

AUDA-NEPAD GENDER CLIMATE CHANGE AND AGRICULTURE SUPPORT PROGRAM TRAINING OF TRAINERS

John W. Recha

Workshop Report



AICCRA
Accelerating Impacts of CGIAR
Climate Research for Africa



AUDA-NEPAD Gender Climate Change and Agriculture Support Program Training Of Trainers

Workshop Report

**Accelerating Impacts of CGIAR Climate Research for Africa
(AICCRA)**

October 2022

John W. Recha

To cite this workshop report

Recha J.W. 2022. AUDA-NEPAD Gender Climate Change and Agriculture Support Program Training of Trainers. Workshop Report. Accelerating Impacts of CGIAR Climate Research in Africa (AICCRA).

About AICCRA reports

Titles in this series aim to disseminate interim climate change, agriculture, and food security research and practices and stimulate feedback from the scientific community.

About AICCRA

The Accelerating Impacts of CGIAR Climate Research for Africa (AICCRA) project is supported by a grant from the International Development Association (IDA) of the World Bank.

Contact us

Accelerating Impacts of CGIAR Climate Research for Africa (AICCRA). Email: aiccra@cgiar.org

Disclaimer: This workshop report has not been peer-reviewed. Any opinions stated herein are those of the author(s) and do not necessarily reflect the policies or opinions of AICCRA, donor agencies, or partners. All images remain the sole property of their source and may not be used for any purpose without the written permission of the source.



This workshop report is licensed under a Creative Commons Attribution – NonCommercial 4.0 International License.

© 2022 Accelerating Impacts of CGIAR Climate Research for Africa (AICCRA).

Acknowledgments

The Accelerating Impacts of CGIAR Climate Research for Africa (AICCRA) project is supported by a grant from the International Development Association (IDA) of the World Bank. IDA helps the world's poorest countries by providing grants and low to zero-interest loans for projects and programs that boost economic growth, reduce poverty, and improve poor people's lives. IDA is one of the largest sources of assistance for the world's 76 poorest countries, 39 of which are in Africa. Annual IDA commitments have averaged about \$21 billion over circa 2017-2020, with approximately 61% going to Africa.

About the authors

John W. Recha (J.Recha@cgiar.org) is a Climate Smart Agriculture Policy Scientist, AICCRA Eastern and Southern Africa at the International Livestock Research Institute (ILRI).

Table of contents

Acknowledgments	4
Table of contents	5
Summary	7
Introduction	1
Session 1.1: Understanding Gender and the Gender Concepts	1
Session 1.2: Incorporating Gender in Design, Monitoring and Evaluation in projects and programs	4
Session 1.3: The Gender Trajectory (Gender Responsive Actions)	7
Session 2.1: Business Management and Access to Finance	Error! Bookmark not defined.
Session 2. 2: Post-harvest handling and processing techniques	9
Session 3.1: Climate-smart technologies and practices	11
Session 3.2: Farmer-based appropriate (business) technologies ..	Error! Bookmark not defined.
Session 3.3: Solar energy irrigation & water harvesting technologies	2
Session 3.4: Energy, labour and time saving agricultural technologies	2
Session 3.5: Production of Organic Fertilizer	4
Session 3.6: Construction and use of improved stoves ..	Error! Bookmark not defined.
Session 3.7: Training of women in urban agriculture	5
Conclusion	6
Annex 1: Workshop Program	7
Annex 2: Workshop Participants	9

List of Figures

Figure 1: Role of gender, climate change, and agriculture to attain food security, mitigate climate change and promote gender equity.	1
Figure 3: Gender equality	3
Figure 4: Gender equity	3
Figure 5: Key domains of gender analysis	5
Figure 6: Gender-responsive categories.....	7
Figure 7: Gender transformation and social inclusivity.....	8
Figure 8: Global gas emissions by emissions (Source: EPA, 2017)	11
Figure 9: Trajectory between 1750 and 2017 of the influence of the industrial revolution on CO2 emissions and temperature.	12
Figure 10: Frequency of weather-related disasters since the industrial revolution. (Source: EM-DAT UCL CRED www.emdat.be)	12
Figure 11: trade-offs of CSA pillars when applied independently. CSA synergies, 2-level (2,3, and 4) and 3-level (1), when linked together (Source: Vermeulen et al. 2012)	1

Summary

Agriculture's contribution to the economy and employment is declining at varying rates, posing various socioeconomic issues. Meeting growing agricultural needs with current farming techniques is expected to lead to over-extraction from natural resources, accelerate greenhouse gas emissions, and low yields. In addition, intensive and unsustainable agriculture will lead to environmental degradation such as loss of biodiversity, deforestation, and land degradation, among other things. Smallholder farmers and especially vulnerable groups like marginalized groups and women are affected the most. In the rural setting, women are left to tend to the family and farm as men relocate to the cities to look for jobs. as a result, this has caused a rise in migratory shifts, particularly among households where the man is the household head. Eventually, this is contributing to gender disparity and associating farming with women. Hence climate-smart agriculture is used to create synergies that will enhance crop production and lead to mitigation and adaptation to climate change as well as achieve food security and preserve the environment. Against this backdrop, the gender climate change and agriculture program was initiated in 5 African countries.

The GCCASP is funded by Norad and went through several phases of vigorous planning and, subsequently, implementation. The implementation stages of GCCASP are divided into four primary priority intervention areas, which effectively represent different but interconnected sub-programmes: (i) closing policy and institutional gaps, (ii) capacity building of women smallholder farmers, (iii) creation and strengthening of women platforms, and (iv) investments in scaling up successful and innovative practices.

The gender climate change and agriculture support program (GCCASP) is meant to be used as a CSA training tool and as a component of the process of improving trainers' and smallholder farmers' capacity to merge CSA practices, innovations, and knowledge by designing and implementing customized training courses at both levels.

Various initiatives as well as activities on the ground were carried out during the first stage of implementation. The programs focused on increasing women farmers' capacity through several prioritized training and on Climate-Smart Agriculture (CSA) innovations and practices. The outcomes of this implementation were quite effective, despite some hurdles, such as inadequate finance. this resulted in downscaling and focusing on a small number of districts and stakeholders. Nonetheless, participating countries reported significant outcomes that, when combined with significant resources and a large number of target beneficiaries, might significantly contribute to the African Union Agenda 2063.

Introduction

Climate change is having a growing influence on a variety of businesses and economic sectors in Sub-Saharan Africa with a focus on agriculture, forestry, environment, energy, transportation, manufacturing, tourism, water and sanitation, etc. Agriculture contributes to GDP in most sub-Saharan African countries. Most lands in these countries are arable and owned by smallholder farmers. Agriculture has a significant socioeconomic impact on Africa but climate change has lowered productivity and made the smallholder farmer vulnerable. Farmers exclusively depend on natural resources like land and water to produce food. Hence, for agriculture productivity to thrive it relies heavily on limited natural resources that are vulnerable to erratic weather as well as climate change. In scenarios where there is prolonged drought, there is a reduction in crop and livestock productivity and cases of food insecurity and malnutrition escalate. Hence the need to strengthen the farmer's capacity to produce food and be resilient to climate disasters.

Social disparities such as gender inequality have made farmers vulnerable to climate change. Most farms in Africa are owned by men whereas 60-80% of farm labour comes from women. Other challenges such as lack of equitable land rights, capital, access to markets, agricultural capacity building, conducive working environment, and equity, limit women farmers from optimizing their full potential in agriculture. In the urban setting, most farmers are women who face many challenges in being productive due to lack of time, limited funds, land rights and ownership. Women in the urban are left to fend for food for their families, cook, clean and take care of the children. This hinders women from being productive. Women who practice urban farming do it to feed their families.

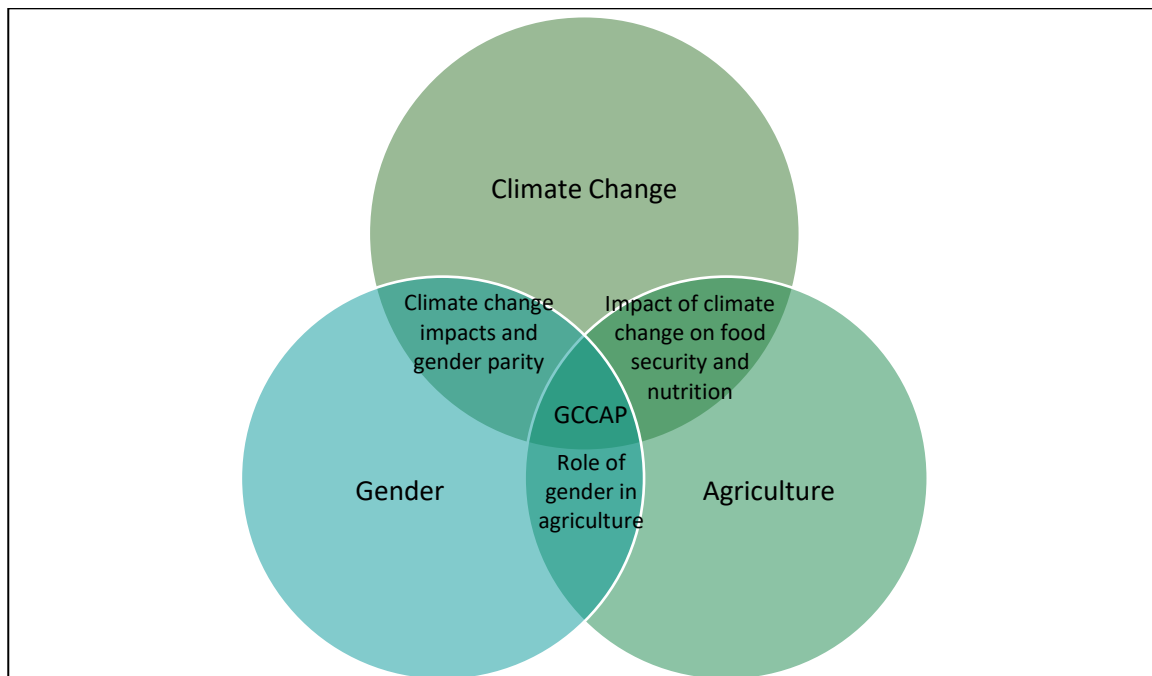


Figure 1: Role of gender, climate change, and agriculture to attain food security, mitigate climate change and promote gender equity.

