global forum for rural advisory services
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Module 13: Climate Smart Agriculture (CSA) in Extension and Advisory Services (EAS) in Rwanda

WORKBOOK

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Module 13: Risk Mitigation and Adaptation

Pre-assessment

After reading through the preface and introduction, complete the following pre-assessment to determine how comfortable you are with the topic of motivation. Rate your knowledge on the topics on a scale of 1 to 5 by circling the corresponding number.

	Question	Self-assessment				
		Low				High
1	To what extent are you familiar with the concepts of Climate smart agriculture?	1	2	3	4	5
2	Are you able to explain the concept of climate change and its impact on agriculture in Rwanda?	1	2	3	4	5
3	Are you able to identify risks related to climate change?	1	2	3	4	5
4	Are you familiar with the concept of climate, weather, climate change and extreme events?	1	2	3	4	5
5	How comfortable are you with explaining the implication of climate change on food security, agriculture and natural resources?	1	2	3	4	5
6	Are you familiar with the concept of climate information service for Agriculture?	1	2	3	4	5
7	Are you familiar with the linkage between climate change, health and socio economics?	1	2	3	4	5
8	To what extent do you know how to access and use weather and climate information for agriculture?	1	2	3	4	5
9	Are you familiar with the concept of Agriculture Extension advisory services for climate smart agriculture?	1	2	3	4	5
10	How confident are you in using key tools like Participatory Integrated Climate Services for Agriculture (PICSA) in guiding farmers to apply skills related to CSA?	1	2	3	4	5
11	To what extent are you familiar with climate smart agriculture best practices and technologies that can be adapted to smallholder farmers in Rwanda?	1	2	3	4	5
12	Are you able to identify communication channels that can be used to inform farmers about climate smart agriculture?	1	2	3	4	5
13	To what extent are you familiar with the concept of gender mainstreaming in climate smart agriculture?	1	2	3	4	5
14	To what extent are you able to implement and monitor climate smart agriculture practices?	1	2	3	4	5

Study unit 1: Introduction to risks, climate science and climate change in Rwandan context

Session 1.1: Understanding concept of risk, uncertainty and risk management

Activity 1.1: Individual activity: Risk and uncertainty

Read through the case study below and answer the question that follows.

Imagine that a farmer has two routes to the market; the quickest route being over rough terrain and the longer route being on well-maintained roads and likelihood of traffic congestion. The shorter route will get him to the market before the other vendors, allowing him to increase his sales, but there is the risk that his wagon will not be able to make the journey.

The farmer now needs to consider the following:

- The shorter path has a higher uncertainty as to whether he will make it to the market but the positive outcome of increasing his sales if he takes the risk; and
- The longer route has a lower uncertainty that he will make it to the market but carries the risk that he will sell less.

What would you do if you were in the farmer's position?

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Activity 1.2: Individual activity: The Irish potato famine

The Great Famine in Ireland saw the loss of over 20–25% of the population between 1845 and 1852. Research the topic and identify the risks that lead to the famine as well as vulnerabilities.

Activity 1.3: Individual activity: Measuring uncertainty and risk

Read through the scenario below and answer the questions that follow.

Looking at the routes to market example in Activity 1.1, the farmer finds out from his neighbour that the short path was travelled safely in the last month but recent rains may have affected the route. You can now assume a 'possible' uncertainty and assume the outcome as being 'severe' due to the fact that not making it will result in no sales. For the short path a negative outcome is 'very unlikely' and a negative outcome is 'negligible'. You can now rank the risk of the two options and see that although the farmer could increase his profits, the risk is high and he would be safer taking the short path.

Consider the following changes to the above case and determine the risk for each. Which route would you suggest based on your analysis?

1. Read through the scenario below and answer the question that follows. (2)

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2. The long route is undergoing road maintenance, which may result in delays and have a moderate effect on profits. Assume the short route is as stated in question 1. (2)

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Total: 4 marks

Session 1.2: Understanding climate science, and climate change in Rwandan context

Activity 1.4: Individual activity: Risk perception

Answer the following questions in your own words. Write your answer in the space provided

1. Is the following true or false? If false, correct the statement.

1.1. Climate refers to what is happening in the atmosphere at a given time for a particular place. (2)

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1.2. Weather refers to conditions in the atmosphere over a long period of time. (2)

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1.3. A greenhouse gas is any gas in the atmosphere which absorbs and emits heat in the form of thermal radiation. (2)

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1.4. Vulnerability to climate change is the degree to which a system is susceptible to or unable to cope with the adverse effects of climate change. (2)

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1.5. Livelihood vulnerability = (exposure x sensitivity) – adaptive capacity. (2)

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1.6. Sensitivity is the ability of a system or household to adjust to climate change. (2)

