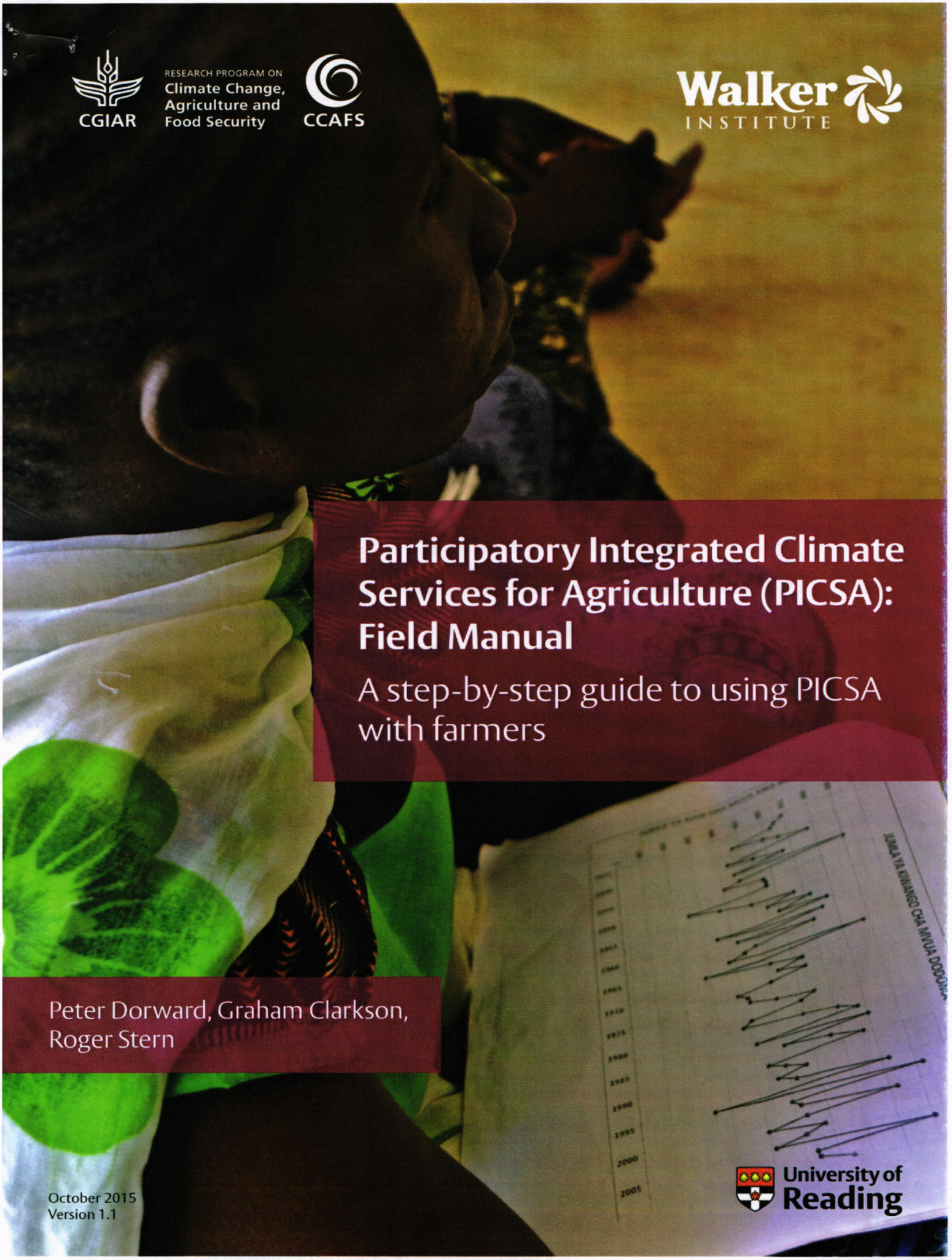


# Participatory Integrated Climate Services for Agriculture (PICSA): Field Manual

## A step-by-step guide to using PICSA with farmers

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Taken during a PICSA training session in Makoja, Tanzania during October 2014. Cecilia Schubert (CCAFS)

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# Activity sheet D1a – Crop Information Tables

## What are Crop Information Tables used for?

Crop Information Tables help farmers to understand the requirements of specific crops and varieties which are crucial in understanding the crops that best fit the local climate. Crop Information Tables can be used to assess the climate related risks of different crops at a given location.

