They have no options other than to become dependent on food aid or abandon their home and migrate in search of work.

Picture: Total crop failure under conventional farming practices

Family Number 2

Reginald and his family live under very similar conditions, but own three cows which not only provide a limited amount of milk, but are able to pull a small plough. They are able to cultivate a larger area. They have invested in a small poultry unit from which they are able to sell eggs. Reginald has attended a farmers' field school and learned to grow vegetables, which both supplement their diet and provide a small income. Contact with the local Para-vet ensures that his goats are routinely dosed. The wife makes mats and baskets to sell in the local market.

They are relatively wealthy, send their eldest child to school and have accumulated some savings.

Picture: Diverse crops thriving under conservation farming *Bumper harvest through hard work*

When their daughter becomes ill, their reserves allow them to pay for the medicines needed by their sick daughter and the wife increases the number of baskets she makes for sale.

A drought comes: crop yields are decreased by some 80%, but the family are able to survive on their savings, egg sales and through the sale of a goat. By deepening the hand-dug well they have made, the family continue limited vegetable production.

Despite having to tighten their belts, the family are able to cope and should be able to recover once the rains come.

---

1. *What is the difference between the two families?*

2. *Why is one able to cope and recover while the other is plunged into destitution?*

3. *What does this tell us about choices and strategies for livelihoods?*

The most obvious difference between the two families is that Reginald and his family have several different means of earning a living. They have **diversified sources of income.**

So we have learned that diversity increases a family's ability to survive adversity.

What determines their ability to choose several different livelihood strategies?

Main Assets for Building Livelihood Resilience

SLIDE - Assets

Certain components or assts are required to make a living. These assets can conveniently be divided into 5 main groups for ease of analysis.

Financial – sources of income, assets which can be traded or sold, savings, financial services, etc. These are objects, resources or activities that can generate cash. A person sells their labour for cash; a person runs a small business to generate cash, etc

Natural – soil, water, forest, environmental assets, etc. These are natural resources such as the land used to produce crops or grazing, the river which provides fish and the forest which provides wild food, timber, fuel and other useful products for consumption or sale.

Physical – houses, schools, clinics, roads, producer goods accessible by community, etc. These are the physical structures such as buildings, including shops and markets and include the tools used in making a living such as ploughs, blacksmith's tools etc

Human – health, skills, education, knowledge, confidence etc. These are the qualities which help to make a living such as knowledge; knowing how to do things, the ability to work due to good health, and confidence, sense of self worth, or motivation.

Social - family links, groups, support networks, conflict, leadership, influences over political decisions, etc. People are more resilient, able to withstand threats to their livelihoods when there is group cohesion. The family structure, support from groups (women's groups, churches etc), a sense of belonging and leaders who actively promote the well-being of their constituents all contribute to the resilience of a community.

We will be discussing assets in greater detail, including how their access and control is influenced by external factors such as policies, institutions and power structures in a later session of the workshop. But it is worth noting here that access and control over natural, human, social, physical and financial resources (assets) is one of the most important components of adaptive capacity.

In the case studies Reginald and Gilbert and their families were affected by drought. Reginald and his family were able to survive and recover; they were "resilient", whereas Gilbert and family were unable to cope. They were "vulnerable" to the impacts of drought.

SLIDE - Vulnerability

Vulnerability defines the characteristics of an individual or group and their situation that influences their ability to withstand, cope with and recover from the impact of hazards and stresses.

People's livelihoods strongly determine their level of vulnerability. People with secure and diversified livelihoods will be better equipped to cope and recover than people with a single productive activity and poor access to resources.

Discuss and clarify what participants understand by the term "Hazard" as opposed to "disaster"

SLIDE – Hazard

Hazards are external factors or events that can impact on people's lives with the potential to affect wellbeing or to do harm – ***depending on the circumstances in which they hit.*** Different types of hazards include shocks such as floods (rapid onset) and stresses such as changing rainfall patterns and droughts (slow onset).

We need to distinguish between the hazard (e.g. a flood) and the effects of the hazard (e.g. drowning of people or destruction of homestead). In the case study, drought (the hazard) had the effect of destroying Gilbert's livelihood. The end result was a disaster for his family.

SLIDE - What happens when hazards and stresses impact on people's lives?

Depending on whether those people are vulnerable or resilient will affect the outcome. *More vulnerable* people are *less* protected from hazards and stresses, they are not able to cope, and therefore they suffer worse outcomes.

Where people have *more resilient livelihoods* the impact of a particular hazard event or stress may be less as they are able to withstand, *cope or recover*.

Reducing vulnerability and building resilience are therefore important strategies for poverty reduction.

Another way of looking at this is to say that when the drought came Gilbert and family were at greater risk of a disastrous outcome than Reginald's family.

What do we mean by "risk"? Discuss

Risk is an expression of the probability of a negative or damaging outcome. There is no such thing as a" risk-free" environment. We all take risks all the time e.g. "Calculated risk", etc.

SLIDE - Risk

Risk is a function of the strength of the Hazard and the Vulnerability of those affected

Risk is often expressed as:

$$R = H \times V$$

$$\text{Or} \quad R = H \times V/C$$

In order to reduce the risk of a damaging outcome, we are most often unable to reduce the hazard (e.g. we have no control over the extent of a dry spell or drought), but we can reduce the vulnerability or increase the capacity of those likely to be affected.

In order to be able to reduce vulnerability, we need to understand who is vulnerable, and why they are vulnerable. Only then can we begin to identify strategies to reduce their vulnerability. We will be dealing with livelihood and vulnerability analysis in detail later in this workshop.

To what hazards, shocks and stresses are the people you work with currently exposed?

How are these changing – for better or worse?

SLIDE - Increasing Severity of (some) Hazards

- The number of reported disasters is increasing, particularly hydro-meteorological disasters (weather events).
- Experts believe that some of the increase in reported disasters can be attributed to increases in extreme climatic events, but the proportion is very difficult to determine and attribution is even tougher
- Impact on hazards (IPCC 2007) Confidence in understanding or projecting changes in hazards and extremes depends on the type of extreme, as well as on the region and season.
- Frequency and magnitude of hot/cold extremes increasing and projected to continue. Same with heavy precipitation. No clear trend in tropical cyclones.
- Some suggestion that droughts will increase, but this depends on definition of drought and the area in question.

While the number of disasters is increasing – some of which might be linked to Climate Change (CC) – the majority of these are primarily due to underlying factors such as increasing population, environmental degradation, disease, etc. and are **NOT** directly attributable to CC.

Climate models are used to make predictions as to how the climate of the future will act. But different climate models make different predictions.

SLIDE – Climate projections

- A **great deal of uncertainty** exists in the projections.
- **Models agree that Climate change is a multiplier of risk**
- Climate change is **not a unique hazard** but will interact with many of the underlying drivers of risk resulting in complex, dynamic situations

Greatest impacts will be on livelihoods. Thus we need to understand livelihoods – what makes one livelihood strategy vulnerable and another less so.

SLIDE – Impact on livelihoods

- Potential decrease in crop yields, increase in water scarcity, biodiversity loss
- New patterns of vector-borne diseases, increase in respiratory diseases
- In countries with weaker risk-reducing capacities, underlying risk drivers such as poor urban governance, vulnerable rural livelihoods and ecosystem decline will be exacerbated by a rapid expansion of weather-related risk.

While it is certain that the earth's atmosphere is warming, the other effects of warming are less certain. While predictions of what lies ahead are uncertain, warming is likely to have profound, as yet unknown effects, previously not experienced. New diseases and ecological change driven by the climate changing faster than the ability of many natural processes to adapt.

SLIDE – Increasing uncertainty and surprises

- Likely that climate change will bring more surprise events
- Disaster risk reduction often based on belief in a 'stationary climate' – i.e. what we have seen before is an excellent record for what we are likely to see in the future. It deals with known risk
- Climate change will act as a multiplier of risk – creating situations that might never have been experienced before

SO there is need to strengthen not only immediate coping capacity and preparedness to deal with known risks, but also build ability to deal with change, the exact nature of which we cannot predict.

Farmers are already experiencing production problems related to current climatic events, as well as facing the prospect of greater uncertainty; we need a two-pronged approach to dealing with climate change – the so-called "Twin Pillars of Adaptation":

1. In the short term: helping farmers to cope better with current risks including normal climate variability

2. Developing options for adaptation to future (largely unknown) risks due to long-term climate change – "Adaptive Capacity".

Building livelihood resilience **now** will contribute to longer-term adaptive capacity. Many of the strategies which will enable farmers to achieve food security and increased well-being under current climatic conditions will directly contribute to increasing their ability to cope with future uncertainty. They will contribute to adaptive capacity.

SLIDE – Adaptive capacity

Adaptive capacity is the ability of a system (people) to adjust to climate change (variability and extremes) to moderate potential damage, to take advantage of potential opportunities, or to cope with the consequences

Adaptive capacity means that not only are communities able to respond to and recover from hazard events in the **short term**, but they are able to **adapt over the long term to changes in their environment.**

Improve **understanding of trends and** their local impacts.

- Ensure **access** and **action** on relevant information
- Build **confidence** and **flexibility** to **learn** and **experiment.**

SLIDE – Building adaptive capacity

Ability to adapt is closely linked to poverty reduction

- Need to tackle both immediate and longer term threats
- Food and livelihood security are of greatest importance
- Need to reduce underlying vulnerability
- Strengthen capacity to adapt – diversify livelihoods, alternative incomes, etc
- Need to accept uncertainty and engage in SCENARIO building based on local meteorological data.

SLIDE – Strategies for building adaptive capacity

Strategies need to have both

- Immediate and
- Long-term benefits
- No regrets strategies address non-climate development needs (eg. Food security) and also support adaptation to CC.
- They address multiple risks – immediate and long-term needs.

FOOD SECURITY and DRR must come first

In order to be able to deal with current hazards (including Climate Variability) and rapidly changing circumstances, farmer's need to be empowered (capacitated) to analyse and understand what is happening. They need to be aware of the risks, hazards and shocks that they face, how these impact on their livelihoods, what strengths or capacities they have that they can use to minimise or avoid these risks and what they can do to make their lives and livelihoods more resilient to change. In order to identify potential risks and adaptive strategies, we need context specific analysis that identifies the causes of peoples' vulnerability.

On days 2 and 3 of this workshop we will be learning about livelihoods and vulnerability analysis.

SECTION 5.0

FACILITATION ROLE OF EXTENSION IN ENABLING FARMERS TO COPE WITH CLIMATE CHANGE/ EXTENSION METHODS TO PROMOTE ADAPTATION TO CLIMATE CHANGE AND CLIMATE VARIABILITY

The complete slideshow can be found in Appendix 3

INTRODUCTION

1. What is agricultural extension? (*Question to be answered by participants*)

2. History of agricultural extension

1950s to 1960s

- "We must **teach** the farmer the **right** technology"
- The technology crafted at research centres was often not useful for the resource poor farmer

1960s to 1970s

- "We must ease the constraints so farmers can adopt" i.e. credit for implements and inputs
- Resource rich farmers profit but was often uneconomic for the resource poor farmer.

Early 1970s

- "We must understand the conditions of the farmers and design technologies that **fit**
- Study the system, figure out solutions.
- Resource poor farmers involved as **sources of information** about their conditions

Early 1980s

- "Farmers have to **say** what they need and **evaluate** the possible solutions"

- Figure out **viable** solutions
- Farmers **participate** in planning and evaluation of extension programs

Late 1980s to 1990s

- Farmers, researchers and extensionists must **all** contribute their **specific knowledge and skills** and experiment **jointly-**
- **Ah!!! We begin to realise that farmers have a wealth of knowledge and experience that, if tapped can blend well with research and extension knowledge and technologies.**
- **Enter….. participatory extension approaches including FFSs and T and V, Study Circles**

3. Facilitation role of agriculture extension to climate change and climate variability

POINTS TO NOTE

1. Farmers need to understand issues to do with
    - Climate change
    - Climate variability
    - What is change in climate
2. Major components of climate that are notably changing
    - Temperature
    - Frequency of extreme events
3. How are these changes affecting agriculture production (*group work, participants in groups list these changes and report back)*
4. What can farmers do to cope, adapt and mitigate climate change and climate variability? Note include livestock and crops (*group discussion*)

ROLE OF EXTENSION IN CLIMATE CHANGE, CLIMATE VARIABILITY AND KNOWLEDGE TRANSFER TO FARMERS IN ZIMBABWE

If farmers need to know all information on CC and CV, who is better placed to facilitate this process. Agriculture extension is to foster development of rural communities through improved agriculture production optimizing yields and maximizing returns.

STEPS THAT NEED TO BE TAKEN TO CAPACITATE EXTENSION

- There is a need to mainstream climate change and climate variability in agriculture extension service.
- There is need to train extension on issues to do with climate change and climate variability e.g. working out probabilities on start of the season, season length, droughts, rain days, end of season, long dry spells etc.
- There is need to train staff in appropriate extension approaches to facilitate exchange of information on CC and CV among farmers.

EXTENSION APPROACHES TO USE

MASTER FARMER TRAINING

This is a strategy crafted by the Agricultural Extensionist named Alvord to try and convince farmers to adapt to certain practices to improve their farm productivity. This approach is still being used in Agritex to impart Agriculture knowledge to farmers. Farmers are given certificates (master farmer certificates) on completion of the 2 years theory and practice course. Climate change and Climate Variability information can also be instilled as farmers learn some of the proficient practices to use in their farm production.

TOURS/ VISITS TO LEARNING CENTRES

Farmers can be sent in groups to research stations or demonstration plots where trials are being done. By this method, farmers can learn through observations. “Learning is based on the adage: if I hear I might forget, if I see I might remember, if I discover, I own for life.” Farmers are required to replicate what they will have seen in their farming plots what they would have seen during their field tour.

FIELD DAYS

Farmers gather at one of the best farmers and learn from the best farmers’ experience. During the gathering, farmers ask questions from the best farmer on how he/she would have conducted his farming activities to achieve good crop stand/yield etc. Farmers during this event learn through seeing best practices.

DEMONSTRATION

Extension staff member might want farmers to adapt to certain farming practices. Demonstrations might be set on plots of some farmers. The demonstration might be that to do moisture with moisture conservation practices, farmers can then go and observe crops during various growth stages on the demonstration plots and learn good practices.

Picture: Extension staff demonstrate how to plant bananas in Serenje District -Zambia

STUDY CIRCLES

This approach involves farmers reading materials that have to do with their farming practices. Farmers read and practice what they would have learnt. An example of this extension approach was used by the Swedish Cooperative Centre (SCC) in Shurugwi District. A number of pamphlets and booklets were written in local languages to facilitate the farmers to read and practice. Some of the books were on conservation agriculture, bee keeping etc. In groups, farmers will read these reading materials and practice on their plots

TRAIN AND VISIT

The extension worker would train farmers on a certain farming practice and will make follow ups to check whether the practice taught is being implemented. This practice was introduced in Zimbabwe by a World Bank programme. This approach needs the extension worker to be highly mobile to visit all the trained farmers.

CLIMATE FIELD SCHOOLS

Small weather stations are set in communities and farmers make recordings of weather parameters at ward or area level. Based on this information, farmers

can use this information for seasonal climate forecast. Farmers can also be taught to analyse this data to make an understanding of their farming environment. A case study is the Climate Field Schools in Chiredzi District established under the Coping with Drought project funded by UNDP and coordinated by Dr L. Unganai.

LEAD FARMER APPROACH

The extension personnel choose an exemplary farmer who has shown more knowledge on adaptation of new practices and technologies. The lead farmer will then teach and instruct other farmers on how he would have done in his/ her plot to achieve improved productivity. The farmers' field can then be used to facilitate learning of technologies that he will have used to achieve good yields.

FAMER FIELD SCHOOL

Farmer field schools have been recently introduced. This practice involves participation of farmers and the extension worker.

PRINCIPLES OF ADULT LEARNING

- When passing messages to the farmer, they must be simplified to the level of the farmer
- When imparting ideas, it should be done in short episodes
- Learning should be followed by practice
- Adults learn when they want to
- Adults want to learn what address their needs
- Adults need to be respected
- Repeat Key Points Three Times and in Three Ways **-**One way to make sure that the key points are retained by the audience is to repeat them three times throughout the presentation using three methods of delivery.
- Provide Supplementary Handouts **-**Handouts that help illustrate your points, or engage the learning by aiding an exercise, can increase retention of the key points and provide the additional information that cannot be covered in the limited time frame.

- Respect experience **-** Adults bring a wealth of expertise to your business. Through previous work positions, they bring a foundation of life experience to their jobs. Your training should reflect this.
- Set goals **-**Adults are more goal-oriented than teenagers. Ensure them that your training sessions include objectives.
- Seek participation **-**Your adult learners want to share their knowledge.
- Build rapport **-** Adult learners value a friendly environment. So from the outset, the training leader needs to build rapport with the employees by setting an open, responsive tone. That means showing concern for each learner, understanding the variety of their responsibilities, and knowing that everyone is motivated differently and comes with accumulated stories of success.

PARTICIPATORY EXTENSION

DEFINITION

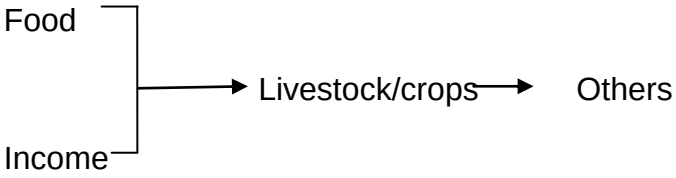
- Communication between farmers (other stakeholders) and extension agents to foster development of communities through agricultural related activities.

EXAMPLES OF PARTICIPATORY EXTENSION APPROACHES

- Study circles: A group of farmers come together to study a subject of their interest and then practice what they will have learnt.
- FFSs: A group of farmers experiment together in the field to evaluate the costs and benefits of alternative technologies to address an identified production constraint**.**

INTRODUCTION TO FFS

- Farmer: one who derives a livelihood from land



- Field: Place/land where crops/livestock are grown /kept
- School: Place/institution of learning
- School (1)
- Farmers (2)
- Field (3)
- School of farmers in the field
- Farmers learn about and investigate for themselves the *costs and benefits* of alternative technologies for sustaining and enhancing farm productivity through adapting to climate change and variability (ACCV):

MAIN FEATURE OF FFS:

- Learning is based on the adage:
- If I hear I might forget
- If I see I might remember
- But if I discover I own for life

STEPS IN INITIATING AND RUNNING FFS

- Defining/characterising the farming system
- Problem identification and prioritisation for the major enterprises.
- Curriculum development
- Training of trainers (tot)
- Formation of farmer field schools
- Study development
- Site and host farmer selection
- Implementation of FFS programme
- Monitoring and evaluation

LEARNING USING THE FFS EXTENSION APPROACH

- A group of 25-30 farmers affected and interested in solving a production constraint form a FFS.
- Together with extension, farmers design field experiments to compare options with their practice
- Farmers select a host farmer and a site
- Farmers meet at agreed periods determined by need: - crop age and growth stages.

  (8-12 meetings per season)
- In sub groups farmers analyse the relationship between a crop and its environment.

- Farmers measure and record parameters that would bring about differences in the performance of the treatments.
- In their subgroups the farmers analyse the data, noting differences in performances and the reasons for the differences
- Farmers make a management decision- if this is what is happening to our crop, what do we need to do to manage it well?
- Subgroups present their findings to the FFS.
- The FFS arrives at a consensus as to what management decision to implement
- Data to be collected and analysed by farmers to compare the performance of crops under different management regimes:
- Percentage emergence, Leaf colour, Plant height, Number of tillers, Number of fruiting bodies, Length, circumference of cob/ panicle, Labour for all operations, Weed spectrum and density, Disease and pest dynamics, Yields
- Returns per dollar invested in the different technologies (cost benefit analysis
- etc.
- A farmer who has analysed the differences in the performance of the different technologies throughout the crop's life cycle can make an informed decision on adaptation and or adoption
- They are experts in the subject as they would have learnt management requirements of all the growth stages of the crop.
- When farmers, researchers and extensionists all contribute their specific knowledge and skills and experiment jointly optimisation of yields and maximisation of profits is achieved within a very short space of time

SECTION 6.0

Current and future likely impacts of weather events on agriculture in Zimbabwe: Results from analysis of climate data for Bulawayo, Makoholi, Gokwe and Beitbridge

Introduction

It is important to know the characteristics of the growing season in your area so that you are able to give relevant and climate smart extension advice to farmers.

To give appropriate advice there is need to know:

a) When the season is likely to start
b) When the season is likely to end
c) The probability of having a certain season length
d) What quantities of rain will fall, with what probability
e) The probability of dry spells occurring and the length of the dry spells.

However it is difficult to predict with precision the quality of the season ahead, but we can make predictions based on long time historical climatic data. Luckily in Zimbabwe we have rainfall data recordings for some areas dating back more than 30 years. The analysis presented here for some stations was done using such data.

It is important for extension staff to know that knowing climate information alone is not enough, we also need to know basic agronomy of crops grown in our areas to give appropriate advice for example, what is the average rainfall requirement for most crops grown in our areas, what is the average growing period for the varieties we are advising farmers to grow compared to the area season length

This session will discuss in some of the climatic events mentioned above and also give example of analysed data for selected stations.

The session is quite long if you want to discuss all events in one go it will take about 3-4 hours therefore we suggest you divide the events into sessions.

The complete slideshow can be found in Appendix 4

Slide 1 Discuss the aim of the session and its importance Aim • To share with extension staff analysed climate information for selected stations
Slide 2 Discuss the importance of the session • Important to know the characteristics of the growing season in your area • To be able to give relevant and climate smart extension advice to farmers • Climate smart agriculture neatly combines 2 objectives of helping to prevent climate change whilst helping farmers adapt to inevitable change • However it is difficult to predict with precision the quality of the season ahead, but we can make predictions based on long time historical climatic data.

Before going into the slide it is important to get a feeling of climate information extension staff thinks farmers would want to know for their area. It is important at this stage to discuss a little bit about events and stress that only events can be analysed.