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Total: 12 marks

Session 1.3: Understanding Rwanda climate and its vulnerability to climate change

Activity 1.5: Individual activity: Climate change example 1

Changes in temperature and precipitation and their distributions are the key drivers of climate and weather-related disasters that negatively affect Rwandans and the overall economy. The main risks/ impacts that adversely affect the population include droughts, floods, landslides and storms. Discuss the following:

1. How the changes in climate can upset the agricultural patterns in Rwanda? (3)

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2. Explain how Rwanda is vulnerable to climate change. (2)

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3. Discuss two socioeconomic factors that can result in climate change. (3)

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Total: 8 marks

Session 1.4: Climate change and agriculture, socio-economics and health

Activity 1.6: Individual activity: Principle of capital and its importance for climate change

Agricultural production and income are dependent on climate due the direct effect of weather on crop yields. Do some research and discuss the following:

- The relationship between climate change and socio-economics.
- Climate change and capital

Summative assessment: Unit 1

Answer the following questions in your own words. Write your answer in the space provided

1. Name the factors that will affect your ability to identify and evaluate risks. (3)

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2. Define risk in terms of uncertainty. (3)

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3. Discuss how the principle of supply and demand can expose farmers to risks. Use an example in your discussion. (3)

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4. What factors should be considered when using statistical data in risk management? (3)

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5. Is the following true or false? If false, correct the statement. Write your answer in the space provided.

5.1. Risk evaluation is the process of identifying the risks which need to be mitigated. (2)

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5.2. Your personal understanding of risk can affect your ability to correctly assess risk. (2)

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5.3. Risk assessment by individuals is only possible by risk experts. (2)

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5.4. Risk matrixes can be used to measure risks caused by hazards and exposure. (2)

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5.5. You can perform a risk assessment as long as you know the severity of the risk. (2)

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6. Socio-economics is important to a farmer when looking at the effects of climate change. Discuss any four types of capital and how the type of capital relates to the farming practice. (8)

Total: 30 marks

Study unit 2: Understanding adaptation and climate smart agriculture (CSA) in Rwanda context

Session 2.1: Understanding climate science

Activity 2.1: Individual activity: Climate science

1. Explain the following terms. Write your answer in the space provided (10)

Column A	Column B
1. Adaptation	
2. Reactive adaptation	
3. Extreme event	
4. Vulnerability	
5. Proactive adaptation	

Total: 10 marks

Session 2.2: Understanding the concept of Climate Smart Agriculture (CSA)

Activity 2.2: Individual activity: Adaptation challenges

1. Indicate whether the following statements are true or false. Provide a reason if false. Write your answer in the space provided. (10)

1.1. Climate-smart agriculture (CSA) is an approach for developing actions needed to transform agricultural systems.

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1.2. Compost making and green manuring is an example of Conservation agriculture.

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1.3. Popularization of crop varieties with high nutrition content, trees and other plants is an example of crop diversification.

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1.4. Current predictions for seal level, temperature and carbon dioxide increases for 2050 are of low confidence.

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1.5. Global warming suggests that temperatures will increase equally across the globe.

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Total: 10 marks

Session 2.3: Overview of select Climate Smart Agriculture best practices and technologies for smallholder farmers

Activity 2.3: Individual activity: Group participation

1. Draw a line connecting the terms/statements in column A to those in column B that best match said term or statement. (5)

Column A	Column B
1. Conservation agriculture	A. Combinations of trees, crops and/or animals are intentionally designed and managed as a whole unit
2. Agroforestry	B. The tree, crop and/or animal components are structurally and functionally combined into a single integrated management unit
3. Intentional	C. cutting down trees, slash and burn, flood irrigation and forest degradation
4. Integrated	D. The practice has been promoted for their potential to mitigate climate change.
5. Harmful practices	E. Has the potential to contribute to both climate change mitigation and adaptation.

Total: 5 marks

Session 2.4: Access and the use of Climate Information Services for Agriculture

Activity 2.4: Individual activity: The implications of climate change

Read through the case study on the link between malaria and climate change from the Proceedings of the National Academy of Sciences of the United States of America (PNAS) at the following link: http://www.pnas.org/content/111/9/3286.full.pdf

1. In your own words describe how climate change has affected malaria distribution. This exercise aims to test your ability to perform independent study and obtain relevant information from complex literature.

Summative assessment: Unit 2

Answer the following questions in your own words. Write your answer in the space provided

1. Describe the difference between weather and climate. (2)

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2. Describe the difference between adaptive and reactive adaptation. (2)

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3. Provide an example of a long term and short term extreme event. (2)

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4. What are the two types of adaptation challenges? (3)

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5. Differentiate between Medium-range weather forecasts and short-range weather forecasts. (5)

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6. Is the following true or false? If false, correct the statement.