## Materials

You will need the completed Crop Information Table.

## Preparation

This step builds on the activities completed in Step C. We are now going to use the probabilities, with Crop Information Tables, to help with planning. The Crop Information Table for your location is included as appendix 1[6].

Ensure that you understand the information in the Crop Information Table (appendix 1) and that you are able to explain the information to farmers.

## Example Crop Information Table

| Crop | Variety | Days to maturity | Crop water requirement | Chance of sufficient rainfall if season starts on x (Early) | Chance of sufficient rainfall if season starts on x (Middle) | Chance of sufficient rainfall if season starts on x (Late) |
|---|---|---|---|---|---|---|
| Maize | Local | 120 | 480 | 5/10 | 4/10 | 2/10 |
| Maize | Pioneer xxx | 100 | 350 | 7/10 | 5/10 | 4/10 |
| Sorghum | Seed Co xxx | 110 | 300 | 5/10 | 7/10 | 6/10 |

## Procedure

1. Remind the farmers how they worked out probabilities for seasonal rainfall during Step C.
2. Explain the information in the Crop Information Table, beginning with the different crops and varieties and then the days required to maturity and how this differs for each crop / variety. Next, explain the crop water requirement to the farmers (see box 'Days to maturity and crop water requirement).

[6] Location specific appendices need to be prepared in advance of the training.

# Step D - What are the options for the farmer?

By the end of this step, farmers should be aware of which crop, livestock and livelihood options are open to them.

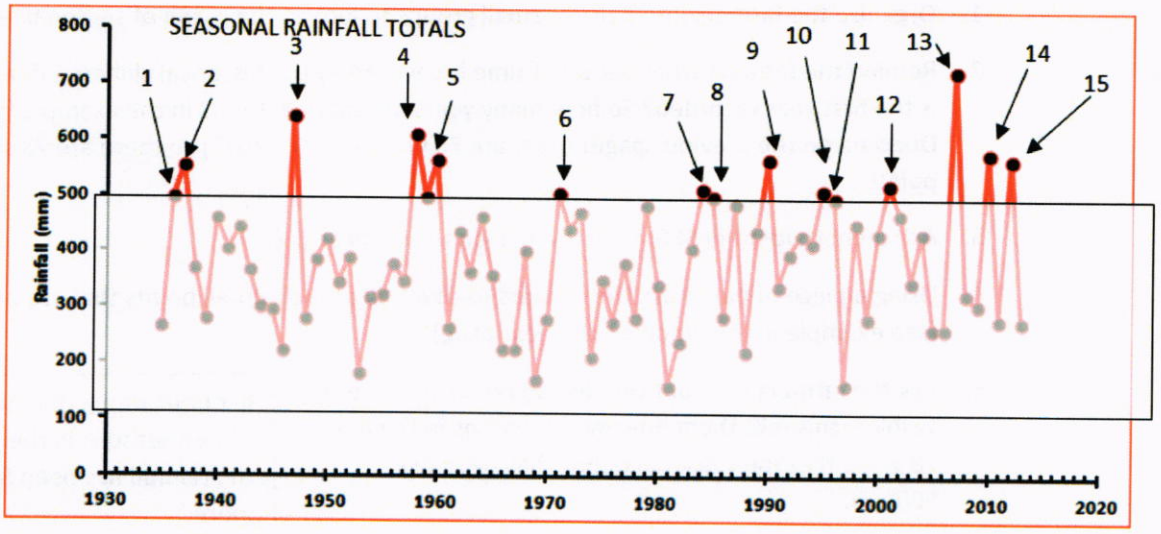
It is important to remember that what individual farmers think is best for their household may vary widely. Individual attitudes to risk and the resources of each household are both likely to influence farmers' choices. It is therefore useful to consider a broad range of options to ensure that all of the farmers you are working with, whether they are wealthy, poor, male, female etc..., are able to identify options that may be suitable for their circumstances.

## *Aims of this step:*

- To explore existing and new crop, livestock and livelihood options that may be suitable for the local climate and weather.