Capacity building, as one of the approaches, is a vital component of the GCCASP in implementing and ensuring the longevity of the program. The training of stakeholders at all multi-levels is one of the tangible approaches used to speed up GCCASP implementation. This is done to enhance pandemic resistance as well as boost production capacity for food, health, and economic recovery. The trainings continue to be an efficient means of utilizing existing resources cost-effectively while preserving return on investment and reaching more people.

The broad objective of the workshop

The main objective of the workshop was to train trainee facilitators/instructors who will be responsible for training extension workers (at the district level/district councils). The trained facilitators will then reach out to smallholder women farmers and other vulnerable groups participating in the GCCASP implementation.

Specific Objectives

1. To train teams of national/district trainee instructors or facilitators for enhancement of GCCASP implementation.
2. To expose trainees to effective training materials/tools for further GCCASP trainings.
3. To explore the various CSA topics of relevance for the implementation in GCCASP countries.
4. To enhance the understanding of gender mainstreaming and its practical aspects in the context of climate change to the trainees

Workshop organization

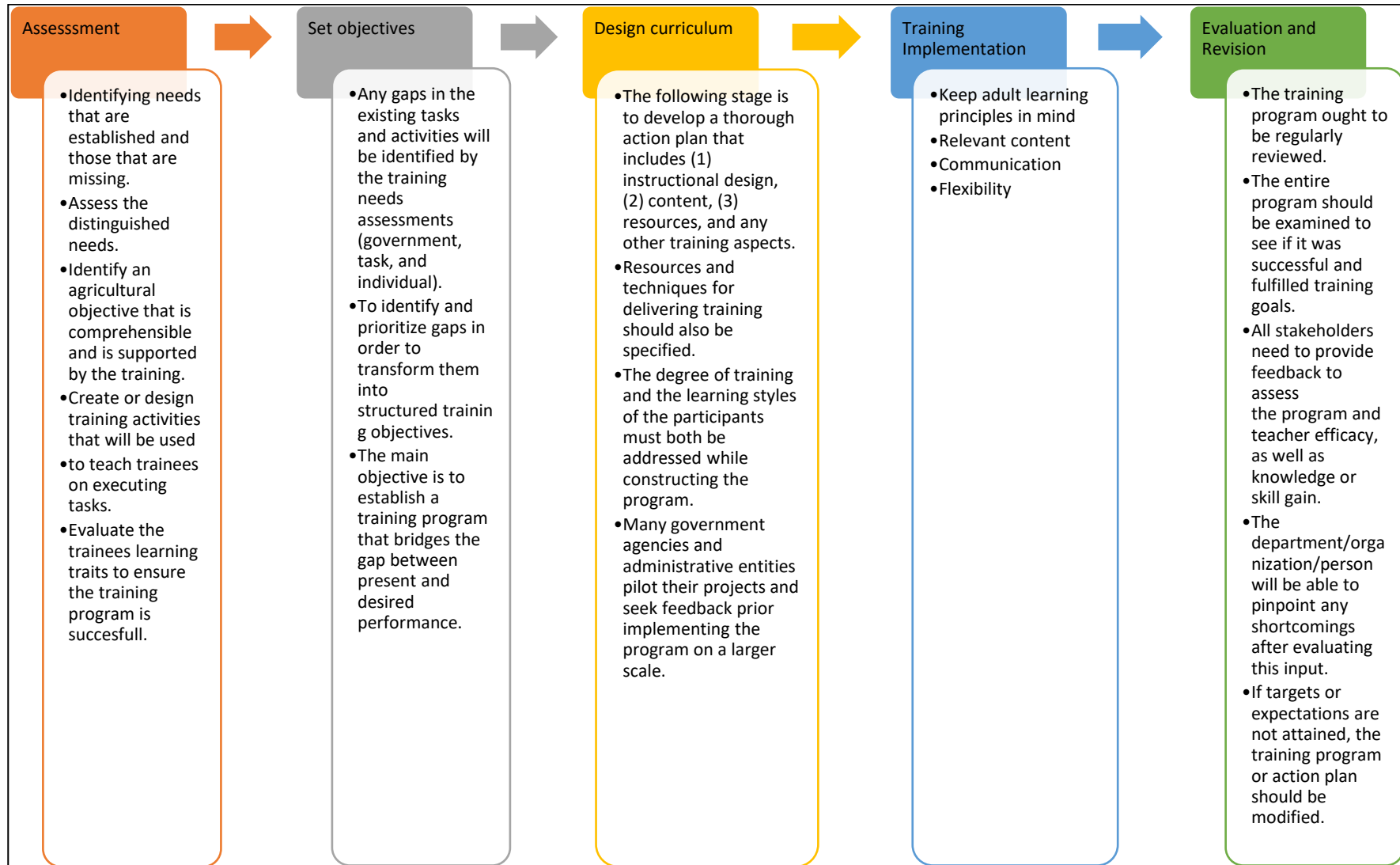
Stakeholders participating in the GCCASP implementation were brought together during the Online 2022 National Partnership Platform. Countries agreed on the top three priority capacity building (CSA trainings) projects for each nation. The workshop kicked off by first training the trainer. The recommended top priority was the 15 capacity building trainings in the 5 participating GCCASP countries. Countries chose 3 key trainings as the focal point (Table 1).

Table 1: Priority Trainings Per GCCASP Countries

#	CAMEROON	ETHIOPIA	MALAWI	NIGER	RWANDA
1.	Construction & use of improved stoves	Encompassing gender and climate change into policies, strategies & other relevant documents	Climate-smart technologies	Techniques for processing and conservation of agricultural products and forestry-pastoral and fisheries products	Solar energy for irrigation
2.	Production of organic fertiliser	Solar energy irrigation & water harvesting technologies	Production & use of energy-saving technologies	Fattening and rearing techniques for the reproduction of small and large ruminants	Capacity building on access to finance
3.	Training of women in Urban Agriculture	Energy, labour & time-saving technologies	Farmer-based business technologies (business management & appropriate technologies)	Manufacturing techniques for cosmetic products	Post-harvest handling
CROSS-CUTTING					
	Gender Trainings	Gender Trainings	Gender Trainings	Gender Trainings	Gender Trainings

Note: The colour coding indicates trainings that will have to be merged. The trainings that are not coded cannot be merged and it will have to be looked at individually, at a later stage. **Green:** Climate Smart Technologies (improved stoves, organic fertilizer [urban agriculture], solar energy for irrigation, water harvesting, energy, labour and time saving etc); farmer-based business technologies. **Turquoise:** Post-harvest handling and processing techniques. **Dark red:** Business Management and Access to Finance. **Violet:** Gender and Gender mainstreaming in Climate Change and Agriculture.

PowerPoint presentations were used to teach the participants. Also, YouTube videos were used to illustrate innovative modern techniques that promote climate-smart agriculture and gender equity. A protocol was developed to guide the facilitators to ensure successful training on climate-smart technologies and practices (Fig. 2).



Session 1.1: Understanding Gender and the Gender Concepts

The broad objectives of the workshop were to:

1. Enhance understanding of gender equality.
2. Capacity builds the attendees by mainstreaming gender aspects in programs and organization practices.

The specific objectives were:

1. Understand the main gender concepts
2. Introduce gender mainstreaming
3. Why gender analysis – domains (individual and household level)
4. Understand the gender equality trajectory
5. How to communicate and report gender

Gender vs. Sex

Sex is defined as the anatomical elements that categorise humans as male and female. Reproductive traits such as the XY chromosome, hormones, and genitals, determine whether one is male or female. Sex is constant across time and is similar regardless of diverse cultures and societies. On the other hand, gender is socially created and defines the roles, behaviours, activities, and characteristics that a specific culture believes are proper for men (masculinity) and women (femininity). It varies according to society and culture (taught via socialization). Furthermore, gender evolves through time and is a taught trait.

Activity 1

Exercise 1: Gender vs. Sex

- i. Each participant to be given 3 different colour sticky notes.
- ii. Write the first word/sentence that comes to mind when you hear the term *Man*.
- iii. Write the first word/sentence that comes to mind when you hear the term *Woman*.
- iv. Pin answers to the flip chart.
- v. Discuss the responses on the sticky notes.