6.1. The seasonal forecast is also referred to as the long-range (climate) forecast. (2)

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6.2. Effective climate services are part of the enabling environment for the transition to Climate Smart Agriculture. (2)

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6.3. Short forecasts are useful in giving the weather conditions expected for the next seven to ten days. (2)

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6.4. Climate change and variation have the same meaning. (2)

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6.5. Adaptive capacity is the ability of groups to adapt to climate change. (2)

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7. Discuss the importance of climate information services. (4)

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8. Name at least four atmospheric/climate components that will be affected by an increase in average global temperatures. (4)

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Total: 32 marks

Study unit 3: Agriculture Extension and advisory services for climate smart agriculture

Session 3.1: Roles of EAS in building smallholder farmers' resilience to climate change

Activity 3.1: Individual activity: The role of EAS

1. Describe the role of EAS in disseminating climate smart agriculture practice. (4)

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Total: 4 marks

Session 3.2: Introduction to Participatory Integrated Climate Smart Agriculture

Activity 3.2: Individual activity: PICSA

1. Discuss the importance of smallholder farmers when it comes to key-security and how PICSA assists farmers in achieving that security. (4)

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Total: 4 marks

Summative assessment: Unit 3

Answer the following questions in your own words. Write your answer in the space provided

1. Complete the following table by filling in the missing adaptation strategies. You only have to include two strategies for each event. Write your answer in the space provided. (8)

Column A	**Column B**
Heat waves	
Adaptation to drought	
Flooding	
Wildfires (often noted during heat waves)	

2. Fill in the missing sections in the following list of successful adaptation strategies. Write your answer in the space provided. (5)

Adoption of water and energy ...2.1... practices.

Developing local market systems

- Improving market ...2.2… and the understanding of how markets operate
- This creates a more transparent market environment to assist farmers in understanding the ...2.3... of their crops ...2.4… approaches/training
- To increase efficient use of available resources

- To assist farmers in increasing ...2.5… through new farming practices and crop types (crop diversification), in order to improve resistance to crop price fluctuation

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Total: 13 marks

Study unit 4: Gender and other adaptive options to Climate change

Session 4.1: Gender mainstreaming in Climate smart agriculture

Activity 4.1: Individual activity: Gender mainstreaming

Mainstreaming a gender perspective is the process of assessing the implications for women and men of any planned action, including legislation, policies or programmes, in any area and at all levels. Do some research and discuss the impact of climate change on gender.

Session 4.2: Other adaptive options to climate change

Activity 4.2: Practical activity: Adaptive options to climate change

Use the tools given in this section, or similar ones for your country, to look up information on adaptation strategies to both address current and future risks in farming.

Session 4.3: Monitoring the implementation of Climate Smart Agriculture practices

Activity 4.3: Practical activity: Design and implement monitoring and evaluation

Use the tools given in this section, or similar ones for your country, to look up information on how to design and implement monitoring and evaluation for climate smart agriculture practices.

Summative assessment: Unit 4 – Group project

Complete this assessment in groups of three or four.

1. In order to test the skills gained in this module you will be required to select a region from a list provided by your lecturer or one you have identified yourself. You will be required to:

- Identify steps that need to be taken to mainstream gender using principles of climate smart agriculture;
- Identify risks faced by communities in the region;
- Identify current adaptation and risk management strategies in place;
- Suggest additional adaptation and risk management strategies; and
- Present your findings to the rest of the class.

Requirements:

- You will need to apply risk management and adaptation strategies discussed in this course;
- Make use of toolkits
- Be able to gather data from reputable sources such as those included in this module; and
- Communicate the data effectively to the rest of the class using visualisation tools.

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Total: 40 marks

Post-assessment

Complete the following post-assessment to determine how much you have learnt.

	Question	Self-assessment				
		Low				High
1	To what extent are you familiar with the concepts of Climate smart agriculture?	1	2	3	4	5
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11	To what extent are you familiar with climate smart agriculture best practices and technologies that can be adapted to smallholder farmers in Rwanda?	1	2	3	4	5
12	Are you able to identify communication channels that can be used to inform farmers about climate smart agriculture?	1	2	3	4	5
13	To what extent are you familiar with the concept of gender mainstreaming in climate smart agriculture?	1	2	3	4	5
14	To what extent are you able to implement and monitor climate smart agriculture practices?	1	2	3	4	5

Global Forum for Rural Advisory Services (GFRAS) is about enhancing the performance of advisory services so that they can better serve farm families and rural producers, thus contributing to improved livelihoods in rural areas and the sustainable reduction of hunger and poverty. Rural advisory services help to empower farmers and better integrate them in systems of agricultural innovations.