## *During this step you should facilitate farmers to:*

- Calculate the probability that the seasonal rainfall will be sufficient for specific crops and varieties (see activity sheet D1a).
- Use the Crop Information Tables (in appendix 1) to compare different crops and varieties and to identify options with farmers.
- Discuss the implications of this probability when considering risk and the farmers' planting strategies.
- Construct a Crop Practices Matrix to identify and consider other crop related practices that are suitable to the location (e.g. soil and water conservation practices which improve retention of water and chances of good yields; see activity sheet D1b).
- Construct a Livestock Options Matrix to identify and consider livestock related options (see activity sheet D2).
- Construct a Livelihood Options Matrix to identify and consider livelihood related options (see activity sheet D3).




7. Help the farmers to make this calculation with their own graphs and to work out the probability that they will receive over 500mm of rainfall in the coming season.

8. Once everyone has agreed on the probability then write it clearly on a flipchart or board for everyone to see.

9. Farmers should then use this same approach to calculate the probabilities for other weather and climate characteristics that are set out in the same format. Help the farmers to calculate probabilities for:

    - Season start date – One of the biggest decisions farmers make is when to plant so knowing the probability of the rainfall season starting for different dates can be very useful. A farmer may plan ahead for specific dates OR when it starts raining on a particular date they can use the calculation to tell them how likely it is that the rainy season has properly started (so that they can avoid planting with a 'false start').
    - Season length – Can be useful in selecting crops and varieties that require different lengths of time to mature.

    Again, once the farmers have agreed on the probabilities for these characteristics then write them clearly on a flipchart or board for everyone to see. *These probabilities can now be used by farmers to help assess their options in Step D and to plan for the coming season.*

10. Identify which other characteristics, if any, they would like to explore further (either in the session or in their own time). For example:

    - Season end date – Can be useful when considering crops that need moisture for an extended period or crops that have a specific need to 'dry-off' soon after they have matured (e.g. sunflower).

## Procedure

1. Organise the farmers into pairs or small groups to look at the graph of seasonal rainfall totals.
2. Remind the farmers what period of time is covered by the historical climate information. What is the first year recorded? So how many years are there in total? In the example (graph for Dodoma on the previous page) there are 78 years (1936 – 2013) so there are 78 seasonal rainfall points.
3. Ask them to identify 500mm of rainfall on the vertical axis.
4. Using a piece of paper ask the farmers to cover all of the rainfall points that are below 500mm (see example in the graph on the next page).
5. Ask the farmers to count the rainfall points that are still visible – this tells them how many seasons in the past 78 years that the seasonal rainfall has been over 500mm.

> In our example that means that in fifteen seasons in the last 78 years the rainfall has been 500mm or more.

Photo: John Gathenya

6. The next step is to divide the number of visible rainfall points by the total number of rainfall points on the historical climate graph to work out your probability.

> In our example graph this means that the number of rainfall points, 15, is divided by the total number of years recorded, 78. 15/78 = 0.19 which is approximately 0.2 or 1 in 5. This exercise has taught us that for any season in the near future the probability of the area from the example receiving 500mm or more of rainfall is 1 in 5

# Activity sheet C1 – Calculating probabilities of weather and climate characteristics

## *Why is it helpful to calculate the probabilities of weather and climate characteristics?*

Knowing the probabilities of different weather and climate characteristics can help farmers to make important decisions about crops, varieties, planting times, livestock management and livelihood choices[4].