Guiding Exercise Notes

- Write the responses/Stick the cards on one side of the hall – MEN VS WOMEN
- Switch the column headings so that 'Men' appears over the list for 'Women' and vice versa
- Ask which words they think do not belong under the new headings.
- *Attitudes towards the opposite sex are shaped by stereotypes, which in turn are based on the limited interaction between men and women.*
- *reiterating the concepts of sex and gender and the differences between them*

Case Study 1

A father and son were involved in a car accident in which the father was killed and the son was seriously injured. The father was pronounced dead at the scene of the accident and his body was taken to a local morgue. The son was taken by ambulance to a nearby hospital and was immediately wheeled into an emergency operating room. A surgeon was called. Upon arrival and seeing the patient, the attending surgeon exclaimed "Oh my God, it's my son!"

Questions:

- i. What do you think happened?
- ii. Are there examples from working life where they believe that unconscious bias influences their way of thinking and decision making (e.g. interviews for recruitment, the way they treat colleagues that are different in comparison to their characteristics and/or experiences etc.)?

Gender Socialization and Stereotyping

The process of educating people on how to act as men or women is known as gender socialization. Family, school, mass media, and peers are all socialization drivers. Each actor supports gender roles by establishing and sustaining normative expectations for gendered conduct. Secondary factors, such as religion and the workplace, also contribute to exposure. Hence, socialization contributes to stereotyping.

Gender Roles and Stereotypes

Gender stereotypes suggest characteristics linked with male and female roles in society. Stereotypes usually influence how women and men will act in certain situations and how they relate with one another.

Experience sharing

What are some of the gender stereotypes that have challenged our work in relation to climate change and agriculture in your countries.

Gender-Based Violence

Gender-based violence is a detrimental act committed against the will of an individual and is ingrained in gender stereotypes and uneven power relationships. Threats of violence and coercion are types of GBV. It causes physical, emotional and psychological, sexual, and economic injuries to girls, boys, men, and women.

- Physical GBV is defined as the use of force that causes damage, discomfort, or disability.
- Sexual GBV is any act of sex, sexual attempt, unwelcome sexual statements or gestures. Anyone, irrespective of their connection to the victim, might use force or pressure to achieve this.
- Emotional and psychological GBV are deeds or comments that harm a person's psychological well-being and can compromise a person's integrity.
- Economic GBV is the act of denying and/or controlling a person's right to access resources e.g financial resources.

Statement

“If women, who are victims of domestic violence, wanted to leave, they could leave. If they stay, they must find some pleasure in the beatings.”

Gender Equality vs. Gender Equity

Gender equality is providing similar rights, benefits, and opportunities to both men and women (Fig. 3). As a result, it is the same treatment of men and women as is legally, constitutionally, and spiritually stated. It's a fundamental human right.

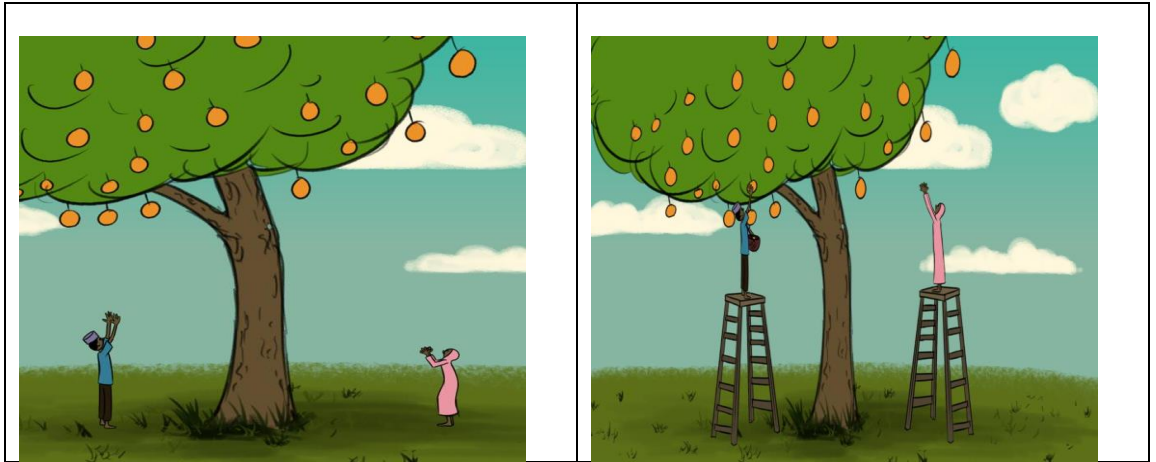


Figure 2: Gender equality

On the other hand, gender equity is providing rights, opportunities, and benefits that are tailored and suitable for each category (Fig. 4). Hence, it is the equitable distribution of resources, benefits, and opportunities within a predefined framework.

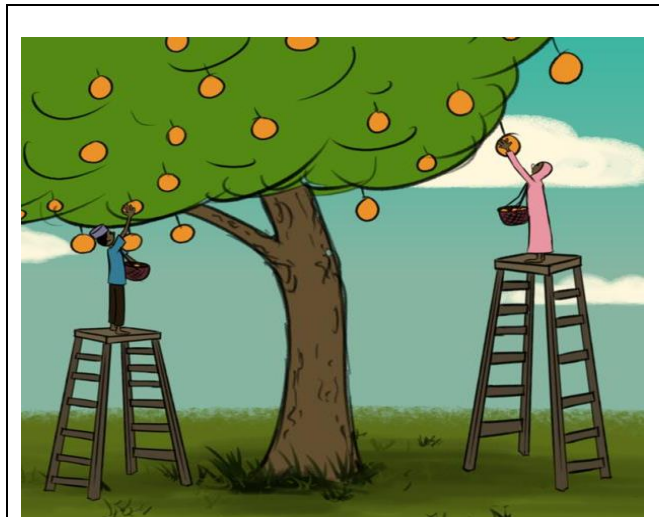


Figure 3: Gender equity

Session 1.2: Incorporating Gender in Design, Monitoring and Evaluation in projects and programs

Gender mainstreaming

It is an approach that designs, implements, tracks, and evaluates men, women, boys and girls' concerns. The derived information is eventually incorporated into policies and programs in all political, economic, and social domains so that men and women benefit equally. This ensures that every individual fundamental needs are met and equal distribution of benefits.

Demystifying gender mainstreaming on the dos and don'ts.

Gender mainstreaming is:	Gender mainstreaming is not:
Putting women's, men's, and people with disabilities experiences and concerns on the development planning	Incorporating a female aspect into a current program or project.
Changing the development strategy such that the outcomes serve all people equally.	Increasing the number of women engaged in the project or task.
To change uneven social and institutional arrangements.	

Gender Analysis

Gender analysis is a methodology/tool for studying the disparities in roles and norms for boys and girls, women and men; the various amounts of decisions they make, their varying demands, restrictions, and opportunities; and the effects of these inequalities within their lives. It is important to do a gender analysis because:

- It highlights the various needs, priorities, and weaknesses of women, men, girls, boys, individuals with disabilities, and other vulnerable people.
- Discover the possible benefits and drawbacks of program activities for men, women, boys, girls, people with impairments, and other vulnerable populations.
- Determine who has access to, control over, and decision-making authority.
- Learn about gender roles and duties, including who's responsible for what, why, and when.
- Raise personal and organizational gender sensitivity and awareness.

The steps of doing gender analysis are:

1. Collective brainstorming
2. Gender-responsive desk reviews and secondary data collection
3. Gender-responsive primary data collection
4. Gender-responsive data analysis and reporting

There are 5 domains of gender analysis (Fig. 5).

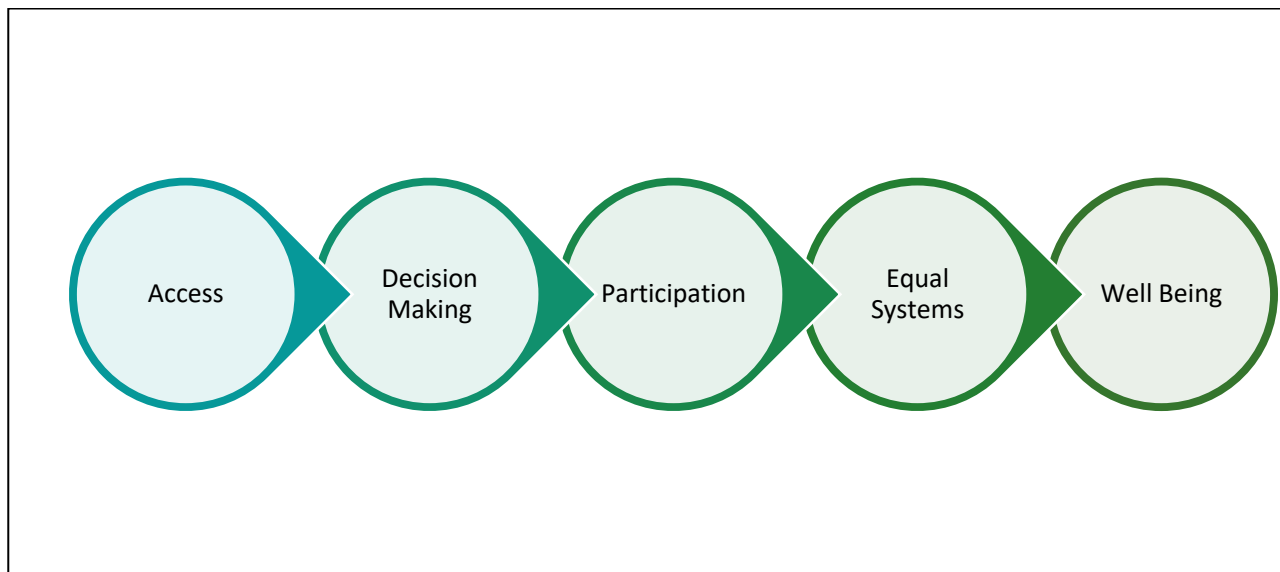


Figure 4: Key domains of gender analysis

Access

This might mean having access to, controlling, and/or owning:

- Properties (e.g. land, houses)
- Resources (e.g. wealth, information, technology)
- Opportunities (e.g. education, job, business)
- Services (e.g. healthcare, water)
- Benefits (e.g. social security, pensions)
- Infrastructure (e.g. transit, accessible roads, and utilities)

Power and Decision making

These decisions may influence:

- The allocation or distribution of benefits and resources.
- Income management.
- responsibility over assets (material, human, economic, social, physical, intellectual or other).
- Personal and social well-being, particularly body integrity and activity.
- Life decisions (purchases, jobs, family planning, and so on), home affairs, community engagement, and socializing
- Use of time.

Participation

It is the degree of participation in social matters and power structures that impact and defines life activities and consequences, such as the capacity or chance for individuals and/or groups to build, play a role to, and develop social systems and processes (e.g. participation in markets). This can be achieved by taking on positions of leadership and influence. At all levels, one can modify critical processes (society, community, household, interpersonal, and individual).

Equal systems

The fostering and broad structures that consider the various demands of both men and women, such as:

- There are formal and informal systems (e.g. market systems)
- Policies, regulations, and laws
- Gender or social norms and behaviours
- Values/relations
- Institutional procedures

Well-being

The sensation of being safe, secure, and comfortable physically, and socially, socially among others are referred to as well-being. It encompasses personal experiences, views, attitudes, and other information on:

- The extent to which people or individuals are respected and have a feeling of freedom.

- The capacity of an individual or a community to live a life devoid of stigma and prejudice, to be free from violence or risk, and to be guarded and secured.
- The level to which abuses of human rights and violent acts, especially sexual and gender-based violence, are avoided and resolved.

Reporting and Communicating Gender

The guidelines that are followed when reporting and communicating about gender include:

- Use encouraging pictures or photographs of both men and women.
- Use photos that defy gender stereotypes. Are there, for example, photographs of males taking care of children?
- Present disaggregated data by gender and age.
- Include a gender component that focuses on gender lessons learned.
- Speak in neutral language e.g., "human power" rather than "manpower", "humankind" rather than "mankind"
- Are women just described as fragile, or are their talents and accomplishments also mentioned?
- Discuss how gender equality's beneficial consequences are promoted and how its negative repercussions are minimized or removed.
- What effect do activities have on women's or men's empowerment (self-esteem, leadership potential, and self-organization)?

Provide information on the percentage of men and women who participated in project implementation (as benefactors, decision-makers, or advocates) over the project's life cycle.

CASE STUDY 2: DEALING WITH RESITANCE AS GENDER TRAINERS

During a one-day gender-training workshop with village community members, a senior man who has been quiet throughout the day stands up and says, "Our society has always operated on the principle that the man is the head of the household. Obviously, there can only be one head and having two will bring confusion. We cannot start the Western fad here even if we need western development aid. Development doesn't mean westernization. They must leave our traditional society alone."

QUESTIONS:

- What do you perceive to be the problem in this case-study?
- As trainers, how might you prevent such a situation from arising – or deal with it if it did arise?

Areas of Intervention

- Accept responsibility for recognizing the various roles, responsibilities, experiences, and disparities that exist between men and women in your company/organization.
- Determine possibilities to actively incorporate women, men, and adolescents in the review process.
- Through training and assistance, ensure that you have gender-responsive policies and practices.
- Strive for gender parity in hiring people and leadership.
- Create/monitor gender-sensitive indicators to track progress.
- Training personnel across projects and industries to be gender aware.

Be a strong leader who advocates for the expansion of gender best practices.

Session 1.3: The Gender Trajectory (Gender Responsive Actions)

Levels of Gender Responsiveness

There are 5 categories of gender trajectory (Fig. 6). The 3 negative gender responsiveness includes gender absence, gender exploitation, and gender insensitivity. The two-positive gender responsiveness is gender accommodation and gender transformation.

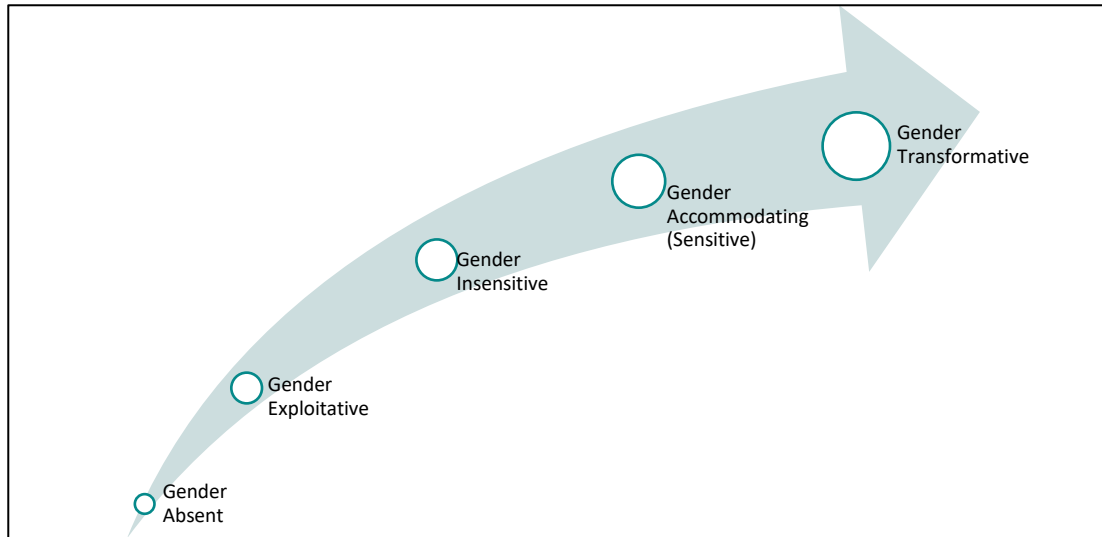


Figure 5: Gender-responsive categories

Gender absence: In the designing and implementation of program activities, gender norms and uneven power relations, as well as possible patterns of gender equality, are not considered. Furthermore, there has been minimal exploration of the inclusive characteristics of the context in which programs are working and how this may affect interventions.

Gender exploitation: Gender inequities, cultural norms as well as beliefs, and preconceptions are reinforced, used, and/or abused.

Gender insensitivity: Socioeconomic disparities and gender norms are recognised as important backdrop factors, but they are not considered in planning, implementation, or feedback.

Gender accommodating: Gender accommodating or sensitivity recognizes the aspect of gender however, programs work around it and other social disparities and inequities to reach

project goals. Also, interventions address the immediate needs of disadvantaged populations but fail to address the fundamental drivers of inequality and discrimination.

Gender transformative: To accomplish long-term gender transformation actively attempts to solve and transform gender inequities. The ultimate goal is to encourage egalitarian systems (Fig. 7).

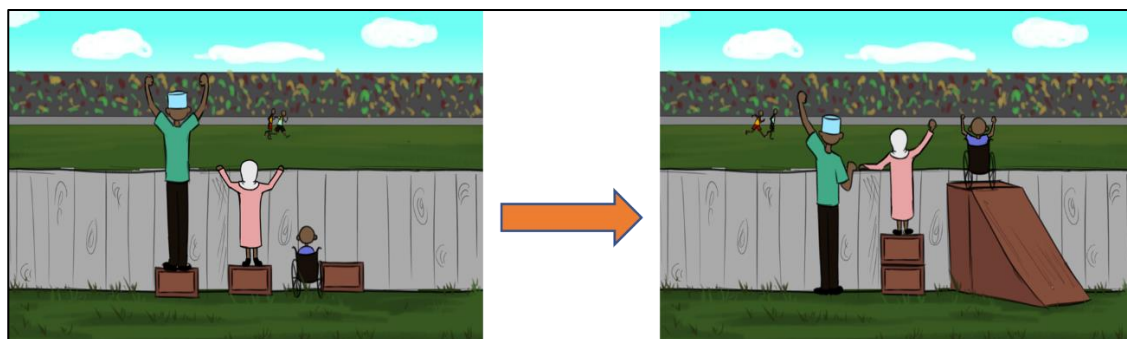


Figure 6: Gender transformation and social inclusivity

Session 2: Post-harvest handling and processing techniques

Farmer training workshop

Expected outcomes of the training included:

1. Understanding of the common challenges reducing the quality of grains in particular maize.
2. To gain a better understanding of the concepts of excellent post-harvest handling and storage methods.
3. Understand how to enhance post-harvest handling and storage systems.