Then discuss the following:

Slide 3

- Start of the season
- Probability of extreme events
  - Dry spell
  - Wet spell
- When these events are likely to occur(at the beginning of the season)
- End of season
- Total seasonal rainfall
- Forecast simplified(go beyond normal and above normal)
- Future weather patterns and their implications

Risks in production of different crops (for informed decision making)

Slide 4

Is climate really changing?

This is a very hot topic. Discuss with farmers what they think is happening to climate change in Zimbabwe and why they think that way. It is important at this stage to remind them the previous topic that climate is not only about rainfall but also includes other parameters like temperature, humidity and so on.

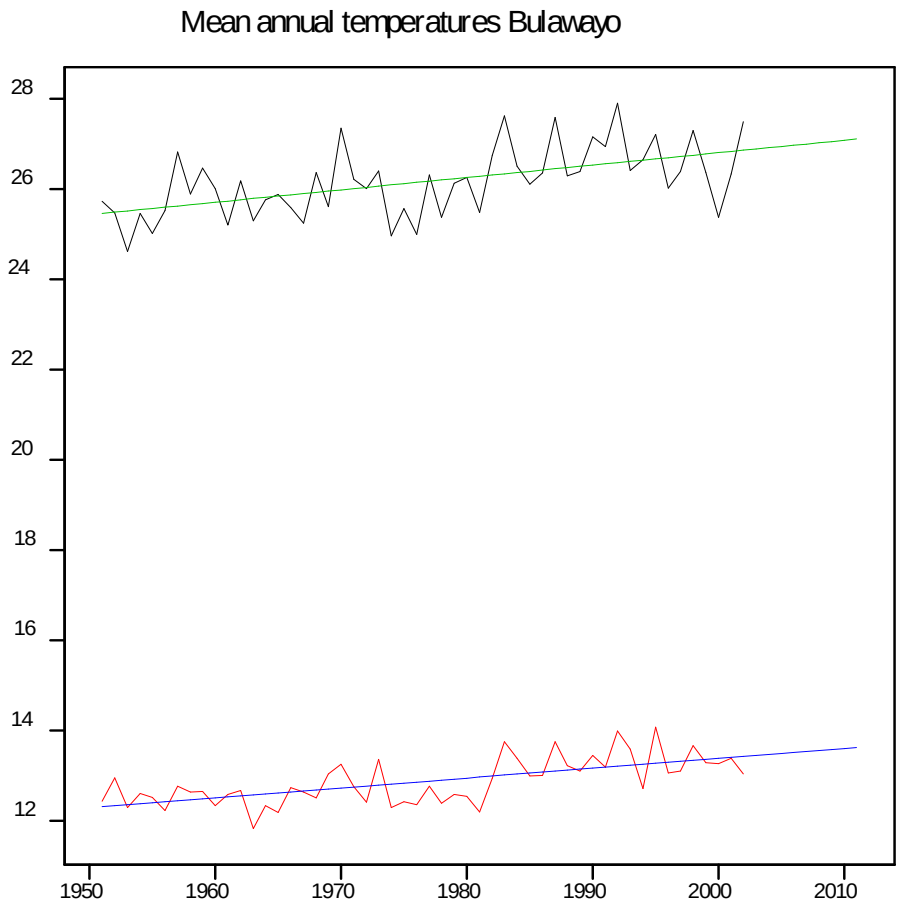
- Then discuss the results of statistical analysis of some sites which clearly shows that it's not easy to conclude for rainfall because of high variability.
- Temps are significantly warming up.
- Rainfall regression is not statistically significant.
- Climate change throughout the world is mostly shown through increased temp
- Rainfall is much more difficult and variable (different models have shown different outcomes with some showing an increase and some showing a decrease while temperatures have been consistently increasing).

The following graphs use climate information from the locations Bulawayo, Gokwe and Matopos - if this met station is not in your area of Zimbabwe, please use analysed met data from your area

Data analysed for Bulawayo shows that maximum temperature is going up faster than minimum.

Because linkage between temperature and rainfall change in temperature is likely to cause changes in rainfall but for now we are not sure.

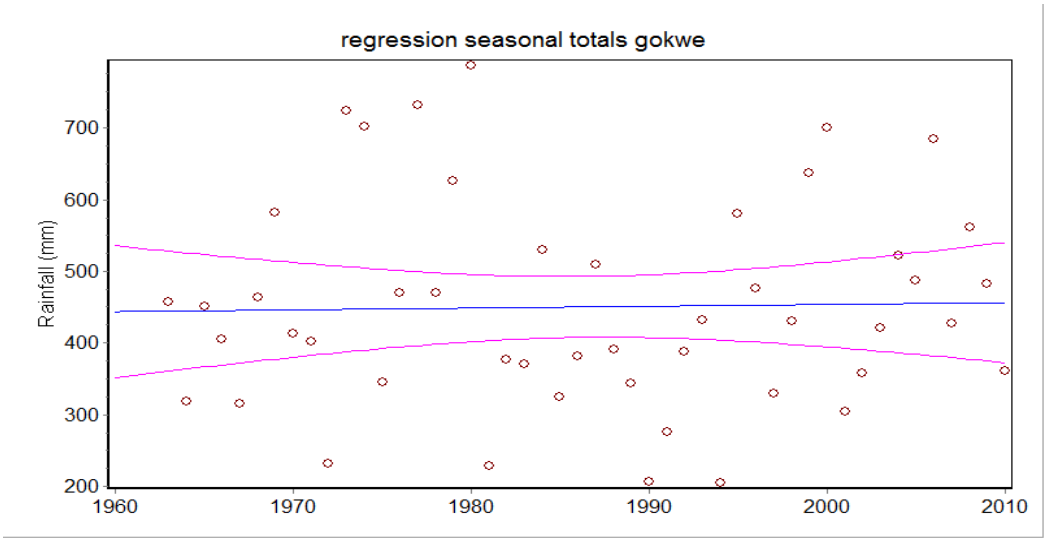
For Example:

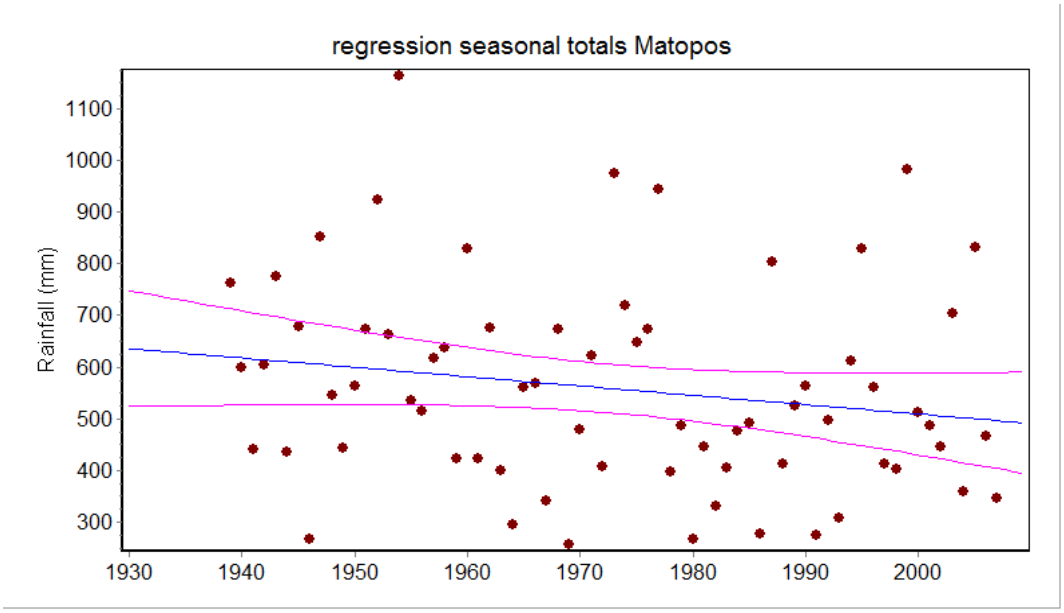


Rainfall regression.

From the graphs below; Gokwe rainfall might seem to be increasing while for Matopos it might seem to be decreasing.

BUT we are **not sure** because statistically it's not significant.





Climate information farmers would want to know

It is important to note that definitions for events given below can be changed to suit different areas and conditions

Seasonal Totals

Please stress that total rainfall on its own might not mean much as agriculture production also depends on the distribution throughout the season. However it gives an indication on whether a crop can be grown in an area or not e.g. it is not advisable to grow maize which requires an average of 500mm of rainfall per season in an area with an average of 400mm per season.

- Total rainfall from 1 October to 30 April
- May be discussed with farmers giving them options of possible crops to grow
- Difficult to use on its own because it does not give distribution indications.

Show given slides for seasonal totals for various sites

Start of the Season

Discuss with the farmers that the definition for the "start of the season" was developed taking into account 3 factors below which previous research had shown

- Research has shown that the season is considered to have started if an area receives "effective planting rains."
- And rainfall is considered to be effective planting rains if the following conditions are satisfied:-
    - ❖ There is sufficient rain during the rainy spell to wet about 5cm of soil to field capacity.
    - ❖ Evapotranspiration does not reduce available moisture to zero in the following 10 days of effective planting rains.
    - ❖ At most 11 days of zero available moisture "preceding the normal" planting dates

The following definition for the “start of the season” was developed taking into account the above 3 factors.

“Any day after the 10th of November when an area receives 20mm or more of rains in 3 days or less provided there is no dry spell of 10 days on more in the next 20 days”

This is the definition we will use in this manual. It is important to note that the start of the season is soil type dependent because different soils require different amounts of rain to wet to field capacity. For example sandy soils require less water to wet to field capacity than clay soils. However for the purpose of this manual we will use the average amount.

We may discuss with farmers the definition they would think is suitable for their area.

Share with them the graphs given for selected sites

Slide 5

Risk of replanting

- This shows the risk of replanting if farmers plant with the first rains without considering whether there was a dry spell afterwards. The graphs show how many years the farmers had to replant. We can further analyse the chances of having a 10, 14 and 18 day dry spell within 30 days after planting
- Has an effect on germination and establishment hence replanting

Share with them the graphs given for selected sites

Slide 6

Annual extremes in the season

- These include the highest total amount of rainfall either in one or several days
- Gives an indication of intensity

Discuss with farmers what they can do with this information. It can be soil conservation advice in form of contours because of increased chances of erosion and hence gully formation.

Longest dry spells

- Number of consecutive dry days between 1 December and 31 March
- A dry day in this presentation is any day with less than 2.95mm of rain
- Possible to plot when these dry days occur within a season

Discuss what they can do with the information.

Share with them the graphs given for selected sites

Picture: Farmers in Deve village in Matobo District having closer look at rainfall events graphs: Picture by H. Muchedzi

Slide 7 End of growing Season

- The end of the growing season is a time when all the water in the soil has evapotranspired and there is no more water available to the plants.
- End of growing season goes beyond end of the rains and time to evapotranspire stored water is added to end of rains to give the end of growing season.
- It is when the available moisture in the soil has reached zero provided that there are no effective rains before 20 days of zero available moisture. Just like start of season is soil dependant
- For the purpose of the manual we 1st calculate end of the rains which is defined as:
- **"Any last day before end of April when an area receives 15mm of rain provided there are no rains of 2.95mm or above in the next 20 days."**
- We then compute end of growing season from the results of the above analysis

Length of the Season

This can be calculated by subtracting end of the season from start of season. This is an important guide on the choice of crops and choice of cultivar to grow.

Share with them the graphs given for selected sites

SECTION 7.0

PROVIDING USEFUL CLIMATE INFORMATION TO FARMERS – WORKING OUT PROBABILITIES AND RISKS AND COMMUNICATING THEM USING PARTICIPATORY APPROACHES

This session should take about 1.5hrs

The complete slideshow can be found in Appendix 5

You will need copies of the graphs of events to give to groups (each group made up of about 4 course participants) for an exercise during this session.

You will also need copies of a handout to give to each course participant. The handout is of a grid / plan for how an extension worker could work with a group of farmers using climate information.

The overall aim of this session is to develop your skills in being able to provide farmers with useful information that they can use in their planning and decisions. This is a key part of the course and you will be using parts of what we cover here a) in practical work that you will be doing with farmers on our field day, and b) after this course training others staff and/or using with farmers in your work.

SLIDE 1 - TITLE

SLIDE 2 – AIM – TO HELP FARMERS WITH PLANNING AND DECISIONS, BY PROVIDING INFORMATION THEY WOULD LIKE

- In the following sessions we will cover:
  - What is meant by probability (or risk or chance)?
  - What would farmers like to know the probabilities of?
  - Ways of working out and communicating probabilities with farmers
  - How we can add value to the Seasonal Climate Forecast and forecasts of El Nino and La Nina years

First we need to be clear about what is meant by probability / risk / chance

Note: As a trainer it is very important that you are clear about what probability is (which is the same as 'risk' or 'chance') before teaching this session. Take time to run through it on your own and if necessary discuss with others or get support if you are not clear. You may need to translate the terms probability / chance / risk in to local language for the participants. The following section uses examples and this is often the easiest way for participants to get a clear understanding.

SLIDE 3 – WHAT ARE PROBABILITIES?

- Probability is the same as CHANCE
- Examples .....

Tossing a coin – A probability / chance of 1 out of 2 of getting a head i.e. ½

Throwing a dice – A probability / chance of 1 out of 6 of getting a particular number i.e. 1/6

Probability is the same as 'risk' or 'chance'.

We could ask "what is the chance of getting a head when I toss a coin?" – Answer given in window above!

(you could get out a coin and ask people)

The answer is "one out of two". This is the same as saying ½ (half) or 50%. This is because: there are only two sides to the coin; I will get one side or the other when I toss it; and there is nothing to make it more likely that one or other of the sides will come up.

Here is another example. "What is the chance of getting a number 3 when I throw a dice?"

The answer is "one out of six". This is the same as saying 1/6. This is because: there are six sides to a dice and only one of them has the number 3 on it.

SLIDE 4 - Communicating probabilities of climate events with farmers

The past can help to predict

i.e. it can be used to give us the probability e.g. ..... of weather next year

e.g. the probability / chance of there being a drought next year

Assuming that climate has not changed drastically (i.e. that there is no clear pattern of change)

Approximate probabilities can be useful

By looking at climate data from many years, we can work out the 'chance' of what the weather will do in a future season

Let us look at some data from Bulawayo...

SLIDE 5 – FARMERS CAN WORK THEM OUT

Slide of Bulawayo rainfall (1951 – 1990)

Refer to the slide. This shows the total rainfall

By looking at climate data from many years, we can work out the 'chance' of what the weather will do in a future season.

SHORT EXERCISE

Looking at the graph of rainfall for Bulawayo ask participants in pairs to quickly work out the chance of Bulawayo next season having more than 800mm of rainfall

Explain how this can be done

We can:

1) count how many years on the graph there has been more than 800mm in the past; then

2) count how many years are covered by the graph; then

3) put the number of years there were more than 800mm over the number of years covered by the graph.

Ask for some answers and then explain...

For our example this would be 4 years (years with more than 800mm) over 40 years. You can use a ruler or any straight edge to get the correct readings. This is 4/40. We can simplify this to ¼. So there is a ¼ chance or 25% chance (or probability) of the next season having more than 800mm rainfall in Bulawayo.

We have found that if given the graphs and explanations, non literate and semi-literate smallholder farmers found it useful to work these probabilities out themselves.

SLIDE 6 – COMMUNICATING PROBABILITIES (AVOIDING POSSIBLE MISUNDERSTANDINGS)

- But there can be misunderstandings about what they mean .....

e.g. If the probability of a low rainfall year is 1 in 3 .... and we have had 2 years of normal / good rainfall,

  - does it mean that the next year will have low rainfall?
  - If not, what is the probability of the next year having low rainfall?

SLIDE 7 - COMMUNICATING PROBABILITIES (AVOIDING POSSIBLE MISUNDERSTANDINGS)

- The answer to the above is that the chance / probability of low rainfall in the 3rd year is still 1 in 3
- It is like rolling a dice or tossing a coin. What you have just rolled or tossed does not affect the chance next time you do it!
- Any questions, feedback and clarification?

It is important to make sure that everyone is clear about what chance / probability is. Later participants will be talking with farmers about this. Ask participants to start thinking and discussing in their spare time how they would explain chance / probability to smallholder farmers

We can now look at how this may be useful to farmers:

SLIDE 8 - WORKING OUT PROBABILITIES FOR KEY EVENTS

- What events might farmers be interested in knowing?
- In the next slide are some events
- We will ask farmers to select and add to this too.....

SLIDE 9 - EVENTS

Total rainfall	Dry spells
Number of rain days	Longest dry spell
Temperature	Annual extremes
Start of season	Length of growing season
Risk of replanting	

EXERCISE 1

Provide small groups or pairs with photocopies if graphs of events and then ask them to do the following described in the next slide:

SLIDE 10 – EXERCISE 1

For an event e.g. total rainfall

- Decide on the characteristics of the event that you will focus on e.g. for total rainfall, what amount (e.g. below or above a certain no. of mm?)
- Remember to keep focusing on what you think would be useful to a farmer. Why have you chosen this amount?
- Work out the probabilities and summarise them
- Discuss the management implications .....This is important

Repeat the above for other events

Go round the groups to provide help and clarification. Participants may find it easier to use a ruler to clearly see and read off points on the graphs

Ask the groups to share their answers with the rest of the class

The next two slides include a number of very important points – take time to go through them

SLIDE 11 – WHAT SHOULD WE COMMUNICATE WITH FARMERS ABOUT EVENTS, AND HOW?

A. What ?

1. ***Variability and trends*** ...*IMPORTANT. Why*? – To see if there are trends and changes and to avoid 'maladaptation'. If farmers and extension are responding to the wrong things/ trends they are likely to waste everyone's effort

2. ***Basic information*** to help with planning and decision making e.g. what is the 'normal' and variation in total rainfall for my area, what is the 'normal' and variation of length of season for may area. This can help with choice of crops and varieties, planting dates etc.

3. Probabilities of events – *Which ones*? *Why*? – So that farmers know the probabilities and can make better informed decisions. e.g. they can each decide on what crop to grow, when to plant, and what levels of inputs to invest.

Different farmers may make different decisions based on their resources and their attitude to disk

Do we need any other events calculated?

SLIDE 12 - WHAT SHOULD WE COMMUNICATE WITH FARMERS ABOUT EVENTS, AND HOW?

What? (continued)

4. ***For each event – which characteristics*** (e.g. levels of total rainfall) are most useful to focus on? Think about this and discuss with farmers

SLIDE 13 - WHAT SHOULD WE COMMUNICATE WITH FARMERS ABOUT EVENTS, AND HOW?

B. How?

Work with none and semi-literate farmers has shown that farmers (with some initial help) are very able to calculate probabilities using graphs in the same way that you have just done

C. Who else other than farmers should receive the information on events? Why? (extension, input suppliers, research, policy makers. To i) help them in decision making and ii) support farmers e.g. if farmers are going to grow small grains, help develop markets and provide seeds)

SUMMARISE ON PROBABILTY USING THE FOLLOWING EXAMPLE...

SLIDE 14 – AN EXAMPLE OF PROBABILITY AND CHOICE

A good example of probability and its use – Ask the course participants the following....

Knowing the probability can help us in planning. To use a gambling example, imagine that you are asked whether you would like to pay $10 and you may lose your $10 OR you may win $100. You would want to know the chance (probability) of winning and if you know it, that may help you to decide whether to pay your $10 or not. Imagine if the chance is 4 out of 10 (4/10) that you will win. What would you do? Imagine instead if the chance is 7 out of 10. It is the same with farming and the weather. It does NOT tell us what will definitely happen, but knowing the probability may be helpful to farmers.

SLIDE 15 – A FINAL POINT ON PROBABILITY

An important point

Remember, different people have different attitudes to risk and we should never try to convince someone to make a particular decision. It is up to them to decide and for us just to give them the information. For example, for some people an 8/10 chance of winning $100 may seem good and they will pay $10. However for another person, an 8/10 chance may be too risky as they have nowhere to get another $10 if they don't win! This is similar for many farmers. They take the risks with their decisions and are affected by the results (good or bad!). Our role is to give them information and choices but NOT to try to persuade them to choose a particular option.

Up until now in this session today we have been focusing on using information based on long climate records. As we have said, this can help farmers to know the probability of events and so help them know the risks in a season and then make better decisions on things like which crop is best suited to this area given the events and probabilities, which varieties are best suited to the rainfall and season lengths etc....

IN ADDITION TO THIS, we can ALSO look for ways to provide farmers with FORECASTS. These are different to and are extra to the probabilities. International, regional and national meteorological organisations give forecasts for what they expect the weather to be in the next few days, months or season. These are mainly based on collections of weather information from the oceans, atmosphere and land shortly before the forecasts and on complex models run on computers that use this information

Ask participants the following question?

SLIDE 16 – PROVIDING FORECASTS TO FARMERS (AS WELL AS PROBABILITES)

- What information is available to farmers about the next season?

Answers may include the items in the next slide, but many extension staff are not aware that short term e.g. ten day forecasts are available from met services

SLIDE 17 – PROVIDING FORECASTS TO FARMERS (AS WELL AS PROBABILITES)

- What climate information is available to farmers about the next season?
    - Seasonal Climate Forecast (What is it, when is it available?)
    - We can add to this El Nino and La Nina (see later)
    - Short term forecasts (e.g. 10 day forecast)

The following slide is a schedule or plan of how BOTH PROBABILITES AND FORECASTS could be provided to farmers

Provide a handout of the slide (see the end of this section of the manual) to each participant or draw it on a flip chart before the session

SLIDE 18 + 19 – PLAN FOR HOW AN EXTENSION WORKER COULD WORK WITH A GROUP OF FARMERS USING CLIMATE INFORMATION

PROVIDE A HAND OUT OF THIS TO PARTICIPANTS TO LOOK AT

Briefly explain the schedule / plan by going though it from left to right. Each column is a different time in the year

There is no need to discuss and get feedback on this plan in detail at this stage of the training as it will be returned to later on.