## *Materials*

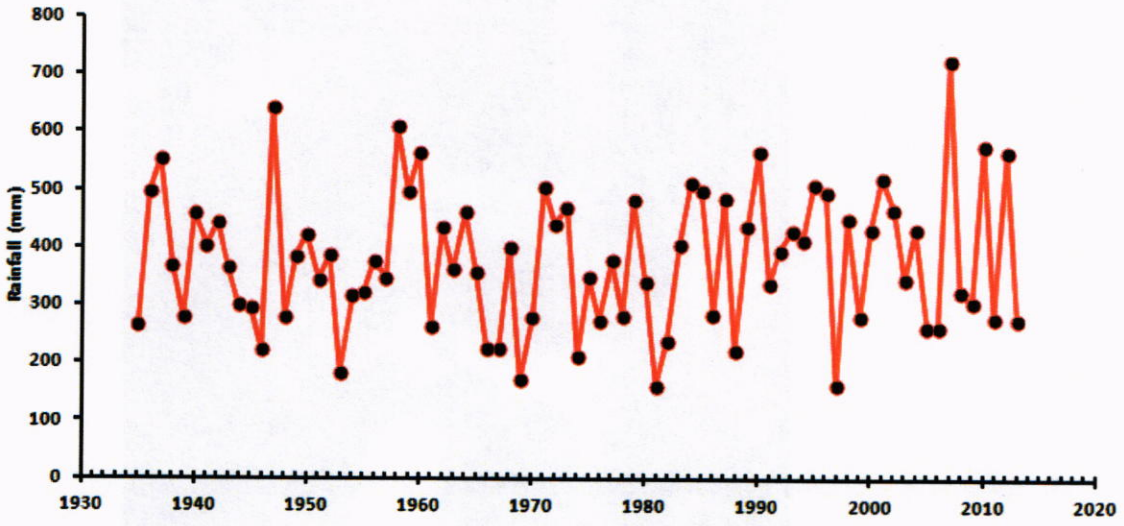
You will need multiple copies of the historical climate graphs (these should have been handed out to farmers during Step B).

## *Preparation*

You discussed the importance of the climate graphs in Step B. Explain to farmers that you will now discuss how these graphs can be of practical use in their planning.

## *Example*

The graph below is an example graph from Dodoma, Tanzania, showing 80 years of seasonal rainfall totals. We will calculate probabilities from this, but you will have historical climate information from your area too. In this exercise you and your group are going to use this to calculate the probability of more than 500mm of rainfall in a season[5].




[4] If there are clear trends in the graphs then you will have discussed different ways of treating probabilities during the training course you have received.

[5] You may want to use a different amount of rainfall, that is more meaningful for the farmers in your group for this exercise

# Step C – What are the opportunities and risks? Using graphs to calculate probabilities

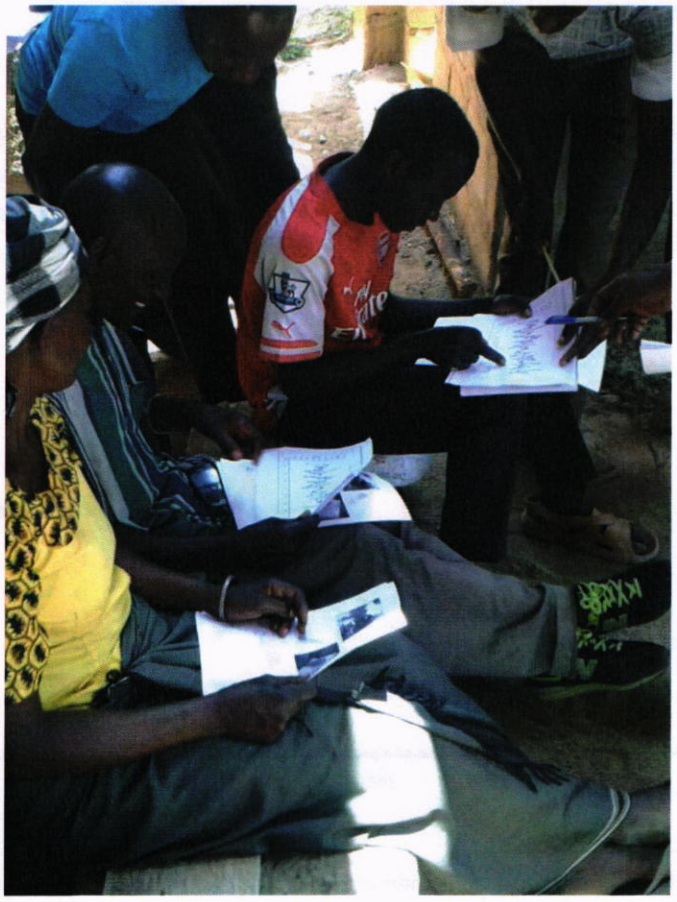
By the end of this step, farmers should be able to calculate the probabilities of weather and climate characteristics and use the information to help make informed decisions for coming and future seasons.