Post-harvest handling and the techniques used

Postharvest is the last step of crop production at the farm level along the agriculture value chain. stage of crop production follows immediately after crops are harvested from the fields. The activities that are carried out in post-harvest include sorting, cleaning, drying, waxing, grading, packing, and storing. Postharvest loss is the amount of food loss that occurs throughout the agri-food chain, from crop harvesting to consumption. Any food losses incurred at the farm level are more severe since they reflect a waste of all the inputs used in the production process. One of the components of SDG 12, Responsible Consumption and Production, is the elimination of post-harvest losses. Every year, around 1.3 billion tonnes of food go to waste, while nearly 2 billion individuals are either malnourished or starving.

Post-harvest losses in Africa are reported to be 30% every year. East Africa incurs 30% postharvest cereal losses annually. According to data from the FAO's Africa post-harvest losses information system in 2019, maize in Africa has one of the largest post-harvest losses of up to 17%, relative to 20% and 13% of wheat and rice respectively. Research in Sub-Saharan Africa by FAO showed that for every 5kg of grain produced, 1kg is lost to pests, diseases and quality deterioration. Such food loss incurred is estimated to be enough to feed 48 million people in a year and is valued at over 4 billion USD, which is roughly half of Africa's yearly grain imports.

Target 12.3 of the SDGs has tasked countries by 2030 to reduce global per capita food waste by half at the consumer and retail levels, as well as reducing food losses which also include post-harvest losses that happen throughout crop production, distribution, processing and packaging. The African Union Commission devised a Post-Harvest Loss Management Framework (PHLMS) for the continent in 2018, to halve post-harvest losses from 2015 levels by 2025. This is important because:

- It will enhance food security and nutrition.
- It will contribute to environmental sustainability.
- It will create wealth.

Case of Rwanda in PH management

Rwanda has increased its efforts to establish an efficient post-harvest infrastructure. Post-harvest losses will be reduced during harvesting, distribution, processing, packaging, and storage. In Rwanda currently: there are 1,461 drying infrastructures, including 894 maize drying facilities and 567 rice drying grounds, with an overall capacity of 44,665MT; 523 storage facilities with a total capacity of 316,420 MT; and 53 cold rooms have been erected to prevent losses in the horticultural value chain.

Post-harvest challenges

Farmers have significant challenges. The following are the major factors influencing grain quality:

- Pre-harvest procedures that are inappropriate.
- Inadequate agricultural equipment.
- Inefficient grain handling and quality losses result in financial losses and food safety concerns.
- Poor grain drying techniques are producing moisture issues (rotting, mould, etc.).
- Inadequate grain storage methods result in grain losses caused by pests' infestation and other pathogens.

Group Work

Questions

1. State and explain the post-harvest related challenges that affect the quality of grains (maize) in your respective countries.
2. Group members are required to discuss and write down the effective post-harvest practices that can improve on quality and the quantity of staple food crops e.g. maize.

Session 3.1: Climate-smart technologies and practices

What is Climate Change?

Climate change is defined as the long-term changes in temperature and weather patterns that cause hot seasons becoming warmer and/or dryer, and rainy seasons becoming wetter. Some climate change-induced disasters include drought, flooding, and the prevalence of pests and diseases. These weather changes might be natural, such as oscillations in the solar cycle. Climate change is influenced, at its most fundamental, by a shift in the planet's energy balance. When the earth lowers the quantity of solar radiation reflected into space, it gains energy. The greenhouse effect occurs because of solar radiation passing through the atmospheric clouds or clear sky. Most of the radiation is absorbed and heats the surface of the earth. Conversely, the atmosphere and earth reflect part of the radiation. A proportion of the reflected heat radiation escapes into space after passing through the atmosphere. However, CO₂ traps part of the radiation. CO₂ reflects trapped radiation to the earth, creating global warming.

There are 2 main sources of CO₂, natural processes like the decomposition of organic matter (biogenic carbon) and non-natural processes that are human-induced (non-biogenic). Human-induced activities that rely on fossil fuels since industrialization has accelerated the production of the 3 main greenhouse gases; methane (CH₄), carbon dioxide (CO₂), and nitrous oxide (N₂O). The burning of fossil fuels releases CO₂ into the atmosphere which creates the greenhouse effect. This traps radiation heat thus the key factor in climate change.

About 65% of CO₂ is emitted from industrial processes and petrochemicals (Fig. 8). Industrial processes that emit CO₂ include refrigeration, stationary heating and combustion. Petrochemicals associated with CO₂ include fossil fuels like coal, petrol, diesel; fertilizer; pesticides etc. Approximately 11% of CO₂ comes from natural processes such as forestry and land use. Agriculture has been associated to cause 16% of CH₄ emissions globally. On the other hand, agriculture and industrial processes cause 6% of N₂O emissions.

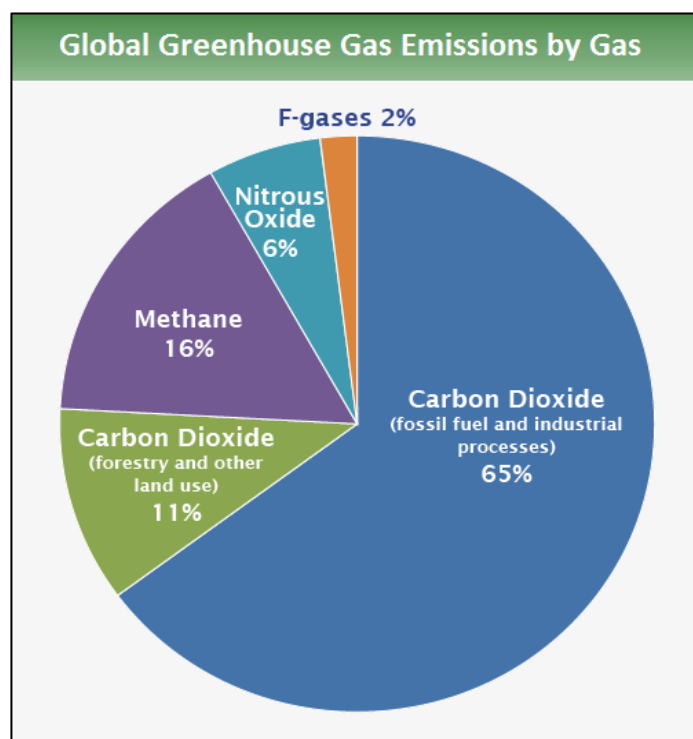


Figure 7: Global gas emissions by emissions (Source: EPA, 2017)

The disaggregation of global GHG emissions per sector indicates that energy, AFOLU, and industries are responsible for 25%, 24% and 21% of CO₂ emissions respectively. Furthermore, the burning of fossil fuels and industrialization in 2014, made China and the USA the main CO₂ emitters globally. The EU-28, India,

Russia Federation, and Japan were responsible for 9%, 7%, 5%, and 4% of global CO₂ emissions in 2014 respectively. The rest of the countries were cumulatively responsible for 30% of CO₂ emissions.

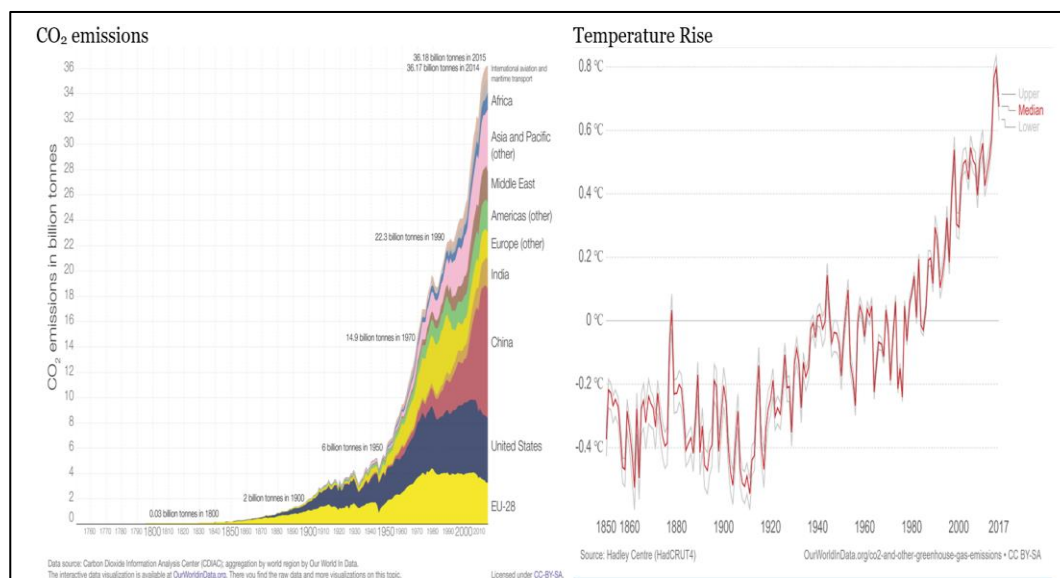


Figure 8: Trajectory between 1750 and 2017 of the influence of the industrial revolution on CO₂ emissions and temperature.

Thus, global temperatures and CO₂ emissions trajectory since the industrial revolution in 1750 have increased by 1°C and 31% respectively (Fig. 9). This in turn has contributed to the frequent climate-related disasters like droughts, flush floods, heatwaves, storms, melting glaciers, and hurricanes (Fig. 10).