SLIDE 20 - LOOKING AT EL NINO AND LA NINA YEARS

- It can be forecasted well before the season whether it is likely to be an El Nino, La Nina or 'normal' season
- This is because sea surface temperatures in the oceans before the season will affect whether the season is going to be El Nino, La Nina or 'normal'. These temperatures can be measured before the season
- In some parts of the country El Nino seasons are often drier than normal seasons
- Also in some parts of the country La Nina seasons are often wetter than in normal seasons
- So, first we need to know whether the location in the country is one where El Nino /La Nina has an effect on rainfall

This has been done for us using the same historical data from the met stations that was put in the graphs for events – see the following slides

SLIDE 21 - EL NINO, ORDINARY AND LA NINA YEARS AT MAKOHOLI (FROM IRI)

SLIDE 22 - MEAN NUMBER OF RAIN DAYS (MAKOHOLI)

Go through the figures in the table on the slide

These show us that for Makoholi:

In El Nino years there were less days with rain in every month (than in normal or La Nina years)

This difference is greater in the first 3 months of the season than the second

In La Nina years there are more days with rain in some of the months than in normal years. Also there are more days with rain in all months than in La Nina years

SLIDES 23 – 25 GRAPHS COMPARING EL NINO, LA NINA AND NORMAL YEARS

These slides support what has been said above.

SLIDE 26 – LOOKING AT EL NINO AND LA NINA YEARS

- These can be forecast before the season
- El Nino ..... Does it mean lower rainfall at our site(s)? YES for Makoholi (We need to do the same analysis for other sites)
- La Nina .... Does it mean more rainfall at our site(s)? NOT SO CLEAR, BUT THEY ARE NOT LIKELY TO HAVE LOW RAINFALL for Makoholi (We need to do the same analysis for other sites)
- *This means that (for Makoholi at least) telling farmers whether it is going to be El Nino, La Nina or neither could be very useful*

SLIDE 27 – LOOKING AT EL NINO AND LA NINA YEARS

- So in Makoholi, knowing whether it is going to be an El Nino, La Nina or Normal season is likely to be very useful to farmers
- One could say that based on this information that in the area near to Makoholi:
    - if it is going to be an El Nino season then it is likely to be a drier season than in a normal or La Nina season
    - if it is going to be a La Nina season then we can expect it to be as wet as a 'normal' year and possibly wetter
    - AND if it is neither El Nino or La Nina, then it probably won't be an extreme year

SLIDE 28 - PLAN FOR HOW AN EXTENSION WORKER COULD WORK WITH A GROUP OF FARMERS USING CLIMATE INFORMATION

Ask participants to look again and see where on the plan the forecast for whether it is going to be an El Nino / La Nina / Normal season is available. Ask how this simple forecast could be communicated to AEWs and farmers IN A WAY THAT IS NOT GOING TO RISK THERE BEING DELAYS

Perhaps by cell phone text direct from head office or from the met department?

SLIDE 29 - RECAP. OUR AIM WAS – TO HELP FARMERS WITH PLANNING AND DECISIONS, BY PROVIDING INFORMATION THEY WOULD LIKE

In the sessions we covered:

- What is meant by probability (or risk)?
- What would farmers like to know the probabilities of?
- Ways of working out and communicating probabilities with farmers
- How we can add value to the Seasonal Climate Forecast and forecasts of El Nino and La Nina years

We will return to this plan again later in the course.

Later in the course we will be looking at how to practically do this with farmers and then actually trying some on the field day.

SECTION 8.0

LIVELIHOODS AND VULNERABILITY ANALYSES

This section of the manual provides a methodology for facilitating farmers to analyse their own vulnerability and capacity to adapt to Climate Variability and Change at the community level. The focus is on their understanding of how their lives and livelihoods are currently affected and might be affected in the future. Using participatory tools farmers are facilitated to examine their own hazards, livelihoods, vulnerability and capacities with a view to building resilience and future adaptive capacity. Active participation of the farmers (community) is essential. Agricultural Extension Workers (AEWs) need to be able to **facilitate** this process of participatory analysis which empowers farmers themselves to analyse their own situations and identify possible solutions to their current and future problems.

Introduction

We have discussed how climate change acts as a multiplier of risk, exacerbating the current and future hazards, shocks and stresses to which communities are exposed. Rising temperatures, increasingly erratic rainfall and more severe floods and droughts are already having drastic consequences for the livelihoods and food security of resource poor people – particularly small-holder farmers. Their coping strategies are no longer able to keep pace with rapidly changing circumstances.

In order to ensure that AGRITEX helps to reduce the vulnerability of their clients to the impacts of climate change, we need to understand who is vulnerable to its effects and why. We need to be aware of and able to identify the potential shocks and stresses that can impede the development of food security. Only then can we assist communities to increase their resilience through building adaptive capacity.

The link between adaptation to climate change and poverty reduction points to the need to focus on reducing vulnerability. The extent to which people are exposed to climate change depends on the magnitude and rate of change and its resultant impacts. These will be determined not only by the vulnerability of those affected, but also by their capacity to adapt. In order to identify potential risks and adaptive strategies, we need context specific analysis that identifies the causes of their vulnerability.

Remember **R=H*V/C**

As we cannot reduce the hazard, we need to reduce vulnerability or increase capacity – ***preferably both!***

The following methodology provides a framework for analysing vulnerability and capacity to adapt to climate variability and change at the community level, while combining scientific data in order to ensure greater understanding of possible local impacts of climate change. The focus is on understanding how climate change will affect the lives and livelihoods of small-holder farmers. Using participatory tools it examines hazards, livelihoods, vulnerability and capacities with a view to building adaptive capacity and future resilience.

HANDOUT

The multi-dimensional nature of poverty and uncertainty

Three out of four poor people in developing countries live in rural areas (UNDP, 2007). Of these, most live in fragile environments such as arid or mountainous areas often at long distances from markets and other services. They have few resources at their disposal and have inadequate access to skills and technologies that could help them to make best use of those resources. Therefore their income earning options are limited and their ability to diversify or adapt when circumstances change is constrained. Poor people also often live in risk-prone areas such as on steep slopes, river embankments or floodplains because they cannot afford to live in safer areas. The impacts of drought and floods are often exacerbated by unsustainable development such as deforestation or a combination of increasing population pressure, political tensions and economic changes that lead to practices that cause environmental degradation.

Conflict is fuelled by easy access to weapons and the increasing competition over scarce resources such as pasture and water. In the event of hazards, the poor and their livelihoods tend to be the hardest hit. The livelihoods of marginal and small farmers, artisans and fishermen are affected through the loss of assets, loss of food sources (crops or stores) and loss of employment or income earning opportunities. When disaster strikes they may be forced to take desperate measures to survive such as abandoning their homes or selling vital land or tools on which their livelihoods depend because they have no savings or other alternatives. This undermines their future recovery and each shock can drive them deeper into poverty. The poor are often politically marginalized and have little voice in the policy or institutional decisions that affect them. Services, such as schooling, health, extension, transport and markets are often inadequate or unavailable to people living in more remote or challenging areas. They lack the safety nets that are taken for granted in richer countries, such as savings, insurance policies or government services to warn and protect them from disasters.

Growing uncertainty is a further characteristic of the lives of the poorest. As the world becomes more interconnected, the livelihoods of the poor can be affected by events happening in distant parts of the world. Financial markets can affect prices for staple crops in developing countries. Policy shifts, for example towards biofuels, can contribute to rising grain prices and urban food shortages. The impact of climate change is being felt directly by increasing numbers of people as changing seasons and more extreme weather patterns affect the natural environment that people depend on and contribute to crop failures and livestock losses, thus tipping the balance between survival and destitution. Poverty, vulnerability and disasters are closely related and cannot be viewed in isolation from one another. These multiple factors: lack of resources; fragile livelihoods; exposure to hazards; climate change and other trends; and weak institutional support mechanisms must be understood in a more integrated manner in order to seek effective ways to address them.

Source: From Vulnerability to Resilience. Pasteur. 2011

LIVELIHOODS VULNERABILITY AND CAPACITY ASSESSMENT

SESSION 1: INTRODUCTION TO VCA

Objective: To introduce the VCA methodology

Vulnerability and Capacity Assessment (VCA) is a participatory process to determine the nature, scope and magnitude of the effects of hazards, shocks and stresses on the community. It determines the probable or likely negative effect on elements of livelihood strategies (assets at risk) and why some households are more badly affected than others. The coping strategies and resources (capacities) present in the community are identified.

The complete slideshow can be found in Appendix 6

SLIDE – Livelihoods and vulnerability analysis

- VCA is a participatory process to determine the nature, scope and magnitude of the effects of hazards, shocks and stresses on the community.
- It determines the likely negative effect on elements of livelihood strategies
- Why some households are more badly affected than others.

Participation is the most essential component of the process which helps the community to understand the risks they face while identifying the resources and opportunities available to deal with both specific hazards and future uncertainty. It is an essential part of the bottom-up decision making process for developing resilience (Pillar 1) and adaptive capacity (Pillar 2).

Vulnerability and Capacity Assessment is diagnostic and provides a systematic method for identifying, estimating and ranking local risks. The assessment is divisible into five steps.

SLIDE - Steps in VCA

STEP 1: Community selection and profiling ensures that essential general background information is collected in order to form focus groups for the following assessments.

STEP 2: Hazard assessment identifies the hazards that the community is exposed to, including the possible impacts of climate change, the principal characteristics of the hazards, and which groups of people are most likely to be affected.

STEP 3: Livelihoods Vulnerability assessment identifies what elements (assets) are at risk and why (what livelihoods conditions are causing the vulnerability of particular assets). It also looks at which institutions and policies affect the vulnerability of those assets.

STEP 4: Livelihoods Capacity assessment – identifies people's coping strategies and the resources and technologies that can be mobilised in the face of a particular hazard. These positive capacities (which include the ability to access climate and other information) will be key to devising a plan for building future adaptive capacity. It is important to build on existing strengths and abilities.

STEP 5: Prioritisation of Risks and Risk Reduction Strategies – begins to highlight key areas for potential action whilst the assessment discussions are still fresh in people's minds. These can be further developed into concrete actions during community action planning.

Task: Briefly discuss what to do with the information from the 5 steps. What use is the information? Ensure participants understand the relevance of the different

SLIDE – Aims of the assessment

The aims of the assessment are

- To identify and prioritise current and future risks (including unknown risks) that the communities will need to reduce.
- To empower the community by raising their awareness of their own situation, their vulnerabilities and capacities
- To build capacity for the community to be able to adapt to current and future hazards, stresses and shocks.
- To collect baseline information against which risk and vulnerability reduction, adaptive capacity and resilience can be measured (M&E).

VCA is both a tool and a process. It should be participatory. The community or group are facilitated to analyse their own vulnerabilities, identify their own capacities and develop and implement plans which utilise these capacities to reduce their vulnerabilities to hazards, stresses and shocks. The process should be empowering.

SESSION 2: COMMUNITY SELECTION AND PROFILING (STEP 1)

Objective: To gather a "snapshot" of conditions existing in target

Preparation and Initiation

The selection of a target community is often made in response to an acknowledged need or request for assistance. Initial activities include a review of secondary information on the locality, district and region with particular emphasis on livelihood activities (how people in the area make their living), the hazards they face and the impact of previous disasters

Community profiling

Building on the information gained from review of secondary information, a rapid participatory investigation is initiated to build a picture of the general nature, needs and resources of the target community. The community are at the front line; they know their situation and can provide a true and detailed picture of their situation.

The community profile is helpful in determining the degree of cohesion within the community and forms the basis for the selection of focus groups for more in-depth investigations. Local perceptions of wealth and vulnerability should be revealed and groups often excluded from decision-making processes should be identified.

SLIDE – Elements of community profile.

Basic elements of the community profile include:

- Layout of community (mapping)
- Economic / livelihood activities (identification of occupational and different socio-economic groups)
- Social and institutional networks (Venn diagram)
- Seasonal factors, such as weather, cropping and labour patterns (calendar)
- General issues and challenges (group discussion)

PRA tools should be used, including semi-structured interviews (focus groups, key informants and individual households), community mapping, transect walk, wealth ranking, Venn diagrams, seasonal calendar, livelihood analysis (including coping strategies) and ranking. It is assumed that participants have some experience of applying participatory methods and therefore they will not be covered in detail here.

Task: Ask what experience of using PRA tools participants have? Why is it important to use participatory tools? Discuss the nature of the information collected in the community profile and what it can be used for.

The information collected should be useful for several purposes. Firstly, the general profile provides a background and starting point for the facilitator to organise the following VCA activities. It helps to highlight key issues, activities and institutions, as well as identifying useful key informants or vulnerable groups that may get missed. It is important to analyse this information before moving on to the VCA activities to ensure that the issues raised are taken into account.

Secondly, based on the discussions around economic activities and wealth ranking, focus groups can be formed for the following assessments. These should consist of people who share some similar characteristics; this could be shared livelihoods activity, common vulnerable geographical location within the community, or similar levels of wealth or poverty. This means that there is likely to be a fruitful discussion around the issues. Ensure that both women and men, young and old, healthy and infirm, are all represented in each of the different focus groups.

Finally, information collected as part of the community profile can be used as baseline data, in addition to that collected during the vulnerability and capacity assessments which will follow.

SLIDE – Task

Task: Each Group to spend 20 minutes drawing a rough map of a rural community with which they are familiar. Include information/notes on different economic/livelihood activities, fields, crops etc., social institution and networks, areas exposed to hazards and stresses, etc., Try to include most of the information that you would hope to gain from initial community profile. Be realistic!

SESSION 3: HAZARD ASSESSMENT (STEP 2)

Objective

Hazard assessment determines the likelihood of experiencing a natural or man-made hazard and its effect.

SLIDE – Hazard assessment

- Hazard assessment determines the likelihood of experiencing a natural or man-made hazard and analyses the nature, impact and behaviour of each specific hazard experienced by the community.
- Climate change interacts with known hazards to potentially produce conditions which have never been experienced before. Uncertainty becomes a hazard itself.

The hazard assessment will largely be based on the past experiences of the community and include:

SLIDE – Task: Identify

- What different hazards affect your community?
- How often is the community affected and for how long?
- What are the underlying causes of the hazard?.
- What physical parts of the community are affected and how the effects are distributed?
- Which sectors of the community are affected by the hazards and how?
- The extent or severity of the effects

Weather related hazards (meteorological hazards) are already exhibiting increased variability (GLOBAL WEIRDING).

PLENARY: Discuss hazards that participants have experienced both at first hand and in their "communities".

Initiate a general discussion of observed changing weather patterns that participants know of

Through brainstorming with focus group or in semi-structured interviews with key informants and other stakeholders the facilitator should elicit a list of the major hazards faced by the community. Remind the participants that hazards can be any of the following:

a) **Rapid onset or sudden**
b) **Slow onset / trends**
c) **Seasonal**

Write down all the hazards. Sometimes a community will only be concerned with the most recent hazard, particularly a sudden hazard, as it has left a strong impression on them. However, there are other longer term trends that are equally, if not more significant – such as climate change.

Discuss each hazard in turn based around the questions in the following format:

SLIDE (Handout)

Hazard	Name one hazard type per format
History	What are the trends in hazard occurrence in living memory (or beyond if there are records)? How has the incidence / frequency changed over time? *Draw a TIMELINE to map changes if this helps.*
Frequency / duration	What is the typical frequency of occurrence of this hazard (annual; occasional) How long does the hazard itself tend to last?
Location	Which physical areas of the community are affected? *Use the COMMUNITY MAP you developed in Step 1 to add on areas affected.*
Causes	Are there underlying causes of the hazard? This may not be the case for hazards such as earthquakes, however drought may be caused by deforestation.
Warning signs	Is there local knowledge about signs of an impending hazard? Are there any early warning systems established in the area?
Who is most severely affected & how	1) Farmers in low lying areas, land flooded, crops destroyed, land eroded
	2) Women & children - water supply is contaminated, higher incidence of illness, more time needed for collecting water
How many people affected	1) 10% of population (poorest)?
	2) 50% of population (rich and poor)?
Severity / ability to recover	Serious in some years. Lately erratic and very unpredictable. Crops destroyed. Houses destroyed. Livelihoods threatened. Food insecurity. Recovery for farmers is difficult and slow.

Task: Groups fill out hazard assessment for their "community"

How will Climate Change affect this table?

SLIDE - Example of hazard assessment

Hazard	Flood
History	Periodically in living memory, severe flooding becoming more frequent
Frequency / duration	Annually, 3 – 6 months from July to November
Location	Plain and low-lying areas
Causes	Natural rainfall patterns, exacerbated by climate change.
Warning signs	
Who / what is affected & how	1) Farmers in low lying areas, land flooded, crops destroyed, land eroded
	2) Water supply is contaminated, higher incidence of illness, time required to collect clean water
How many people affected	1) 10% of population (poorest)
	2) 90% of population (rich and poor)
Severity / ability to recover	Serious in some years. Lately erratic and very unpredictable. Crops destroyed. Houses destroyed. Livelihoods threatened. Food insecurity. Recovery for farmers is difficult and slow.

If more than one hazard has been identified, compare the hazard assessments and then decide whether to prioritise a single hazard, or whether more than one hazard should be addressed in sequence. This decision should be made by community members based on factors such as the frequency of severe events and the number and poverty levels of those affected.

SESSION 4: ASSESSMENT OF LIVELIHOODS VULNERABILITY (STEP 3)

Objective

To understand how to carry out a Livelihoods Vulnerability Assessment. This process will help participants to understand which aspects of people's livelihoods are vulnerable to particular hazards, shocks and stresses, the nature of that vulnerability, and whether there are institutional and/or policy factors which contribute to that vulnerability.

The vulnerability assessment aims to identify who is at risk, what assets are at risk from the identified hazards and why they are at risk? This involves detailed discussion with particular groups of vulnerable people identified in the community profiling and hazard analysis. Remember, some aspects of vulnerability may be hazard specific. In a community facing several hazards of equal importance, the vulnerability of the community should ideally be assessed for each specific hazard. You may also wish to select different participants for focus groups depending on the hazard and the group most affected by it.

SLIDE - The vulnerability assessment aims to identify

- who is at risk and how?
- which assets are at risk?
- why are they at risk?

This involves detailed discussion with particular groups of vulnerable people identified in the community profiling and hazard analysis.

Many aspects of vulnerability are hazard specific.

The livelihoods vulnerability assessment seeks information on the following issues:

a) **Which assets** are vulnerable during or after the particular hazard event under discussion, and **how** are they vulnerable, i.e. would they be destroyed by the hazard, or weakened, or sold, or undermined? Encourage participants to think both broadly and over the period after the hazard has occurred. Ask whether any of these assets are affected negatively as a result of the hazard.

b) **Why** are those assets particularly vulnerable to the hazard, i.e. what are the characteristics of those people's household assets base, or the availability of assets within the community, that make them vulnerable? To help identify answers to this question you might want to think about the characteristics of people whose assets are *not* vulnerable and assess the difference.

c) Are there **policies or institutions** which are contributing to those vulnerable conditions? Here we are not looking at what policies or institutions might have caused the hazard itself (those should have been identified during the Hazard Assessment under "Causes"). Rather, here we are looking at what policies or institutions (or the lack of them) limit or hinder people's ability to access, develop or protect household or community assets. For example, a lack of savings institutions contributes to the fact that few poor people have savings, which means they need to sell other assets in times of need. It is important for the community to understand that vulnerable livelihoods conditions may be influenced by policies and actions remote from their immediate environment, e.g. forest degradation may be the result of national policies around logging. This is important when choosing mitigation activities.

SLIDE - External factors contributing to vulnerability

- Are there institutions or policies that contribute to vulnerability?

There are often policies or actions remote from the communities, over which they have little control, but which contribute to their vulnerability. These can have a large influence on vulnerability.

Task: Groups carry out exercise using data from their "communities".

Alternatively, Groups can analyse one or other of the two case studies.

Tables have been designed to help you to frame discussions with focus groups to find out more about the above three sets of issues. Tables on the following pages propose some suggested questions to help you work through the assessment, and illustrate what a completed table might look like. It is important to think broadly, to probe and ask open questions which lead to greater insights for both the facilitator and, more importantly, the participants. Remember, this is not merely an exercise to collect data; it is only necessary to collect relevant information that will aid understanding different aspects of vulnerability so that activities can be designed to reduce their exposure to risks.

The importance of asking "open" questions cannot be over stressed. Closed questions tend to require a yes or no answer and therefore close down other possible options or ideas that might have been offered. Open questions should hand control of the conversation to the respondent. You can do this by asking them to think and reflect, or to give you opinions and feelings.

Remember that different groups have different vulnerabilities. Men, women, youth, poor and rich, the infirm and the chronically sick all have different vulnerabilities. If the focus group has a mix of different people, ensure that all voices are heard to ensure that all vulnerabilities are highlighted.

All information collected must be recorded and can be used as **Baseline data.** This can be used to measure the reduction in vulnerabilities of the community over time.

Task: Fill in form using your "communities"

Hand out the completed LVA format with the example of drought in Ethiopia. Discuss the factors included there. Are there others missing? Are trainees clear about the range of issues that might be elicited in this exercise?