## *Aims of this step:*

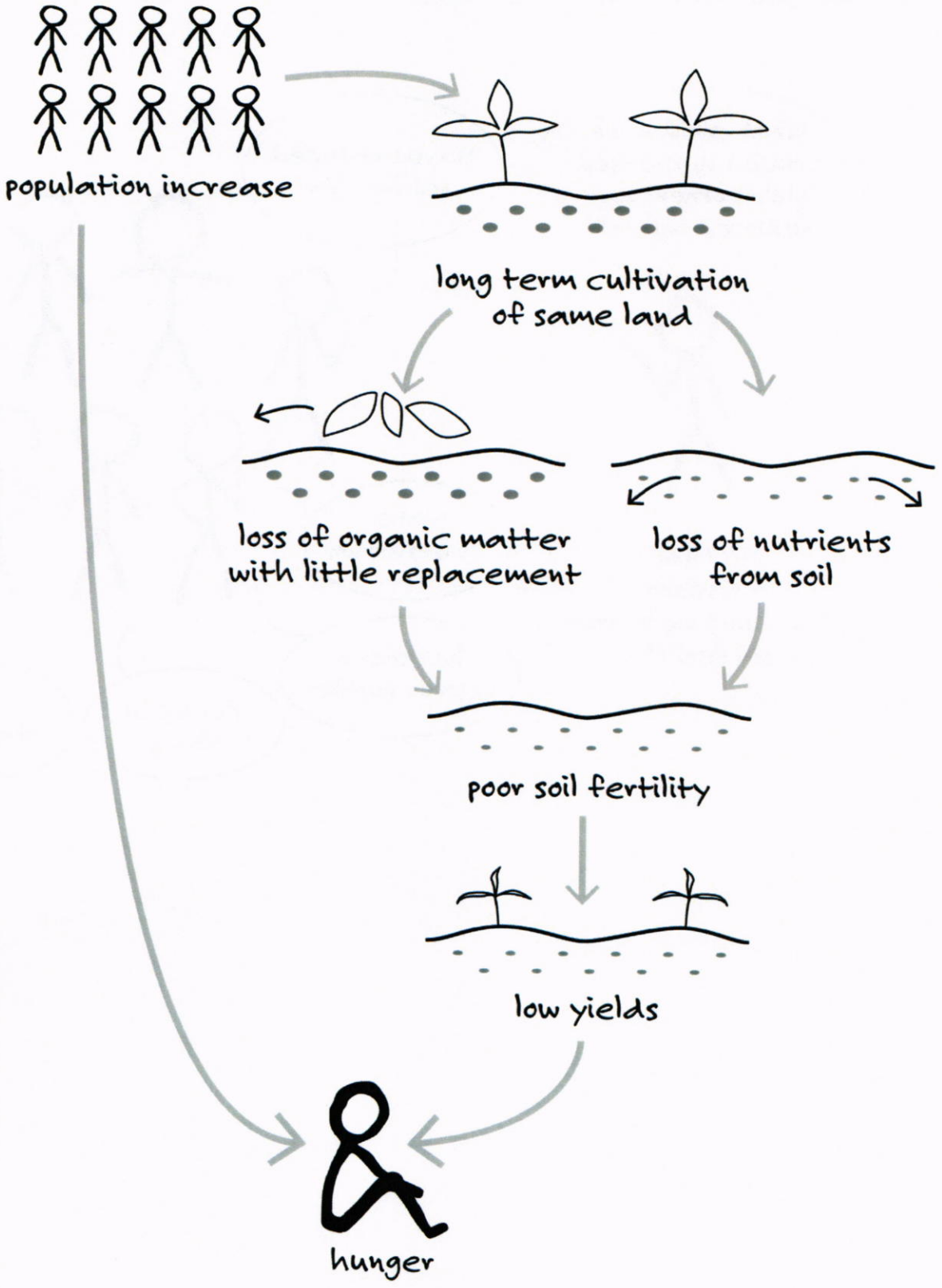
- Enable farmers to use graphs to work out simple probabilities that are of interest to them and will help them to plan.