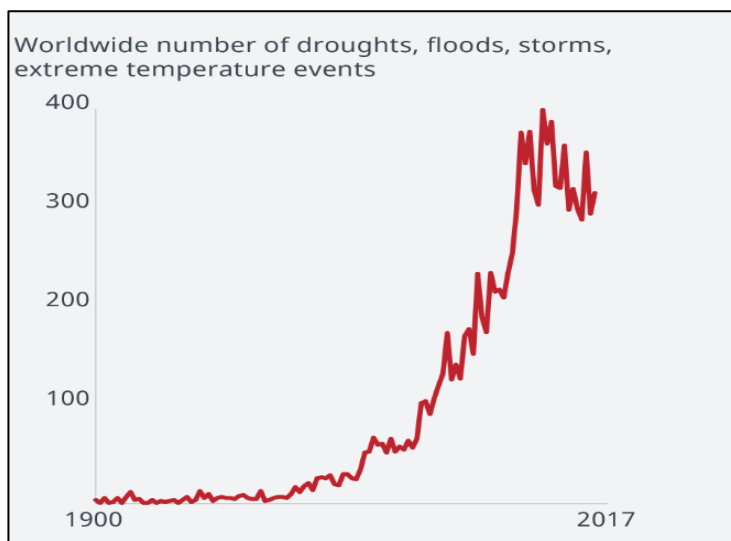


Figure 9: Frequency of weather-related disasters since the industrial revolution. (Source: EM-DAT UCL CRED www.emdat.be)

What Is Climate-Smart Agriculture?

Climate-smart agriculture (CSA) is to sustainably increase agricultural productivity and revenue. CSA techniques strengthen the resilience of farmers to climate change and variability and at the same time mitigate GHG emissions. The endgame of CSA is to achieve national food security and sustainable development goals.

Key pillars of CSA

Productivity: CSA attempts to boost agricultural production sustainably to enable fair income growth and food security from crop production, animal products, and aquaculture whilst minimizing environmental effects.

Adaptation: CSA strives to lower farmers' vulnerability to adverse short-term potential risks while simultaneously enhancing their tolerance. This is done by improving their ability to adapt and persist when they experience shocks and longer-term challenges. Conservation of the ecosystem services that landscapes provide to farmers and others is given special consideration. These are critical for increasing production and adapting to climate change.

Mitigation: CSA must work towards decreasing and eliminating GHG emissions to attain net zero by 2050. This means that sectors such as energy and agriculture have to cut emissions for every calorie or kilogram of food, fibre, and fuel produced. Furthermore, agricultural deforestation must be avoided and promote agroforestry. Also, soils and trees ought to be managed to optimize their ability to function as carbon sinks and capture atmospheric CO₂.

Characteristics of CSA

- i. Addresses climate change
- ii. Integrates several synergies and has solutions for tradeoffs created (Fig. 12).
- iii. Protects, conserves, and promotes ecosystem services.
- iv. CSA offers a broad range of access opportunities at various levels.
- v. CSA varies depending on the site, i.e. what works in one location/country may not work in another.
- vi. Women and marginalized communities are actively involved in CSA.

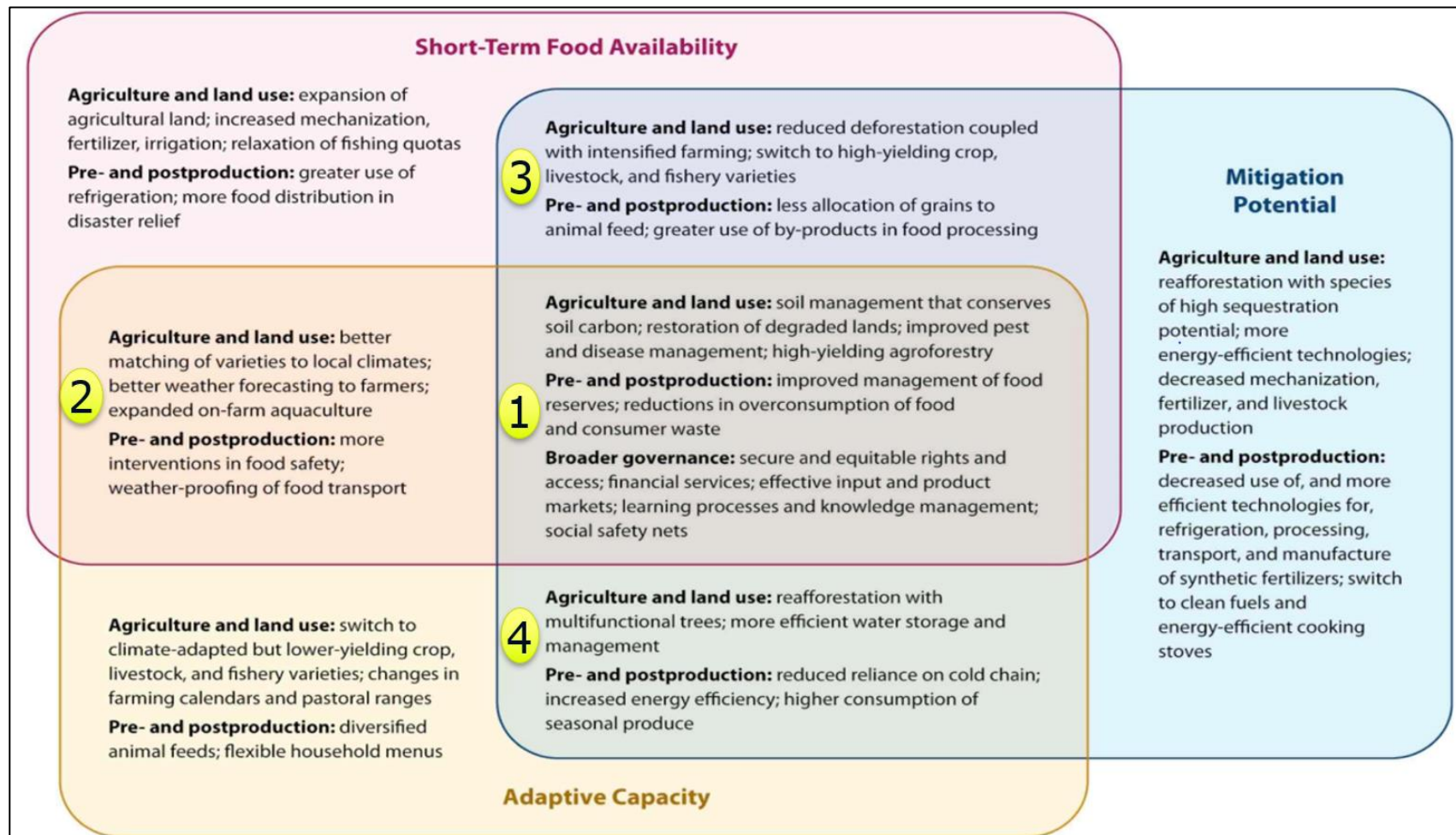


Figure 10: trade-offs of CSA pillars when applied independently. CSA synergies, 2-level (2,3, and 4) and 3-level (1), when linked together (Source: Vermeulen et al. 2012)

Session 3.2: Solar energy irrigation & water harvesting technologies

Water management under climate change

Water is an essential resource but has become scarce, especially in developing countries. This is attributable to climate change that has caused springs to dry up, some rivers to end up being seasonal, a rise in water sea level as well as the saltwater invasion. Erratic rainfall patterns have caused environmental damage such as landslides, and erosion of topsoil thus accelerating the degradation of landscapes. This in turn leads to economic losses and food insecurity.

Water shortage is becoming a big concern due to growing water usage and decreased water supply. In times of severe drought, agriculture is frequently the initial and severely impacted industry. The agriculture sector utilizes more than 75% of all freshwater resources on the planet. To guarantee the efficient use of the available water resources effectively, CSA necessitates a significant adjustment of how water is managed through:

- i. Modern and efficient water management systems ought to be implemented through novel strategies that boost water supply and target decreased water usage in rainfed agricultural or irrigation systems. efficient and effective water harvesting strategy for supplementary irrigation is as follows:
 - Water conservation through irrigation
 - Improved irrigation water schedule and application
 - Appropriate water-saving irrigation (alternative dry and wet irrigation, drip irrigation, sub-surface irrigation, etc.), reduction of GHG emissions, and reduction of water run-off and soil erosion.
- ii. Crop water use efficiency innovations
- iii. Rainwater capture and retention strategies result in good soil management.
- iv. Irrigation system rehabilitation to decrease soil-water loss and boost resilience against prolonged dry seasons as a result of climate change.
- v. Sustainable land management education.
- vi. Precision irrigation involves directing water directly to the crop's roots at the appropriate time and dosage based on the crop's needs.

Solar energy irrigation

Examples of solar-based irrigation pumps for various land sizes, pump lifts, benefits of the pump, and the type of method of irrigation are presented in Table 1.

Table 1: Types of solar pumps and description.