HANDOUT

	Vulnerable Assets What are the impacts during or after the hazard (short/long term)?	**Livelihood conditions / characteristics** What characteristics of peoples livelihoods make those assets vulnerable?	**Policies & institutions (local, regional, national)** Which policies or institutions (or lack of) contribute to the vulnerable conditions? How?
Financial assets Discuss: seasonal activities (e.g. agriculture, fishing, wage labour, migration); how is cash income earned; times of hardship; saving/borrowing.	Which economic assets are affected? How? Are people forced to sell assets? What do they sell? Are people able to borrow money? Is it harder?	Are people heavily dependent on a single economic asset? Why are people forced to sell assets? Why are people unable to save or borrow money?	Consider: government line ministries; savings and credit schemes;
Natural assets Discuss: soils, trees, water (for drinking, irrigation, cooking, bathing)	Which natural assets are affected? How?	Why are these natural assets vulnerable to the hazard? Is there a lack of natural assets? Why? How does this affect people?	Consider: local institutions which might manage resources; land ownership; agricultural policy; industry
Physical assets Discuss: houses, wells, tools and equipment, buildings, communications, transport, etc.	Which physical assets are affected? How? E.g. water supplies, buildings, communications, transport.	Why are these physical assets vulnerable?	Consider: local authorities; building regulations; land ownership; support from community/religious groups.
Human assets Discuss well-being, skills, knowledge and individual strengths (health, motivation, etc.)	What are the impacts on people (health, nutrition, physical wellbeing), both immediately and shortly after the hazard? Who is most affected?	Why are these people most likely to be affected? Do people have knowledge of the hazard and its impact?	Consider: access to health institutions, education.
Social assets Discuss: between men and women; community groups; NGOs; religious groups; people with power and authority	How are social relations affected after a hazard? What are the consequences? Do relationships between men and women change?	Why do social relations change? Why are they vulnerable?	Consider: historical traditions; social pressures; local authorities; traditional leaders

HANDOUT

An example of a completed vulnerability assessment is illustrated below.

The identified hazard was **Drought.** (Based on Ethiopia)

	Vulnerable Assets What are the impacts during or after the hazard (short/long term)?	**Livelihood conditions / characteristics** What characteristics of peoples livelihoods make those assets vulnerable?	**Policies & institutions (local, regional, national)** Which policies or institutions (or lack of) contribute to the vulnerable conditions? How?
Financial assets	Loss of crops Loss of livestock Sale of assets for cash	Dependence on rain-fed agriculture Inadequate food and water stores for animals No alternative income source No savings	MoA – limited support to small scale rain fed farming Church – festivals and rituals reduce livestock Lack of small savings institutions
Natural assets	Water shortage Dry pastures Soil erosion No wild food	Environmental degradation Deforestation Loss of traditional seed varieties Loss of traditional knowledge	No local institutions for NRM
Physical assets	Shallow wells dry	No water harvesting No protected water sources	No local institutions to manage water
Human assets	Malnutrition Death Loss of strength Stress	No early warning systems Poor health care & family planning Poor vocational skills for enterprise based livelihoods Low education level Large families	MoH – limited health care provision MoE – limited education support / high cost of education Village elders – promote large families
Social assets	Increased family conflicts Education disrupted Migration	Competition for limited resources Gender inequalities Weak civil society Lack of local employment	

SESSION 5: LIVELIHOODS CAPACITY ASSESSMENT (STEP 4)

Objective

To understand how to carry out a Livelihoods Capacity Assessment. This tool will help participants to understand which livelihoods assets and which policies or institutions are can be drawn on in order to cope with or recover from hazards. This will provide some insights into ways in which to strengthen livelihoods in order to respond to the livelihoods vulnerabilities explored in the Livelihoods Vulnerability Assessment and to reduce impact of hazards in the community.

SLIDE – Capacity assessment

- Capacity relates to the full range assets that enhance people's ability to reduce their vulnerability, i.e. which enable them to cope with, withstand, prevent, prepare for or recover from the impact of a hazard.
- The livelihoods capacity assessment identifies the existing strengths within the community (or group) based on the assets they have available to them or can mobilise.
- Assets include financial, natural, physical, human and social
- They include skills, knowledge, organisations and attitude as well as physical and natural resources.

Capacity assessment stresses the positive and seeks to identify how people usually deal with adverse circumstances. Even the weakest members of a community have useful skills or resources which are valuable when coping with shocks and stresses.

SLIDE

The ability to access knowledge and information and the opportunity to learn new skills are often overlooked when assessing capacities. The availability and short-comings of seasonal crop forecasts have been discussed. Now that AGRITEX, in conjunction with the Met Office, will have up to date information on climate trends, farmers will have access to advice on meteorological (weather) information that guides their decision making.

People live in fragile environments may have developed ways of "riding out" periods of stress. These are known as coping strategies. Coping mechanisms can include defensive actions, active problem solving and ways of handling stress. Following the

impact of a hazard such as drought, strategies for survival may include the consumption of alternative less desirable foods, such as forest fruits or roots. This is a successful strategy if it staves off hunger and avoids the necessity of selling productive assets such as tools and livestock, which would undermine their long-term livelihoods.

People may also be able to identify technologies which play a part in reducing vulnerability or helping them to cope in times of stress. Technologies might include agricultural technologies such as terracing or the use of particular seed varieties (e.g. drought resistance); building technologies, e.g. houses which withstand earthquakes; flood defence walls; or communications technologies, e.g. CB radios for remote communities to call for help in times of emergency.

SLIDE – Capacity assessment

- Which assets are safe or can be quickly recovered after a hazard? What technologies have been used to make them better able to cope?
- What are the livelihood characteristics that make some people more resilient than others?
- What institutions and policies contribute to livelihood sustainability?
- How will people cope with uncertainty? Will they be able to experiment and adapt?
- Will they be able to get relevant information and guidance such as updated weather forecasts?

The livelihoods capacity assessment seeks information on the following issues

- Which assets are safe during or can be quickly recovered after a hazard? Which alternative assets can be drawn on in times of need (think here of coping strategies – what do they draw on). What technologies have been used to protect assets, or make them more resilient to its impact? Think as broadly as possible to all the possible resources that can be drawn upon, including such things as traditional knowledge, individuals' motivation, or social cohesion.

- What are the livelihood characteristics of those people who have some safe assets, or whose assets are protected from the impact of the hazard and make them more resilient to its impact? Do they have a wider range of assets than those who are more vulnerable? Do they grow different types of crops, or grow

them in a different way? Do they have other sorts of skills or resources? What resources are available to be drawn on in building resilience?

- Which institutions and policies are important in ensuring that livelihoods are sustainable and able to cope with and recover from hazards? Don't just think about those institutions that respond after a hazard has struck – but rather think about those that ensure that people are not vulnerable in the first place. Which institutions are doing positive work in the area that could be further strengthened or replicated? Which institutions are always available for support, not only when disaster strikes? Think about specific opportunities for influencing: is there a visit from someone in a relevant institution who could be approached? Is there a policy process which could be fed into?

- How will people be able to cope with long-term uncertainty? Climate change might bring unpredictable situations, never experienced before. Will people have the ability to experiment and adapt to changing circumstances? Where will they obtain relevant information and guidance? Will they be able to access updated forecasts that can guide their decision making?

Assessing the capacities of people at risk is an important step in choosing strategies for building resilience. Building on existing strengths ensures that existing and traditional coping strategies are not undermined but reinforced. If the resources and resourcefulness which exist in communities and households are ignored when designing risk reduction measures, existing coping methods may be weakened leading to increased vulnerability. The information can be recorded in a table as illustrated below.

Task: Identify the capacities found in your "communities" or the case studies.

Are these coping strategies or adaptive strategies? What is the difference?

Suggest how these could be used in building adaptive capacity or resilience

Suggest ways of improving or increasing the capacities of your communities.

SESSION 6: PRIORITISATION OF RISKS AND RISK REDUCTION STRATEGIES (STEP 5)

Objective

Identified risks are prioritised and possible strategies to reduce risk, protect assets and build resilience and adaptive capacity are identified.

After completion of the Livelihoods Vulnerability and Capacity Assessments, key vulnerabilities should be prioritised according to the consensus of the group. This can be done informally, through discussion, or formally through using a participatory ranking tool. It is important that all members of the focus group are involved in prioritisation, and if there is any disagreement, this should be recorded for future reference. Prioritisation will help in the planning process to follow.

Rank the areas of asset risk according to priority. It may be worth distinguishing between priorities of men and women, or between other significant social groups, in the ranking in order to ensure that their key priorities are noted (e.g. men and women vote with different coloured marks).

SLIDE – Prioritisation of risks

- Rank areas of asset risk according to priority
- Identify priority areas for action to address identified risks.
- Encourage flexibility and the ability to adapt to changing situations
- Communities need to deal with immediate identified needs as well as future uncertainty.

Based on the prioritised areas of risk, look across the areas of livelihood vulnerability, asset and livelihoods capacity, and constraining and supportive policies and institutions, to seek priority areas for action to address the identified risks. It is not necessary at this stage to get down to practicalities of what exactly to do – this will come in the action planning session. The aim is to identify areas which seem most important whilst the assessment discussions are still fresh in people's minds. Select a few different areas, these can always be prioritised further during the planning stage.

In order to deal with uncertainty, communities need to be flexible and able to adapt to changing circumstances. Climate change promises to be dynamic and unpredictable. Greater extremes of variability are already appearing. This increased variability and uncertainty will require communities to build resilience and adaptive capacity. They

will need to be prepared to experiment with new technologies, new crops and to adopt greater diversity in the pursuit of sustainable food security.

This session should result in the production of positive interventions which will reduce vulnerability while building resilience and adaptive capacity.

Task: Participants prioritise vulnerabilities and risks identified in previous exercises and suggest interventions to increase resilience and adaptive capacity

Prioritised risks and possible interventions to reduce their impact and build adaptive capacity form the basis of community-based planning.

CASE STUDY 1

Maidei Jejeje is a widow, with no children, farming a fenced holding of 3 hectares in Natural Farming Region 5 (Gwanda South District) of Matabeleland South. She has been trained in soil and water conservation using basins as a way of harvesting rain water and building soil moisture to take crops through the recurrent and prolonged dry spells which characterize the region. After training in conservation farming (CF) Maidei had the further opportunity to be trained in seed multiplication of open pollinated varieties of drought tolerant small seed cultivars. The extension worker, who had been impressed by Maidei's demonstration of conservation farming, selected her to receive 3 maize varieties from Pannar for multiplication. In the same season as multiplying the 3 maize cultivars she cultivated 1 variety of cow peas (CBC2) and 1 sorghum cultivar (Macia). Besides being a work horse Maidei is a typical innovative farmer who is keen on experimenting with different technologies. On her CF plot, she has combined methods such as basins/potholes and mulch and some areas basins only for comparison. So as not to loose on rainfall data, Maidei improvised a rain gauge using an empty tin of 500g beans which she has set out in an open space on top of a pole. Once the rains stop, she collects the tin and uses a tape measure and reads the amount collected which she then records.

Her seed multiplication has created an income stream as well as multiple linkages as she now has to constantly liaise with Matopo Research for her sorghum and cow peas seed, while also liaising with Pannar for her maize seed. She has become an important lead/contact farmer who has earned a lot of respect from AGRITEX with the local extension workers and even her village head.

Maidei has three cows which she restocked after the devastating 1992 drought. She also has few goats from which she gets some milk. She has recently attended training on Participatory Market System Development (PMSD) and maintains regular contact with the District Department of Veterinary services since there are no paravets in her area.

She and other women have formed Internal Lending and Savings Schemes where each of the women gets some money when her turn comes. As a society they also bake cakes, scones and fat scones for sale at the local school and clinic. When she has urgent financial needs she draws money from these savings.

She has a deep well and grows some vegetables. During extreme drought most villagers survive on this well as the community source of water will have dried.

CASE STUDY 2

Kirian and his family are typical subsistence farmers living on 4 hectares of unfenced arable land in a semi-arid area of Gwanda South District. The family has one ox and two goats which were paid as lobola when the second born child was married. A paravet is resident in the area. As the community has agreed that the paravet charges a small fee for any service rendered, Kirian has not been able to access the service of the paravet. Instead he relies on local herbs for treating his livestock. The local communities claim that the local herbs sometimes work if the correct dosage is applied. Grazing is communal and during the dry season livestock roam around even into other people's fields destroying the crop stover reserved for their own livestock.

Kirian and his wife have six children, the eldest being 18 and the youngest 2 years. They have only managed to send two of their children to school. The eldest is largely engaged, on a daily basis, in herding goats and cattle for one of their wealthy neighbours. As he is still staying with his parents, they use his income to buy grain and pay for the milling costs and other household requirements.

Kirian and wife survive by collecting and selling macimbi (caterpillars) when they are in-season. The caterpillars have two generations per year i.e. April and November. They also sell wild fruits such as matamba, tsubvu and matohwe by the road side. They also depend on small jobs such as weeding and harvesting, especially during good seasons, to supplement their income.

The family is reliant on a communal borehole which frequently breaks down. Then Kirian's family has to resort to collecting water from sand abstraction (mufuku). They are unable to grow vegetables because the demand for water to meet basic human needs is so great. During the rainy season two of their children suffered from water borne diseases and the wife spent the greater part of the rainy season at the District Hospital. The family had to borrow transport money from the local Village Health Worker. The family has accrued a debt at the hospital as they could not afford to pay the bills. To date they have received two reminders from the hospital to pay their hospital bills.

During difficult years the family spends time attending food aid verification meetings. Through one of the projects in the area, Kirian's family has received two rabbits for income generation and as a source of protein. However the rabbits have not increased to any meaningful extent since they regularly sell them to meet their most urgent needs.

CASE STUDY 1 – OUTCOMES

A drought comes: crop yields are decreased by 50%, but the family is able to survive through their own savings, sale of vegetables, sale of goats and cookies, and the sale of seed to seed companies. Local farmers also prefer to buy her local seed since it is cheaper as they do not incur transport costs and is adapted to the local conditions. Her family is able to cope and soon recovers during subsequent seasons.

CASE STUDY 2 – OUTCOMES

A drought comes: In 2011/2012 season the Southern region of Zimbabwe suffered a severe drought with total crop failure. The family is reduced to eating one meal a day and the two kids who attend school supplement their meal with some porridge at school. The family is currently dependant on food aid or well-wishers since the distribution of food by Aid agencies is not regular.

SECTION 9.0

SMALLHOLDER FARMERS' LIVELIHOOD AND CROP PLANNING – HOW CLIMATE AND WEATHER INFORMATION MAY HELP

INTRODUCTION

This session (or split into 2 sessions) is a participatory exercise. The aim is to introduce course participants to two methods that they can then use with farmers. The methods help farmers to think and plan ahead what they might do in seasons with normal, higher than normal, or lower than normal rainfall e.g. if they received the El Nino / La Nino forecast.

Course participants will need to work in groups of about 5 people.

Each group will need:

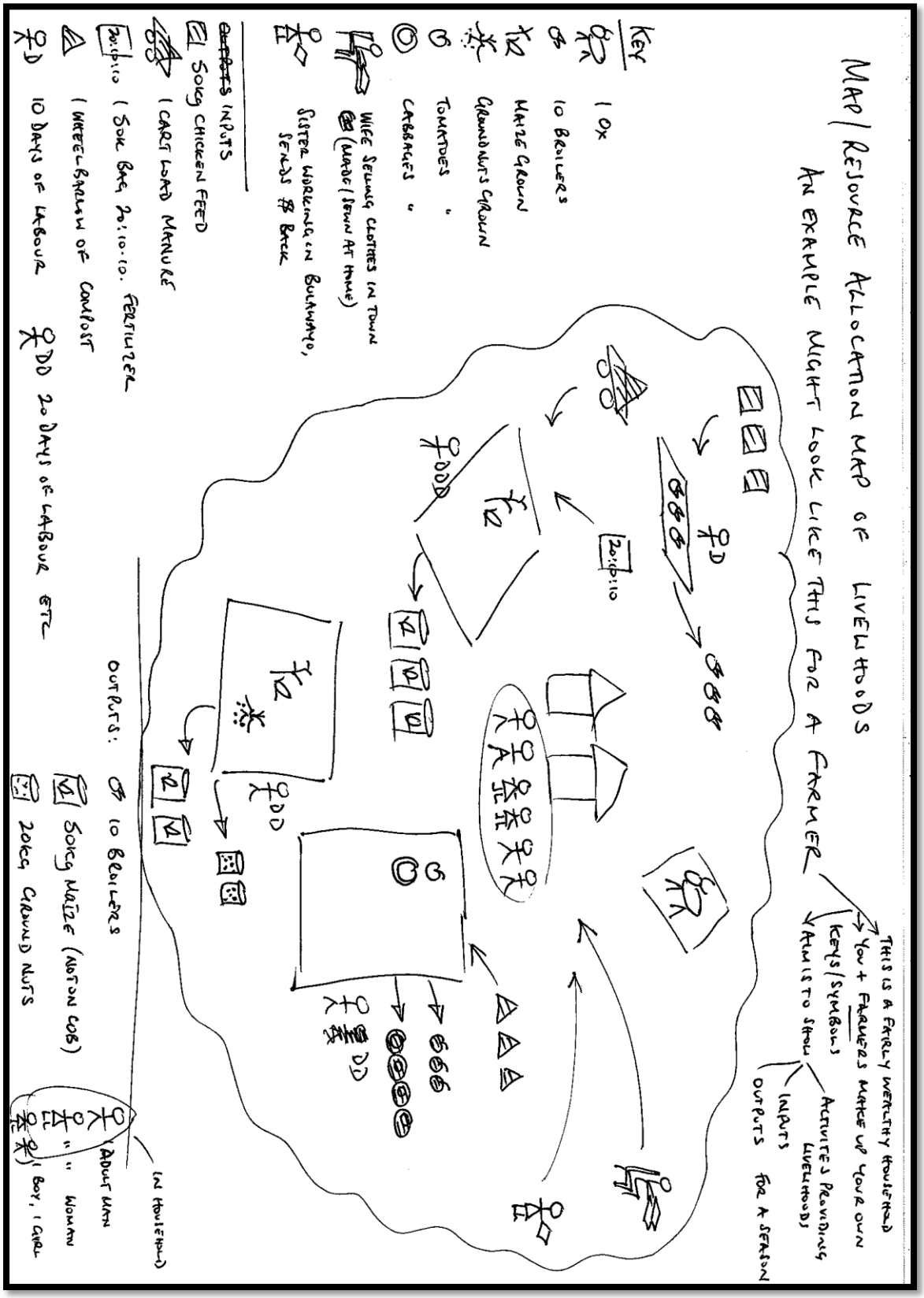
- Handouts of instructions
- Handout example of a Resource Allocation Map
- Handout example of a Cropping Calendar
- Flip chart paper and pens

Instructions for exercise 1 are given in Slide 1

PLEASE SEE THE EXAMPLE OF THE RESOURCE ALLOCATION MAP ON PAGE 80

SLIDE 1 - USING RESOURCE ALLOCATION MAPS (RAM) TO EXPLORE AND PLAN LIVELIHOOD OPTIONS

- **A RAM is a simple map drawn by a farmer(s) that shows their main resources on and off their farm and changes in them (see handout)**
- **RAMs are useful for describing what happens and for planning ahead**
- **Draw a RAM for an example farmer from your area for last year if it was a normal year. If it wasn't pick the most recent normal year. Include all the livelihood activities (both on and off farm) that the household were engaged in**
- **Note that you do not need to give all the details of the amounts of inputs and outputs of resources. Focus on the main changes in activities between normal and La Nina / El Nino years**
- **Consider what the household might do (and plan to do) if they know next year is going to be a La Nina year. Mark this on the RAM clearly e.g. using a different colour**
- **Consider what the household might do (and plan to do) if they know next year is going to be an El Nino year. Mark this on the RAM clearly e.g. using a different colour**
- **Think of probabilities of the events we looked at yesterday to help identify and consider livelihood options**


MAP/RESOURCE ALLOCATION MAP OF LIVELIHOODS
AN EXAMPLE MIGHT LOOK LIKE THIS FOR A FARMER
THIS IS A FAIRLY WEALTHY HOUSEHOLD
YOU + FARMERS MAKE UP YOUR OWN
KEYS/SYMBOLS
ACTIVITIES PROVIDING LIVELIHOODS
INPUTS
OUTPUTS FOR A SEASON
KEY
1 Ox
10 BROILERS
MAIZE GRAIN
GROUNDNUTS GRAIN
TOMATOES "
CABBAGES "
WIFE SELLING CLOTHES IN TOWN
(MADE/BOUGHT AT HOME)
SISTER WORKING IN BULAWAYO, SENDS $ BACK
INPUTS
5 OKG CHICKEN FEED
1 CART LOAD MANURE
1 SOK BAG 20:10:10. FERTILIZER
1 WHEELBARROW OF COMPOST
10 DAYS OF LABOUR
20 DAYS OF LABOUR ETC
OUTPUTS: 50 10 BROILERS
5 OKG MAIZE (MEAL OR COB)
20KG GROUND NUTS
ADULT MALE
" WOMAN
BOY, 1 GIRL
(IN HOUSEHOLD)

Give the groups an amount of time to do this (say 45 mins). If you are short of time ask all groups to do the RAM for a normal year and then after this some groups to focus on a La Nina year and the other groups to focus on an El Nino year. Go round between groups to answer questions and clarify what they are asked to do and why.

After the 45 minutes choose some good examples and ask the groups who did them to present and explain them.