## *During this step you should facilitate farmers to:*

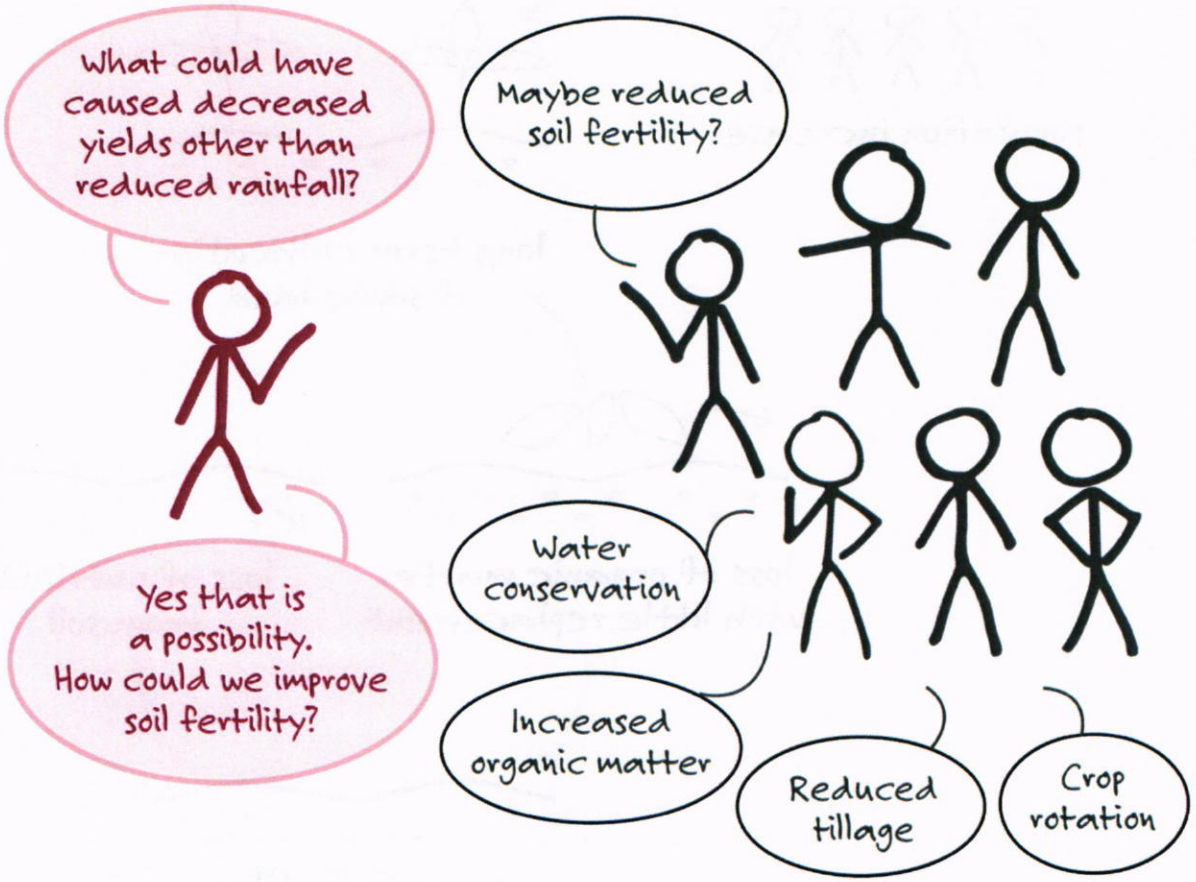
- Calculate the probability of receiving a given amount of rainfall (activity sheet C1).
- Calculate the probability of different start dates for the season (activity sheet C1).
- Calculate the probability of a season being a specified length (activity sheet C1)



## *Example causal diagram*



## *Example Discussion of causation*



# Activity sheet B2a – Exploring differences between perceptions and the historical climate information

## *Why explore these differences?*

If there are differences between the farmers' perceptions of the weather and climate over the past thirty years and the data collected by meteorological agencies it is important to try and understand with the farmers why these differences exist. With everybody talking about climate change, it is easy to assume it is the cause of many of the problems that we see; however, it may not be the only or main cause. Although it is clear that climate change is happening, it is important to consider the possible causes of individual problems, because if we don't focus on the real causes we may not identify solutions that work.

In some locations it has been found that farmers perceive rainfall to have decreased but the climate data collected show that:

(a) There is often no clear evidence of rainfall having decreased.

(b) Rainfall has always been very variable from year to year and continues to be.