Type of irrigation pump	Pros	Pump lift (drawing and pump head)	Land size	Crops	Irrigation method
SF2 water pump	-Affordable -Portable	15m	1-2 acres	Vegetables (indigenous vegetables, kale, spinach), tomatoes, potatoes, mangoes, banana	Flood irrigation, drip irrigation, sprinklers, hose pipe
Solar fixed sprinkler irrigation system		Draws water from a depth of 70m and a maximum pump head of 120m	Up to 30ha		Overhead sprinklers
Rainmaker pumping system	-Affordable -Portable	Maximum pump head of 100m	Approximately 1 acre		Overhead sprinkler

CSA Pillars' Contribution to Water Management

- **Productivity:** Reduce water stress in crops by improving rainwater collection and preservation as well as timing and discharge of irrigation water.
- **Adaptation:** Short-term water management solutions can lessen crop water stress and loss of yield (e.g. supplemental irrigation and rainfall capture). Efficient water-saving innovations in rain-fed agricultural or irrigation systems that will address water demand and availability.
- **Mitigation:** In flooded rice fields, alternate soaking and drying cycles (this will promote the conservation of water and methane emissions reduction). Irrigation solutions that limit the quantity of water used can lower energy usage for pumping thus lowering emissions associated with the usage of diesel-fuelled pumps.

Rainwater collected from roof catchment

https://www.youtube.com/watch?v=3s_1jE9qxcw

Session 3.3: Energy, labour and time saving agricultural technologies

Climate Smart Energy Management in Agriculture

Most countries rely on non-renewable energy like fossil fuels that includes coal, natural gas and petroleum products as the main source of energy. The energy demand is at 80% and is the main source of GHG emissions globally. Energy is an essential commodity to a country's economic development. It is a need that influences the production of products, distribution and service provision. It influences all elements of sustainable development, such as the environment, socioeconomic development, and people. Because of the finite, depleting supply and environmental effects, fossil fuel as a source of energy is unsustainable. In the projected scenario of the energy system, expanding the availability of sustainable sources of renewable energy will substitute non-renewable energy sources. This will therefore greatly reduce the dominance of unsustainable carbon-intensive fuels.

At the farm level, plants convert energy from the sun through the photosynthesis process to food energy consumed by people and livestock feed. In the agricultural sector, energy is important in every phase of the value chain of the agri-food system namely:

- pre-production stage of inputs
- production of crop products
- post-production and post-harvest operations
- food storage and processing
- food transport and distribution
- food preparation

The agri-food systems rely on direct and indirect energy:

- direct energy – includes electricity, mechanical power, solid, liquid and gaseous fuels
- indirect energy – the energy used to manufacture inputs such as machinery, farm equipment, fertilizers and pesticides

The purposes of energy management in agriculture are:

- Require addressing efficiency in the industry through lowering losses and improving energy diversity.
- Creating a renewable energy supply from the agri-food industry.
- Increasing access to advanced renewable energy services and inexpensive energy sources.

High production of food to fulfil the requirements of a rising population is projected to rise energy consumption in the industry. This poses a substantial problem for CSA energy management. Energy consumption must be controlled and regulated at all phases of the agri-food value chain, including agricultural inputs, crop production, pre and post-harvest activities, product storage and processing, transportation and distribution, and meal prep.

Low-carbon farming systems

A low-carbon farming system is an agri-food strategy that allows for the efficient manufacture of primary commodities like food, feed, and fibres whilst also minimizing energy inputs and GHG emissions across the entire value chain and adhering to SDG principles. Some of the focus areas are:

- Promotion of biogas for animal waste management
- Utilization of 'energy-material' efficiency
- Waste management entails reducing, reusing, and recycling.
- Changes in lifestyle/culture/behaviour to impact energy use, such as the adoption of fuel-efficient upgraded cook stoves to preserve the wood and reduce carbon emissions.

CSA Pillars' Contribution to Energy Management

- **Productivity:** Agricultural productivity may be boosted by enhancing energy efficiency and lowering energy wastage;

- **Adaptation:** Decreasing dependence on non-renewable energy and related expenses, as well as adopting innovative sustainable methods of bioenergy use (e.g., solid fuels such as wood and briquettes, or liquid biofuels), could potentially lead to the availability of time and increase revenue.
- **Mitigation:** Bioenergy, wind, tidal, solar energy, and other renewables like hydropower and geothermal energy may be used to replace petroleum-based fuels and other high-emission biomass energy sources like wood and charcoal, thus lowering CO₂ emissions. Energy management may aid in mitigating climate change by conducting audits of energy systems, finding clean and sustainable energy supplies, promoting efficient and adaptable technology, and analyzing existing frameworks for areas for improvement.

Biogas

Biogas from normal wastes: <https://www.youtube.com/watch?v=QtZl2le8SiY>

Biogas from animal waste: https://www.youtube.com/watch?v=o_jSVVaG8Hc

Improved Cookstoves

https://www.youtube.com/watch?v=Belzz_xNmXs

Labour and time-saving agricultural mechanization

- Smaller mechanized service providers should receive extra assistance.
- More maintenance assistance should be available, including planned maintenance services, portable workshops, and replacement components.
- Greater emphasis on building maintenance skills and knowledge.
- By integrating complementary equipment, we can promote many applications for small tractors, both on-farm and off-farm (shellers, multi-crop threshers, planters, harvesters, seed drills, boom sprayers, etc.).
- Broadening tractor brand alternatives for prospective service providers.

Session 3.4: Production of Organic Fertilizer

What is organic fertilizer? Organic fertilizer is the application of plant-based or animal-based materials to the soil to boost soil fertility and improve the soil structure as well as crop yield. Examples of organic fertilizers include green manures, dry or wet compost, crop residue, agricultural by-products, farm yard manure, animal droppings, etc. OF are important because they improve the soil structure physically, chemically and biologically. Biologically, the OF are a source of food for soil microbes which break down the material through the decomposition process and at the same time release nutrients that become available to the plants. Over time, the OF has become essential to provide crops with the nutrients they require thus enhancing crop quality and productivity, therefore, promoting sustainable agriculture. There are several benefits and setbacks to using organic fertilizer.

The advantages of Using Organic Fertilizer

1. Improved **Soil structure** and as a result, the soil's water-holding capacity and nutrients increase.
2. **Microbes thrive:** Organic fertilizer comprises organic carbon, nitrogen, phosphorous, and potassium as components of its chemical composition that sustains soil organisms. The OF allows the microbes to make nutrients accessible to plants in simpler compounds through complex processes.
3. **Sustainable and environmentally friendly:** Organic fertilizers are related to binding soil structure and therefore are not easily prone to runoff. The major soil biological difference with synthetic fertilizer is that it increases species biodiversity (soil macro and microbiota) by 30%.
4. It **minimizes the number of synthetic fertilizers and pesticides applied** thus it is cost neutral and, in certain cases, cost-saving.
5. **Avoid crop damage and soil acidification:** Some synthetic fertilizers can cause plant leaves and roots to be scotched or burned.

Disadvantages of Using Organic Fertilizer?

1. **Not all products are created equally:** Many OF give variable effects since not all organic components are mixed in the right quantities. Examine any research papers, scientific reports or case studies to ensure you are picking a product that has been industry-validated.
2. **Nutrient levels are low:** Organic fertilizer frequently has a poor nutritional content depending on the source of organic material. Furthermore, the nutrients are frequently complex in organic chemical composition. Thus, utilizing OF may not generate the same burst of colour crops as using chemical fertilizer. Using OF is a systematic process that is repetitive each planting season, not a one-off application.
3. **Composting is laborious:** It is a time-consuming and intricate procedure that frequently results in an uneven output and result.

Composting is country-specific – due to the availability of agricultural wastes

Compost Making Tutorial – Morogoro, Tanzania

<https://www.youtube.com/watch?v=uOtxfWoM8p8>

Kenya: Low-cost organic fertilizer from farm waste

<https://www.youtube.com/watch?v=KvbEgSjCO5c>

Session 3.5: Training of women in urban agriculture

Urban Agriculture

Rapid expansion, particularly in metropolitan areas, necessitates the need for sustainable consumption of food, which urban farming should be capable of supplying. Establishing an urban farming approach that includes the role of urban women to satisfy household nutritional requirements. Women have an important role in food security and nutrition since they are accountable for what their families eat. Women in urban settings can practice urban agriculture. This is because it is practised in locations near urban populations, such as backyards and estate roofs. Urban farming is usually combined with other household tasks such as housekeeping. Additionally, women in the urban setting grow food to feed their families whereas the male grows food for commercial purposes.

For urban agriculture to be successful and advance farming in urban areas, the innovations must consider space, resource recycling, as well as reforestation and conservation. Types of urban farming methods include:

1. Backyard Gardens: It is usually on personal property. The harvest is often divided among friends, relatives, and neighbours when there is a bumper harvest during that growing period. In most cases, backyard gardens benefit societies since neighbours may use each other's backyards and use diverse farming practices, resulting in higher outputs.

2. Tactical Gardens: Taking advantage of the little available space to grow crops without incurring significant costs. For example, an individual living in the city may easily create a garden to replace a parking lot. Doing so utilizes land that would otherwise stay idle but alternatively, it creates an activity that may be done for pleasure or to produce additional food.

3. Street landscaping: This is the beautification of sidewalks for various purposes, like green spaces that are maintained by the residents of the area. not only do they beautify the streets, but the green spaces also filter the air, resulting in a clean atmosphere. The green spaces have the additional benefit of minimizing urban rainwater runoff because they are typically positioned along the roads.