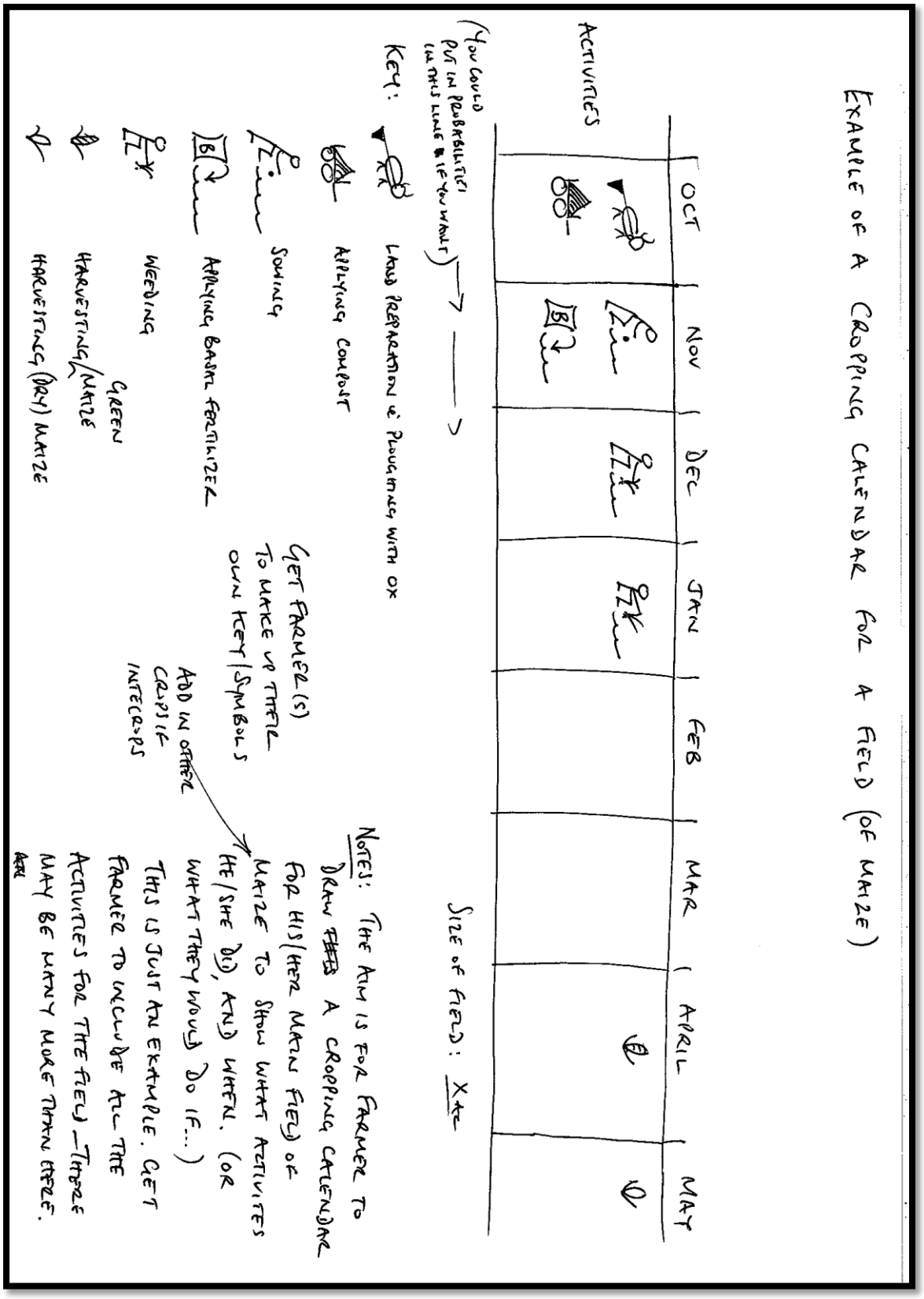
Ask participants to share with the class and discuss how they could be used with farmers.

Instructions for exercise 2 are given in Slide 2

PLEASE SEE THE EXAMPLE OF THE CROPPING CALENDAR ON PAGE 82

The first exercise above that used RAMs looked at the whole farm and household. The next exercise focuses on an individual crop.

- **SLIDE 2 - USING CROP CALENDARS TO EXPLORE AND PLAN CROP MANAGEMENT OPTIONS A Crop Calendar is a diagram drawn by a farmer(s) that shows their main cropping activities for a crop during the season. It can be used to explore and plan what management options may be better to use in different years (see handout)**
- **Draw a Crop Calendar for a field of a crop on an example farm from your area for last year if it was a normal year. If it wasn't pick the most recent normal year. Include all the crop activities and when they were conducted in the season**
- **Consider what the farmer might do (and plan to do) if they know next year is going to be a La Nina year. Mark this on the crop calendar clearly**
- **Consider what the household might do (and plan to do) it they know next year is going to be an El Nino year. Mark this on the crop calendar clearly**
- **Think of probabilities of the events we looked at to help you consider management options**



Give the groups an amount of time to do this (say 45 mins). If you are short of time ask all groups to do the crop calendar for a normal year and then after this some

groups to focus on a La Nina year and the other groups to focus on an El Nino year. Go round between groups to answer questions and clarify what they are asked to do and why.

After the 45 minutes choose some good examples and ask the groups who did them to present and explain them.

Ask participants to share with the class and discuss how they could be used with farmers.

A USEFUL METHOD

Point out that Crop Calendars can also be turned into budgets by farmers. The farmers can put in a row below the activities and indicate what resources and how much are used in each time period (column). For example, two 10 kg bags of basal fertiliser in December cost $70 i.e. each costing $35. In the next row the farmer can indicate what is harvested. Again showing how much e.g. 5 bags and when. The budget therefore shows the inputs and outputs and their timing. This can be useful for farmers looking back at a recent season, or planning ahead, or deciding which crop to grow and how.

SECTION 10.0

DAYS 2 AND 3 – COMMUNITY ACTION PLANNING FOR ADAPTATION TO CLIMATE CHANGE AND CLIMATE VARIABILITY

The complete slideshow can be found in Appendix 7

INTRODUCTION

In the last session we discussed the framework for analysing vulnerability and capacity to adapt to climate variability and change at the community level. It is now important for Agricultural Extension staff to establish the linkage between the community vision and the need for secure livelihoods. This session will strengthen understanding on the key components of community action planning and in the process enable extension staff to acquire the basic skills necessary to facilitate the development of community-based, disaster-resilient action plans

Developing a disaster resilient action plan

SESSION 1: INTRODUCTION TO COMMUNITY ACTION PLANNING

Objective: Participants gain a basic understanding of the principles & process of Community Based Planning

The prioritised list of LCDRR actions developed in the previous section outlines the **vision** of the ward i.e. where the community wants to go, the ward **goals**, the **strategies and projects** which are how the community will achieve what they want to do. There is still need to produce a detailed implementation plan of the specific activities that will need to be carried out. This implementation plan will be specific in terms of what exactly needs to be done, when, who will be responsible, how much it will cost, and local resources to be mobilized.. This will be compiled into a Community Action Plan (CAP) that will be implemented during the current financial year. The Community Action Plan will include activities whose funding is confirmed and those for which Service Providers are seeking funding for. The community will also include the projects they are implementing without external support.

As far as possible, the problems to be solved through an action plan should also resonate with the articulated vision and development goals of the community. Project-based action plans on their own do not achieve the community goals, but make a contribution among several other interventions.

It is important that community action plans reflect a high degree of community contributions to the required inputs in terms of committed time and expertise, labour, physical and material resources. Emphasis should be on ensuring that the initial problem/s, solution/s and the plan are fully owned by the community through its local organizational structures. For each of the steps/activities in the action plan,

Contributions in cash or kind need to be agreed by the whole community, taking into account the variations in resource endowment among community members. Leaders and communities must commit themselves to mobilizing such resources within the agreed time frame.

For example for a community nutrition garden, some communities can purchase the materials on their own and require technical assistance from their Extension Worker. Others may have a financial shortfall, in which case the leadership has to consult and seek external assistance. Some of the potential support could already have been pledged by NGOs operating in the locality during the time of service provider analysis. On the whole, a good action plan, drawn by the community itself, articulated by the community itself, showing their own level of commitment, is best placed to attract external funding. Remember one of the roles of local leaders is networking and resource mobilization.

The community action plan as a product of community dialogue should be as simple as possible, and in the language and symbols they themselves understand.

SLIDE: The main elements of Community Based Planning

To ensure participants understand concepts initiate a brief discussion to clarify main elements.

SESSION 2: COMMUNITY VISIONING

Objectives:

- Participants are able to understand what community visioning is, why it is used and how to conduct it
- Participants are able to conceptualise and envision relevant DRR/Climate Change Adaptation outcomes from VCA data
- Participants are able to learn skills and confidence to facilitate this process in their communities

The next step in the CBDRR process, Community Visioning, aims to move away from problem-based planning, to a more **visionary** approach – looking at where a community desires to be in terms of the future development of their community, and how to get there.

Community visioning allows people to express their vision of their disaster-proofed community. If consensus can be reached in the community on common aspirations and priority long-term goals, a climate resilient plan of action will be more directed and **strategic** – this can enhance the selection, **prioritisation** and sequencing of actions in the plan. It will ensure that the climate resilient plan is **community-led**, and contributes not just to disaster risk objectives, but to achieving long-term community **development** ambitions – so truly integrating DRR into the development process. It is also this stage that communities will develop their own indicators for successful implementation of risk reduction initiatives, and these can be expressed as **outcomes**.

On the basis of Capacity Analysis, the Vision must be realistic and achievable – i.e. within current resources and capabilities. Participants may also be asked to imagine the roles they would play in attaining their vision. By focusing on hopes, ambitions, and roles, Community Visioning brings a sense of empowerment and motivation, building on the strengths of the current situation.

The process of conducting the vision is as important as the final outcome: it is a shared **negotiation** for community members to articulate and then coalesce around agreed priorities. It should deliberately include marginalised groups, who can make vital contributions to the direction of their future resilient society.

The aim is to develop an overall statement of what people wish for their community in the long-term (10 year) – e.g. "By 2020 we will be a vibrant community where people like to live and work, households are well-fed and resilient to threats from drought, and everyone is able to access health and education services…" To reach consensus in a large group, it is useful to start with small groups (these could be divided by socioeconomic groups, or by issue areas) who discuss and write down their ideas for hopes and visions, then combine into increasingly large groups, to build up agreement across the participants. Once a vision statement (or key elements of it) is

agreed by all, it is useful to specify clear shorter-term goals (5 years), focusing on issue areas (e.g. health, education, agriculture), that will define practical steps towards fulfilling the vision.

SLIDE: Key elements of community visioning

Task:

- Facilitate group discussions to agree on their hopes and wishes in terms of what their community will look like in the future
- Discuss the future scenarios in plenary and allow participants to examine the pros and cons of each scenario.

SESSION 3: DEVELOPING A DISASTER RESILIENT ACTION PLAN

Objectives:

- Participants understand what is expected in a plan of action and how to develop it.
- Participants are able to conceptualise appropriate local level plans and institutionalise arrangements for driving the plans
- Participants are able to formulate relevant practical impact indicators Participants gain facilitation skills in conducting development planning

The final stage of community planning is to develop a realistic and practical **plan of action** to implement those activities. This uses the tools of **Community Based Planning** – a participatory and democratic approach to development visioning and strategising. It should be a plan for community development to achieve the Community Vision. – whilst being disaster resilient by including the priority DRR actions (including disaster preparedness) that address key vulnerabilities. These plans essentially contribute to the long-term, climate resilient, development of the community.

In group planning the issue of organizing communities into different socio-economic groups enables inclusive participation taking account of the most vulnerable groups especially those affected by HIV/AIDS, women, the elderly etc.

For communities, planning is a key skill to learn for the future, so facilitators must ensure that there is strong ownership and leadership from within. However, with potential conflict over priorities and access to resources, this can be a time-consuming and challenging process.

Like all good planning, the resulting actions in the plan need to be **specific**. Detailed operational activities must be developed, that specify what actions will be taken (avoid broad statements such as 'livelihood opportunities will be diversified'). They should be **strategic** – so that the series of projects and objectives envisaged will, together, reap the greatest rewards in achieving the vision and goals. Activities should be **timed** – with implementation of project activities sequenced over time, in short, medium and long term phases, and timetable targets set. The plan should ensure that relevant people, committees or groups take **responsibility** for overseeing the monitoring implementation. The plan should be **realistic** – ensuring that the activities are attainable by the people who take on the responsibilities, and that **resources** needed to implement the plan are identified.

The plan should include an action plan for the year ahead – with the most detail for projects and objectives for the year ahead. Communities need to store their VCA findings to return to and create further plans in the future.

To achieve this, common tools, including transect walks, seasonal calendars, focus group discussions, Venn diagrams, timelines, matrix ranking, participatory mapping, and gantt charts can be used.

Task:

1. In small groups, participants discuss various tools that can be used to create a detailed disaster resilient action plan in a participative way in communities:
    - How can the process be participatory and community led? How do you envisage this process be facilitated in communities?
    - What ideas do you have for tools to facilitate action planning?
    - What challenges do you envisage? How might you overcome the challenges?

Handout- **Example of a consolidated community action plan**

SESSION 4: PARTICIPATORY MONITORING AND EVALUATION

Objectives:

- Participants understand the need for M&E in implementing climate resilient plan
- Participants develop a good conceptual understanding of the shifting paradigms in M&E and can relate their practical experiences to climate change adaptation.
- Participants acquire knowledge to develop M&E systems for their action plans

We have discussed how to develop a disaster resilient action plan now it is important to discuss the need to set up monitoring and learning systems.

Key steps in designing an integrated M&E System for LCDRR Initiatives

Key step	What is involved	Who is involved	Expected Outcome
Developing the M&E system	Building mutual understanding on what needs to be monitored and what changes in institutional relationships, people's lives needs to be closely tracked	All key actors affected directly and indirectly by the initiative	Basis for detailed operational M&E plan for the initiative linked to the project log-frame or the objectives of the local initiatives.
Gathering and managing information	Communities and their local support organizations need to know which information will be required and how can they manage this information	Communities involved in the initiative Local disaster management committees Local leaders Local support organizations	Communities and local Implementation agencies have developed clear systems for gathering and managing the information on their LCDRR initiatives.
Reflecting critically to improve action	This involves deciding from the outset how the initiative will make sense of the information that is being gathered and using it as a basis for making continuous improvements in the LCDRR initiative. This may include periodic community and stakeholder reviews.	All key actors involved in the project and some independent observers to help with the discussion. Sometimes reflection platforms to improve quality of the action are wasted due to poor planning and	Field data and evidence validating project outputs, outcomes and impacts.

		involvement of the right mix of stakeholders	
Communicating and reporting results	This involves understanding the audience for the information. Need to establishment of the information needs of the different stakeholders involved in the project. For a LCDRR project, stakeholders range from the District Administrator, members of the Disaster Management Committees, Local Development Agencies – they all need to know what is coming out of the initiative.	Project coordinating teams at community, district and provincial level. Sometimes, the National Level, such as the Civil Protection Unit needs to know what changes are happening on the ground as a result of new approaches and new ways of doing things.	Mechanisms for spreading good practices are developed and accessible to all interested actors.

Task:

2. In small groups, participants discuss and define the terms *monitoring* and *evaluation,* giving practical, real life examples from their work. They should discuss why these should be undertaken, when and how. Can communities conduct these activities? Which evaluation methods are they aware of?
3. In small groups participants discuss the current challenges in monitoring and evaluation and how these can be overcome

SECTION 11.0

KEY CONCEPTS

ADAPTATION TO CLIMATE CHANGE

"Adjustment in natural or human systems in response to actual or expected climatic stimuli or their effects, which moderates harm or exploits beneficial opportunities". Adaptation reduces vulnerability to change, either by building adaptive capacity or by reducing exposure or sensitivity to climate change impacts. We must ensure that poverty reduction strategies/ development interventions do not inadvertently increase vulnerability (mal-adaptation).

ADAPTIVE CAPACITY

Adaptive capacity refers to *the ability of a system to adjust to climate change, including climate variability and extremes, to moderate potential damage, to take advantage of opportunities to cope with the consequences* (IPCC 2007). One of the most important components of adaptive capacity is access to and control over natural, human, social, physical and financial resources.

Access and control over resources is influenced by external factors such as policies and institutions and power structures. Adaptive capacity is not static but dynamic changing with changing circumstances.

CAPACITY

Capacity is the combination of all the strengths, attributes and resources available within a community, society or organisation that can be used to achieve agreed goals.

CLIMATE

"*Climate defined as the average weather*, or as the statistical description in terms of the mean and variability of relevant quantities over a period of time ranging from months to thousands or millions of years. The classical period for averaging these variables is 30 years, as defined by the World Meteorological Organization. The relevant quantities are most often surface variables such as temperature,

precipitation and wind. Climate in a wider sense is the state, including a statistical description, of the climate system" (IPCC, 2007).

CLIMATE CHANGE

The IPCC defines climate change as "*Any change in climate over time, whether due to natural variability or as a result of human activity"* This refers to observed and projected increase in global temperature and the associated impacts including an increase in extreme weather events, sea level rises, melting of glaciers etc. and changes in the timing and amounts of rainfall.

CLIMATE HAZARD

A potentially damaging physical manifestation of climate variability or change, such as droughts, floods, storms, episodes of heavy rainfall, long term changes in the mean values of climatic variables.

CLIMATE MODEL

A numerical representation of the climate system based on the physical, chemical, and biological properties of its components, their interactions and feedback processes, and accounting for all, or some if it's known properties. The climate system can be represented by models of varying complexity (i.e. for any one component or combination of components a hierarchy of models can be identified, differing in such aspects as the number of spatial dimensions, the extent to which their physical, chemical or biological processes are explicitly represented, or the level at which empirical parameterisations are involved (IPCC, 2007).

CLIMATE CHANGE PREDICTIONS

Climate change predictions are produced by complex climate computer models use the chemical composition of the atmosphere to predict what conditions will be like 50 – 100 years into the future. Climate change predictions are inherently uncertain.

CLIMATE VARIABILITY

Climate variability is variations from the mean state (and other statistics, such as standard deviations, the occurrence of extremes, etc.) of the climate on all temporal and spatial scales beyond that of individual weather events (IPCC 2007).

CLIMATE VULNERABILITY

Climate vulnerability is the degree to which a system is susceptible to, and unable to cope with the adverse effects of climate change, including climate variability and extremes. Vulnerability is a function of the character, magnitude and rate of climate change and variation to which a system is exposed, it's sensitivity and it's adaptive capacity (IPCC, 2007). Exposure to climate change is context specific – for example a community living in a semi-arid area has greater exposure to drought.

DISASTER RISK REDUCTION (DRR)

The concept and practice of reducing disaster risks through systematic analysis and management of the causal factors of disasters, including through reduced exposure to hazards, lessened vulnerability of people and property, wise management of land and the environment and improved preparedness for adverse events.

ENSO – EL NIÑO SOUTHERN OSCILLATION

ENSO is a complex interaction of the tropical Pacific ocean and the global atmosphere that results in irregularly occurring episodes of changed ocean and weather patterns in many months such as altered marine habitats, rainfall changes, floods, droughts and changes in storm patterns (UNISDR 2009). El Niño y La Niña are defined as sustained sea surface temperature anomalies of magnitude greater than 0.5 C across the central tropical Pacific ocean, El Niño being a warming and La Nina a cooling event. El Nino events are associated with wetter weather in Peru/Ecuador and East Africa and drier conditions in South East Asia, northern Australia and Southern Africa. La Niña events generally cause the opposite and are associated with increased Atlantic cyclones. Climate change may increase the strength and the frequency of the oscillation.

HAZARD

A dangerous phenomenon, substance, human activity or condition that may cause loss of live, injury or other health impacts, property damage, loss of livelihoods and services, social and economic disruption or environmental damage. Different types of hazards include shocks such as floods (rapid onset) and stresses such as changing rainfall patterns and droughts (slow onset). We need to distinguish between the hazard (e.g. a flood) and the effects of the hazard (e.g. drowning of people or destruction of homestead). Some effects are the result of cumulative hazards (events) such as declining soil fertility plus reduced rainfall and poor access to markets leading to reduced income and food insecurity.

RESILIENCE

The ability of a system, community or society exposed to hazards to resist, absorb, accommodate to and recover from the effects of a hazard in a timely and efficient manner, including through the preservation and restoration of its essential basic structures and functions. The term "resilience" as used in DRR has strong linkages to "adaptive capacity".

RISK

The combination of the probability of an event and its negative consequences, often expressed as R = HxV/C.

SEASONAL FORECASTING

Seasonal forecasting predicts the climate in between weather and climate model time scales and is based on slowly changing phenomena that have a significant impact on the weather, such as the El Niño Southern Oscillation (ENSO). Monitoring these phenomena allows seasonal trends to be predicted up to around two years in advance but with greater confidence for around three months. Typical seasonal forecasts predict daily rainfall with a level of confidence; generally speaking confidence reduces the further the location is away from the equator and the influence of ENSO (Ensor, 2011).

SCENARIO

In relation to climate change a scenario is a plausible and often simplified description of how the future may develop, based on a coherent and internally consistent set of assumptions about the driving forces and key relationships. Scenarios may be derived from projections, but are often based on additional information from other sources, sometimes combined with a narrative storyline (IPCC, 2007).

SENSITIVITY

Sensitivity is the degree to which a system is affected, either adversely or beneficially by climate variability or change. The effect may be direct (e.g. a change is crop yield in relation to a change in annual mean temperature or variability in the temperature range) or indirect (e.g. damages caused by the increase in coastal flooding due to sea level rise (IPCC, 2007).

TRENDS

Livelihoods are affected by long-term trends. It is important to differentiate between trends that are likely to change as opposed to those that are likely to continue. Trends include: population growth, violent conflict, national and international economic growth, technology trends. It is also useful to note the difference between local and national and international trends.

VULNERABILITY

The characteristics and circumstances of a community, system or asset that makes it susceptible to the damaging effects of a hazard. The level of vulnerability depends on the characteristics of a person or group in terms of their capacity to anticipate, cope with, resist and recover from the impact of a natural or man-made hazard.

WEATHER

It is important not to confuse weather and climate, weather is the short term daily and hourly changes in conditions such as temperature, rain, wind and humidity which can only be predicted up to about 15 days in advance.

ADAPTATION VERSUS COPING:

Coping	Adaptation
Short term and immediate For survival Not continuous Reactive, motivated by crisis Often erosive of resources Often lack of alternatives	Aim of long-term livelihood security Continuous process Sustainable Efficient use of resources Planned Uses old and new strategies and knowledge Looks for alternatives

APPENDIX 1

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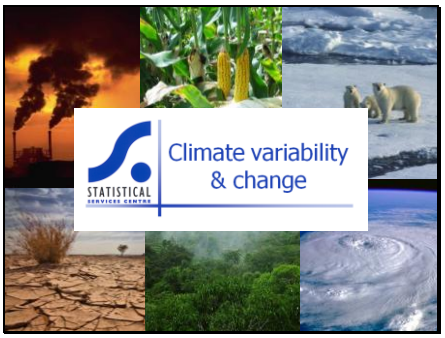

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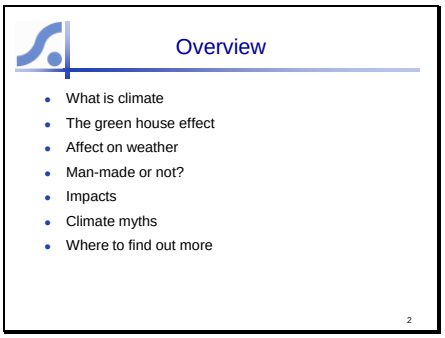

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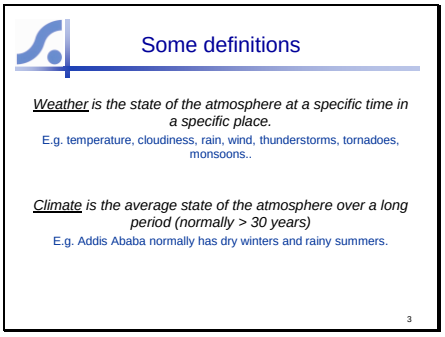

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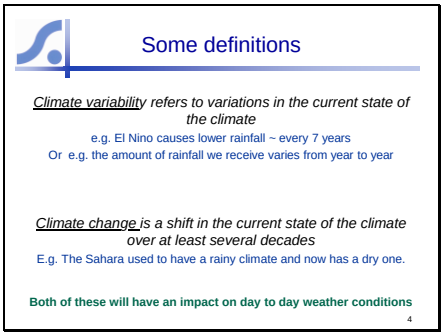

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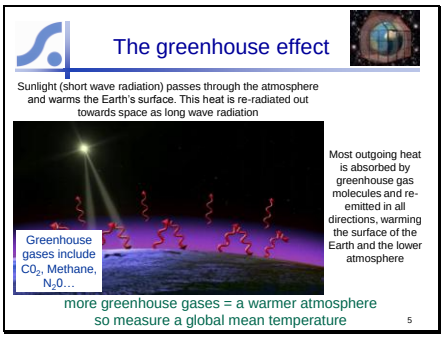

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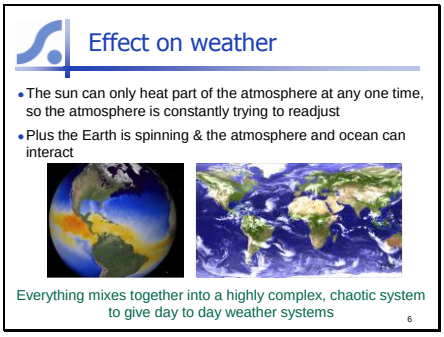

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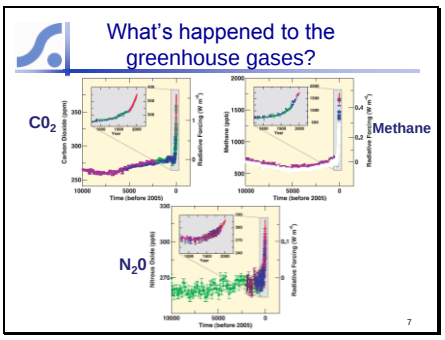

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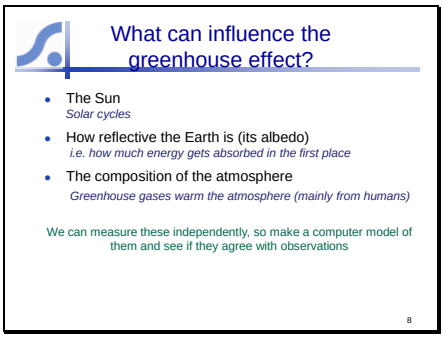

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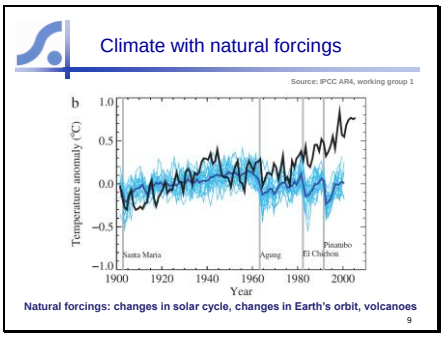

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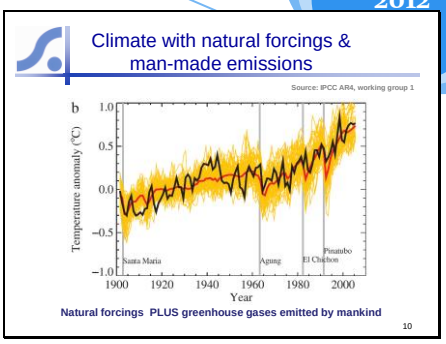

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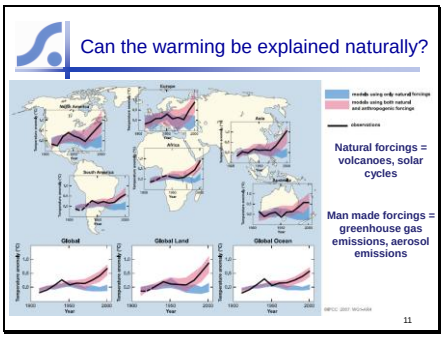

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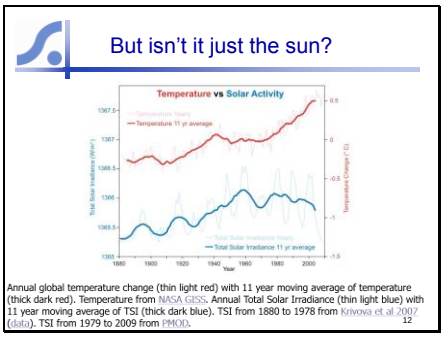

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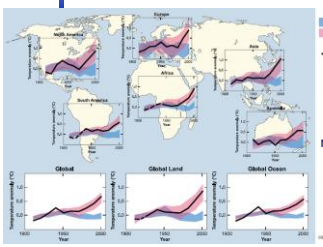
Can the warming be explained naturally?



Natural forcings = volcanoes, solar cycles

Man made forcings = greenhouse gas emissions, aerosol emissions

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What would one expect to happen with global warming?

- This is a shift in the mean state of the atmosphere → climate change
- A warmer atmosphere means a warmer ocean
  Ice melt leads to sea level rise
- The complex weather system is shifted into a new state
  The weather will change (i.e. some places wetter/some drier, some warmer and some cooler)

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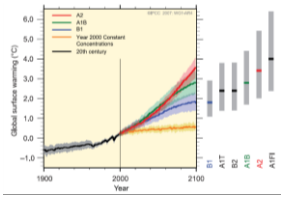
Slide 15

What's going to happen in the future?

We are still emitting green house gases, so the atmosphere will continue to warm



How much depends on the future scenario you choose

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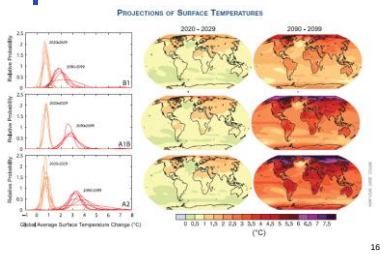
Predicted effect on temperature



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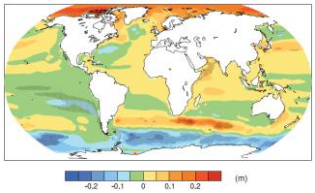
Predicted effect on sea level rise



This is the amount the sea level is forecast to rise before 2100 under the A1B scenario

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Slide 18

Predicted effect on precipitation

- Much more uncertain due to the complex weather systems on Earth
- Some areas expected to get wetter & some drier but climate models disagree about regional effects.
- A warmer atmosphere in general will intensify the water cycle, leading to more intense storms.

This is the cutting edge of climate science!

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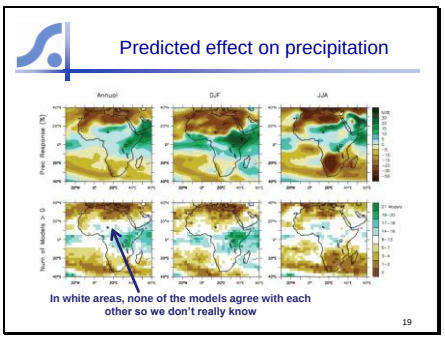
Slide 19



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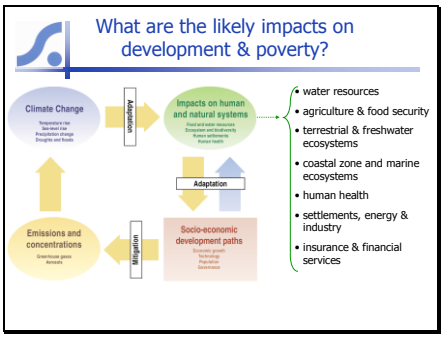

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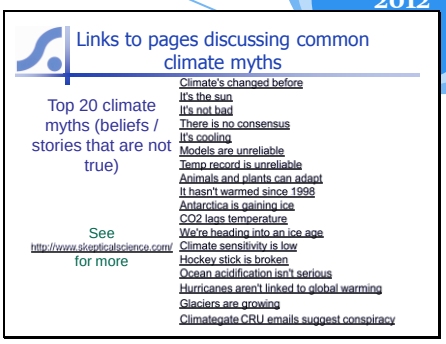

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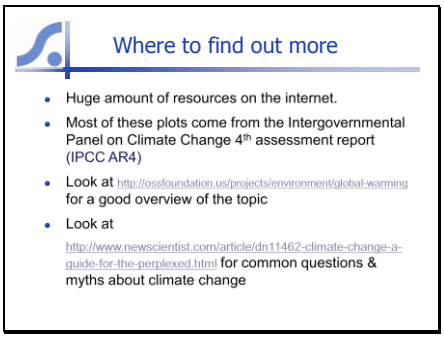


APPENDIX 2

Slide 1

The Impact of Climate Change on Livelihoods

Slide 2

Problems farmers are facing

- Delayed onset of rains, poor distribution, intensity
- Increased length & frequency of mid-season drought
- Increase in temperature
- Reduced yields
- Increased runoff and erosion
- Leaching of nutrients
- Heat stress of livestock -> reduced yields, mortality
- Increased costs of production

Slide 3

Livelihoods

- A livelihood comprises the assets, skills, technologies and activities required to make a living and have a good quality of life.
- The strategies employed to make a living are complex, location specific and have often evolved over generations.
- People's livelihoods strongly determine their level of vulnerability. People with secure and diversified livelihoods will be better equipped to cope and recover than people with a single productive activity and poor access to resources and knowledge.
- It is important to understand how people make a living, why they chose the strategies they do and what makes them vulnerable to the hazards that affect them.

Slide 4

Assets

- **Financial** – sources of income, assets which can be traded or sold, savings, financial services, etc.
- **Natural** – soil, water, forest, environmental assets, etc.
- **Physical** – houses, schools, clinics, roads, ploughs, producer goods accessible by community, etc.
- **Human** – health, skills, education, knowledge, confidence etc.
- **Social** - family links, groups, support networks, conflict, leadership, influences over political decisions, etc..

Slide 5

Vulnerability

Vulnerability defines the characteristics of an individual or group and their situation that influences their ability to withstand, cope with and recover from the impact of hazards and stresses.

People's livelihoods strongly determine their level of vulnerability. People with secure and diversified livelihoods will be better equipped to cope and recover than people with a single productive activity and poor access to resources.

Slide 6

Hazards

- Hazards are external factors or events that can impact on people's lives with the potential to affect wellbeing or to do harm – **depending on the circumstances in which they hit.**
- Different types of hazards include shocks such as floods (rapid onset) and stresses such as changing rainfall patterns and droughts (slow onset).

Slide 7

What happens when hazards and stresses impact on people's lives?

Depending on whether those people are vulnerable or resilient will affect the outcome. *More vulnerable* people are *less* protected from hazards and stresses, they are not able to cope, and therefore they suffer worse outcomes.

Where people have *more resilient livelihoods* the impact of a particular hazard event or stress may be less as they are able to withstand, *cope or recover*.

Reducing vulnerability and building resilience are therefore important strategies for poverty reduction.

Slide 8

Risk of an adverse event or disaster

Risk is a function of the strength of the Hazard and the Vulnerability of those affected

- Risk is often expressed as:

R = H x V

Or

R = H x V/C

Slide 9

Increasing Severity of (some) Hazards

- The number of disasters are increasing, particularly hydro-meteorological disasters (weather events).
- Experts believe that some of the increase in reported disasters can be attributed to increases in extreme climatic events, but the proportion is very difficult to determine and attribution is even tougher
- Impact on hazards (IPCC 2007) Confidence in understanding or projecting changes in hazards and extremes depends on the type of extreme, as well as on the region and season.
- Frequency and magnitude of hot/cold extremes increasing and projected to continue. Same with heavy precipitation. No clear trend in tropical cyclones.
- Some suggestion that droughts will increase, but this depends on definition of drought and the area in question.

Slide 10

Climate Projections – uncertainty!!!

- A **great deal of uncertainty** exists in the projections.
- climate change projections **will be difficult** and any projections must be interpreted and used cautiously as there are **limitations of global and regional climate** models and **observational datasets** for most regions of the world.
- **Climate change is a multiplier of risk**
- Climate change is **not a unique hazard** but will interact with many of the underlying drivers of risk resulting in complex, dynamic situations

Slide 11

CC as Multiplier of Risk

- Climate change is not a unique or stand-alone hazard.
- The changing climate will interact with and compound existing hazards, stresses and shocks leading to situations never previously experienced.
- Weather related events are likely to become more variable and extreme.
- Ecological changes will occur.

Slide 12

Greatest impact is likely to be on Livelihoods

- Potential decrease in crop yields, increase in water scarcity, biodiversity loss
- New patterns of vector-borne diseases, increase in respiratory diseases
- In countries with weaker risk-reducing capacities, underlying risk drivers such as poor urban governance, vulnerable rural livelihoods and ecosystem decline will be exacerbated by a rapid expansion of weather-related risk.

Slide 13

Increasing Uncertainty and Surprises

- Likely that climate change will bring more surprise events
- Disaster risk reduction often based on belief in a 'stationary climate' – i.e. what we have seen before is an excellent record for what we are likely to see in the future. It deals with known risk
- Climate change will act as a multiplier of risk – creating situations that might never have been experienced before

Slide 14

Adaptive Capacity -

Adaptive capacity is the ability of a system (people) to adjust to climate change (variability and extremes) to moderate potential damage, to take advantage of potential opportunities, or to cope with the consequences

Adaptive capacity means that not only are communities able to respond to and recover from hazard events in the **short term**, but they are able to **adapt over the long term to changes in their environment.**

Improve **understanding of trends and** their local impacts.
- Ensure **access** and **action** on relevant information
- Build **confidence** and **flexibility** to **learn** and **experiment.**

Slide 15

Building adaptive capacity

Ability to adapt is closely linked to poverty reduction
- Need to tackle both immediate and longer term threats
- Food and livelihood security are of greatest importance
- Need to reduce underlying vulnerability
- Strengthen capacity to adapt – diversify livelihoods, alternative incomes, etc
- Need to accept uncertainty and engage in SCENARIO building based on local meteorological data.

Slide 16

Strategies

Strategies need to have both
- Immediate and
- Long-term benefits
- *No regrets* strategies address non-climate development needs (eg. Food security) and also support adaptation to CC.
- They address multiple risks – immediate and long-term needs.

FOOD SECURITY and DRR must come first

Slide 17

Zimbabwe: droughts, environmental degradation, veldt fires, etc

APPENDIX 3

Slide 1

SOME PARTICIPATORY EXTENSION APPROACHES TO PROMOTE ADAPTATION TO CLIMATE CHANGE AND CLIMATIC VARIABILITY

BRIEF HISTORY OF EXTENSION

Slide 2

- 1950s to 1960s
- "WE MUST **TEACH** THE FARMER THE **RIGHT** TECHNOLOGY"
  - THE TECHNOLOGY CRAFTED AT RESEARCH CENTRES WAS OFTEN NOT USEFUL FOR THE RESOURCE POOR FARMER
- 1960s to 1970s
- "WE MUST EASE THE CONSTRAINTS SO FARMERS CAN ADOPT" i.e. credit for implements and inputs
- RESOURCE RICH FARMERS PROFIT BUT WAS OFTEN UNECONOMIC FOR THE RESOURCE POOR FARMER.

Slide 3

- Early 1970s
- "WE MUST UNDERSTAND THE CONDITIONS OF THE FARMERS AND DESISIGN TECHNOLOGIES THAT **FIT**
- STUDY THE SYSTEM ⟷ FIGURE OUT SOLUTIONS
- RESOURCE POOR FARMERS INVOLVED AS **SOURCES OF INFORMATION** ABOUT THEIR CONDITIONS
- Early 1980s
- "FARMERS HAVE TO **SAY** WHAT THEY NEED AND **EVALUATE** THE POSSIBLE SOLUTIONS"
- FIGURE OUT **VIABLE** SOLUTIONS
- FARMERS **PARTICIPATE** IN PLANNING AND EVALUATION OF EXTENSION PROGRAMS

Slide 4

- Late 1980s to 1990s
- FARMERS, RESEARCHERS AND EXTENSIONISTS MUST ALL CONTRIBUTE THEIR SPECIFIC KNOWLEDGE AND SKILLS AND EXPERIMENT JOINTLY-
- AHH!! WE BEGIN TO REALISE THAT FARMERS HAVE A WEALTH OF KNOWLEDGE AND EXPERIENCE THAT, IF TAPPED CAN BLEND WELL WITH RESEARCH AND EXTENSION KNOWLEDGE AND TECHNOLOGIES.
- ENTER..... PARTICIPATORY EXTENSION APPROACHES INCLUDING FFSs AND T AND V, STUDY CIRCLES

Slide 5

Definition

- **PARTICIPATORY EXTENSION:**
- **COMMUNICATION BETWEEN FARMERS (OTHER STAKEHOLDERS) AND EXTENSION AGENTS TO FOSTER DEVELOPMENT OF COMMUNITIES THROUGH AGRICULTURAL RELATED ACTIVITIES.**

Slide 6

- EXAMPLES OF PARTICIPATORY EXTENSION APPROACHES.
- STUDY CIRCLES: A GROUP OF FARMERS COME TOGETHER TO STUDY A SUBJECT OF THEIR INTEREST AND THEN PRACTICE WHAT THEY WILL HAVE LEARNT.
- FFSs: A GROUP OF FARMERS EXPERIMENT TOGETHER IN THE FIELD TO EVALUATE THE COSTS AND BENEFITS OF ALTERNATIVE TECHNOLOGIES TO ADDRESS AN IDENTIFIED PRODUCTION CONSTRAINT.

Slide 7

INTRODUCTION TO FFS

- FARMER: ONE WHO DERIVES A LIVELIHOOD FROM LAND
  FOOD
  INCOME → LIVESTOCK/CROPS → OTHERS
- FIELD: PLACE/LAND WHERE CROPS/LIVESTOCK ARE GROWN /KEPT
- SCHOOL: PLACE/INSTITUTION OF LEARNING

Slide 8

- SCHOOL (1)
- FARMERS (2)
- FIELD (3)
- SCHOOL OF FARMERS IN THE FIELD

Slide 9

- MAIN FEATURE OF FFS:
- FARMERS LEARN ABOUT AND INVESTIGATE FOR THEMSELVES THE *COSTS AND BENEFITS* OF ALTERNATIVE TECHNOLOGIES FOR SUSTAINING AND ENHANCING FARM PRODUCTIVITY THROUGH ACCV:

Slide 10

- LEARNING IS BASED ON THE ADAGE:
- IF I HEAR I MIGHT FORGET
- IF I SEE I MIGHT REMEMBER
- BUT IF I DISCOVER I OWN FOR LIFE

Slide 11

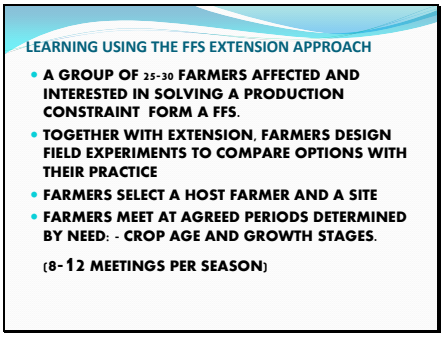
STEPS IN INITIATING AND RUNNING FFS

- DEFINING/CHARACTERISING THE FARMING SYSTEM
- PROBLEM IDENTIFICATION AND PRIORITISATION FOR THE MAJOR ENTERPRISES.
- CURRICULUM DEVELOPMENT
- TRAINING OF TRAINERS (TOT)
- FORMATION OF FARMER FIELD SCHOOLS
- STUDY DEVELOPMENT

Slide 12

- SITE AND HOST FARMER SELECTION
- IMPLEMENTATION OF FFS PROGRAMME
- MONITORING AND EVALUATION

Slide 13



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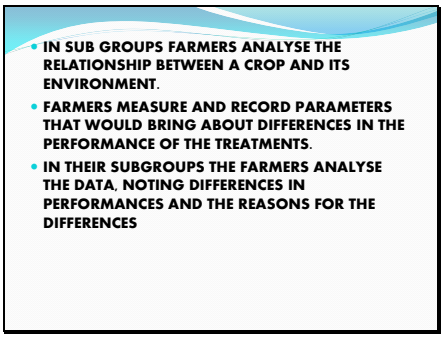

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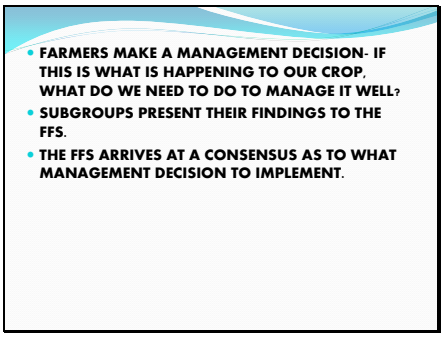

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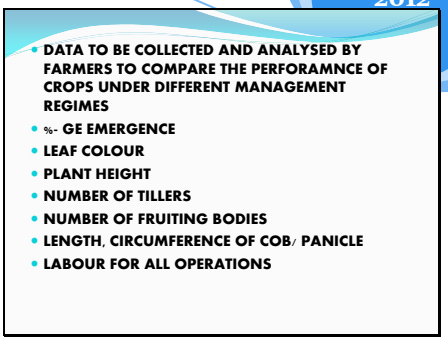

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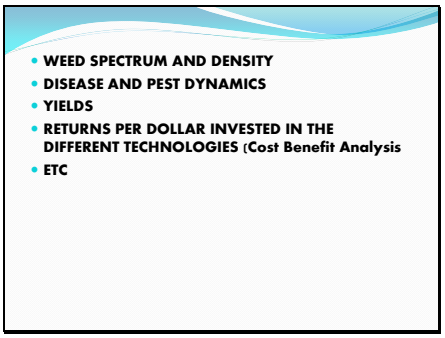

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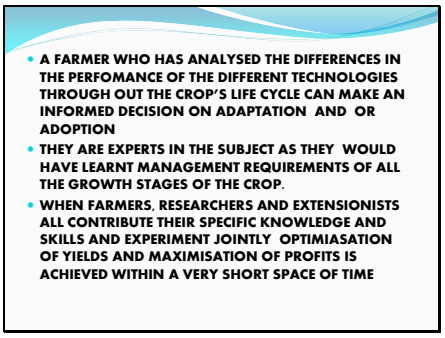

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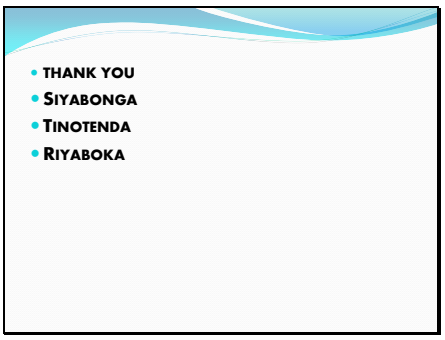


APPENDIX 4

Slide 1

ZIMBABWE
MINISTRY
OF
AGRICULTURE, MECHANISATION AND IRRIGATION DEVELOPMENT

MAINSTREAMING CLIMATE CHANGE ADAPTATION INTO AGRICULTURAL EXTENSION SYSTEM

Rutendo Nhongonhema(MoAMID) and John Mpuro(MET)

Slide 2

Outline of Presentation

- Aim
- What farmers may want to know
  - ✓ Total rainfall
  - ✓ Number of rain days
  - ✓ Start of Season
  - ✓ Is climate changing (temp, rainfall)
  - ✓ Risk of dry spells after planting, at flowering
  - ✓ Extreme rainfall
  - ✓ Dry spells (longest, Dec, Jan, Feb)
  - ✓ End of Season
  - ✓ Season length

Slide 3

Aim

- To share with extension staff analysed climate information for selected stations
- From the previous workshop it was clear that analysed information is not available to extension staff

Slide 4

What farmers would want to know about climate change

- Start of the season
- Probability of extreme events
  - – Dry spell
  - – Wet spell
- When these events are likely to occur
- End of season
- Total seasonal rainfall

Slide 5

What farmers would want to know(cntd…..)

- Forecast simplified(go beyond normal and above normal)
- Future weather patterns and their implications
- Risks in production of different crops(for informed decision making)
- What else???????????

Slide 6

Probabilities can be calculated using historic climatic data (rainfall, temp).
Advice to farmers and implications to planning and farming can be diiscussed with farmers.
This session will show the analysis done for Matopos, Makoholi and Gokwe.

Slide 7

Seasonal Total Rainfall

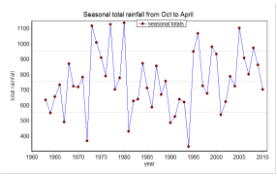
- Total rainfall from 1 October to 30 April
- May be discussed with farmers giving them options of possible crops and var to grow
- Difficult to use on its own because it does not give distribution indications.
- Maybe combined with rain days for proper advice

Slide 8

Gokwe

Receives an average of 742mm of rainfall per season.

Individual seasons vary from as little as 370mm to1136mm.

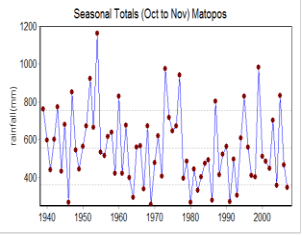


Slide 9

Rainfall -Matopos

Matopos receives an average rainfall of 570mm.

Rainfall over the years ranges from about 370mm to 780mm.

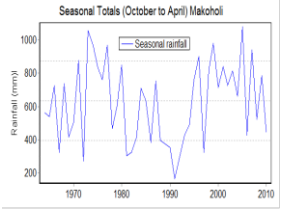


Slide 10

Rainfall-Makoholi

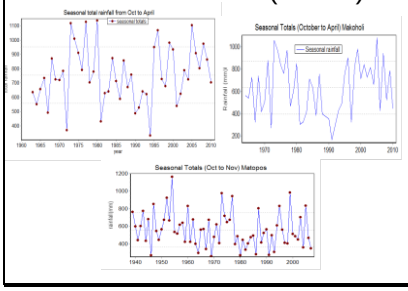
Makoholi receives an average of 634mm of rainfall per season

individual seasons vary from 164mm to 1079.



Slide 11

Seasonal Totals(rainfall)



Slide 12

What sort of advice would we give farmers????????

Slide 13

Rain days

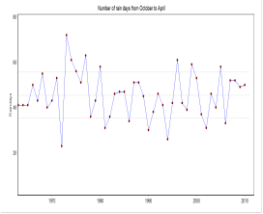
- Any day when an area receives 2.95mm or more of rainfall
- Maybe used together with seasonal totals for advice
- The definitions are not hard and fast they may differ area by area and crop by crop

Slide 14

Rain days in a season

Gokwe has an average of about 50 rain days in each season.

The total number of days in the season is roughly 210 days about 24% of the days are rainy.

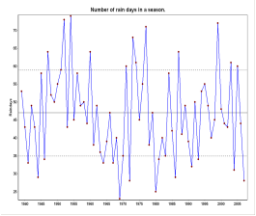


Slide 15

Matopos

Matopos has an average of 47 rain days

days range from 35 to 59.

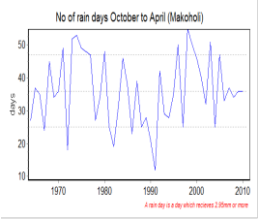


Slide 16

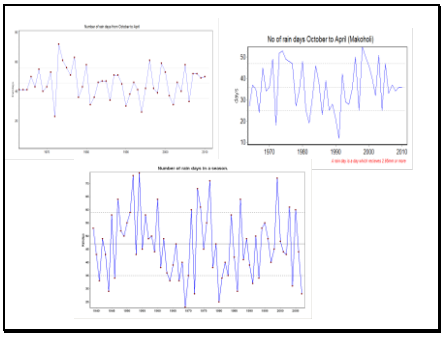
Makoholi

Makoholi has an average of 36 rainy days (about 17%).

Makoholi has a higher probability of having intense rainfalls



Slide 17



Slide 18

Is climate changing?

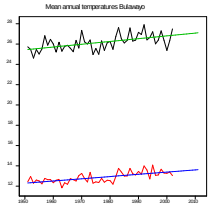
- not easy to conclude for rainfall because of high variability.
- Temps are significantly warming up.
- Rainfall regression is not statistically significant.
- Climate change throughout the world is mostly shown through increased temp
- Rainfall is much more difficult and variable (different models have shown different outcomes with some showing an increase and some showing a decrease while temperatures have been consistently increasing).

Slide 19

Temp for Bulawayo

It shows that maximum temperature is going up faster than minimum.

Because linkage between temperature and rainfall change in temperature is likely to cause changes in rainfall but for now we are not sure.



Slide 20

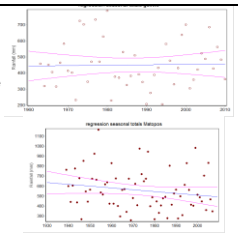
Rainfall????

Gokwe might seem to be increasing

Matopos might seem to be decreasing

BUT

Not sure



Slide 21

Start of the Season

- Two definitions have been agreed upon and will be used here.
- Def 1: Any day after the 15th of October when an area receives 20mm or more in 3 days or less provided there is no dry spell of 10 days or more in the next 30 days.
- Def 2: Any day after the 1st of November when an area receives 20mm or more in 3 days or less provided there is no dry spell of 10 days or more in the next 30 days.

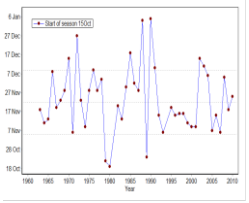
Slide 22

Start of Season

Gokwe Mean is 3rd dekad of November

Is normally between 5 November and 10 December

There are 2 years when the season never started but that doesn't mean farmers did not plant



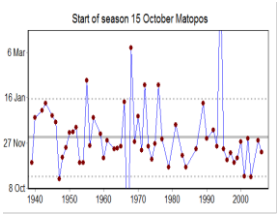
Slide 23

Start of Season Matopos

Mean start around 3rd dekad of November to first dekad of December.

Start of Season ranges between 2nd week of November to 2nd week of January

The start is more variable in Matopos



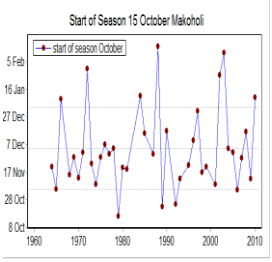
Slide 24

Start of the season Makoholi

Starts between 15 November and 5 January

In most of the years the season between 15 November and 7 December

There were 7 out of 47 when the season never started



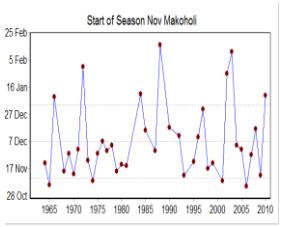
Slide 25

Start of the season Makoholi

Starts between 15 November and 5 January

In most of the years the season between 15 November and 7 December

There were 7 out of 47 when the season never started



Slide 26

Risk of replanting Gokwe

In 22 out of 46 years the farmers had to replant. If they decide to plant whenever an area received 20mm or more in 2 days or more

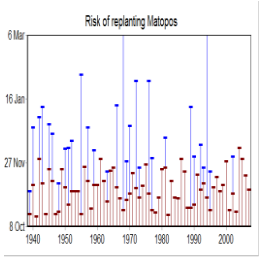
Risk is 46%

Slide 27

Risk of replanting Matopos

In Matopos there were 29 in 69 years when the farmers had to replant start. (About 42% risk).

There were two years when there was no start to the season

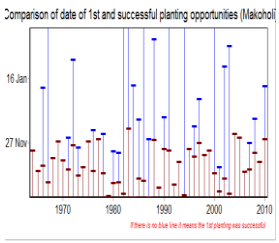


Slide 28

Risk of replanting Makoholi

7 out of 48 years the season did not start

farmers had to replant in 21 out of 40 years which is a risk of about 53%.



Slide 29

Risk of a dry spell

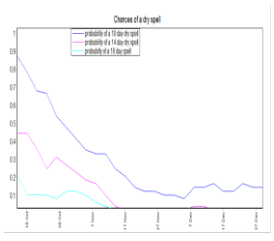
- These are chances of having a 10, 14 and 18 day dry spell within 30 days after planting
- Has an effect on germination and establishment hence replanting

Slide 30

Probability of dry spell Gokwe

Chances of spells 30 days after planting decreases as the season progress

The lowest chances of a dry spell is around 25 November onwards

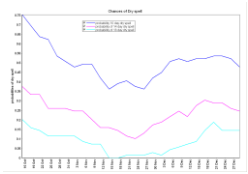


Slide 31

Chances of a dry spell Matopos

There are higher chances of a dry spell compared to Gokwe

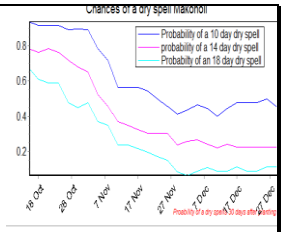
Planting window is very small



Slide 32

Chances of a dry spell Makoholi

Like the other stations chances are higher at the start of season and decrease as the season progress

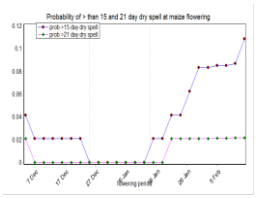


Slide 33

Chances of a dry spell at flowering Gokwe

This is for the maize crop assuming flowering at around day 50

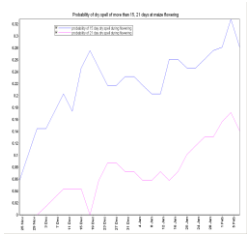
the graph shows that farmers in Gokwe should plant their maize such that flowering occurs between 27 December and 13 January. This crop may have been planted between 5 and 28 November.



Slide 34

Chances of a dry spell at flowering Matopos

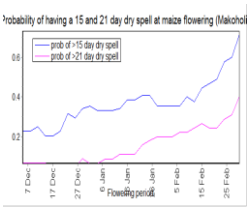
Chances increases as the season progress



Slide 35

Chances of a dry spell at flowering Makoholi

If flowering occurs after 6 January the chances of it coinciding with dry spell increases



Slide 36

Annual extremes in the season

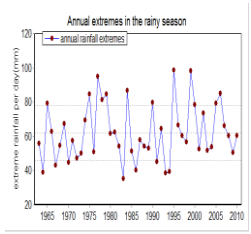
- Highest total amount of rainfall
- It can be either in one or several days
- Gives an indication of intensity

Slide 37

Annual extremes in the season Gokwe

the average highest single day rainfall in a season is about 62mm. There are no cases when Gokwe received more than 100mm in a day

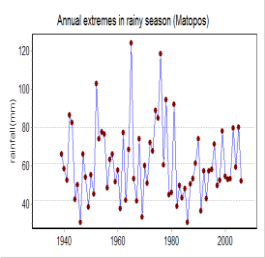
about 25% of the years had a highest about 80mm or more in a day.



Slide 38

Annual extremes Matopos

Matopos has an average of 63mm There are three years when the highest single day rainfall was over 100mm.

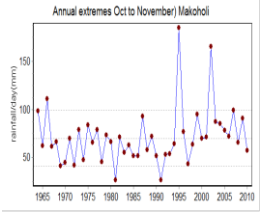


Slide 39

Extremes Makoholi

Makoholi had 3 years in 47 when its highest daily rainfall was above 100mm.

The maximum was the year it had 184mm as the highest daily rainfall and the minimum was the year it had 26mm as its highest daily rainfall.



Slide 40

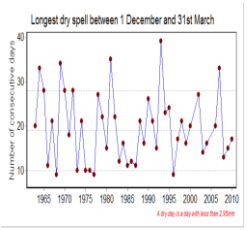
Longest dry spell

- Number of consecutive dry days between 1 December and 31 March
- A dry day in this presentation is any day with less than 2.95mm of rain
- Possible to plot when these dry days occur within a season

Slide 41

Longest dry spell Gokwe

The mean length of the longest dry spell is about 19 days. About 42% of the years have had a dry spell of 21 days (3 weeks) or more between 1 December to 31 March.

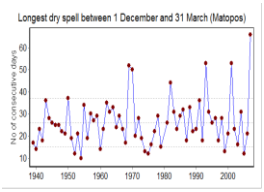


Slide 42

Longest dry spell Matopos

The average length of dry spell In Matopos is 26 days and ranges from 15 to 37 days.

Most years in Matopos have a dry spell of more than 3 weeks

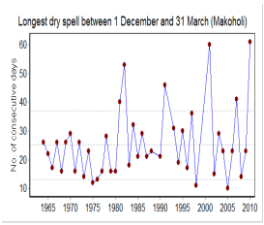


Slide 43

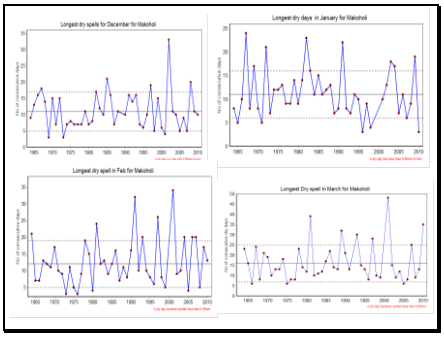
Longest dry spell Makoholi

The mean length of the longest dry spell for Makoholi is about 25 days.

About 60% of the years had the longest dry spell more than 21 days.



Slide 44



Slide 45

End of Season

- End of season is any last day before end of April when an area receives 10mm or more of rainfall
- Season length is calculated by subtracting start of season from end of season

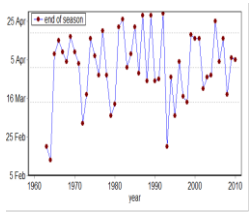
Slide 46

End of season Gokwe

For Gokwe the average end of season is around1 April each year.

However, there are 8 in 48 years where the end of season was later than 18 April.

There are also 8 out of 48 years when the season ended earlier than16 March (about 17% chances).

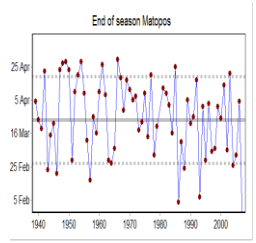


Slide 47

End of Season Matopos

The average end of season for Matopos is around 24 March and many years ranges from 27 February to 19 April.

There were about 6 years in 69 when the season ended before 25 February



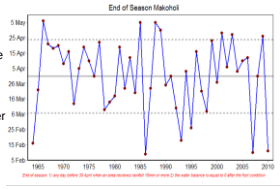
Slide 48

End of Season Makoholi

Makoholi has an average early end to the season at around 23 March

Many instances when the season ended earlier than 25 February

Compare with start of Season????



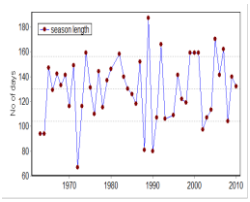
Slide 49

Length of Season Gokwe

The mean season length for Gokwe is about 130 days.

The season length ranges from 104 to 156 days in most years.

There is a 13% chance of having a season with less than 100 days.

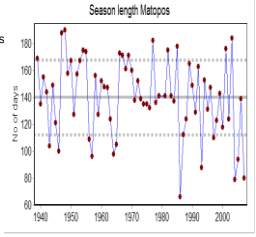


Slide 50

Season length Matopos

Mean length for Matopos is around 140 days and ranges from 112 to168 days.

There were about 10 seasons out of 69 with season length less than 100 days.

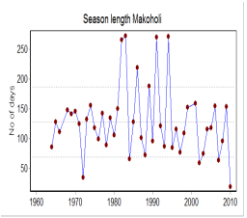


Slide 51

Length of Season Makoholi

Mean season length for Makoholi is about 127 days.

There is a 35% chance of having a season below 100 days.



Slide 52

Thank you

APPENDIX 5

Slide 1

Providing useful climate information to farmers

Working out and communicating probabilities and risks

Slide 2

AIM – To help farmers with planning and decisions, by providing information they would like

- In the following sessions we will cover:
  - What is meant by probability (or risk)?
  - What would farmers like to know the probabilities of?
  - Ways of working out and communicating probabilities with farmers
  - How we can add value to the Seasonal Climate Forecast and forecasts of El Nino and La Nina years

Slide 3

What are probabilities?

- Probability is the same as CHANCE
- Examples .....

  Tossing a coin – A probability / chance of 1 out of 2 of getting a head i.e. ½

  Throwing a dice – A probability / chance of 1 out of 6 of getting a particular number i.e. 1/6

Slide 4

Communicating probabilities of climate events with farmers

The past can help to predict

ie it can be used to give us the probability eg ..... of weather next year

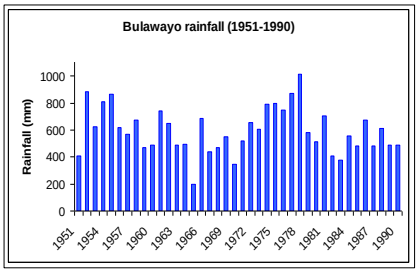
e.g. the probability / chance of there being a drought next year

Assuming that climate has not changed drastically (ie that there is no clear pattern of change)

Approximate probabilities can be useful

Slide 5

Farmers can work them out!



Slide 6

Communicating probabilities of climate events with farmers – avoiding misunderstandings

- But there can be misunderstandings about what they mean .....

  e.g. If the probability of a low rainfall year is 1 in 3 .... and we have had 2 years of normal / good rainfall,
  - does it mean that the next year will have low rainfall?
  - If not, what is the probability of the next year having low rainfall?

Slide 7

Communicating probabilities of climate events with farmers - (avoiding possible misunderstandings)

- The answer to the above is that the chance / probability of low rainfall in the 3rd year is still 1 in 3
- It is like rolling a dice or tossing a coin. What you have just rolled or tossed does not affect the chance next time you do it!
- Any questions, feedback and clarification?

Slide 8

Working out probabilities for key events

- What events might farmers be interested in knowing?
- In the next slide are some events
- We will ask farmers to select and add to this too.....

Slide 9

Events

(definitions of each are on hand out)

- Total rainfall
- Number of rain days
- Temperature
- Start of season
- Risk of replanting
- Dry spells
- Longest dry spell
- Annual extremes
- Length of growing season

Slide 10

Exercise

- For an event e.g. total rainfall
  - Decide on the characteristics of the event that you will focus on e.g. for total rainfall, what amount (e.g. below or above a certain no. of mm?)
  - Remember to keep focusing on what you think would be useful to a farmer. Why have you chosen this amount?
  - Work out the probabilities and summarise them
  - Discuss the management implications .....This is important
- Repeat the above for other events

Slide 11

What should we communicate with farmers about events, why and how?

A. What ?

1. ***Variability and trends*** *...IMPORTANT. Why?* – To see if there are trends and changes and to avoid 'maladaptation'. If farmers and extension are responding to the wrong things/ trends they are likely to waste everyone's effort
2. ***Basic information*** to help with planning and decision making eg what is the 'normal' and variation in total rainfall for my area, what is the 'normal' and variation of length of season for may area. This can help with choice of crops and varieties, planting dates etc
3. ***Probabilities of events*** – *Which ones? Why?* – So that farmers know the probabilities and can make better informed decisions. e.g. they can each decide on what crop to grow, when to plant, and what levels of inputs to invest.

   Different farmers may make different decisions based on their resources and their attitude to disk

Do we need any other events calculated?

Slide 12

What should we communicate with farmers about events, why and how?

What ?(continued)

4. ***For each event – which characteristics*** (eg levels of total rainfall) are most useful to focus on? Think about this and discuss with farmers

Slide 13

What should we communicate with farmers about events, why and how?

B. How?

Work with non and semi-literate farmers has shown that farmers (with some initial help) are very able to calculate probabilities using graphs in the same way that you have just done

C. Who else other than farmers should receive the information on events? Why? (extension, input suppliers, research, policy makers. To i) help them in decision making and ii) support farmers eg if farmers are going to grow small grains, help develop markets and provide seeds)

Slide 14

An example of probability and choice

- Pay $10. You may lose it Or win $100
- Would you want to know the probability of winning the $100 before you decide?
- Imagine it is 4/10. Who would pay the $10?
- Imagine it is 7/10. Who would pay the $10?
- It is the same with farming and the weather. The probability does NOT tell us what will definitely happen, but knowing the probability may be helpful to farmers in their planning

Slide 15

A final point on probability

- Different people have different attitudes to risk
- For some people an 8/10 chance of winning $100 may seem good and they will pay $10
- For another person, an 8/10 chance may be too risky as they have nowhere to get another $10 if they don't win!
- This is similar for many farmers. They take the risks with their decisions and are affected by the results (good or bad!)
- We should never to try to convince someone to make a particular decision. Our role is to provide good information and let them choose

Slide 16

Providing forecasts to farmers (as well as probabilities)

- What information is available to farmers about the next season?

Slide 17

Providing probabilities to farmers AND using forecasts

- What climate information is available to farmers about the next season?
  - Seasonal Climate Forecast (What is it, when is it available?)
  - We can add to this El Nino and La Nina (see later)
  - Short term forecasts (eg 10 day forecast)

Slide 18

Providing probabilities to farmers AND using forecasts

- A suggested approach to build on the above and to communicate about the next season

  Please see handout

Slide 19

PLAN FOR HOW AN EXTENSION WORKER COULD WORK WITH A GROUP OF FARMERS USING CLIMATE INFORMATION

Well before the season starts eg June	When SCF and El Nino / La Nina predictions are available eg Sept	Just before season starts	During season
Working with groups of farmers look at whether there are any climate trends (by looking at graphs together with farmers)	Communicate these to farmer groups, (including for El Nino and La Nina the 'strength') (In future years it may be sufficient to text this information to a 'contact' farmer in each group)	Farmers use short term 10 day forecasts (and refer to probabilities and forecasts)	Use 10 day forecasts & refer to probabilities. Update of SCF becomes available & by then is evident whether it is an El Nino / La Nina year etc
Communicate probabilities of events to farmers in participatory way (including discussion on implications and management options)	Consider implications with farmers for livelihoods and crops (revisit options you did with farmers in last box of previous column).		(May be possible for 10 day forecasts to be sent to contact farmers and AEWs by sms to cell phones?)
Include looking at data for El Nino, La Nina years and discuss usefulness of this and of SCF Make farmers aware of 10 day forecast	Support services e.g. extension, can now consider any implications for farmer requirements eg make available seeds of varieties needed		i) Continue to visit and work with farmers ii) Observe and get feedback on how this process and support to farmers can be improved
Consider livelihood and crop options for El Nino, La Nina and 'normal' years	(It is also possible to revise now the probabilities of events eg for a normal year if you want to)		Visit farmers at end of season for feedback &see how this approach can be improved

Slide 20

Looking at El Nino and La Nina years

- It can be forecasted well before the season whether it is likely to be an El Nino, La Nina or 'normal' season
- This is because sea surface temperatures in the oceans before the season will affect whether the season is going to be El Nino, La Nina or 'normal'. These temperatures can be measured before the season
- In some parts of the country El Nino seasons are often drier than normal seasons
- Also in some parts of the country La Nina seasons are often wetter than in normal seasons
- So, first we need to know whether the location in the country is one where El Nino /La Nina has an effect on rainfall

Slide 21

El Nino, Ordinary and La Nina years at Makoholi (from IRI)

La Nina	*Ordinary*	*El Nino*
1970	1964	1965
1973	1966-1969	1972
1975	1971	1982
1984	1974	1986-1987
1988	1976-1981	1991
1998-1999	1983	1994
2007	1985	1997
2010	1989-1990	2002
	1992-1993	2006
	1995-1996	2009
	2000-2001	
	2003-2005	
	2008	

Slide 22

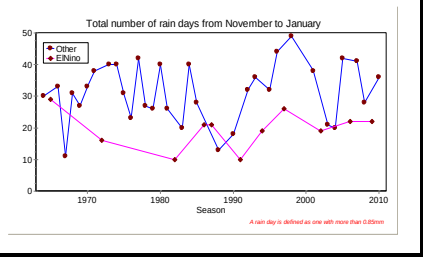
Mean number of rain days (Makoholi)

Mean number of rain days (rain is defined as a value >0.85mm)

Month	La Nina	Ordinary	El Nino
November	8.4	7.9	5.1
December	12.3	12.5	7.1
January	14.3	9.89	7.3
February	9.6	8.2	6.8
March	6.6	7.0	6.3
April	3.4	3.3	3.2

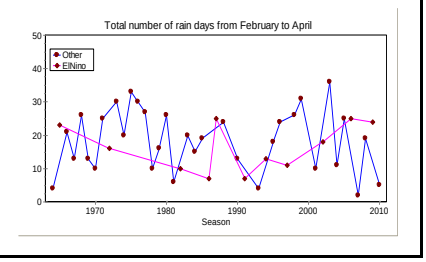
Slide 23

El Nino vs other years Makoholi Nov to Jan Total number of rain days



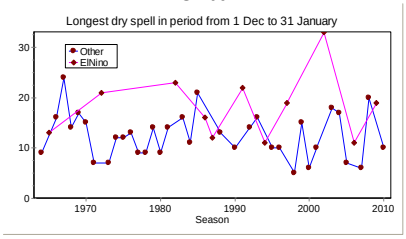
Slide 24

El Nino vs other years Makoholi Feb to April Total number of rain days



Slide 25

El Nino vs other years Makoholi
Longest dry spell in between 1 Dec and 31 Jan



Slide 26

Looking at El Nino and La Nina years

These can be forecast before the season

El Nino ..... Does it mean lower rainfall at our site(s)? YES for Makoholi (We need to do the same analysis for other sites)

La Nina .... Does it mean more rainfall at our site(s)? NOT SO CLEAR, BUT THEY ARE NOT LIKELY TO HAVE LOW RAINFALL for Makoholi (We need to do the same analysis for other sites)

This means that (for Makoholi at least) telling farmers whether it is going to be El Nino, La Nina or neither could be very useful

Slide 27

Looking at El Nino and La Nina years

- So in Makoholi, knowing whether it is going to be an El Nino, La Nina or Normal season is likely to be very useful to farmers
- One could say that based on this information that in the area near to Makoholi:
  - if it is going to be an El Nino season then it is likely to be a drier season than in a normal or La Nina season
  - if it is going to be a La Nina season then we can expect it to be as wet as a 'normal' year and possibly wetter
  - AND if it is neither El Nino or La Nina, then it probably won't be an extreme year

Slide 28

PLAN FOR HOW AN EXTENSION WORKER COULD WORK WITH A GROUP OF FARMERS USING CLIMATE INFORMATION

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Consider livelihood and crop options for El Nino, La Nina and 'normal' years	(It is also possible to revise now the probabilities of events eg for a normal year if you want to)		Visit farmers at end of season for feedback &see how this approach can be improved

Slide 29

Recap. Our AIM was – To help farmers with planning and decisions, by providing information they would like

- In the sessions we covered:
  - What is meant by probability (or risk)?
  - What would farmers like to know the probabilities of?
  - Ways of working out and communicating probabilities with farmers
  - How we can add value to the Seasonal Climate Forecast and forecasts of El Nino and La Nina years

APPENDIX 6

Slide 1

Livelihoods and vulnerability analysis

- VCA is a **participatory** process to determine the nature, scope and magnitude of the effects of hazards, shocks and stresses on the community.
- It determines the likely negative effect on elements of livelihood strategies
- Why some households are more badly affected than others.
- It identifies the coping strategies and resources (capacities) present.

Slide 2

Steps in VCA

- Community selection and profiling
- Hazard assessment
- Livelihoods vulnerability assessment
- Capacity assessment
- Prioritisation of risks and risk reduction strategies

Slide 3

Aims of assessment

- To identify and prioritise current and future risks (including unknown risks) that the communities will need to reduce.
- To empower the community by raising their awareness of their own situation, their vulnerabilities and capacities
- To build capacity for the community to be able to adapt to current and future hazards, stresses and shocks.
- To collect baseline information against which risk and vulnerability reduction, adaptive capacity and resilience can be measured (M&E).

Slide 4

Elements of community profile

- Layout of community (mapping)
- Economic / livelihood activities (identification of occupational and different socio-economic groups)
- Social and institutional networks (Venn diagram)
- Seasonal factors, such as weather, cropping and labour patterns (calendar)
- General issues and challenges (group discussion)

Slide 5

Task

- Each Group to spend 20 minutes drawing a rough map of a rural community with which they are familiar. Include information/notes on different economic/livelihood activities, fields, crops etc, social institution and networks, areas exposed to hazards and stresses, etc,
- Try to include most of the information that you would hope to gain from initial community profile.

Slide 6

Hazard assessment

- Hazard assessment determines the likelihood of experiencing a natural or man-made hazard and analyses the nature, impact and behaviour of each specific hazard experienced by the community.
- Climate change interacts with known hazards to potentially produce conditions which have never been experienced before. Uncertainty becomes a hazard itself.

Slide 7

Task - Identify

- What hazards affect your community?
- How often are they affected and for how long?
- Do any of the hazards have underlying causes?
- Are the hazards predictable, rapid or slow onset, seasonal?
- Who is affected and how?
- Identify the extent and severity of the effects.

Slide 8

Example of hazard assessment

Hazard	Flood
History	Periodically in living memory, severe flooding becoming more frequent
Frequency / duration	Annually, 3 – 6 months from July to November
Location	Plain and low-lying areas
Causes	Natural rainfall patterns, exacerbated by climate change.
Warning signs	
Who / what is affected & how	1) Farmers in low lying areas, land flooded, crops destroyed, land eroded
	2) Water supply is contaminated, higher incidence of illness, time required to collect clean water
How many people affected	1) 10% of population (poorest)
	2) 90% of population (rich and poor)
Severity / ability to recover	Serious in some years. Lately erratic and very unpredictable. Crops destroyed. Houses destroyed. Livelihoods threatened. Food insecurity. Recovery for farmers is difficult and slow.

Slide 9

Assessment of livelihood vulnerability

The vulnerability assessment aims to identify

- who is at risk and how?
- which assets are at risk?
- why are they at risk?

This involves detailed discussion with particular groups of vulnerable people identified in the community profiling and hazard analysis.

Many aspects of vulnerability are hazard specific

Slide 10

External factors contributing to vulnerability

- Are there institutions or policies that contribute to vulnerability?

There are often policies or actions remote from the communities, over which they have little control, but which contribute to their vulnerability.

Slide 11

Task 3. Vulnerability analysis

	Vulnerable Assets What are the impacts during or after the hazard (short/long term)?	Livelihood conditions / characteristics What characteristics of peoples livelihoods make those assets vulnerable?	Policies & institutions (local, regional, national) Which policies or institutions (or lack of) contribute to the vulnerable conditions? How?
Financial assets			
Natural assets			
Physical assets			
Human assets			
Social assets			

Slide 12

Capacity assessment

- Capacity relates to the full range assets that enhance people's ability to reduce their vulnerability, i.e. which enable them to cope with, withstand, prevent, prepare for or recover from the impact of a hazard.
- The livelihoods capacity assessment identifies the existing strengths within the community (or group) based on the assets they have available to them or can mobilise.
- Assets include financial, natural, physical, human and social
- They include skills, knowledge, organisations and attitude as well as physical and natural resources.

Slide 13

Task 4. Capacity assessment

- Which assets are safe or can be quickly recovered after a hazard? What technologies have been used to make them better able to cope?
- What are the livelihood characteristics that make some people more resilient than others?
- What institutions and policies contribute to livelihood sustainability?
- How will people cope with uncertainty? Will they be able to experiment and adapt?
- Will they be able to get relevant information and guidance such as updated weather forecasts?

Slide 14

Capacity analysis table

	Secure Assets Which assets are protected or able to recover rapidly?	Livelihood conditions / characteristics What characteristics of peoples livelihoods make those assets resilient?	Policies & institutions (local, regional, national) Which policies or institutions contribute to reduced vulnerability? How?
Financial assets			
Natural assets			
Physical assets			
Human assets			
Social assets			

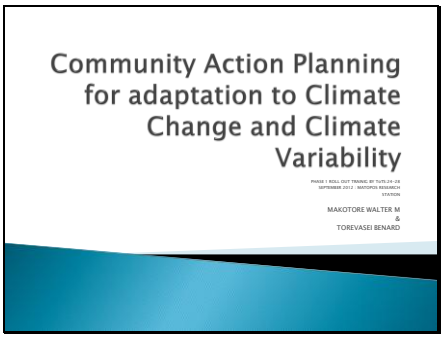
Slide 15

Prioritisation of risk reduction strategies

- Rank areas of asset risk according to priority
- Identify priority areas for action to address identified risks.
- Encourage flexibility and the ability to adapt to changing situations
- Communities need to deal with immediate identified needs as well as future uncertainty.

APPENDIX 7

Slide 1



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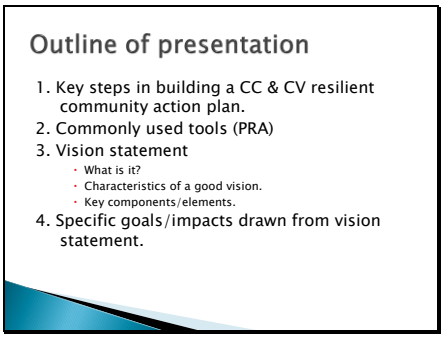

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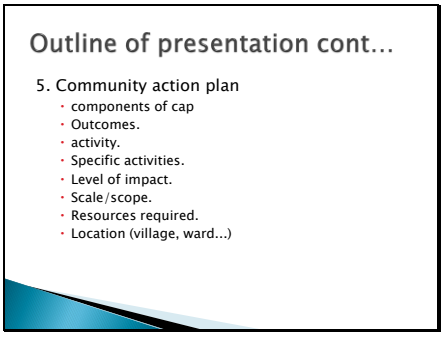

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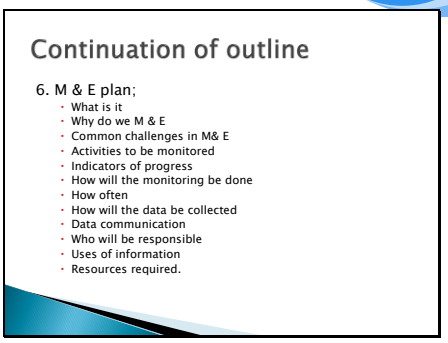

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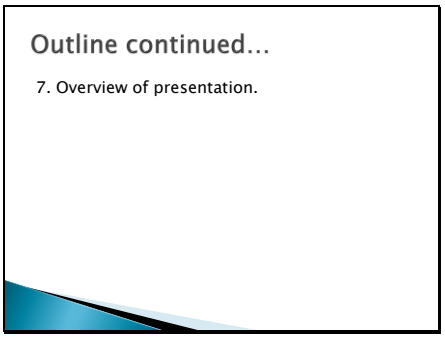

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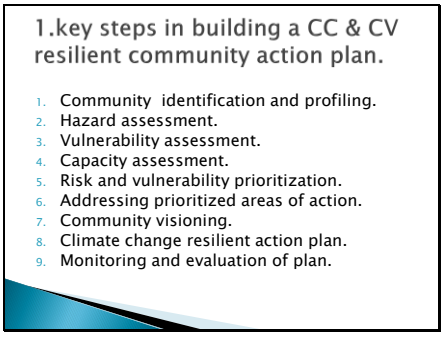


Slide 7

2. COMMONLY USED TOOLS FOR A RESILIENT CAP.

- Focused group discussions
- Transect walks
- Seasonal calendars
- Timeline analysis
- Rich pictures
- Participatory resource mapping
- Venn diagrams
- Matrix ranking
- Gantt charts

Slide 8

3. VISION STATEMENT

- What is it ; this is where a community desires to be in terms of future development of their area and how to get there.
- **Why is it important;**
  - It ensures that the plan is more directed (campus for development) and strategic.
  - Allows everyone to express their vision of a disaster proofed community.
  - Ensures consensus amongst all stakeholders.
- **A good vision is one that ;**
  - Is realistic and achievable.
  - Brings a sense of empowerment and participation.
  - Builds on strengths of the current situation.

Slide 9

VISION cont....

- **What do we draw from it (key components) for our CAP for adaptation to CC & CV;**
  - Specific goals/outcomes/impacts.
  - Guidelines on how we achieve the outcomes/impacts.
  - Who will be the responsible individual or institution.
  - Progress indicators.

Example of a vision statement.

"By 2020 we will be a vibrant community where people like to live and work and work, households are well fed and resilient to threats from drought ,and everyone is able to access health, education and extension services".

Slide 10

4.Specific goals/outcomes drawn from vision statement for the CAP for adaptation to CC & CV.

- **A Goal is:** A simple, clear statement of the "impact" we want to achieve with our project,
  The change we hope to bring about in the target population's standard of living.
- Goals can be phased into;
  - Short term.
  - Medium term.
  - Long term
- This may be quantifiable, but it doesn't have to be.

A .Einstein once said "*not everything that counts can be counted, and not everything that can be counted counts".*

AFTER SPECIFYING THEIR KEY GOALS THE COMMUNITY CAN NOW IDENTIFY KEY ACTIVITIES & DRAFT THEIR COMPREHENSIVE CAP FOR ADAPTATION TO CC & CV.

Slide 11

5.Community Action Plan for Adaptation to CC & CV.

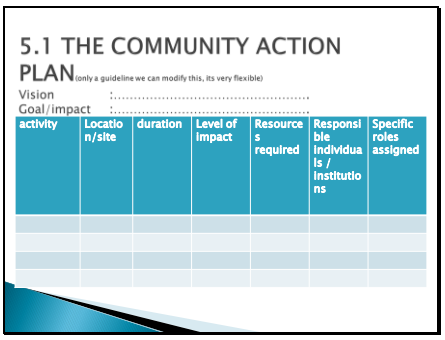
- **What is it** – sequence of programmed activities that helps ensure that all important tasks are planned for and carried out on time.
- **Components of CAP for adaptation to CC & CV.**
  - Specific activities.
  - Resources required.(internal & external)
  - Location.
  - Level of impact.
  - Duration (how long will it take to complete activity)
  - Specific roles.
  - Responsible individual/ institution.

Slide 12

A good community plan should...

- Be guided by a thorough assessment of the situation and a firm knowledge of the target population because a good assessment gives us the "big picture" of the target area and informs our strategy and approach.
- combine our target population's greatest unmet needs, their strongest assets while considering their vulnerabilities.

Slide 13



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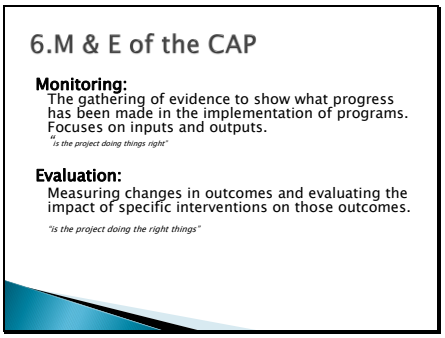

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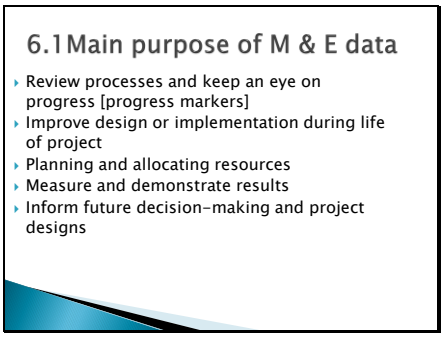

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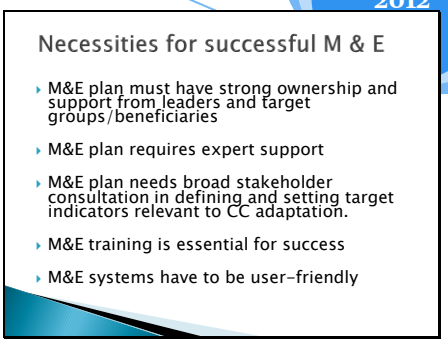

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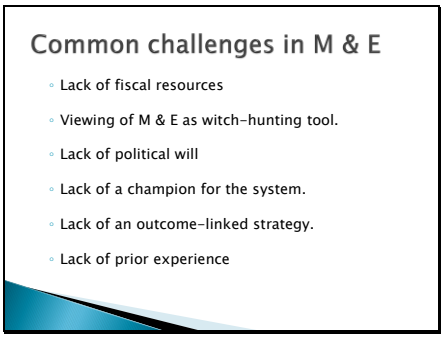

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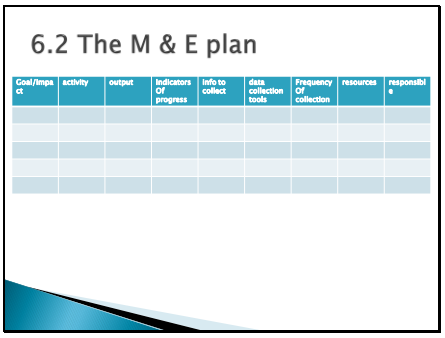

Slide 19

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