(c) Temperature has increased.

If this is the case where you are working it may be useful to complete the following short exercise:

(a) Ask the farmers, "What are these perceptions based on? (What makes you think rainfall has decreased?)". Discuss these possible causes with the farmers. Farmers may suggest problems like lower yields and lower water tables amongst others.

(b) For each of these suggestions, ask farmers, "What could be causing these problems?" For example:

- What could cause reduced yield or food shortage?
- What could cause lower water tables?
- What could cause changes in vegetation?

It may be helpful to place these problems on a flipchart and ask farmers to draw connections that they see. See an example of this (for reduced yield) on page 24.

5. When you've finished discussing the graph on seasonal rainfall you should share and explore each of the following graphs with farmers:
    - Season start date
    - Season end date
    - Season length
    - Temperature
    - Number of dry spells
    - Lengths of longest dry spell
    - Timing of dry spells
    - Extreme rainfall events
    - Any other graphs you have been supplied with for your location

   If there is not enough time to discuss each of the graphs then ask the farmers to select two or three of the graphs that they think will be the most useful for them to discuss.

   <u>Example questions for exploring additional graphs.</u>

   (a) Do they show that things are different in the last few years when compared to 30/40/50 years ago? (i.e. are there any trends?)
   (b) Do they show that, from year-to-year, the changes are bigger (or smaller) than they were 30/40/50 years ago? (i.e. has the variability increased, decreased or stayed the same?)
   (c) Is this information useful and how could you use it for planning/choices/decisions?

6. Find a public place where all of the graphs can be displayed so that people can see and discuss them.

## Procedure

1. Begin by handing round the graph that shows total seasonal rainfall.

2. Explain that the horizontal line displays the years and that the vertical line shows the total amount of rainfall that fell in the rainy season each year. To help explain this and check that farmers understand, it is helpful to ask farmers questions.

<u>Example questions to check understanding of the graphs:</u>

- What year had a drought?
- What year had heavy rains?
- How much rain was there in x year?

3. Explore the data with the farmers by asking questions. You should establish whether or not:
    - the data shows that things are different in the last few years compared to 30/40/50 years ago? (i.e. are there any trends?)
    - shows that, from year-to-year, the changes are bigger (or smaller) than they were 30/40/50 years ago? (i.e. has the variability increased, decreased or stayed the same?)

<u>Example questions to explore data:</u>

- Does the graph show that there is more rainfall recently than there was 30/40/50 years ago?
- Does the graph show that there is less rainfall recently than there was 30/40/50 years ago?
- Does the graph show that, from year to year, the amount of rainfall varies/changes more recently than it did 30/40/50 years ago?
- Does the graph show that, from year to year, the amount of rainfall varies/changes less recently than it did 30/40/50 years ago?

4. How does this information compare with the farmers' perceptions of the weather and climate in the area over the past 30 years or more?

<u>Example questions to compare perceptions and past climate:</u>

- Do you think weather and climate have changed in the last 30 years or more?
- If so, how do you think it has changed?
- Do you think rainfall is higher, lower or the same?

***Note**: In many locations the graphs will show a high degree of variability from year to year. This presents a major problem to farmers for planning. In Step C we will use tools to help us understand and address rainfall variability.*

# Activity sheet B2 – Understanding and interpreting historical climate information/graphs

## *Why is it useful for farmers to understand the historical climate information for their location?*

Historical climate information is useful for farmers as it enables them to better understand their local climate and therefore make more informed decisions about their crop, livestock and livelihood options.

## *Materials*

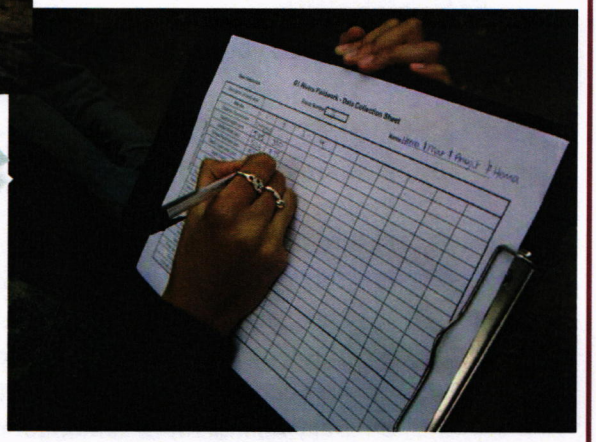
You will need a full set of the climate graphs for the nearest available weather station. Make sufficient copies to ensure that you are able to leave one for each of the farmers.

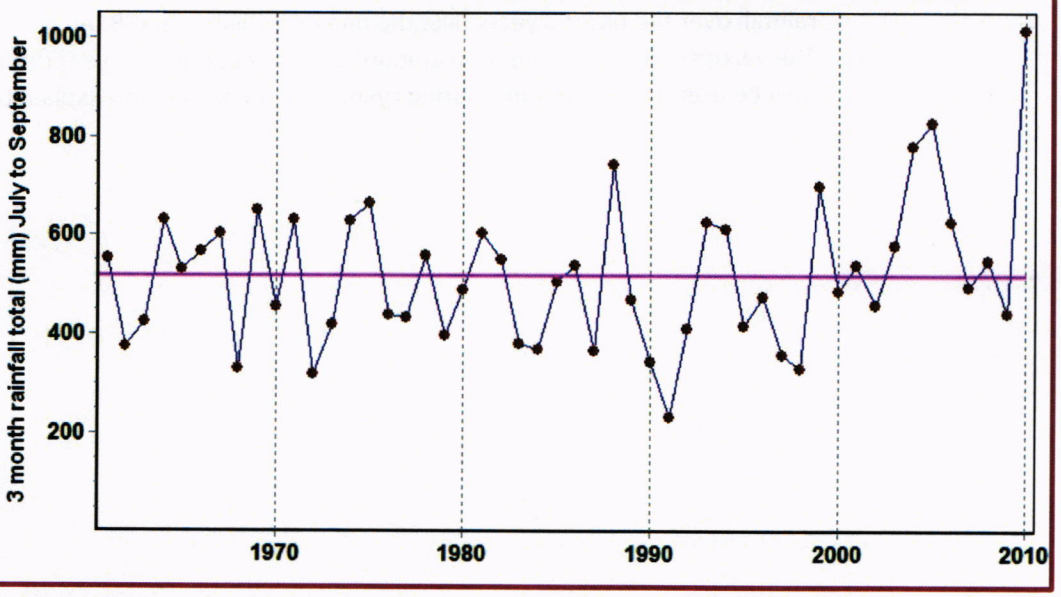
## *Preparation*

- You will have been provided with the appropriate climate graphs for the location in which you work. Ensure you understand them and think about the questions that farmers may have.
- Introduce the concept of historical climate information and how it is collected using activity sheet B1 & B1a.
- Explain how this information can be useful in informing farmers' crop, livestock and livelihood decisions.

## Activity sheet B1a – How is the historical climate information recorded and presented?[3]

Image credit: IDCR/ Thomas Omondi






[3] Image 1 - Rainfall is measured in the field using a rain gauge. Image 2 - Rainfall measurements are recorded and stored. Image 3 - Rainfall measurements are presented on a graph.

# Activity sheet B1 – Where does the historical climate information come from?

## *Why is it important for farmers to understand climate information and where it comes from?*

Historical climate information is vital in the PICSA approach. It is important for farmers to understand where this information comes from and how it has been collected so that they are able to trust the outputs that they are presented with during steps B and C.

## *Materials*

You will need a copy/copies of activity sheet B1a to pass round the farmers.

## *Preparation*

- Familiarise yourself with the procedure below and the pictures in activity sheet B1a.

## *Procedure*

1. Pass around the copies of activity sheet B1a.
2. Explain to the farmers each of the pictures/diagrams in turn.
3. Ensure that the farmers understand that:
    - The amount of rain that has fallen every day is measured using standard equipment.
    - The daily rainfall total is written down by meteorology staff at each of the weather stations.
    - This information has been recorded for many years; normally more than 50. The exact number of years depends on the location of the station.
    - Daily rainfall totals can be summarised and represented in a graph that displays seasonal rainfall over the past 50 years (like the one on activity sheet B1a).
    - The vertical axis shows the total amount of rain that fell each year during the rainy season (it may be useful to use the measuring cylinder as an example to explain this to farmers).