4. Forest gardening: It includes the traditional habit of cultivating gardens in urban forests. Forest gardening is accomplished by growing a variety of crops, fruits, and vegetables in urban areas.

5. Greenhouses: Greenhouses are found in personal properties, institutional, and social urban environments. primarily relying on the crops grown, they require a large amount of area to put up. Greenhouses allow farmers to produce crops all year because they provide a controlled environment in which the crops may be subjected to precise conditions essential for growth.

6. Vertical farms: This may entail farming vertically to decrease agricultural land intensification. Green walls, which occupy less area and are practised on the sides of vertical walls, can be utilized as a way for vertical farms.

Example from Kenya:

<https://www.dw.com/en/creating-spaces-for-vertical-farming/video-58035228>

7. Animal husbandry: An appropriate location for breeding varieties of animal species or focusing on specialized species such as poultry, rabbits, or shoats. Certain cities restrict both the quantity and type of animals that can be bred.

Conclusion

Based on the training, implementing the recommended scheme for capacity building strategy would make it possible for governments to develop endogenous climate policies in the agricultural sectors sustainably. Hence, strategic planning, execution, tracking, and providing information on CSA interventions will be most impactful, sustainable, and a turning point if it is steered using aspects such as social inclusivity, and frequent capacity building for trainers and/or facilitators as well as individuals under formal and informal enabling environments. The workshop training and capacity-building approaches and practices were utilized as catalytic variables for implementing CSA. Organic fertilizer, solar-powered irrigation systems, post-harvest handling, urban agriculture, access to capital, capacity building, and gender training are examples of CSA's disruptive pathways to empower vulnerable communities and lead to gender transformation.

Annex 1: Workshop Program

TIME	TOPICS/ACTIVITIES	RESPONSIBLE
DAY ZERO – MONDAY, 17 October 2022 (Planning & Preparatory Meeting – Facilitators & Focal Points Only)		
09:00-09:30	<ul style="list-style-type: none"> Registration 	AUDA-NEPAD
09:30-10:00	<ul style="list-style-type: none"> Introduction & Objectives of the Planning and Preparatory Meeting 	AUDA-NEPAD
10:00-11:30	HEALTH BREAK	
11:30-12:00	<ul style="list-style-type: none"> AUDA-NEPAD Presentation on the ToTs 	AUDA-NEPAD
12:00-13:00	<ul style="list-style-type: none"> Discussions 	Facilitators
13:00-14:00	LUNCH BREAK	
14:00-15:30	<ul style="list-style-type: none"> Facilitators' Presentations of Methodologies 	All
15:30-16:00	<ul style="list-style-type: none"> Q & A 	All
DAY ONE – TUESDAY, 18 October 2022 (Trainings – All participants)		
08:00-08:15 am	<ul style="list-style-type: none"> Arrival and Registration 	AUDA-NEPAD
08:15-08:45 am	<ul style="list-style-type: none"> Welcoming Remarks 	MIGEPROF
08:45-09:00 am	<ul style="list-style-type: none"> Introduction of Participants – <i>Cameroon, Ethiopia, Malawi, Niger, Rwanda.</i> 	AUDA-NEPAD
09:00-09:30 am	<ul style="list-style-type: none"> Opening Remarks, Objectives of the Training Workshop and Overview of the Agenda 	AUDA-NEPAD
09:30-10:30am	Training Session 1.1 Understanding Gender and the Gender Concepts	Stellah Nyaga
10:30-11.00	HEALTH BREAK	All
11:00-13:00	Training Session 1.2: Incorporating Gender in Design, Monitoring and Evaluation in projects and programs	Stellah Nyaga
13:00-14:00	LUNCH	All
14:00-15:00	Training Session 1.3: The Gender Trajectory (Gender Responsive Actions)	Stellah Nyaga
16:00-16:30	Health Break – and transition towards the SECOND FACILITATOR	
16:30-18:30	<p>Training Session 2.1 Business Management and Access to Finance.</p> <p>Training session 2.1.1: Overview and objectives of cooperate governance and business/financial management of cooperatives</p> <p>Training session 2.1.2: Values, principles and structure of farmer's cooperatives</p> <p>Training session 2.1.3: Cooperatives financial management and accounting</p> <p>Training session 2.1.4: Countries' experiences on how to access finance</p>	Michael Rudahusha
18:30	End of day 1	AUDA-NEPAD
DAY TWO – WEDNESDAY, 19th October 2022 (Trainings – All participants)		

07:00-07:30	Day - 2 Agenda Overview and recap of day 1	AUDA-NEPAD
07:30-10:30	<p>Training Session 2.2 Post-harvest handling and processing techniques.</p> <p>Training session 2.2.1: Introduction to post-harvest handling and technics</p> <p>Training session 2.2.2: Major factors affecting the quality of staple crops particularly maize</p> <p>Training session 2.2.3: Effective post-harvest management (6 principles of good post-harvest management for staple crops eg maize and beans)</p>	Michael Rudahusha
10:30 -11:00	HEALTH BREAK	
11:00-13:00	<p>Training session 3.1 Climate-smart technologies and practices</p> <p>Training session 3.2: Farmer-based appropriate (business) technologies</p>	Dr. John Recha
13.00-14:00	LUNCH	
14:00-16:00	<p>Training session 3.3: Solar energy irrigation & water harvesting technologies</p> <p>Training session 3.4: Energy, labour and time saving agricultural technologies</p> <p>Training session 3.5: Production of organic fertilizer</p> <p>Training session 3.6: Construction and use of improved stoves</p>	Dr. John Recha
16:00-16:30	HEALTH BREAK	
16:30-17:30	Training session 3.7: Training of women in urban agriculture	Dr. John Recha
17:30-18:30	Summary, next steps, and meeting closure	AUDA-NEPAD
18:30	End of the training workshop	

Annex 2: Workshop Participants

No	Name	Organization Affiliated/ Position
<u>Cameroon</u>		
1	Eunice Ekwe Emade	Director Creative Minds Relief Foundation
2	Alain Matip	Director/ GCCASP Coordinator, Ministry of Women's Empowerment and the Family
3	Anne Marie Lazare Mbala NTSAMA	Chief of Service Ministry of Women's Empowerment and the Family
4	Louiza BATE-AYUK TITA	Chief of Service Ministry of Agriculture and Rural Development
5	Ngouyap Yaya	Assistant Research Officer Ministry of Agriculture and Rural Development
6	Stella GUELLEU DOPGIMA epse ETEKI	Project Coordinator Forum for Christian Women Empowerment and Development (FOCWED)
<u>Malawi</u>		
7	Fred Ica Simwaka	Ministry of Gender Community Development and Social Welfare/ Chief Gender and Development Officer
8	Chimwemwe Grace Kussein	Agriculture Gender Roles Extension Support Services Officer
9	Edith Mwaiwao Mithenga	Agriculture Gender Roles Extension Support Services Officer
10	Golivati Maloni Gomani	Environmental Affairs Department/ Environmental Inspector
11	Thandizo Verna Mphwiyo	Centre for Human Rights and Rehabilitation/ Programs Officer
<u>Ethiopia</u>		
12	Beshir Salih Beshir	GCCASP country coordinator Ministry of Women & Social Affairs
13	Samson Nishan Negewo	Project management, partnership building and resource mobilization team leader, Ministry of Women and Social Affairs)
14	Tsige Tadele Biyazen	Mainstreaming, Implementation, monitoring and

		accountability lead, Ministry of Women and Social Affairs)
15	Yehenew Abebe Tegegne	Cross Cutting issues mainstreaming senior expert, Environment protection Authority)
16	Mohammed Abdi Ahmed	Director, Pastoralist Concern
<u>Niger</u>		
17	Balki Maman Sanda	Directrice de l'Autonomisation Économique de la Femme
18	Pauline Douramane	Directrice Générale Compost Niger
19	Ramatou Djibo Hama	Inspectrice des Services Ministère de l'Agriculture
20	Mahaman Mariama	Directrice dela Législation Ministère de l'Environnement et de la Lutte contre la Désertification
21	Aicha Issa Hamidou	Directrice de la Législation Ministère du Plan
<u>Rwanda</u>		
22	Mrs. Alice Uwimana (auwimana@migeprof.gov.rw)	GCCASP country coordinator The Ministry of Gender and Family Promotion (MIGEPROF)
23	Ngayaboshya Silas (sngayaboshya@migeprof.gov.rw)	The Ministry of Gender and Family Promotion (MIGEPROF)
24	Mr. Tugizimana Jonas (jtugizimana@minagri.gov.rw)	Ministry of Agriculture and Animal Resources
25	Gasangwa sylie (sgasangwa@environment.gov.rw)	Ministry of Environment
26	Leoncia Mukamwiza (leoncia.mukamwiza@mininfra.gov.rw/)	Ministry of Infrastructure



About AICCRA

Accelerating Impacts of CGIAR Climate Research for Africa (AICCRA) is a project that helps deliver a climate-smart African future driven by science and innovation in agriculture.

It is led by the Alliance of Bioversity International and CIAT and supported by a grant from the International Development Association (IDA) of the World Bank.

Discover more at aiccra.cgiar.org

AICCRA Eastern and Southern Africa is led and hosted by OneCGIAR centers:

Alliance



AICCRA is supported by the International Development Association of the World Bank:

