Conflict, Climate Change and Small-Scale Farming

A Training Manual

The West African Network for Peacebuilding (WANEP) – Nigeria

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Ifeanyi Okechukwu
National Network Coordinator

Introduction

Climate change has been described as the most significant challenge of the 21st century. Its impact ranges from extreme weather conditions, irregular rainfall patterns, rise in temperatures, sea level rise and ocean surges etc. which negatively affect lives and livelihood directly or indirectly. Climate change has the potential to affect agriculture through changes in temperature, rainfall (timing and quantity), increase in CO_2, solar radiation and the interaction of these elements.

A primary driver of climate change is the increase in greenhouse gases like gases nitric oxide, nitrous oxide, carbon dioxide etc in the atmosphere, especially carbon dioxide (CO_2) that has the greatest impact on climate change. Experts have linked the production of CO_2 to human activities such as overgrazing; prolong land use, use of fossil- based fertilizers and pesticides industrial growth, use of energy, burning fossil fuels, deforestation and other human activities.

Many of the first impacts of climate change to be felt around the world have been and will be in the agriculture sector; with cases of reduced yields, destruction of cultivated farmland. Climate change is already threatening food supplies around the world. Those impacts will only be exacerbated as temperatures increases and rainfall patterns changes. Extreme weather events like flood and drought also significantly contribute to the threat to food production and the food value chain.

In Nigeria a research on expected climate change in Nigeria (Abiodun *et al* 2011) covering historical record (between 1971 and 2000) shows a trend of rising temperatures in Nigeria which is projected to increase over time. The research predicted longer rainy seasons in the south of Nigeria and shorter rainy seasons (i.e. early cessation) for northern Nigeria. The research also predicted heat waves are likely to occur more often over the entire country in the future; more extreme weather events, such as rain and wind storms with increase in frequency; and sea level rise will occur along the coast.

While climate change is and will drive aridity and desertification in northern Nigeria, it is increasing flooding and erosion (gully, sheet and coastal/beach) in the middle belt and southern regions especially in the coastal and rainforest ecological zone (Uyique and Agho, 2007). Flooding and erosion has increasingly been reported as a major climate change hazard in almost all communities in these zones. Other climate

change hazards include landslides, severe windstorms, excessive heat, drought and late and variable onset of the rainy season trend of rising temperatures, reported to be increasing in Nigeria since 1901 (Odjugo, 2010).

Sea-level rise, resulting from climate change, is affecting crop production in coastal areas. The Nigerian Environmental Study/Action Team (NEST, 2004), reported that sea level rise and repeated ocean surges is leading to increased coastal erosion and associated intrusion of sea-water into surface water and groundwater resources. Exacerbating the problem is the fact that many coastal ecosystems are degraded due to a loss of mangrove forests which, when present, provide a protective function reducing the impact of salt water on inland areas of crop production.

The above climate change hazards are predicted to have devastating impacts on agriculture in Nigeria, causing lower crop productivity and difficulties with livestock husbandry in the north. Whereas, the state of the agricultural sector in Nigeria now and in the future is critical to Nigeria's economic and social well-being as agriculture is the most important sector of the Nigerian economy in terms of its contribution to Gross Domestic Product (GDP) and employment, contributing approximately 42 percent of GDP in 2009 (National Bureau of Statistics, 2009). Despite a growing urban population, the majority (>56%) of Nigerians still reside in rural areas (Earth Trends, 2003) where the main economic activity is agriculture. According to FAO (2010) 60 percent to 70 percent of the population is engaged in agriculture. This puts the agricultural sector ahead of other sectors in terms of the potential consequences of climate change impacts for the majority of Nigerians.

The Nigerian agricultural sector is characterised by dominance of small producers on small land holdings, low technology use, and reliance on human labor. While some larger farms have been established by organisations and individuals, small scale farmers account for approximately 95 percent of total agricultural output (Federal Ministry of Agriculture, 2005). Women's labor is very important with women being major producers of staple food crops, estimated at between 60 to 80 percent of the food in Nigeria. In addition, women are engaged in most of the post-harvest activities especially food processing (Akinyele *et al* 1991).

Agriculture sector remains the most vulnerable to global climate change impact. The impact is even stronger in Nigeria, where agriculture is essential for daily subsistence, and where adaptive capacity is low. IPCC (2007) indicated that smallholder and subsistent farmers, pastoralists and artisan fisher folk will suffer complex, localised impacts of climate change as they face an increasingly complex

set of challenges that make them more vulnerable to changes that are beyond their control. The change which undermines food security in Nigeria on several levels; in extreme cases, individual farm production is no longer sufficient for household consumption and intense rain and flooding disrupts accessibility to markets. Climate change results in malnutrition, especially of women and children, it leads to out-migration from rural farms by men and youth (i.e. farm labour), and loss of food crops due to impacts resulting from climate change.

Nigeria's agro-economic regions made up of communities in which farming is not only the major means of livelihood, but also essentially small scale with productivity remaining low. Nigeria itself is classified in the category of socially vulnerable zones, comprising mainly populations with low incomes constantly experiencing food shortages. Small scale farmers and farming communities throughout Nigeria have, in most instances, survived by mastering the ability to adapt to widely varying weather and climatic conditions. However, the dramatic growth in human population is imposing enormous pressure on existing farming production systems even as the reality of climate change is impacting negatively.

Despite these changes, small-holder farmers are developing strategies to cope with and adapt to the impacts of climate change. It is important to recognise that in the past many communities have faced harsh changes in environmental conditions and over time have been trying, testing and adopting different types of coping and adaptation strategies for crop and animal production. Small scale farmers are expected to manage the more insidious effects of long-term climate change that are now occurring at an unprecedented rate, against the backdrop of very unfavorable economic scenarios and other external stresses such as poverty, lack of access to basic services, poor health conditions and lack of voice. Small scale farmers continue to struggle to maintain their income by continuously trying to increase yields in their production systems. The current pressures will demand the development and implementation of appropriate methods to address issues of vulnerability to global warming and the consequent climate change needed to assist small scale farmers to further develop their adaptive capacity and lead to better economic, social, and environmental outcomes (Falaki, 2011).

Rural households engaged as subsistence and smallholder farmers are most vulnerable to the impacts of climate change on agriculture. They are often affected by increased likelihood of crop failure; land degradation due to over cultivation; outright loss of livelihoods due to extreme weather events; increase in diseases and mortality of livestock, and/or forced sales of livestock at disadvantageous prices; increased

livelihood insecurity, resulting in assets sale, indebtedness, out-migration and dependency on food aid; and downward spiral in human development indicators, such as health and education.

These impacts further aggravate the stresses already associated with subsistence production, such as isolated location, small farm size, informal land tenure, low levels of technology and narrow employment options, in addition to unpredictable and uneven exposure to world markets that smallholder farmers particularly risk-prone in the face of climate change. Indirect effects of climate change on agriculture include the effects on pests and diseases and the impacts of these on agricultural production, the impacts on health, and the impacts on agro-related socio-economic activities.

The poor performance of the agricultural sector is mainly because most farming is directly dependent on climate. For example, less than two percent of farming in Nigeria uses irrigation, hence most agricultural production is rain-fed (Falaki, 2011). As a result, changes in climate factors have significant consequences for the agricultural sector. The low adaptive capacity of crop farmers in Nigeria can be attributed to a variety of factors, including poverty, lack of access to resources, and poor infrastructure, etc.

Given the current concerns with climate change and it's impacts on small scale agricultural productivity, especially in the most vulnerable agro-ecological zones of the country and vulnerable groups, particularly women, there is an urgent need to sensitise small scale farmers about the projected climate change in their regions and the current coping strategies, and building on these coping mechanisms to develop adaptation strategies for projected changes in climate.

In line with this, The West Africa Network for Peacebuilding in partnership with OXFAM Great Britain and its partners United Nations Development Fund (UNDP) and the Climate Change Department of Federal Ministry of Environment on the platform of the CLIMATE CHANGE ADAPTATION IN SMALL SCALE FARMING project is working with small scale farmers (crop farmers, pastoralist, fisher folks, Agric Extension officers and critical community based NGOs and CBOs) in selected communities/states in Nigeria to build their capacity on climate change adaptability in agriculture thereby enhancing the resilience of an average smallholder farmer to the impact of climate change. The objectives of the project are to: increase small scale farmers knowledge and awareness of climate change impact on agriculture especially small scale farming; create a 'farmer to farmer' directed learning on climate

change adaptability in Agriculture; deepen beneficiaries' understanding of the nexus between climate change, conflict, small scale farming and food security. The project will also enable the partners to assess the knowledge gaps existing among farmers on issues of climate change and form a critical mass of farmers that can provide information and awareness on issue of climate change in Agriculture.

The project has specific focus on women and youth small scale farmers because of their peculiar vulnerability, especially the vulnerability of female farmers who live in patriarchal rural communities and often inhibited by poor access to credit, land tenure system, illiteracy and poverty. Despite these the major task of ensuring family welfare rests on the shoulders of the already vulnerable women. Therefore direct effort to build their resilience to the reality of climate change on their agricultural practices will go a long way to ensure they develop the capacity to mitigate the primary and secondary impact of climate change on them, their practices and households.

In line with the major aspect of the project, the capacity building aspect which includes Training of Trainers Workshop at the National level and the community/ state level training workshop, the West Africa Network for Peacebuilding WANEP-Nigeria, the main implementer of the project and its partners the Pan African Climate Justice Alliance (PACJA), The Centre for 21st Century Issues, developed this TRAINING MANUAL ON CLIMATE CHANGE ADAPTATION IN SMALL SCALE FARMING.

The Manual is a Trainers' manual developed for the use of trainers that conduct training for small scale farmers on climate change adaptation in agriculture at the community level. The manual is developed in the context of Resilience building, Prevention/mitigation of agro producers' conflict, Food security and Participatory Learning Action with a lot of training aid and participation by the trainees.

The Manual is divided into five Modules (each Module is sub-divided into four Sessions) the Introduction and Evaluation sessions. Module one titled Understanding climate change is focused on building the capacity of the beneficiaries on the Meaning of climate change, Causes of climate change, Impact, Effect and Consequences of Climate change and Responses to Climate Change (Adaptation and Mitigation). Module Two titled Climate change and Agriculture is focused on building the capacity of the beneficiaries on the Meaning of Agriculture, Relationship between Climate Change and Agriculture, Impact of climate change on different stages of Agricultural processes and the Importance of small scale agriculture to

food security at the various tiers. Module titled Three Climate Change and conflict is focused on Understanding Conflict, The nexus between Climate Change and conflict, Community analysis and Intervention. Module Four titled Climate Change Adaptation in Agriculture is focused on the meaning and components of Climate Change Adaptation, Barriers to adaptation, Vulnerability Analysis and Adaptive measures/options. Module Five titled Actors and Institutions is focused on Using stakeholder mapping to Indentifying the actors and institutions, Addressing identified gaps, Networking and Skills for community mobilisation and Advocacy.

Using the Manual

Trainers

This manual is developed for trainers to train others at other levels, especially farmers, pastoralists, fisher folks at the local level. The trainer must understand that they are imparting knowledge. Trainees/trainers should be able to draw from all the subtle and obvious skills and resources among the participants. The challenge for the trainer is to discover strategies for eliciting knowledge from the participants and should be flexible enough to adapt to these varied needs and technical level of the participant. The trainer should be gender sensitive to provide space for the participants especially the female participants that are often shy and tend to be voiceless in a training workshop that involves men and women. The success of transferring the knowledge and skills in this manual is really left to the discretion to ascertain what would be applicable to particular group or in a given context. Trainers should meet for a wrap meeting at the end of each day to assess the methodology of the day's training and overall responses of the participants during the sessions.

Module

Each Module is divided into four sessions with broad key learning objectives. Before each section, it is recommended that the trainer read the corresponding Trainer's notes to understand how the session proceeds. This is a GUIDE; Sessions should be fluid and specific to the group, e.g. the lecture sessions for groups in rural communities may need to be translated or simplified, for the trainer might need to use more role plays to achieve the objectives of the session in such situations. The facilitator should use games and energisers to keep the sessions interesting and engaging.

Assumption of the Manual

Trainers using this manual are expected to be experienced or potential trainers with basic knowledge on climate change, small-scale farming, disaster, conflict management and food security. The user is expected to have at least a higher education degree for appreciation and usage of this manual. The necessity to mainstream gender throughout the training sessions is important.

Duration

Factors like funding and availability of participants could determine how long the trainer wants to run the workshop. The manual is content intensive; trainers should not overload sessions, as group retention may dwindle. The ideal duration for workshops using the entire manual is 5 DAYS (Interpretation into other language may require the workshop to be extended by 1 day). This would allow the trainer enough time to structure individual training sessions, taking into account the background of the target group. Trainers are required to be clear on the objectives of the training and determine if those objectives can be achieved in a shorter period. The manual could also be adapted to lesser days using just specific aspects/modules of the manual depending on the context.

Using Groundrules

Groundrules are a means of making sure that training workshop runs smoothly. It facilitates the success of the workshop. Setting the groundrules at the beginning of the workshop, helps to set the tone for what is allowed and disallowed for the duration of the workshop. Examples of groundrules are; "everyone should be punctual", "there should be no side talks", etc. The groundrules should be pasted where everyone can view it easily.

Training Evaluation

Trainers are encouraged to start each training Module with a Pre-training Evaluation and end it with a post-training evaluation. This is to help determine if participant's expectations are met, which will also serve as personal assessment for the trainer to understand his/her strength and weakness. Some simple suggestions for training evaluation include: Use of pre developed questionnaire to assess if learning objective was achieved (PRE AND Post evaluation) or some less structured evaluation methods like: 'Parking Lot', 'Keep/Revise'. 'What Worked', 'What Did Not Work',

‘Suggestion for tomorrow’ can be used to test the understanding of the participant halfway through the training. The last part of this Manual is devoted to the issue of Evaluation, trainers are to study this.

Definition of Terms

Climate: Climate is the average weather condition of a particular place over a long period of time. This includes temperature, wind and rainfall patterns.

Weather: Weather is the frequent change of atmospheric condition of a place on a daily basis.

Climate change: Climate change distinguished from weather is any change in climate over time, whether due to natural variability or anthropogenic forces

Green house gases: The atmosphere is made up of gases which are referred to as green house gases and they include: water vapor, carbon dioxide, methane, nitrous oxide, and ozone. These gases act as a thermal blanket for the Earth, absorbing heat and warming the surface to a life supporting average of 59 degrees Fahrenheit (15 degrees Celsius).

Agriculture: Agriculture also called farming or husbandry is the cultivation of animals, plants, fungi, and other life forms for food, fiber, biofuel and other products used to sustain life. Agriculture generally speaking refers to human activities, although it is also observed in certain species of ant and termite.

Small scale farming: Small scale farming is the farming practices done on a small scale of about 2 hectares of land or less. Most small scale farmers are subsistence farmers, majority of the rural poor in Nigeria can be grouped in this category. They depend majorly on rain-fed agriculture and this group account for most of the food production in the country. As a result of their dependency on rain-fed agricultural practices, they are the worst hit and also bear the brunt of the adverse impacts of climate change.

Agro pastoralist conflict: Dispute or and violent expression of disagreement between pastoralists and farmers. This type of conflict can be said to be basic on access to basic human need, land, water point etc, and are often triggered by incompatibility in the actions and means of accessing this basic human need.

Adaptation: Adaptation involves making changes to existing systems, structures, and ways of life to reduce vulnerability and increase the resilience of a community to climate change.

Mitigation: mitigation aims to reduce greenhouse gas emissions or enhance the removal of these gases from the atmosphere.

Conflict: Conflict is a relationship between two or more people (individuals or groups) who have or think they have disagreeable goals. Conflict is a fact of life, inevitable and often creative. Conflict happens when people pursue goals which clash. Also conflict is a struggle over values and claims to scarce status, power and resources in which the aims of the opponents are to neutralise, injure or eliminate their rivals.

Hazard: Hazard is a physical or human made event that can potentially trigger a disaster. Examples include floods, drought, economic collapse and war. These physical events need not necessarily result in disaster.

Human security: It is the combination threats associated with war, genocide and displacement of populations. At minimum it means freedom from violence, fear of violence. In another parlance it can be described as freedom from want and the totality of factors that support the security of the human person in a specific context.

Vulnerability: This is a set of prevailing or consequential conditions, which adversely affect the community's ability to prevent, mitigate, prepare for or respond to hazard events. Vulnerability precedes the disaster event and contributes to their severity, impedes disaster response and may continue long after a disaster has struck.

Vulnerability is also the degree to which a system is susceptible to, or unable to cope with, adverse effects of climate change, including climate variability and extremes. Vulnerability is a function of the character, magnitude, and rate of climate variation to which a system is exposed, its sensitivity, and its adaptive capacity.

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

Food security: Food security requires that all people have both physical and economic access to basic food.

Definition of Methodologies

Brainstorm: a process of rubbing minds together, exchange of ideas to arrive at possible solutions to a particular problem. Brainstorming always seeks to find the best way to achieve results through participatory and interactive system.

Role plays: a participatory method that vividly captures transferred messages in a practical way. It involves participants taking up roles and acting them out to deepen understanding.

Case studies: this is referential, i.e. it refers to a past situation for comparison. It can be complementary to role play because it can be dramatised. It involves studying what has been done by a group of people or somebody and learning from it.

Trainers note: This involves imparting theories and skills to an audience. The trainer operates under the assumption that the audience has little or no knowledge of the topic. The lecture method serves as addition to existing knowledge.

Wrap up: This is the summary of the session and the conclusion.

Debrief: This calls for participants to give feedback on the day's session as well as on what they have learned.

Debate: It provides the space for participants to exchange opposing viewpoints in friendly and constructive manner.

Group discussion/Interactive Session: seeks to elicit varied knowledge of the topic under discussion from the participants.

Focus Group Discussions: a process whereby a set of questions are developed to guide discussions among a homogenous group of people. It is knowledge based on group discussion.

Presentation/plenary session: Presenting a group work or any other given task to the larger group for further discussion of what was presented. A presenter or more is selected from the small group to give the presentation to the larger group at a plenary session.

Simulation: A make-belief session to reflect a real life situation. Simulation will also enable the trainer to access the beneficiaries' possible response to a particular event.

Transect walk: A brief physical assessment of an environment, identifying the critical elements that supports or increase the risk of a hazard or disaster in an environment.

Experiential Learning: A more personalised form of learning. Knowledge is acquired through direct experience.

Lectures: This involves imparting theories and skills to an audience. The trainer operates under the assumption that the participants have little or no knowledge of the topic. It serves as addition to existing knowledge.

Multimedia presentation: An interactive visual presentation that provides illustrations and key points which further enhance the knowledge and skills of participants.

Graphic Illustrations: The use of images and pictures to deepen impression and ability of participants to associate the topic with context realities.

About the Partners

OXFAM Great Britain

In Nigeria Oxfam GB supports and empowers small-scale farmers to produce more efficiently in order to achieve food security. Oxfam works through partners to deliver our projects in the areas of sustainable development, campaigns and advocacy and rights to gender justice. Oxfam in Nigeria runs different programmes in areas such as sustainable development, Advocacy and campaign for policy reforms and rights of small scale farmers, enhancing the livelihood of small scale farmers, providing business linkages and opportunities with the private sector, Climate Change Adaptation and Disaster Risk Reduction.

The West Africa Network for Peacebuilding (WANEP-Nigeria)

WANEP-Nigeria is the Nigeria arm of the sub regional peacebuilding organisation with structural presence in all the countries of ECOWAS, including Cameroon and Chad. The West Africa Network for Peacebuilding (WANEP) is the largest peacebuilding network in Africa. WANEP is the West African civil society representative in the areas of Conflict Prevention and Good Governance in ECOWAS and has Observer and consultative status with the African Union and United nations respectively. The network was established out of necessity to provide an organised platform for collaborative peacebuilding in West Africa with the overarching goal of building sustainable peace and development in the region.

WANEP in Nigeria has worked with different development partners in carrying out projects on conflict transformation and prevention, early warning and response, women leadership in peacebuilding, peace education, disaster risk reduction, emergency preparedness, humanitarian intervention, as well as on specifically mitigating agropastoralist conflict. WANEP-Nigeria has being working with Oxfam GB since 2006 on various capacity building projects for humanitarian actors in Nigeria, small scale farmers, pastoralists, fisher folks on issue of conflict prevention/ mitigation in the context of disaster reduction as well as on mitigating the impact of climate change.

United Nations Development Project

UNDP has been in Nigeria since the country became independent in 1960. In the last programme cycle (2003-2008), UNDP provided capacity building and policy

development support to the Federal Government and 21 states drawn from the six geo-political zones in four programme areas: Governance and Human Rights; Poverty Reduction; HIV & AIDS; and Energy and Environment.

Federal Ministry of Environment, Department of Climate Change

The Federal Ministry of Environment was established in 1999 to ensure effective coordination of all environmental matters, which hitherto were fragmented and resident in different line Ministries. The creation was intended to ensure that environmental matters are adequately mainstreamed into all developmental activities. In 2006, the Climate Change Department of the Ministry was established. The department's major activity is the coordination of activities towards national implementation of the Climate Change Convention and the Kyoto Protocol. The Ministry carries out these activities through the Unit by working in collaboration with other relevant government organisations, non-governmental organisations, academia and private sector under a Committee known as Inter-ministerial Committee on Climate Change (ICCC). ICCC forms a policy advisory organ for government under the Chairmanship of the Federal Ministry of Environment. The Committee meets regularly on quarterly basis and on ad-hoc basis to review polices on climate change, advice government on appropriate actions, and put up Nigeria's position at meetings where climate change issues are being discussed or negotiated (www. http://climatechange.gov.ng/index.php/the-special-climate-change-unit/about-us).

MODULE ONE

Understanding Climate Change and Climate Variability

Contents

- Session 1: Meaning of climate change
- Session 2: Causes of climate change
- Session 3: Consequences and impact of Climate change
- Session 4: Responses to Climate Change (Adaptation and Mitigation)

Key Learning Objectives

At the end of this session participants should be able to:

- Understand the differences between climate change and climate variability.
- Understand the various causes of climate change and its drivers
- Understand the linkages between climate change, global warming and greenhouse gas (GHG) effect.
- Understand responses to the impacts of climate change.

Methodology

- Story telling
- Poster presentation
- Interactive discussion
- Questions and answers
- Brainstorming
- Diamond ranking
- Case studies
- Plenary discussion

Sample of Pre- and Post-Knowledge Assessment Questions

1. Is climate change caused by act of God or human activities?
2. What is the difference between weather, climate, climate change and climate variability?
3. What are examples of extreme weather events/natural hazards that affect agricultural production and/or activities in your community?

4. What are the observed impacts of climate change in your community?
5. How can you respond to the impacts of climate change?

Time guide: 6 hours

Key Points/Summary of the Module

Climate change is the most significant challenge of the 21st century. Its impacts are already manifesting in irregular rainfall patterns, rise in temperatures, sea level rise and ocean surges.

A primary driver of climate change is the increase of greenhouse gases in the atmosphere. Amongst them, carbon dioxide has the greatest impact on climate change. It is produced by human activities such as overgrazing; prolong land use, use of fossil-based fertilizers and pesticides, industrial growth, use of energy, burning fossil fuels, deforestation and other human activities.

Climate change distinguished from weather is any change in climate over time, whether due to natural variability or anthropogenic (human activity) forces while the frequent change of atmospheric condition on a daily basis is weather, and average weather conditions at a particular place over a long period of time is called climate.

Session 1: Meaning of Climate Change

Tips for trainers

Step 1: Story telling

The trainer encourages the participants to share their stories and experiences of variations and other changes in climate and its impacts on various agricultural activities which they have observed over a period of 20-30 years. Participants are to capture the particular year, the weather events and the significant impacts it had on various aspect of their societal life on a flip chart and display them.

Step 2: Plenary discussions

The trainer defines climate, weather, and climate variability and distinguishes it from climate change. The trainer presents the science of climate change and evidence of occurrences of climate change with reference to scientific predictions, data and relates it to the changes they have been experiencing in their local context (with multimedia presentations or pictures). This is important to enable participants compare their local observations with scientific evidence of climate change. The trainer should try as much as possible to encourage participant to come up with the local meaning they have ascribed to climate change.

Step 3: Poster Presentation

The trainer facilitates this session by displaying a poster of the green house gases/ effects. Here, the trainer explains and lists the green house gases and its effects as well as their importance. The trainer should present and explain some aspects of IPCC findings on climate change and the climate change scenarios for Nigeria. However the trainer should avoid too much technicality in presenting this aspect to enhance participants understanding.

Step 4: Brainstorming

The trainer elicits responses from the participants on green house gases and its effects.

Trainers notes

Meaning of climate change: refers to any change in climate over time, whether due to natural variability or anthropogenic forces (human activities).

Climate variability refers to differences in the average state of the weather and other climate statistics (standard deviations, the occurrence of extremes, etc.) on all temporal and spatial scales beyond those of individual weather events. Variability may result from natural internal processes within the climate system (internal variability) or from variations in natural or anthropogenic external forces (external variability).

Weather is defined as the frequent change of atmospheric condition on a daily basis.

Climate is the average weather conditions at a particular place over a long period of time. This includes temperature, wind and rainfall patterns.

It doesn't rain in time. Crops cannot be planted. It rains only after rainy season. In some places, there was too much rainfall, while in others there was drought. Lots of property is getting damaged due to flooding, soil erosion, ocean surges etc, all these problems may be due to climate change. The average weather change noticed or experienced over a long time is an indication of climate change.

Compared to 150-200 years ago, the climate is changing at a rapid rate. Due to the increase in the earth's atmospheric temperature, many species of plants and animals cannot cope with the changing environment. Unbelievable indications of climate are already being noticed due to the increase in atmospheric temperature. The increase of greenhouse gases in the atmosphere is responsible for this increase in temperature.

According to climate scientists, the massive emission of greenhouse gases (GHG) accumulated over the years has led to increase in the level of carbon dioxide (Co_2) in the atmosphere resulting in rapid rise in earth's temperature (Warming).

Box 1.0. The Intergovernmental Panel on Climate Change (IPCC)

Climate change is a very complex issue: policymakers need an objective source of information about the causes of climate change, its potential environmental and socioeconomic consequences, and the adaptation and mitigation options to respond to it. This is why the World Meteorological Organization (WMO) and United Nations Environment Programme (UNEP) established the Intergovernmental Panel on Climate Change (IPCC) in 1988.

The IPCC is a scientific body: the information it provides with its reports is based on scientific evidence and reflects existing viewpoints within the scientific community. The comprehensiveness of the scientific content is achieved through contributions from experts in all regions of the world and all relevant disciplines including, where appropriately documented, industry literature and traditional practices, and a two-stage review process by experts and governments. Because of its intergovernmental nature, the IPCC is able to provide scientific, technical and socio-economic information in a policy-relevant, yet politically neutral way to decision makers. When governments accept the IPCC reports and approve their Summary for Policymakers, they acknowledge the legitimacy of their scientific content.The IPCC delivers its reports at regular intervals. As soon as they are published, these reports immediately become standard works of reference, widely used by policymakers, experts and students. The findings of the first IPCC Assessment Report of 1990 played a decisive role in leading to the United Nations Framework Convention on Climate Change (UNFCCC), which was opened for signature in the Rio de Janeiro Summit in 1992 and entered into force in 1994. It provides the overall policy framework for addressing the climate change issue. The IPCC Second Assessment Report of 1995 provided key input for the negotiations of the Kyoto Protocol in 1997. The Third Assessment Report of 2001 as well as Special and Methodology Reports provided further information relevant for the development of the UNFCCC and the Kyoto Protocol. The IPCC continues to be a major source of information for the negotiations under the UNFCCC.

Source: IPCC, www.ipcc.ch

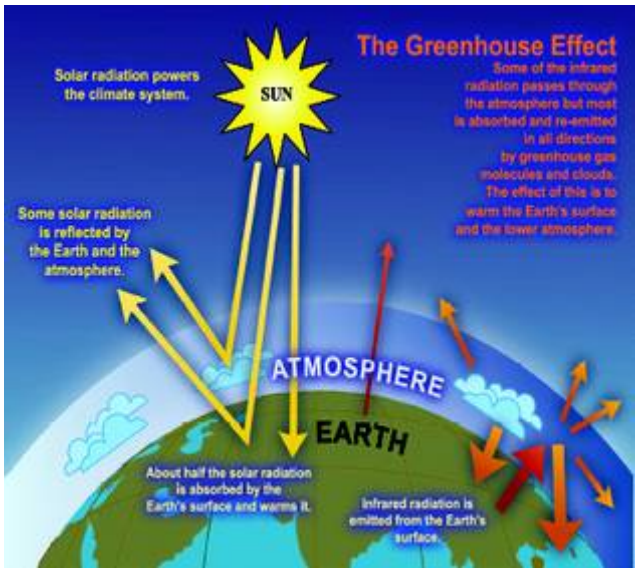
The green house gases

The atmosphere is made up of gases which are referred to as green house gases and they include: water vapor, carbon dioxide, methane, nitrous oxide, and ozone. These gases act as a thermal blanket for the Earth, absorbing heat and warming the surface to a life supporting average of 59 degrees Fahrenheit (15 degrees Celsius).

The green house effect is the natural process by which the atmosphere traps some of the sun's energy, warming the Earth enough to support life.

Energy from the Sun beats down on the Earth. Some energy is reflected into space, the rest enters the atmosphere. The Earths absorbs the energy and emits heat. Unlike

other gases, greenhouse gases absorb and re-emit the heat energy-some is emitted into space and some back to Earth. The heat is effectively trapped and warms the earth.



Greenhouse effect: The process by which the absorption of radiation by the atmosphere warms the earth. The greenhouse effect occurs naturally (without it, the Earth's surface would be 20-30°C colder and much less suitable for life), but is enhanced by the presence of gases emitted as a result of human activities (anthropogenic greenhouse gas emissions). Figure 2 source IPCC 2007.

Global warming is the increase in the average measured temperature of the Earth's near-surface air and oceans since the mid-20th century, and its projected continuation. Global surface temperature increased 0.74 ± 0.18 °C (1.33 ± 0.32 °F) during the 100 years ending in 2005. The Intergovernmental Panel on Climate Change (IPCC) concludes "most of the observed increase in globally averaged temperatures since the mid-twentieth century is very likely due to the observed increase in anthropogenic greenhouse gas concentrations" via an enhanced greenhouse effect (IPCC, 2007).

Box 2: Climate Change Projections for Nigeria

Climate change projections for the country indicate grim realities. Under best estimate scenario, there is a projected increase in average temperature in Nigeria of 0.8^0C and 1.8^0C for year 2020 and 2050 respectively. Under low scenario, average temperature rise in Nigeria will be 0.5^0C and 1.0^0C by year 2020 and 2050 respectively. Under high scenario however, the projected increase in average temperature in Nigeria is 1.3^0C and 3.2^0C by 2020 and 2050 respectively.

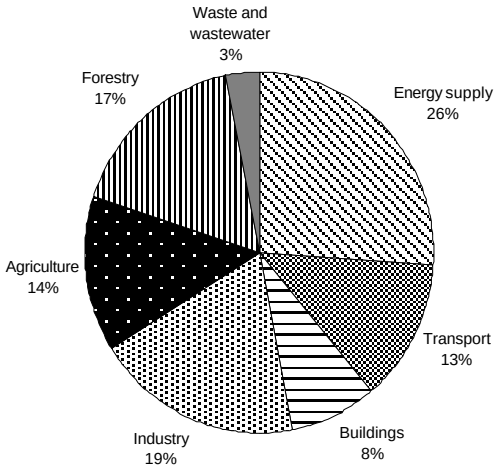
For projections on precipitations, under best estimate, an average increase of 6mm and 14mm is projected by year 2020 and 2050 respectively. Low scenario estimates for precipitation increase by year 2020 and 2050 were given as 4mm and 8mm respectively, while high scenario estimates was projected to be 9mm and 19mm by year 2020 and 2050 respectively. It should be noted that although average precipitation is expected to increase in Nigeria, different zones will have varying effects, with some areas becoming increasingly desertified, while others will likely suffer increased precipitation.

A global rise in sea level is expected to significantly affect Nigeria's coastline. The current IPCC predictions are a rise in sea level of between 0.18m and 0.59m by 2100 relative to 1980-1999, depending on the scenario. As such, the study by DFID assumes there to be an increase of potentially 0.4m and 0.9m by year 2020 and year 2050 respectively for the best estimate. Under high scenario, an increase of 1m and 2m is projected for by year 2020 and 2050 respectively. However, the IPCC Fourth Assessment forecast is now widely viewed to be too conservative by the scientific community as it is based on multiple models that all exclude ice sheet flow due to a (then) lack of published literature.

The general consensus in the scientific community is that extreme events will continue to increase and become more severe across the continent. It is thought that a further 1°C rise in surface sea temperature in the Atlantic will create the conditions required to create hurricanes off the coast of Nigeria.

Culled from Climate Change Impact and Adaptation in Relation to Small Scale Farming in Nigeria by Akindeji Falaki.

Anthropogenic Greenhouse Gas Emissions by Sector (2004)



Source: IPCC 2007

Table: Carbon dioxide emissions 1990-2004

	Total emissions ($MtCO_2$)		CO_2 emissions Annual Change (%)	CO_2 Emissions share of world total (%)		Population share (%)	CO2 emissions per capita (tCO_2)	
CO_2 emitters	1990	2004	1990-2004	1990	2004	2004	1990	2004
United States	4,818.3	6,045.8	1.8	21.2	20.9	4.6	19.3	20.6
China	2,398.9	5,0071.1	7.8	10.6	17.3	20.2	2.1	3.8
Russian Federation	1,984.91	1,524.1	-1.9	8.8	5.3	2.2	13.4	10.6
South Africa	331.8	436.8	2.3	1.5	1.5	0.7	9.1	9.8
Nigeria	45.3	114.0	10.8	0.2	0.4	2.2	0.5	0.9
Tanzania	2.3	4.3	6.2	0.0	0.0	0.6	0.1	0.1

Source: UNDP Human Development Report 2007/8

Session 2: Causes of Climate Change

Tips for trainer

Step 1: Interactive discussion

The trainer should open discussions by asking participants to identify environmental hazards and extreme weather events common in their community.

Step 2: Brain storming

The trainer inquires about the causes of changes in weather by allowing the participants to brainstorm and write it on the flip chart/board and display the responses.

Step 3: Group work

Identify the activities of agriculture that contribute to climate change. This can be done by dividing the participants into three groups of farmers, fishers, and pastoralists and then direct each group to present their responses.

Trainers note

The changes in the global climate are likely to be due to a combination of both natural and human causes:

Natural causes

The Earth's climate varies naturally as a result of interactions between the ocean and the atmosphere, changes in the Earth's orbit, fluctuations in energy received from the sun, and volcanic eruptions.

Human causes

The main human influence on global climate is likely to be emissions of greenhouse gases (GHG) such as carbon dioxide (CO_2) and methane (CH_4).

Most climate scientists agree the main cause of the current global warming trend is likely due to human expansion of the greenhouse effect (IPCC 2007).

Human activities have increased pollution in the atmosphere, disrupting ongoing natural processes in the climate cycle. These changes have triggered a number of

serious climate-related problems, including drought, very intensive or very low rainfall, temperature increase, and increased flooding.

Gases that contribute to the greenhouse effect include:

Water vapour: Water vapour is the most abundant greenhouse gas and it is also very important as it acts as a feedback to the climate. As the water vapour in the atmosphere increases so does the possibility of clouds and precipitation, making these some of the most important feedback mechanisms to the greenhouse effect.

Carbon Dioxide: Carbon dioxide (CO_2) is a minor but very important component of the atmosphere; carbon dioxide is released through natural processes such as respiration and volcano eruptions and through human activities such as deforestation, land use changes, and burning fossil fuels. Humans have increased atmospheric CO_2 by a third since industrial revolution began. This is the most important long-lived "forcing" of climate change.

Methane: Methane is a hydrocarbon gas produced both through natural sources and human activities, including the decomposition of wastes in landfills, agriculture and especially rice cultivation, as well as ruminant digestion and manure management associated with domestic livestock.

Nitric acid: Nitric acid is a powerful greenhouse gas produced by soil cultivation practices, especially the use of commercial and organic fertilizers, fossil fuel combustion, nitric acid production and biomass burning.

Session 3: Consequences of Climate Change

Tips for trainers

Step 1: Case studies

Using case studies impacts of Climate change on pastoralist, fishers and farmers in Tanzania and Nigeria the trainer should highlights the effect of climate change and relate it to human activities and how it contributes to the changes in global climate as well as on their well being.

Step 2: Interaction on the case study

The trainer should encourage the participants to respond to the case studies presented and write their responses on the flip chart.

Step 3: Group discussion

The trainer should divide the participants into three groups and provide them with guidelines for discussion and ask them to develop a list of different sectors where they are feeling the impacts of climate change the most.

Trainers note

Case studies

ALI Makame Madah, Fishermen in Nungwi, Zanzibar. "In the past there was more of a distinction between cold and hot seasons. Now it is always hot. The season for fishing is less defined. There used to be certain times of the year when you could catch specific species of fish now it is hard to tell We used to stay close to the shore to fish because there was plenty of fish available there.

We used to sell our catch at low prices because money went further in those days. Today we have to go further out to sea to catch fish and everything is more expensive" culled from "Unheard Voices challenges of climate change in Tanzania".

3 November, 2011

Nigeria: 60,000 farmers affected as floods destroy crops

by Seye Adeniyi

A devastating flood has destroyed assorted farm produce worth one billion naira in Silame Local Government area of Sokoto State, says the Chairman, Alhaji Mani Maishinko. Maishinko told the News Agency of Nigeria (NAN) in Silame, Sokoto, recently that the produce affected included rice, millet, beans, onions, sweet potatoes, pepper, tomatoes and guinea corn farms.

He said that more than 60,000 farmers in the area were affected. ``Over 80 per cent of the people of Silame local government are either farmers or fishermen and they were all affected. The incident occurred when the River Rima which traverses the entire local government area was inundated and it over flooded its banks,'' he said.

The chairman attributed the cause of recent flood disaster in the area to climate change.

Consequences of Climate Change

Rise in temperature is one of the multiple consequences of climate change. Rise in the level of the oceans, changes in wind patterns and a multiplication of extreme weather events are other examples. Fragile and vulnerable species are already suffering from consequences of these changes, and will in the future face the worst consequences.

Reduced Water availability, reduced fisheries resources (aggravated by over fishing), reduced areas suitable for agriculture and reduced yields for rain-fed agriculture are the consequences of the effects of climate change.

Session 4: Responses to Climate Change

Tips for trainers

Step 1: Plenary discussion

The trainer starts the discussion with summary of the previous sessions and gives the two approaches use to reduce the impacts of climate change and definition of these approaches: adaptation and mitigation.

Step 2: Simple Ranking

The trainer comes up with lists of adaptation tips written on a flip chart and asks the participants to rank the possible ways of adapting with the most important idea at the top of the table, then the next two most important, then the next three to the least important ones as identified by the participants.

Step 3: Questions and answers

Here, the trainer poises a question to the participants on how agriculture can adapt to climate change allowing them to brainstorm and come up with the answers. Female participation should be fully encouraged as their opinion is of great importance. After the responses, the trainer should link it to the examples of incidences and experiences shared in the previous sessions and come up with possible action points to reduce these impacts.

Step 3: Link the responses with the examples of incidences and experiences shared by the participants in the previous session.

Trainers note

Definition of adaptation and mitigation

In the previous sessions, we discussed the concept and definition of climate change, its causes, and impacts at different level and on Agriculture. Two approaches are advocated to reduce the impacts of climate change: adaptation and mitigation. Adaptation involves making changes to existing systems, structures, and ways of life to reduce vulnerability and increase the resilience of a community to climate change. It goes hand in hand with mitigation, which aims to reduce greenhouse gas emissions or enhance the removal of these gases from the atmosphere.

How can agriculture adapt?

Agriculture can thrive in the face of the changing global climate with special consideration of the following:

- Improve research and knowledge on the impacts (i.e. in food security) and costs of adaptation options, giving special attention to indigenous and local crops, seeds and technologies rather than to new crop varieties and technologies.
- Raise awareness and improve capacity building in the sector, including training of farmers and agricultural workers.
- Develop more efficient irrigation techniques, new cultivars, change cropping patterns.

Mitigation

Since agricultural activities is said to contribute to the global climate change the following activities and more can be practiced to reduce emissions:

- Improve crop and grazing land management to increase soil storage;
- Restore cultivated peaty soils and degraded lands;
- Reduce use of fossil-based fertilizers and pesticides;
- Improve livestock and manure management;
- Improve energy efficiency;
- Improve crops yields

MODULE TWO

Climate Change and Agriculture

Contents

- Session 1: Meaning of Agriculture
- Session 2: Relationship between Climate Change and Agriculture
- Session 3: Impact of climate change on different stages of Agricultural processes
- Session 4: Importance of small scale agriculture to food security

Key Learning Objectives

At the completion of the module, the participants will be able to:

- Understand the different systems of practicing agriculture.
- Understand the differences between temperature, drought, short duration rainfall and flooding and how these impacts relates to climate change.
- Understand how climate change impacts affect agricultural processes at various stages (planting, harvesting, storage, etc.).
- Identify who a small holder farmer is and differentiate between small and large scale agriculture (subsistence and commercial agriculture).
- Understand the impacts of climate change on smallholder farmers and the contribution of small scale agriculture to food security.

Methodology

- Group Exercises/Discussions
- Brainstorm sessions
- Plenary sessions
- Simulation exercises
- Use of Pictures/Illustrations/posters
- Interactive Discussions
- Mapping
- Questions and Answers

Sample of Pre- and Post-Knowledge Assessment Questions

1. What are the different systems of practicing agriculture?
2. What are the possible causes of drought, flood, and short duration rainfall.
3. What are impacts of rise in temperature, variation in rainfall pattern, drought and flooding on agriculture.
4. What are the impacts of climate change on fish, crop and livestock farming.
5. How can climate change affect food security at household, local, state and federal level?

Time Guide: 6 hours

Key Points/Summary of the Module

This module is designed to increase awareness of participants on the following issues: Meaning of Agriculture; Relationship between Climate Change and Agriculture; Impact of climate change on different stages of Agricultural processes (planting/ stocking, harvesting and storage); and the Importance of small scale agriculture to food security. It aimed at reducing the vulnerability of smallholder farmers to the adverse impacts of climate change.

Session 1: Meaning of Agriculture

Step 1: Group activity

The trainer places pictures of: fishes, cassava, yam, goat, cattle, oranges and farmers at work, etc. on a flipchart paper, distributes stick up papers to participants and asked them to write a word that describes the type of agriculture seen in the picture placing it at one corner of the flipchart. After the stick ups he/she asks each participant the reason for the classification based on what they placed on the flipchart paper. The Trainer then ask one of the participants to separate the sticks ups into the different types of agriculture.

Step 2: Brainstorm

The trainer writes the word "agriculture and types of agriculture" and selects participants to either describe or define agriculture and the different types of agriculture practice in their community on the flipchart. He/she flips over the chart and selects other participants to write on the flipchart on who are involved in the various types of agriculture practiced in their community.

Step 3: Plenary Discussions:

The trainer discusses agriculture which includes definition and types of agriculture. This is done using flipchart demonstrations or multimedia projector (as applicable).

Trainers Note

Definition and types of agriculture

Agriculture is the cultivation of crops and rearing of animals for human consumption. Agriculture is also called farming or husbandry. The cultivation of animals, plants, fungi, and other life forms for food, fiber, biofuel and other products used to sustain life. The study of agriculture is known as agricultural science.

Types of agriculture can be categorised under two broad classifications of size and nature of agriculture practiced.

Size of Agriculture

This refers to the magnitude of farming practices in terms of inputs, output and levels at which agriculture is practiced. This can be either:

(a) Small scale/subsistence farming: this is the type of agriculture popularly practiced in Nigeria. Farming at this level is mainly for subsistence and at household level. This group of farmers produces food and products for consumption and sustenance life for the nation and contributes to the Gross Domestic product of the nation. This class of agriculture is usually not for exports but for internal consumption within the country. The size of a small-scale farm ranges from cultivation or rearing of animals for household food consumption to agricultural practices for both consumption, generation of income and creation of employment for small holder farmers. Machineries and mechanised farming are not often used for this type of farming practice.

Picture of small scale farming (*Source:* www.google.com)

(b) Large scale/ Mechanised/Commercial Farming: This is the type of agriculture practised on a large scale. It is usually capital intensive and involves the use of machineries. This type of farming is for exports and acts as source of raw materials for food production. It contributes to the national exports and earnings. It serves as a means of income generation both at local and international level, creation of employment.

Nature of Agriculture

This can be described as the type of items (crops or animals) cultivated .It can either be crop farming or animal farming. Animal farming include: Aquaculture, Dairy

farming, Aquaponics, Grazing, Hydroponics, Livestock, Pig farming, Orchard, Poultry farming, Sheep husbandry.

Picture of large scale farming (*Source:* www.google.com)

Aquaculture, also known as aquafarming, is the farming of aquatic organisms such as fish, crustaceans, molluscs and aquatic plants. Aquaculture involves cultivating freshwater and saltwater populations under controlled conditions, and can be contrasted with commercial fishing, which is the harvesting of wild fish.

Picture of aquaculture farm in Nigeria (*Source:* www.dailyindependentnig.com)

Dairy farming is a class of agricultural, or an animal husbandry, enterprise, for long-term production of milk, usually from dairy cows but also from goats, sheep and camels, which may be either processed on-site or transported to a dairy factory for processing and eventual retail sale.

Aquaponics is a sustainable food production system that combines a traditional aquaculture (raising aquatic animals such as snails, fish, crayfish or prawns in tanks) with hydroponics (cultivating plants in water) in a symbiotic environment.

Grazing generally describes a type of feeding, in which a herbivore feeds on plants (such as grasses), and also on other multicellular autographs (such as algae). Grazing differs from true predation because the organism being eaten from is not generally killed, and it differs from parasitism as the two organisms do not live together, nor is the grazer necessarily so limited in what it can eat.

Hydroponics is a subset of hydroculture and is a method of growing plants using mineral nutrient solutions, in water, without soil. Terrestrial plants may be grown with their roots in the mineral nutrient solution only or in an inert medium, such as perlite, gravel, mineral wool, expanded clay or coconut husk.

Livestock are domesticated animals raised in an agricultural setting to produce commodities such as food, fibre and labour.

- Pig farming: Pigs can be farmed in free range, being allowed to wander around a village, kept in fields, or tethered in a simple house. In developed countries, farming has moved away from traditional pig farming and pigs are now typically intensively farmed. Today, hog operations are significantly larger than in the past, with most large-scale farms housing 5,000 or more pigs in climate-controlled buildings.

- Poultry farming is the raising of domesticated birds such as chickens, turkeys, ducks, and geese, for the purpose of farming meat or eggs for food. Poultry are farmed in great numbers with chickens being the most numerous. More than 50 billion chickens are raised annually as a source of food, for both their meat and their eggs. Chickens raised for eggs are usually called layers whilst chickens raised for meat are often called broilers.

- Sheep husbandry is a subcategory of animal husbandry specifically dealing with the raising and breeding of domestic sheep. Sheep farming is primarily based on raising lambs for meat, or raising sheep for wool. Sheep may also be raised for milk or to sell to other farmers.

Pictures of animal farming (source www.google.com)

Crop farming includes the farming of cash crops such as cocoa, rubber, etc. and food crops such as rice, millet, sorghum, groundnut, etc.

Pictures of millet and cocoa farm (*Source:* www.google.com)

Session 2: Relationship between Climate Change and Agriculture (crops and livestock)

Tips for trainer

Step 1: Brainstorming

The trainer should ask participants to discuss their observation of changes in weather and how it affects their agricultural practices in the last ten years bringing out significant effects which have impacted either negatively or positively on their agricultural practices.

Step 2: Plenary Discussions

The trainer discusses the impact of climate change on agriculture which includes definition of climate change, agriculture and the nexus between the two concepts. This is done using flipchart demonstrations or multimedia projector (as applicable). At the end of the plenary discussion, the trainer tests the knowledge and understanding of the participants on the relationship between the two concepts.

Step 3: Brainstorm

The trainer elicit from the participants to either describe how climate change has impacted on the different types of agriculture practice (crop and livestock) in their community on the flipchart. He/she flips over the chart and selects other participants to write on the flipchart how their various agricultural practices have impacted negatively on the climate/environment.

Trainers Note

Nexus between climate change and agriculture

Explain the reason(s) for the increase and decrease in crop/livestock yield:

- Climate change has the potential to affect agriculture through changes in temperature, rainfall (timing and quantity), CO_2, solar radiation and the interaction of these elements. Agriculture can both mitigate and worsen global warming.
- Temperature increases are particularly worrying as key crop processes such as pollination will cease after temperature thresholds are reached.

- Around 14 percent of global emissions are due to non-carbon dioxide (CO_2) gases emitted by the agriculture sector, principally nitrous oxide (N_2O) from the production of synthetic nitrogen fertilizers and methane (CH_4) from animals.
- Livestock production accounts for one third of Nigeria's agricultural GDP, providing income, employment, food, farm energy, manure, fuel and transport (Nuru, 1986).
- The livestock species are cattle, goat, sheep, camel, local poultry; other non-livestock animals are donkey, horse, and wildlife. The feeding sources are natural range lands, tree forage, and crop residues.
- Higher than normal temperatures leads to poor livestock health which reduces the market value of affected livestock thereby reducing farmers' income.
- Greater frequency and severity of coastal storm/sea surge could impact mangroves, which constitute critical breeding habitat for many fish species.
- Drought could reduce or eliminate dry-season habitat critical to sustaining fish populations through the dry season to the next wet season.

Picture of a farm affected by climate change www.cnn.com

- An increase in the area of saline and freshwater flooding (wetlands), resulting in an increase in fish habitat, but also changes in species diversity and abundance.

Session 3: Impact of climate change on different stages of Agriculture

Tips for trainer

Step 1: Simulation Exercise

The trainer places/draw a pictures farmer planting or tilling the ground, livestock farm, harvesting crops, storage barns, and farmers at work etc on a flipchart paper, distributes stick up papers to participants and asked them to write a word that describes what they see in the picture placing it at one corner of the flipchart. After the stick ups he/she asks each participant the reason behind for the placement in different places (whether harvesting period, planting or storage).

Step 2: Plenary Discussions

The trainer discusses what happens at the various stages of agriculture. This is done using flipchart demonstrations or multimedia project (as applicable). At the end of the plenary discussions, the trainer tests the knowledge and understanding of the participants on how the various stages are interconnected.

Step 3: Brainstorm

The trainer elicit from the participants to either describe how climate change has impacted at the different stages of the agriculture practice (planting/stocking, harvesting and storage) in their community on the flipchart. He/she flips over the chart and selects other participants to write on the flipchart how have they survived with these impacts at each of the stages.

Trainers Note

Nexus between climate change and agriculture

Trainer to take note of the responses.

Explain the reason(s) for the increase and decrease in crop/livestock at every stage.

- Climate change affects agriculture in a number of ways and at different stages. Extreme weather events such as thunderstorms, heavy winds, and floods devastate farmlands and can lead to crop failure. Pests and crop diseases migrate

in response to climate variations (e.g. the tsetse fly has extended its range northward) and will potentially pose a threat to livestock in the drier northern areas.

- The proliferation of pests and crop diseases (again originating with climate change) can hinder storage when the need arises because of temperature increases. The pests, in turn, attack crops and animals.
- Climate change can increase the incidence of pests and diseases that attack and decimate forest trees; it can lead to species extinction in the various ecozones of Nigeria.
- The fruiting intensity of some trees is diminishing; aberrations in animal mating habits and changes in bird and animal migratory patterns (due to the need for new habitats or new food sources) are evident.
- Fish spawning patterns have changed; the extinction of rare and endangered species of plants and animals has increased.
- Temperature increases are particularly worrying as key crop processes such as pollination will cease after temperature thresholds are reached.
- Higher than normal temperatures leads to poor livestock health which reduces the market value of affected livestock thereby reducing farmers' income.
- Rapid deterioration and wastage of farm produce.
- Erratic weather interferes with processing of produce (e.g. sun-drying crops and smoking fish).
- Loss of low lying coastal ecosystems and shorelines and a general shift of existing coastal ecosystems inland; exposure of new inland areas to coastal erosion processes.
- An increase in the area of saline and freshwater flooding (wetlands), resulting in an increase in fish habitat, but also changes in species diversity and abundance.
- Drought could reduce or eliminate dry-season habitat critical to sustaining fish populations through the dry season to the next wet season.

Session 4: Important of small scale agriculture to food security

Tips for trainer

Step 1: Simulation Exercise

The trainer places/draw a pictures silos, food stuff, small scale farmers on their farms, barns, groundnut pyramid, mechanised agric farm, etc. on a flipchart paper, distributes stick up papers to participants and asked them to classify what they see into small scale or large scale agriculture (differentiate between subsistence and commercial agriculture) on the flipchart. After the stick ups he/she asks each participant the reason for the classification.

Step 2: Plenary Discussions

The trainer discusses the impacts of climate change on smallholder farmers. This is done using flipchart demonstrations or multimedia project (as applicable). At the end of the plenary discussions, the trainer tests the knowledge and understanding of the participants on the reason(s) for the low farm output by smallholder farmers.

Step 3: Brainstorm

The trainer elicit from the participants to either describe how climate change has impacted the activities small holder farmers in their community on the flipchart. He/she flips over the chart and selects other participants to write on the flipchart on what makes smallholder farmers vulnerable to the impact of climate change. Also relate low productivity to climate change impacts.

Trainers Note

The contribution of smallholder farmer to food security

Trainer to take note of the responses.

Explain the reason(s) for the low farm output by smallholder farmers and contribution of smallholder farmers to food security.

- Smallholder farmers are those whose farming practices is done on a small scale of about 2 hectares or even smaller than this size. Majority of the rural poor in

Nigeria can be grouped in this category. They depend majorly on rain-fed agriculture and this group account for most of the food production in the country. As a result of their dependency on rain-fed agricultural practices, they are the worst hit and also bear the brunt of the adverse impacts of climate change.

- Climate change poses the greatest threat to small scale agriculture and the four dimensions of food security (food availability, food accessibility, food utilisation, and food systems stability). Agriculture is key to food security in two ways: food production for human consumption and source of livelihood for the people.
- Small-scale farmers account for approximately 95 percent of total agricultural output (Federal Ministry of Agriculture, 2005).
- Women's labour is very important with women being major producers of staple food crops, estimated at between 60 to 80 percent of the food in Nigeria.

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MODULE THREE

Climate Change, Conflict and Agriculture

Contents

- Session 1: Understanding Conflict
- Session 2: Community Analysis
- Session 3: Relationship between Climate Change and Conflict
- Session 4: Intervention

Key Learning Objectives

At the completion of the module, the participants will

- Deepen their knowledge of conflict.
- Strengthen their understanding and appreciation of their environment and community.
- Enhance their understanding of the linkages between conflict and climate change.
- Develop their skills for conflict management and resolution to address conflict arising from the impacts of climate change on agriculture.

Methodology

- Group Exercises/Discussions
- Brainstorm sessions
- Transect walks
- Simulation exercises
- Use of Pictures/Illustrations
- Interactive Discussions
- Mapping
- Questions and Answers

Sample of Pre and Post Knowledge Assessment Questions

1. What do you understand by conflict.

2. Give example of conflict that happened in your community and which groups are most affected.
3. How can you describe your community
4. How has climate change contributed to conflict in your community?
5. What do you think is the way forward to reduce conflict caused by climate change issues in your community?

Time Guide: 6 hours

Key Points/Summary of the Module

The module is designed to enhance the knowledge of participants to conflict especially situated within the context of their environment/society. It further links the inter relationship between the environment and their communities and how they can adopt local resilience through cooperative platforms to manage and reduce the consequences of climate change to conflict towards sustainable human security and peace.

Session 1: Understanding Conflict

Tips for trainer

Step 1: Simulation Exercise

The trainer places a picture depicting conflict on a flipchart paper, distributes stick up papers to participants and asks them to write a word that describes what they see in the picture placing it at one corner of the flipchart. After the stick ups he/she asks each participant the reason behind the words placed. The Trainer then picks one volunteer from the participants and asks him/her to separate the sticks ups into what he/she considers positive or negative. The participant will place the positive stickers at the left side and the negative ones at the right side. The trainer leads a brainstorm session on the positive and negative response to conflict.

Step 2: Plenary Discussions

The trainer discusses the concept of conflict which includes definition, types, causes and stages of conflict. This is done using flipchart demonstrations or multimedia projector (as applicable). At the end of the plenary discussions, the trainer tests the knowledge and understanding of the participants on their new perception of conflict.

Step 3: Brainstorm

The trainer writes the word "causes of conflict" and selects participants to write one word of what causes conflict in their community on the flipchart. He/she flips over the chart and selects other participants to write on the flipchart on who are involved in the conflicts in their community. Other questions include:

- Is it all the time that the conflict by farmers or pastoralists ends in crises?
- What makes farmers/pastoralists to act or respond in a certain way to conflict?

Trainers Note

Definition of Conflict

Conflict is a relationship between two or more people (individuals or groups) who have or think they have disagreeable goals. Conflict is a fact of life, inevitable and often creative. Conflict happens when people pursue goals which clash. Also conflict is a struggle over values and claims to scarce status, power and resources in which

the aims of the opponents are to neutralise, injure or eliminate their rivals. The paradox of conflict is that it is both the force that can tear relationships apart as well as the force that binds them together. This dual nature of conflict makes it an important concept to study and understand.

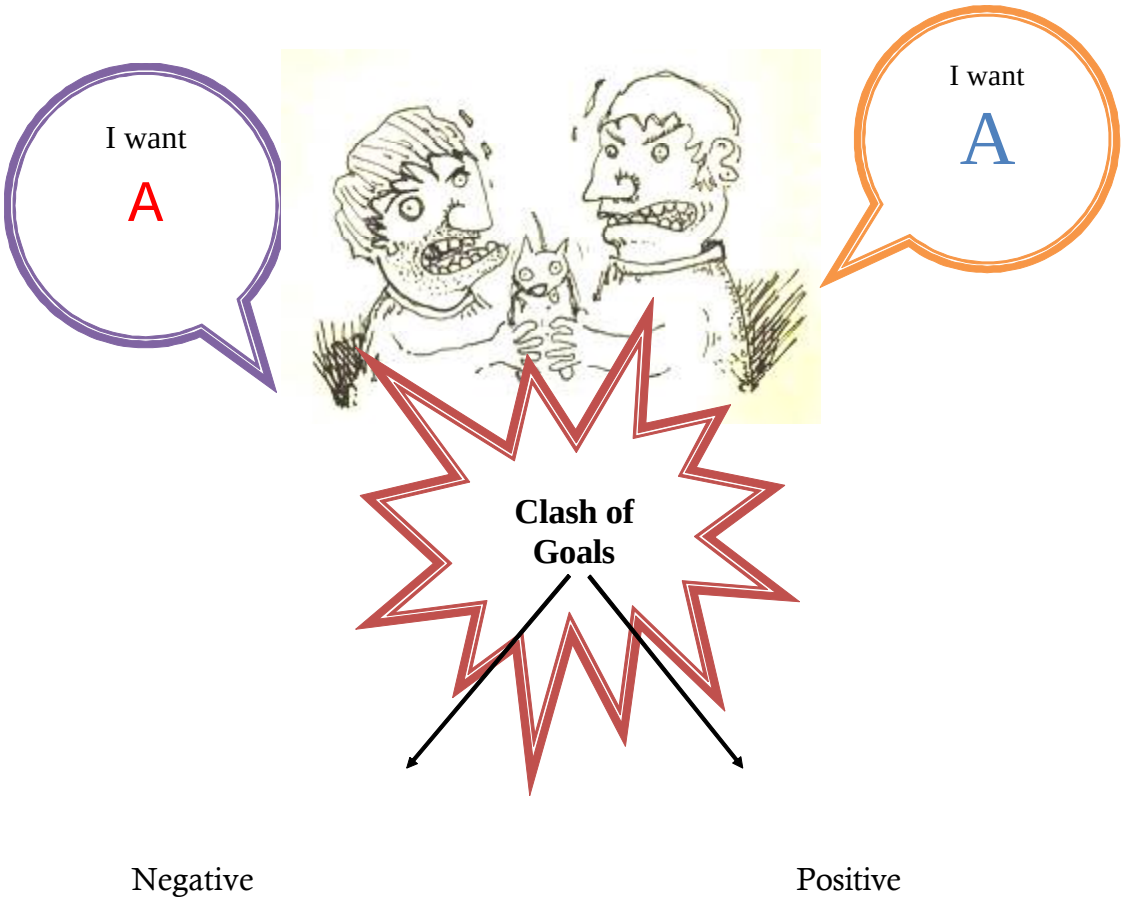


Fig. 1: Illustration of conflict (Negrotambor.wordpress.com)

Conflict has various types and manifestation with potentials to progress from one type to another. Types of conflict include the following:

- Intra-personal conflict: A type of conflict that occurs within a person. Examples include conflict of choice of fertilizer to buy, yam seedlings to plant, the type of feed for cattle, etc.
- Inter-personal conflict is a type of conflict which occurs between two or more people's example between a farmer and a Fulani cattle breeder.

Fig. 2: Illustration of Intra personal conflict
Pquirk.com

- Intra group conflict is conflict between individual or factions within a group. Example a conflict within the Myetti Allah Cattle Breeders Association.
- Inter group conflict is a conflict between groups such as associations, villages versus villages, farmers versus pastoralists.

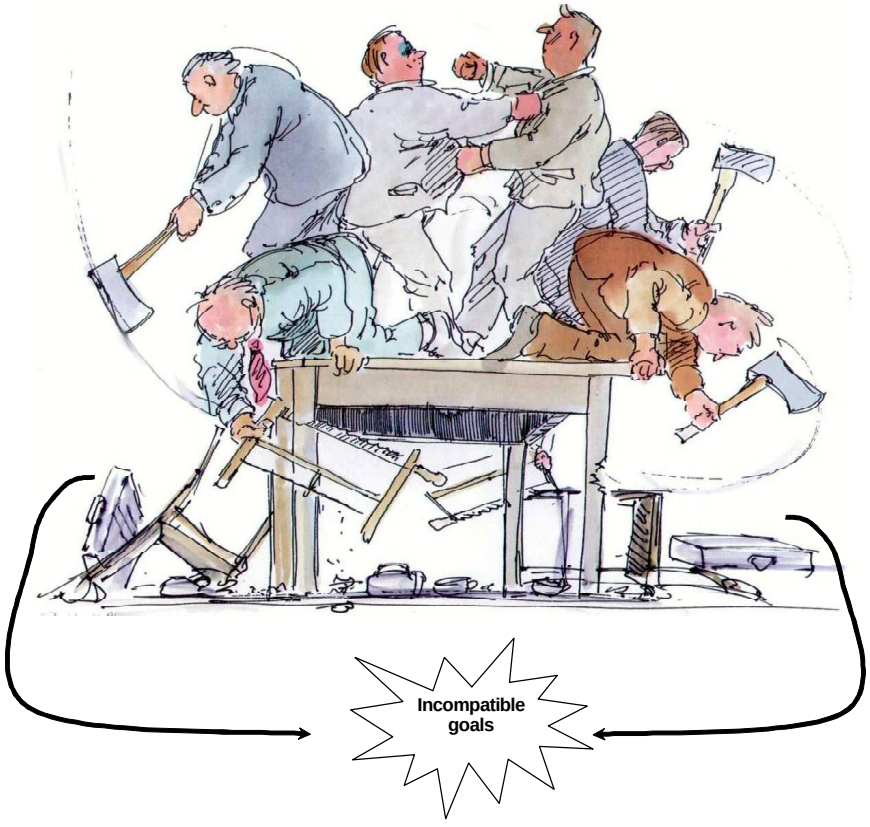


Fig. 3: Illustration of Inter group conflict
Incompatible goals

- Intra national conflict is conflict that happens within a nation or involving different groups within the nation. This could be inter-ethnic, inter-religious, or a competition for resources as manifested in the sharing of revenue in the country. Example the conflict between the Fulanis and Tivs of Benue State in Nigeria.
- International conflict is conflict between nations this could be for ideological reasons, territorial claims or political competition. Example Cameroun and Nigeria over Bakassi Peninsula.

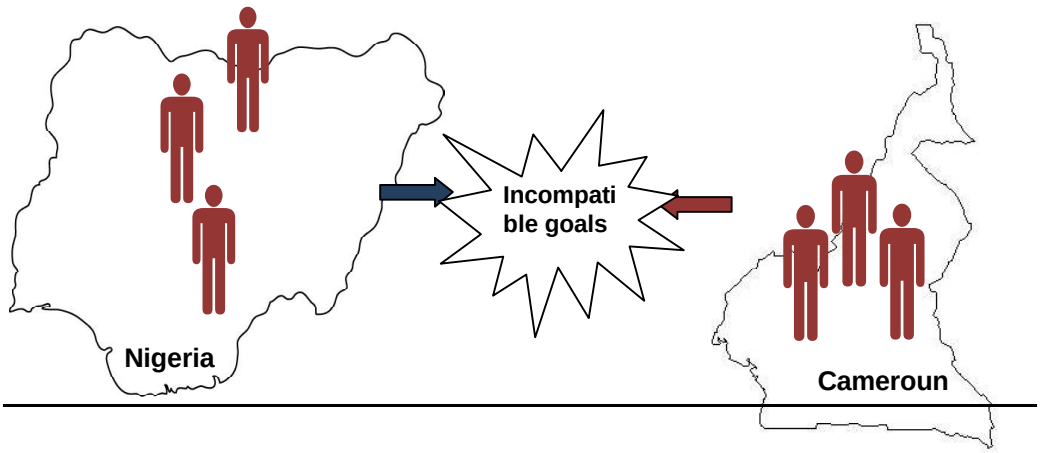


Fig. 4: Illustration of International conflict
Courtesy: Heinrich Boll Foundation

Causes of Conflict

Everybody encounters conflicts on daily basis; within self, at home, work, farm, church/mosque etc. Conflicts originate from many sources, which make it difficult to determine the cause. To manage or resolve any conflict, the root causes of conflicts needs to be highlighted. There are several factors, which cause conflicts in anybody's life. However, three broad categories have identied. These include:

- Conflicts over limited resources
- Conflicts over psychological needs
- Conflicts over values/cultures.

Conflicts over limited resources are conflicts easily identified because they are tangible and easier to resolve. This conflict occurs when two or more people compete for limited resource that is not enough to satisfy the needs of the disputing parties.

With increasing desert encroachment in the sahel region, farmers and pastoralist compete for limited fertile lands which causes conflict.

Conflicts over psychological needs are conflict that are not physical but affect the mind and eventually the behaviour and ability of a person to function properly. For example the feeling of insecurity, the need for acceptance and belonging in a community, etc. The absence of this leads to frustration and aggressive behaviours

Conflicts over values are the most difficult conflicts to resolve or understand as it is based on belief system and worldview. Most times people could die for what they believe in. Parties in conflict over values defend their positions strongly, irrespective of whether it is societally percieved as right or wrong. Conflicts over values can only be prevented, managed or resolved when those involved are willing to re-examine their own value system and respect the differences in each other's value.

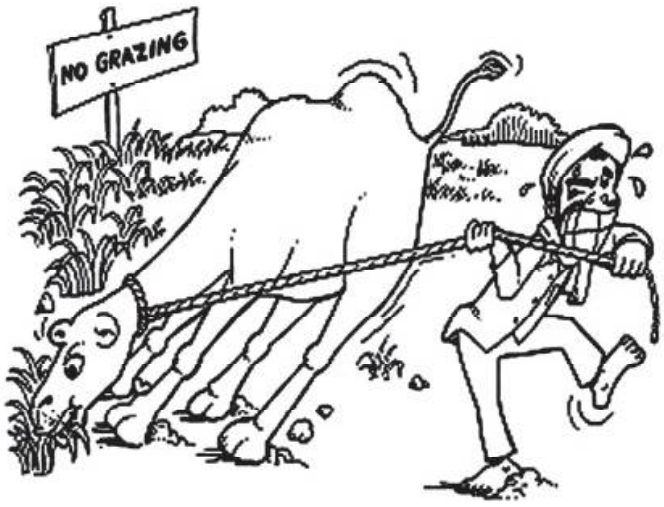


Fig. 5: Illustration of Conflict over Resources

Stages of conflict

Conflict is dynamic in nature and therefore capable of growing and changing if not properly handled. This change can evolve through various stages as follows:

Formation/Latent Stage: This is characterised by clash of goals and tensions which may lead to open conflict. This is the best time for prevention. Example when a group of farmers notice a herd of cattle by Fulanis grazing too close to their farmland. It will raise initial suspicion and tension of possible confrontation between the farmers and the Fulani cattle breeders.

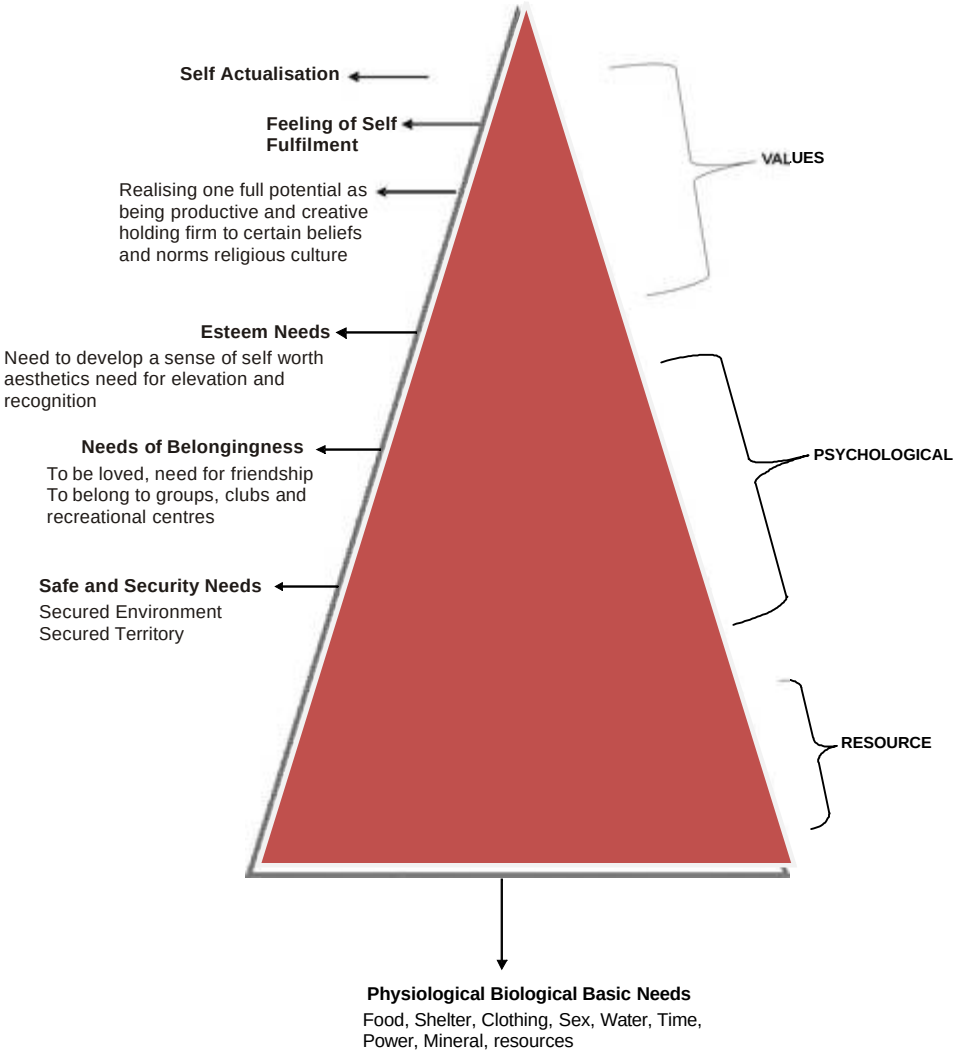


Fig. 6: Illustration of Maslow's Hierarchy of Needs

Confrontation/Escalation Stage: This is when people in conflict are identified, the source of the conflict is acknowledged and many issues are cleared. Problems emerge and things previously taken for granted become serious issues. There are antagonistic shifts in attitude and behavioural pattern, including occasional fighting or low levels of violence. A mediator may be called in or contacted to help facilitate a negotiation process and help the parties begin to communicate and bargain at this stage. Example the Fulani cattle breeders grazing close to the farmland did not notice when few of their cattle enter into a farmland. This immediately leads to outright confrontation between the fulanis and farmers. A verbal abuse and threat ensues and traditional leaders in the village intervene but tension is running high.

Crisis/ Manifest Stage: This is the peak of the conflict when people or groups in conflict are involved in active conflict. There is tension and violence, which escalates to severe levels. In a large-scale conflict, this stage is marked by war, resulting in killing, maiming, rape, destruction of property etc until parties to the conflict may start to negotiate or reach an impasse. Example the cattle continues intruding and eating up cassava leaves and corns in the farm land. The farmer kills one of the cattle which infuriates the fulanis and they embark on violent confrontations with the farmers and indigenes of the community.

De-escalation Stage: At this stage, measures are taken to resolve the conflict. Violence has ceased or is reduced to the barest minimum and there is possibility of settlement. Parties may agree to negotiate with or without the help of a mediator. Also a follow up to the previous example, with the violence escalating between the Fulani cattle grazers and indigenous farmers, the local government council chairman wades in to facilitate a negotiation and cease fire.

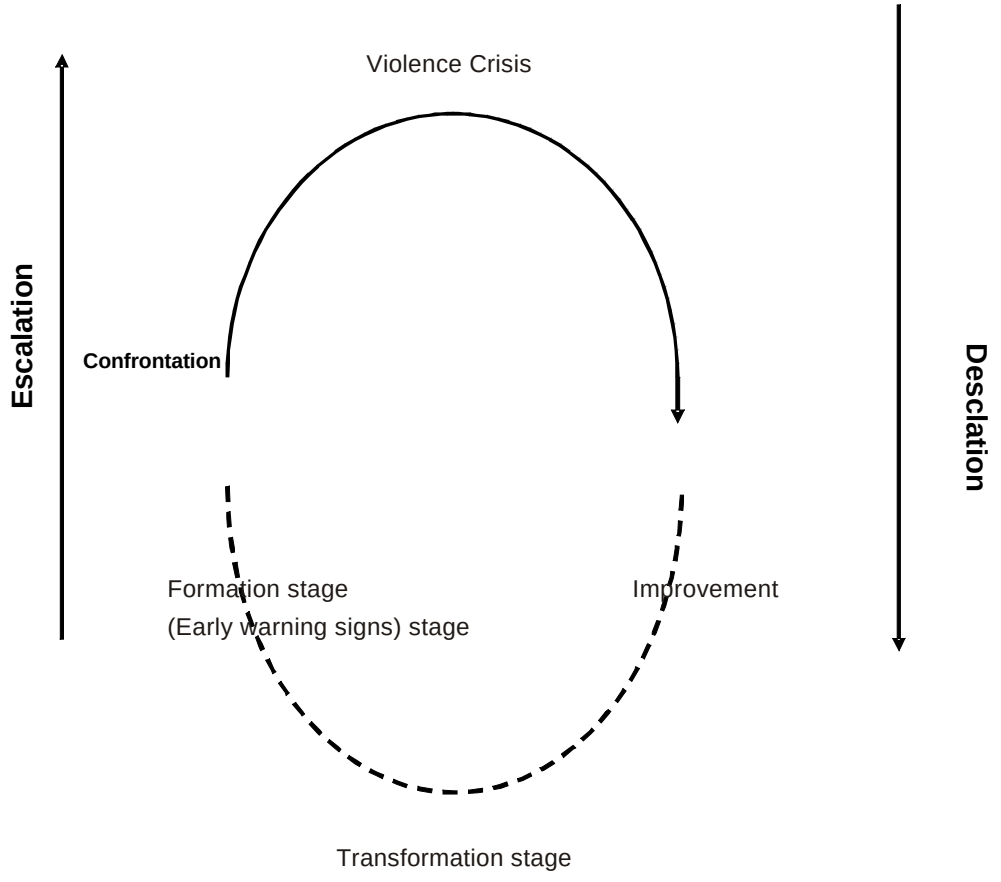


Fig. 7: An Illustration of the stages of Conflict

Postconflict/Transformation Stage: This is the period following the end of hostilities. The conflict is truly resolved and efforts are made to return the society to a normal state as agreements are implemented. Being aware of the different stages of conflict will facilitate the understanding of best options for intervention or resolution. For instance in the case study of the conflict between the Fulani cattle breeders and the farmers, the local government chairman in tracing the cause of the conflict finds out that farmers have also intruded in the marked out official grazing routes for the cattle. An agreement is reached on how the farmers will supply harvested fodder for feeds for the cattle and also negotiation on where to provide for the cattle to feed to avoid future incidences of cattle grazing in farmlands.

Session 2: Community Analysis

Tips for trainer

Step 1: Mapping

The trainer starts the session by informing the participants that for the mapping exercise they are all members of a new community. He/she places plain charts on the wall and asks each participant to walk up and draw what they consider very important object or image that must be in their community. When each participant draws the object, he/she explains to the plenary why it is considered critical to the existence of the community. The trainer asks the participants to name their community. After the drawings the trainer shares stick up of different colours to selected participants and asks them to write one major issue that causes conflict in their community and stick it to any of the objects or images drawn which relates closely with the cause or what is affected by the conflict in their community.

Step 2: Brainstorm

The trainer engages the participants in an interactive discussion of the drawings and their relationship to each other as well as to the relationships and effect of conflicts to the entire community. This will further enhance the participants understanding of interconnectedness of vulnerabilities, hazards and responses to development, peace and security in their communities.

Step 3: Plenary Discussions

The trainer discusses the concept of community with emphasis on types and its interrelatedness. At the end of the plenary discussions, the trainer tests the knowledge of the participants on their new understanding of a community using interactive discussion.

Step 4: Questions and Answers

The trainer provides opportunity for questions and answers from the participants.

Trainers Handout

What is a Community?

A body of people having common rights, priviledges or interests or living in the same place under the same laws and regulations.

Types of Community

- Informal Community
- Formal Community
- Micro Community
- Macro Community

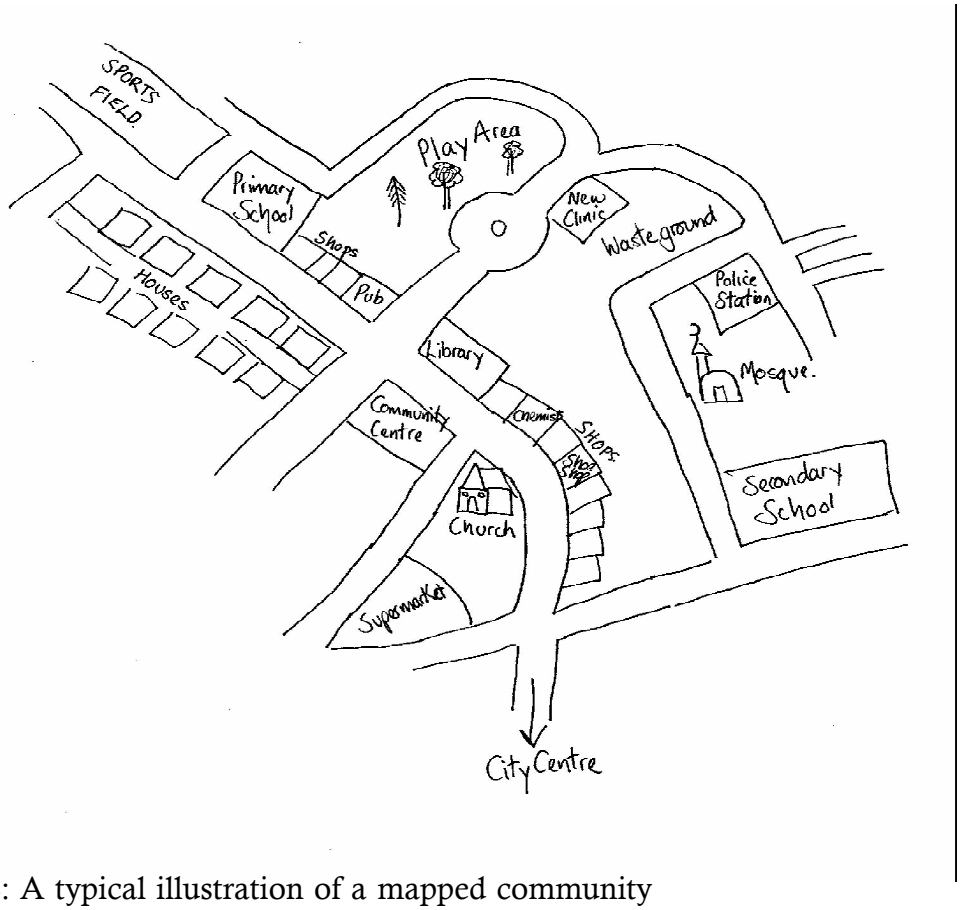


Fig. 8: A typical illustration of a mapped community

- Informal Community

A composition of a group of people linked by reason of natural existence or as a result of an 'unconscious' or 'involuntary' relationship of need or circumstance. For example family clans, sex groups, consumer of specific products, people associated by illness, etc.

- Formal Community

Group of People linked by reason of organised platforms that reinforces their interests and enhances the satisfaction of identified needs for sustainable human

existence. It is voluntary and 'consciously' developed. For example, Farmers Association, Myetti Allah Cattle Breeder Association.

- Micro Community

Refers to local communities constrained by 'space' or geographical boundary with political, cultural and social structures that determine their continued opportunity to interact and co-exist. These communities are quantified with size and population, e.g. Villages, towns, etc.

- Macro Community

Transcend geographical boundaries. Recognised by homogenous affiliation or interests. It forms a larger representation of a local community. For example, Fulani ethnic community in Togo, the Hausa ethnic group in the United States, Tiv Christian Women Community in Benin Republic.

Community Analysis

There is a revolving door which connects all categories of what constitutes a community. These categories interact with each other, shape and maintain the order prevalent in a community and Continually determine its existence and sustainability.

A community is a nerve centre which controls and influences how various categories of its components build up or motivate the interdependence of the elements that make up the community. These influences are not static but highly dynamic or 'fluid' based on the complexity of the human person who continually shapes and reshapes her/his social constructs based on prevailing environment/circumstances.

The various categories of a community represent a chain of interdependency while at the same time maintaining a self sustaining elixir that ensures its continued structure and existence.

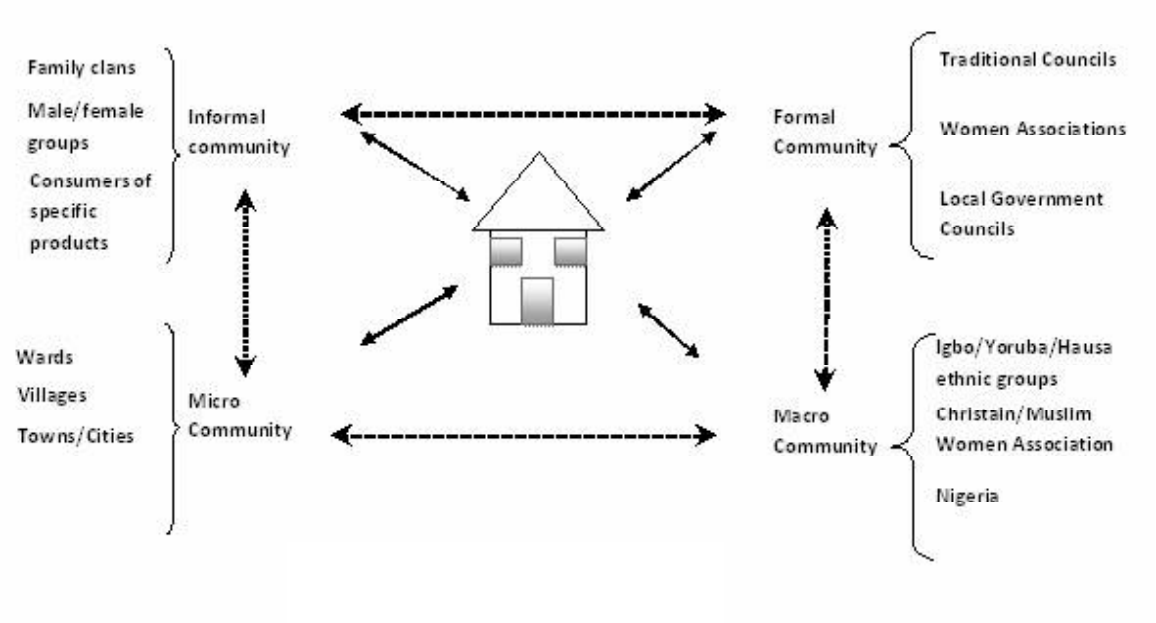


Fig. 9: An integrated framework of a community
Courtesy: WANEP-Nigeria

Session 3: Relationship Between Climate Change and Conflict

Trainers Guide/Tips for trainer

Step 1: Group Exercise

The trainer presents case study (Zang Zang Local Government) to facilitate a group exercise for the participants. Using identified communities the participants are divided into groups of at least four (4) participants each to brainstorm on solutions to the problem. Their response is written on a flipchart paper which is presented to plenary by a member of the group nominated to present it on their behalf. All the participants are encouraged to interact and share their comments and opinions on whether the suggested solutions are workable and why?

Step 2: Plenary

The Trainer engages the participants on vulnerability and hazard analysis caused by climate change. At the end of the plenary discussions, the trainer tests the knowledge of the participants on their understanding.

Step 3: Questions and Answers

The trainer provides opportunity for questions and answers from the participants.

Trainer's Handout

The Case Study of Zang Zang Local Government

The **Zang Zang Local Government** is a flourishing Local Government made up of four communities **Ako, Badi, Como** and **Dimi** communities. Each of the communities has an autonomous chief and has various unique resources which are valuable to all.

Ako community is known for its great springs and river which is home to rich resource of cat fish that forms the source of livelihood and trade with other three communities in the local government council. It is also a major source of drinking water for the other three communities who get supplies of drinking water and other essential needs from the Ako Community.

Badi community is known for rich arable land and hard working farmers who produce potatoes, yam, carrots, tomatoes and rice as the source of food for the other three communities in the local government. They also supply fodder to Como community to support their cattle rearing especially after harvest. The community is also home to large mahogany trees that are the source of firewood and wood for furniture and other domestic appliances for the 4 communities.

Como Community is known for cattle rearing. They are the source of beef and milk for themselves and the other 3 communities. The opportunity to graze in harvested farms of Badi community enables their cattle to provide dung as fertilizer to replenish the rich soil of Badi community.

Dimi Community is known as the trade centre in the local government. They provide the market for the sale of cattle, fish and vegetables from the three communities and other necessary products and services.

While Badi community borders with Ako community which makes it easy to get drinking water, Como and Dimi communities have to trek kilometres to get drinking water from Ako Community.

For the past five years, there has been growing concern by all the communities over the reducing rainfall which has been affecting harvest and drying up the rivers and springs in Ako community and the fishes are gradually diminishing. The trees in Badi are also disappearing due to high felling as result of higher demands. The Local Government Council Chairman says its as a result of an increasing population density in the local government. Two years ago the chief of Badi community reached an agreement with the Chief of Ako Community for an irrigation project which provided supply of irrigated water to the farms at Badi. With the presence of irrigated water, Como and Dimi communities border with Badi community found it easier and shorter to access water for their cattle and use.

However, last year, the Local community was hit by lack of rainfall which has caused the chief of Ako community to cut off the irrigation supply to Badi Community and put high taxes on the other three communities who come to river. This infuriated the Badi community as they were not informed before the irrigation agreement was suspended. In protest they have decided increase the price of their vegetables and woods also asked Como community to pay for the fodder for their cattle. The Como cattle rearers in anger started raiding their farms at night to get food for their cattle which increased tension and the threat of war between the two communities. The

Dimi community increased market taxes as well as the price of goods especially woods and vegetables which led to the protest by community members in all the four communities as cost of living sky rocketed. Also killings and fights over access to water in Ako community increased and the chief of Ako community has finally suspended other three communities from directly coming to get water from the river and contracted the local government tanker as the official source of water supply that will have access to its water and deal directly with the other three communities. In return como and badi communities have cut off all ties and relationship with Ako community and refused to deal with the water tankers from the local government council. The Badi community are worried over the increasing rate they are loosing arable soil to drought. They have also warned Dimi community from selling their products to Ako community until they come to their senses. The como community recently raised an alarm that their cattles are getting infected and dying from drinking water supply from Ako community. A recent case of cholera was recently reported in Ako community.

As a member of the each of the community identify the following that affect your community:

(a) Identify the causes of Conflict in your community.

(b) Can you identify extreme weather events in your community.

(c) How have the events contributed to conflict in the community.

(d) What are the relationships between conflict and climate change in your community.

Climate Change and Conflict

Conflicts arising from climate changes are from the existence of extreme weather event which influences competition for resources that triggers several level of violent conflict which impedes human security. The relationship existing between climate change and conflict looks at conditions influencing as well as generating conflict in the community. Specifically, extreme weather events such as water scarcity, droughts, and desertification fuels competition over land for grazing and farming.

When communities are faced with the challenges of climate or environmental threats, especially when they already suffer deprivations and exclusion, they are likely to resort to various levels of violent competition for scarce resources and conflict.[1]

Session 4: Interventions in Climate Change Induced Conflict

Trainers Guide/Tips for trainer

Step 1: Group Exercise

The trainer divides the participants into four groups and each group is expected to re-examine the case study on Zang Zang Local Government Council. Each group is then expected to present four options of addressing the problems identified for their community. The responses are written on a flipchart paper which is presented to plenary by a member of the group nominated to present it on their behalf at plenary. After the presentations, all participants are expected to discuss about the presentation on which ones are more effective and why?

Step 2: Plenary

The Trainer discusses general intervention strategies relating to climate change induced conflicts in a local environment. as well as developing resilience and coping mechanisms. Also conflict resolution mechanisms will be discussed. At the end of the plenary discussions, the trainer tests the knowledge of the participants on their understanding.

Step 3: Questions and Answers

The trainer provides opportunity for questions and answers from the participants.

Trainer's Note:

Dispute Resolution Spectrum for Climate related Conflicts

Where issues of environmental conflicts exist, there are always opportunities available for management, resolution and transformation of these conflicts. Affected communities only need to look critically and creatively inwards to identify available opportunities which will enable them reverse the negative trend and strengthen their resilience or coping mechanisms to these conflicts. Various options can include one or a combination of the following interventions:

(a) Negotiation

(b) Mediation

(c) Dialogue

(d) Consensus Building

(a) Negotiation

This is a process of making joint decisions when the persons or groups involved have different preferences. Negotiation is performed in two basic ways: Positional negotiation and principled negotiation.

Fig. 10: An Illustration of Negotiation
Courtesy: coachwithjeremy.com

Positional Negotiation: It refers to a competitive process in which parties make offers and counter offers which they feel will resolve the conflict. Positional negotiation start with parties making an offer which will maximise their benefit. Each party then attempts to draw the other into their bargaining range by using a series of counter offers and concessions. These exchanges of offers typically start to either converge on a solution which both parties find acceptable or, if parties reman far apart, bring them to an impasse (no agreement). This type of process tends to end in compromise, where gains and losses to both parties are shared half/half depending on the ability of the negotiator's position.

Principled Negotiation: This is designed for parties who have a need to create or maintain healthy relationships. In this process, parties discuss the issues which face them and express the interest, values and needs that they bring to the table. Instead

of focusing on competitive measure and winning the negotiation, parties collaborate by looking to create solutions which maximise the meeting of all parties' interest, values and needs. This cooperative process focuses parties away from their positions and onto using interests and objective criteria for making decisions.

(b) Mediation

Mediation is a form of alternative dispute resolution (ADR), which aims to assist two or more persons in dispute to reach an agreement. Whether an agreement results or not, and whatever the content of that agreement, if any, the parties themselves determine, rather than accepting something imposed by a third person. The dispute may involve states, organisations, communities, individuals or other representatives with a vested interest in outcome.

Mediators use appropriate techniques and/or skills to open and/or improve dialogue between disputants, aiming to help the parties reach an agreement (with concrete effects) on the disputed matter. Normally, all parties must view the mediator as impartial.[2]

Fig. 11: An Illustration of Mediation
Courtesy: Croydon Community Mediation

(c) Dialogue

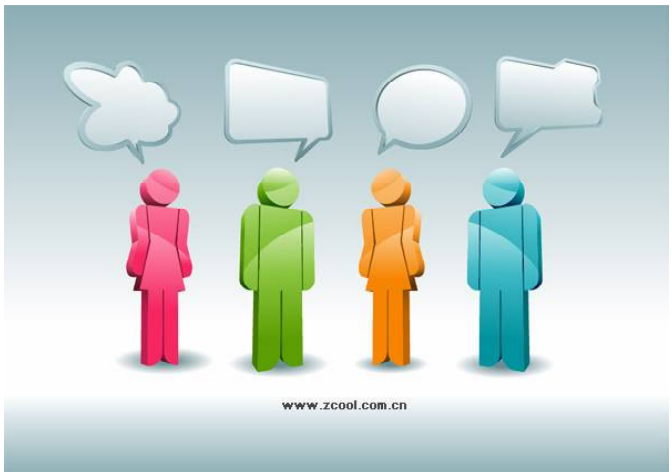


Fig. 12: An Illustration of Dialogue
Courtesy: www.zcool.com.cn

Dialogue is a tool to prevent violent conflict and build peace through quality conversation that facilitates the transformation of interpersonal relations and a shared understanding of complex problems. Dialogue processes can be organised or promoted in a wide range of areas. For example during or after a violent conflict or when there are subdued or emerging tensions. When initiating dialogue processes, transparency about their purpose is important. Dialogue processes have also been proven to be critical in building resilient societies.

(d) Consensus Building

Consensus means overwhelming agreement. And, it is important that consensus be the product of a good faith effort to meet the interests of all stakeholders. The key indicator of whether or not a consensus has been reached is that everyone agrees they can live with the final proposal; that is, after every effort has been made to meet any outstanding interests. Thus, consensus requires that someone frame a proposal after listening carefully to everyone's interests.

Most consensus building efforts set out to achieve unanimity. Along the way, however, it often becomes clear that there are holdouts-people who believe that their interests will be better served by remaining outside the emerging agreement. Should the rest of the group throw in the towel in such case? No, this would invite blackmail

(i.e. outrageous demands that have nothing to do with the issues under discussion). Though unanimity is the best option in consensus building, when this becomes impossible, overwhelming agreement that goes as far as meeting the interests of all stakeholders can be adopted. It is absolutely crucial that this definition of success be clear at the outset.[3]

Fig. 13: An Illustration of Consensus Building
Courtesy: crosscollaborate.com

It is not so much the design of dispute resolution mechanisms, but rather their clear definition, timely applicability and their ability to bind disputing parties to a settlement that ensures their contribution to the solution of conflicts in environment related conflicts.[4]

MODULE FOUR

Climate Change Adapation in Agriculture for Sustainable Livelihoods

Contents

- Session 1: Mapping risks and vulnerability to climate change in agriculture for sustainable livelihoods.
- Session 2: Adaptation in Agriculture and approaches to adaptation
- Session 3: Adaptation planning for resilient agriculture and sustainable livelihoods
- Session 4: Meeting the adaptation needs of the most vulnerable and other marginalised groups
- Session 5: Community Based Adaptation

Key Learning Objectives

At the end of this module participants will be able to:

- Understand climate change adaptation and sustainable livelihood in agriculture in their local context.
- Differentiate between coping, adaptation and mitigation.
- Identify, map and prioritise vulnerabilities and barriers to adaptation in agriculture.
- Address the different adaptation needs of vulnerable groups especially women.
- Prepare a community based adaptation plan.

Methodology

Brainstorm session,
Group exercise/discussion,
Participatory Vulnerability and Capacity Analysis (PVCA),
Pictures/illustrations, mapping, case studies, questions and answer.

Pre- and Post-Knowledge Assessment Questions

- What do you understand by adaptation to climate change in agriculture?
- Why are specific interventions/measures needed to adapt to changing weather patterns in agriculture?
- What are the past and current adaptation strategies that your community has been using to adapt to climate changes?
- Are these past/current adaptation measures enough to cope with future climate changes?

Time Guide: 6 hours

Key Points/Summary

This module is designed to help trainers understand climate change adaptation in agriculture and how effective adaptation planning an implementation can strengthen livelihoods.

Session 1: Mapping Risks and Vulnerabilities to Climate Change in Agriculture for Sustainable Livelihoods

Step 1: Interactive discussion

The Trainer explains the meaning and the 3 components of vulnerability via, exposure sensitivity and adaptive capacity of vulnerability and why vulnerability assessment is important for adaptation.

Step 2: Participatory Vulnerability and Capacity Assessment

The Trainer divides participants into 3 groups of farmers, fishers and pastoralist. Each group is to identify the impacts of climate change on their agriculture activities and production processes. Once this is done, the trainer should then introduce simple ranking tools to identify which of the impacts is most devastating to agricultural activities/production processes. Participants will be given 3 pebbles to vote for the 3 most devastating impacts. The impacts with the highest number of pebbles will be ranked the most devastating. After this exercise the trainer should then ask participants to answer the following questions based on the impacts/consequences identified. The responses of participants should be recorded on a flip chart:

- What are the consequences of these impacts on food security at the household and community levels.
- What negative effects will the impacts have on community members and their assets and resources?
- Who in the community will be affected the most by these impacts?
- Are there other multiple stresses in the agriculture environment that can increase vulnerabilities of agriculture and different population groups to these impacts?
- Are there any social protection initiatives either by the government or the community to help reduce these impacts?

Step 3: Brainstorming Session

Use brain storming session to elicit/generate a list of barriers to adaptation. Lead participants, to rank the barriers and assist them to identify the most devastating barriers to adaptation that should be addressed earliest. Discuss possible solutions to overcoming the barriers identified.

From the list of barriers generated, probe participants further, to elicit barriers that are peculiar to men, women, youths and other socially vulnerable groups as a result of their different roles and responsibilities in agriculture and the society. For instance women do not own land in many cultures. It will be important to understand how this lack of ownership increases vulnerabilities of women and hinder their adaptation.

Trainers Note

The total agricultural sector including, crop husbandry, livestock farming and fishing is extremely vulnerable to the impacts of climate change. The devastating impacts of climate change such as floods, soil erosion, leading to crop failures plus existing multiple stress in the agricultural environment is increasingly exposing agriculture to the impacts of climate change.

PATICIPATORY METHODS A ND TOOLS	PURPOSE
Risk map	Locate the occurrence of extreme events and of human exposure to it
Venn diagram	Visulaize how different institutions interact with each other (facing a certain risk)
Transect walk	Walk through a community to see its vulnerability by example
Cropping calendar	Visualize the crop statges during a year of the important crop
Hazard calendar	Visualize the period when specific natural hazards become prevalent
Climate risk calendar	Visualize when phases of prevalent hazards create high risk for specific crops
Problem tree	Simplify the multi causality of a problem and visualize its roots and its effects
Matrix ranking	Order the risk known in a community to allocate resources by severity

Source: E-learning Tool- Planning for community based adaptation http://www.webgeo.de/fw_22/

Mapping risk and vulnerabilities in the agricultural environment will entail identifying the risks and vulnerabilities of agricultural production activities to the impacts of climate change and their impacts on lives and livelihood. In mapping risks it is also of utmost importance to analyse the changing risk pattern by reviewing

the past impacts of climate change with current impacts and compare with likely future risk. This analysis will help develop adaptation strategy that addresses current risk with strategic focus on future risk reduction. There are different tools and methods by which risk and vulnerabilities can be mapped the following participatory tools and methods can be very useful when trainers are training community members. Trainers can use any of the listed tools depending on the relevant information they want to elicit from the community to inform adaptation planning.

What is a Hazard?

A Hazard is a physical or human made event that can potentially trigger a disaster. Examples include floods, drought, economic collapse and war. These physical events need not necessarily result in disaster.

Fig. 14: A typical environment affected by drought
Courtesy: newsimg.bbc.co.uk

Vulnerability is the degree to which a system/community/ farmer is susceptible to, or unable to cope with, adverse effects of climate change, including climate variability and extremes. Vulnerability is a function of the character, magnitude, and rate of climate variation to which a system is exposed, its sensitivity, and its adaptive capacity.

Fig. 15: A typical example of vulnerability

Categories of Vulnerabilities

Physical/material vulnerability

- Disaster prone location of community.
- Lack of access and control over means of production.
- Lack of adequate skills.
- Over exploited natural resources.
- Exposure to violence.

Social/organisational vulnerability

- Weak family/kinship structure
- Lack of leadership, initiative, organisational structures
- Ineffective decision making processes
- Rumours, divisions, conflict, ethnic.

Motivational/attitudinal

- Negative attitude toward change
- Passivity, hopelessness, dependence
- Lack of initiative
- Lack of unity
- Negative beliefs/ideologies

Vulnerability Assessment

This is the process of estimating the susceptibility of elements at risk to various hazards and analysing the root causes which place these elements at a risk. The assessment takes into account the physical, geographical, economic, social, political and psychological factors, which causes people to be particularly exposed to the dangers of a given hazard while others are relatively protected.[1] Vulnerability assessment should be able to identify the main threat or hazard in an environment.

Step to Risk Assessment

(1) What threats, risk or hazard have there been till now; map threats and incidents; try to see trend.

(2) Threat pattern analysis; exactly what has happened and why.

(3) What threat may be in the future.

- Will known threats increase
- What are new threats?
- Will they impact on individual and the community?

(4) Community Vulnerability/risk analysis

- What is our exposure to these hazards? Who, why, where
- Impact is who and what is affected and how badly
- Risk is impact times likelihood
- Level of exposure, i.e length of time and frequency

(5) Risk Mapping and Actor mapping

- Visuals help both for briefings and assessment
- Think about using the environment/community map and showing past or possible future threats/risk
- Think about creating a map/matrix of different" actors" in a threat
- This can be use to see what links need to be lessened/strengthened to for support and to be able to be able to triangulate information.

Definition of risk: Risk refers to the expected or anticipated losses (lives lost, people injured, property damaged, and economic activities or livelihoods disrupted) from the impact of a given hazard on a given element at risk over a specific period of time.

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

Exposure is often treated as a geographical matter but can be extended to who is exposed and why they are exposed.

Adaptive capacity (in relation to climate change impacts): The ability of a system to adjust to *climate change*, (including *climate variability* and extremes) to moderate potential damages, to take advantage of opportunities, or to cope with the consequences.

Session Two: Adaptation in Agriculture and Approaches to Adaptation

Time Guide

Step 1: Group Exercise

The trainer divides participants into 3 groups of farmers, fishers and pastoralists and gives each group a flip chart and a marker. Trainer then asks each group to identify the impacts of climate change on their agricultural activities, the current measures being adopted to cope with the hazards and how effective are the coping measures. Trainer should ensure that coping strategies of women and men are captured distinctly to elicit the gender differentiated coping strategies. After the group work, the trainer asks each group to present their work.

Step 2 Plenary Discussion

Trainer facilitates an open discussion on the various coping strategies identified by each group to probe the reasons for the coping measures adopted. Trainer should also help participants to identify coping strategies adopted by men and women.

The trainer then introduces the concept of climate change adaptation, why adaptation is inevitable and the various stages and approaches to adaptation.

Trainer also explains adaptation and links same to agriculture, food security, poverty reduction and sustainable livelihoods of local people. Explain why adaptation needs to take account of issues of the poor, the marginalised and the most vulnerable, especially women and youth

Trainers Note

The impact of climate change poses a significant risk to food security and sustainable livelihoods of current and future generations in many places. The over accumulation of Greenhouse gases in the atmosphere during the industrial revolution in the developing world has made some level of climate changes inevitable even if the most stringent efforts are made to mitigate the effects of climate change. Adaptation is one of the responses to climate change; it is the opposite of vulnerability. It a process by which strategies to moderate, cope with or take advantages of climatic events is enhanced, developed and implemented.

Adaptation depends greatly on the adaptive capacity or adaptability of an affected system, region, or community to cope with the impacts and risks of climate change. The adaptive capacity of communities is determined by their socioeconomic characteristics. Enhancement of adaptive capacity represents a practical means of coping with changes and uncertainties in climate, including variability and extremes. The purpose of adaptation is to reduce exposure, decrease sensitivity and increase adaptive capacity while the outcomes expected from adaptation is resilience. Climate change adaptation in agriculture will therefore mean to reduce the exposure, decrease sensitivity of agricultural processes and activities to the impacts of climate change in order to secure livelihoods and ensure food production under a changing climate.

There are three major approaches to adaptation

Anticipatory adaptation: This is adaptation that takes place before impacts of climate change are observed.

Autonomous Adaptation: Adaptation that does not constitute a conscious response to climatic stimuli but is triggered by ecological changes in natural systems and by market or welfare changes in human systems.

Planned adaptation: Adaptation that is the result of a deliberate policy decision, based on an awareness that conditions have changed or are about to change and that action is required to return to, maintain, or achieve a desired state (IPCCC 4th report).

It must be noted that local people have been adapting to climate change. Adaptation should therefore be seen as consistent with existing and ongoing communities coping strategies rather than a new methodology that requires a radical transformation.

Definition of coping and Adaptation

The Oxford English Dictionary defines coping as "the action or process of overcoming a problem or difficulty" or "managing or enduring a stressful situation or condition", and adapting as "rendering suitable,modifying".

Coping is a "way of responding to an experienced impact with a shorter-term vision (for example, one season), and adaptation is the process of adjusting to change (both experienced and expected), which is longer term (for example, over a decade or longer).

Differences between Coping and Adaptation

COPING	ADAPTATION
Short-term and immediate	Practices and results are sustained
Oriented towards survival	Oriented towards longer-term livelihood security
Not continuous	A continuous process
Motivated by crisis; reactive	Involves planning
Often degrades the resource base	Uses resources efficiently and sustainably
Prompted by a lack of alternatives	Focused on finding alternatives
	Combines old and new strategies and knowledge

Session 3: Adaptation Planning for Resilient Agriculture and Sustainable Livelihoods

Time Guide

Step 1: Group Exercise

Maintain the 3 groups of farmers, fishers and pastoralists; ask them to use the table and matrix generated during the PVCA (Step 2 above) to come up with adaptation plans suitable for the 3 agricultural sectors of focus.

Step 2: Plenary discussions

Trainer discusses the various plans generated after the group discussion and introduces the concept of adaptation planning to the participants. Explain the purpose and the importance of planning for adaptation at the community level and how adaptation planning in agriculture can promote resilient agriculture and sustainable livelihoods. Emphasise the importance of taking account of issues and concerns of the poor, socially vulnerable and excluded groups in adaptation planning.

Trainers Note

Resilience

Resilience is the capacity for positive adaptation despite adversity. It is the *capacity of a system, community or society potentially exposed to hazards to adapt, by resisting or changing in order to reach and maintain an acceptable level of functioning and structure.*

This is determined by the degree to which the social system is capable of organising itself to increase its capacity for learning from past disasters for better future protection and to improve risk reduction measures. (UN/ISDR, 2004).

In order to plan for adaptation it is important to know the likely direction of and magnitude of climate change impacts. Addressing future anticipated risks while including current risk and vulnerabilities is the bases for adaptation planning.

> CLIMATE – SMART AGRICULTURE: Climate smart agriculture is defined as agriculture that sustainably increases productivity and resilience (Adaptation), reduces/remove green house gases (GHG) (mitigation), and supports achievement of national food security and development goals.

Food security and climate change are addressed together by transforming agriculture and adopting practices that are "climate smart", i.e. that increase productivity and resilience while reducing or removing greenhouse gases. Some of the approaches include changing or improving management of farming practices such as agroecology, conservation agriculture, low emission rice production, livestock efficiency and resiliency and agroforestry among others agroecology can contribute to the realisation of the right to food and to broader economic development".

Source: Enhancing women's Leadership to address the challenges of climate change on Nutrition Security and health.

Making agriculture resilient to the impacts of climate change will mean adopting climate smart agriculture practices through, adopting drought tolerant crops, integration of tree and crop cultivation, provision of extension services that promote better crop diversity and policies that prioritises the training of men and women in methods of increasing productivity through development of nurseries, proper site selection and land preparation.

Practical adaptation measures for different agricultural groups

Suggested Adaptation Measures by Fishermen/women:

- Improved fishing practices, e.g. use of pipes and wire barricades.
- Not building on sloppy land/gradients to avoid flooding and subsequent loss of stock.
- Exploring simple, local storage systems to avoid wastage.
- Adaptation Measures by Crop Farmers.
- Practicing mixed farming and/or crop rotation.
- Improving storage facilities.
- Minimising tillage.

Adaptation Measures by Pastoralists

- Exploring alternative sources of feed.
- Establishing links with relevant veterinary and agricultural extension workers.
- Agricultural education training create much needed awareness about benefits

and facilities for farmers and is an important part of adaptation for all types of farmers.

Barriers to Adaptation

There exist multiple stresses in the agricultural environment which tend to increase the vulnerability of agriculture and different population groups to climate changes. For instance in the case of small scale farming stresses such as lack of infrastructure, inadequate water supply, storage facility, increase in fuel price, and change in economic policy are but some of the stresses which continue to make agriculture more vulnerable to the impacts of climate change. The multiple stresses which exist for women in the agricultural sector are limited access to land and extension services and general poverty. The interaction of impacts of climate change on agriculture coupled with existing barriers in the agricultural sector could pose serious challenge to food, nutrition, health and livelihood security. For example, the risk of crop failure and livestock destruction as a result of climate change especially with regards to small scale faming could hinder household access to sufficient, safe and adequate food and nutrition. This may in turn impact on maternal and child care and feeding practices which can undermine peoples resilience to climate change. Mapping risks and vulnerabilities will enable adequate and effective planning for adaptation.

There are also barriers which can hinder adaptation, some of which are: difficulties associated with changing individuals'/communities' behavior/attitude and ingrained cultural practices, limited access to credit, limited access to climate information, and conflict over natural resources etc.

Addressing Barriers to Adaptation

- Attitude and behavioral change which can be addressed by enlightenment and advocacy in the form of door to door advocacy, radio jingle, television, phone in radio/television programs and community dialogue. It is becomes more effective to address behavioural challenges through the traditional/religious heads which should be situated in the context of the community.
- Practical demonstration by setting examples and role play. Confidence and trust building.
- Adaptation should be community led and initiated at the grassroot level.

Session 4: Meeting the Adaptation Needs of the Most Vulnerable and Other Marginalised Groups

Time Guide

Step 1: Questions and answers

The trainer ask participants to mention/list out the most vulnerable, marginalised and socially excluded groups that are most vulnerable to climate change impacts. Write out responses on a flip chart with the reasons for such identification

Step 2: Brainstorming session

Refer to the vulnerable groups and other marginalised groups identified. Recall also the adaptation options peculiar to these groups and discuss how to meet their peculiar adaptation needs.

Step 3: Group Exercise

The trainer divides participants into groups to identify the vulnerable groups, reason(s) for their vulnerability and suggest ways of adaptation for the different groups using the gendered Approach case study below,

Trainers Note

Vulnerable groups and peoples include those who are traditionally disadvantaged, marginalised, excluded or lacks the voice and power due to , gender, age, disability, ethnicity, geography and other identities. They are disproportionably among the poorest and are often victims of violence, exploitation, trafficking, discrimination and other abuses. The most vulnerable groups and peoples not only lack opportunities and resources to participate in decision-making processes but also are often invisible in state and national statistics and are therefore ignored by policy-makers. While access to social services expands, the coverage remains uneven and often excludes the most vulnerable.

Gender and adaptation in agriculture

Gender-based vulnerability does not derive from a single factor, but reflects historically and culturally specific patterns of relations in social institutions, culture, and personal lives (Enarson, 1998). Women's historic disadvantages – their limited

access to resources, restricted rights, and a muted voice in shaping decisions – make them highly vulnerable to climate change (UNDP Human Development Report, 2007). Both women and men are affected by climate change but existing inequalities determine who is most impacted by natural disasters.

Source: www. artsrn.ualberta.ca

Women and men play different roles in agriculture and are also differently affected by the impacts of climate change on agriculture. Some of the differentiated roles of women in the agricultural sector include women produce most of the household food such as vegetables and subsistence grains while men produce cash crops such as coffee and livestock. Women in Nigeria are amongst the poorest of the populace, lacking access to land, suffer systemic social and political discrimination and are physically vulnerable to gender based violence.

In the agricultural environment women are overrepresented in small scale farming due to the fact that women are more vulnerable, women's participation in climate change adaptation initiatives is critical.

A GENDERED APPROACH TO ADAPTATION IN AGRICULTURE THE CASE STUDY OF AKWA ESUK EYAMBA, COMMUNITY, in Akpabuyo Local Government area (LGA) Cross River State NIGERIA.

The Akwa Esuk Eyamba community in Akpabuyo Local Government Area (LGA) of Cross River State is a coastal community where fishing is the main livelihood for both men and women. However, the viability of this livelihood is in decline as a result of rapid depletion of the fishery due to several changes, some of which are climate change related.

A local organisation, Coastal Life Initiative (COLIN), works with this community and identified women and children as the most affected by changes in the fishery. For generations, the men have done the fishing while the women take the catch to the market. Now, this is changing because the catch is so low, compared to how it was seven to ten years ago. One reason for the reduced catch is the increase of sea surges into the community estuaries. Salt water intrusion into a fresh water ecosystem has adverse effects on the aquatic biodiversity. Other reasons, which are unrelated to climate change, include increased fishing pressure with higher local population growth and unsustainable fishing methods, which the local communities in the area are tryingto address.

The women and children are most vulnerable to this situation because women depend almost entirely on fish as a means of income to support themselves and their family's basic needs. Some farming is also done but the viability of agriculture has also affected by flooding due to sea level rise and storm surges along the coast. In terms of food security, fish is traditionally the main source of protein so, in addition to loss of an important livelihood, the health of women and children are also compromised. The men are not as vulnerable since they tend to migrate to neighbouring communities away from the coast to engage in hired farm labour, palm fruit harvesting, firewood marketing (logging) as well as delivering fresh water with their boats to distant fishing communities to sell. The women have no such alternatives and experience a double burden when the men leave, as they are left to manage the household challenges alone.

After extensive consultation with community members, a decision was taken to start a fish farm as an alternative means of livelihood. The women decided

that income from aquaculture would benefit them the most, and they contributed their local knowledge to choosing the site for the pond by detecting flood-prone areas.

A committee made up of men and women leaders in the community was established to manage the operations and proceeds from the fish farm. The agreement is that the women will engage actively in the purchase and retailing of the fish, which they will buy from the men who fish from the pond. This pilot project, funded through the BNRCC project, is testing aquaculture in the community and will measure how the women and men as well as boys and girls benefit.

Source: Gender and Climate Change Adaptation: Tools for Community –Level Action in Nigeria. Prepared by Nigerian Environmental study / Action Team(Nest) page 15 http://nigeriaclimatechange.org/BNRCCgenderFINAL.pdf assed on 17 October 2013.

The Poor and the Marginalised Population

Poor and marginalised people are vulnerable to climate change because of a number of factors that frequently occur in combination: they depend on subsistence or small scale farming livelihoods that are susceptible to climate variation; they have inadequate or poorly maintained infrastructure; they have few assets and little to fall back on when crisis occurs. Usually, they have poor access to new knowledge or opportunities for learning new skills and they tend to have poor access to and influence over the institutions and policies that control resources. Until climate change began to overpower their coping mechanisms, poor and marginalised communities have shown an ability continuously to cope with changing circumstances, using their own capabilities, skills, knowledge and technologies.

It has also been found that the vulnerability and capacity of a social group to adapt or change depends greatly on their assets. Next to their physical location, the vulnerable group's assets such as resources and land, knowledge, technology, power, decision-making potential, education, health care and food have been identified as determinant factors of vulnerability and adaptive capacity. As pointed out by Moser and Satterthwaite (2008), the more assets people have, the less vulnerable they are and the greater the erosion of people's assets, the greater their insecurity. Experience

with programmes of community based adaptation shows that peoples can adapt to additional challenges when appropriate support is provided.

Addressing the needs of vulnerable communities and people involves

- Strengthening their capacity to identify risks, to assess vulnerabilities and sources of resilience.
- Women should be trained on conserving the soil and water, building embankments to avoid floods and by doing more non-agricultural work.
- Training farmers – many who are illiterate women – on how to use natural resources and new agro-forestry techniques that help them adapt to the changing climate.
- Most health consequences of climate change will be adverse. Small scale farmer become vulnerable vis-a-vis quick access to health care services. Provision of quick access to health care services would be key.

Session 5: Community Based Adaptation

Time Guide

Step 1: Interactive discussion

Trainer asks participants the meaning of community-based adaptation and records the responses on a flip chart. Trainer facilitates an interactive session to discuss the various responses of participants recorded on the flip chart.

Step 2: Plenary discussion

Trainer discusses the concept of community based adaptation and its relevance to climate change adaptation. Trainer also explains the steps to CBA preparation and planning.

Trainers Note

The roles and context of each community differs which makes it important to understand the peculiarities and realities of issues with respect to responses and coping mechanisms to the impact of climate change. Community-based adaptation to climate change is a community-led process, based on communities' priorities, needs, knowledge, and capacities, which should empower people to plan for and cope with the impacts of climate change. Community based adaptation builds the resilience of communities and ecosystems upon which they rely in the face of climate change (http://www.webgeo.de/fw_18/).

The essence of community based adaptation is that people should be at the centre of development. The whole community is brought together to map out and understand the issues on ground to chart a way forward and have a common knowledge on issues that affect them. It is important to use participatory tools, never underestimate the power of indigenous knowledge because of the variability in the contextual issues in different community.

CBA is based on the premise that local communities have the skills, experience, knowledge and networks to undertake locally appropriate activities to increase resilience.

CBA

- is identified as an effective mechanism for development, research and policy

where adaptive capacity is linked with livelihood opportunities;

- generates adaptation strategies through participatory processes involving local stakeholders;
- builds on existing cultural norms and addresses local development issues that underlie vulnerabilities.

CBA draws on participatory disaster risk reduction approaches, livelihood, local gender roles and more recently social protection. There are various models of community based adaptation depending on the peculiarity of the community. Since CBA is a community led process each community is better placed to come up with its own community based adaptation plans based on its risk and vulnerability assessments.

An illustration of a group of people planning together
Source: www.featurepics.com

Adaptive Capacity refers to "the whole of capabilities, resources and institutions of a community to make adjustments to decrease its vulnerabilities, moderate damages,

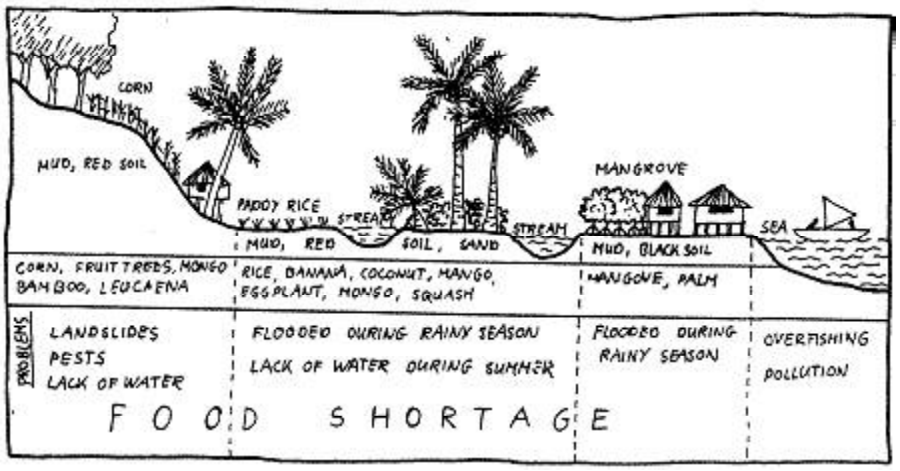
take advantages of opportunities and cope with changes" (adapted from IPCC, 2007).

Adaptation = the outcome of the use of different adaptive capacities.

Community Based Adaptation Planning

Goal is to draw out and act upon vulnerabilities and capacities by using participatory tools and community action planning. Some of the participatory tools include:

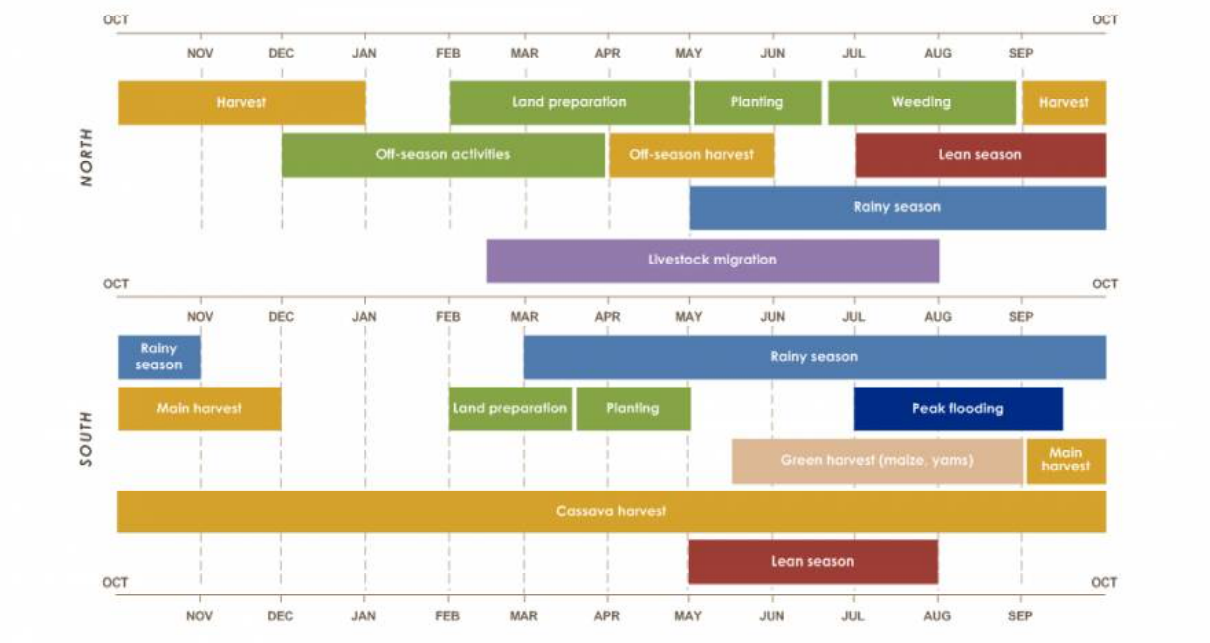
- Hazard map
- Transect walk



Picture of a transect walk source: www.adpc.net

- Source-hazard tree (problem tree) root: (causes of hazard), trunk (hazard), branches/fruits (effects of the hazard).

- Seasonal Calendar.



Picture of a typical seasonal calendar, source: www.fews.net

Community Action Planning

- Planning of 'adaptation' activities in communities.
- Support by local authorities for activities.

Selection, Evaluation and Prioritisation of Adaptation Practices

- Prioritisation/select adaptation options for field testing.
- Develop variable Adaption options.
- Collate local, introduced and improved adaptation options.
- Synthesise into potentially suitable adaptation options for location specific conditions.
- Validate adaptation options.

Sample Illustration of How Current and Future Climate Risks Can Be Managed Through Adaptation Options

Current risks	Future trend	Anticipated impacts	Adaptation practice	Relevance to livelihood asset development
Traditional ponds have lost their full water storage capacity	High intensity rainfall and heavy erosion may aggravate the risk	Lack of water for fish cultivation and supplemental irrigation	Re-excavation of traditional ponds	Improved water storage facilities; water available during dry season
Improper water control structures and excessive rain water loss	Increased rainfall intensity; loss of excessive rain water	Excessive run-off, soil erosion and uncontrolled water flow may cause localized inundation	Building of water control structures; check dams across the water ways	Increased access to community water resources and reduced health risks from stagnant water

Communities Cannot Do it Alone

- Integration of plans at different levels
- Integration into (local) development programs
- Cooperation between stakeholders and the creation of networks

Integration of Plans at Different Levels

- Policies are enabling environment for local level adaptation.
- Important role for local government.
- Role of communities in monitoring and evaluation.

MODULE FIVE

Stakeholders in Climate Change Adaption in Agriculture

Contents

Session 1: Identifying the actors and institutions

Session 2: Stakeholders Analysis

Session 3: Networking

Session 4: Skills for community Advocacy and Mobilisation

Key Learning Objectives

At the end of the session, participants will be able to:

- Identify relevant stakeholders in climate change adaptation in agriculture;
- Identify the roles and responsibilities of stakeholders in climate change adaptation;
- link the various stakeholder interests and expectations;
- Understand the essence of networking and information sharing;
- Gain skills for community advocacy and mobilisation.

Methodology

- Pictures
- Group discussion
- Brainstorming
- Ice breaker or Energisers
- Observing good practice
- Mapping
- Mini Lecture

Pre and Post knowledge Assessment Questions

1. What do you understand by stakeholders in climate change adaptation?

2. Name persons and institutions within your state that you consider as stakeholders of climate change and agriculture?
3. Is it necessary for you to work together for climate change adaptation towards food security?
4. How can stakeholders work together?
5. What is your understanding of advocacy and mobilisation and its relevance to climate change adaptation in agriculture?

Time Guide: 4 hours

Key Points/Summary of the Module

The module seeks to help the participants in identifying relevant stakeholders in climate change adaptation in agriculture for improved support and access to information on adaptation. The essence of networking is for possible joint activities and to organise themselves in such a way that they maintain their individual autonomy. Advocacy and mobilisation treated in this module, helps the stakeholders work together in a social change process to build resilience and prevention/mitigation of agro producers' conflict towards food security in their states.

Session 1: Identifying Stakeholders

Time Guide: 60 mins

Tips for Trainer

Step 1: Brainstorm

Trainer facilitates an opening brainstorm exercise by asking the participants to define what stakeholder means to them individually. Answers given are written on a flip chart and the participants are asked to assess their understanding what actors and institutions in climate change adaptation for agriculture. Trainer then gives a brief definition of the broad meaning of stakeholder.

Step 2: Group Exercise

Participants are divided into groups of not more than 6 persons each to answer the questions below. Each group nominates a representative to present the group work in a flip chart paper at a plenary.

(1) List possible stakeholders

(2) Suggest what you think are their roles and responsibilities

(3) List their possible interests

Step 3: Plenary Discussion

The trainer discusses issues raised from the group exercise and comments will be made in agreement or questions asked for clarification.

Step 4: Mini Lecture

The trainer presents a detailed explanation of the meaning of stakeholders (positive or negative) in the critical issues of food security in the state? Who is most affected by the problems or issues arising from climate change? Who is concerned? Who may have different views in relation to the climate change adaptation? who are the opinion leaders within the state? Who is best able to help reduce the impact of climate change in agriculture? Is there a person who could "champion" the cause?

Trainers Note

Definition of Stakeholder

A "stakeholder" is any person or organisation that is actively involved in a project, or whose interests may be affected positively or negatively by the execution of a project. Not all stakeholders in a particular group or sub-group will necessarily share the same concerns or have unified opinions or priorities. Potential stakeholders include but are not limited to:

Professional associations
Government regulatory agencies
Investors/Shareholders
Labour unions
Local communities
Traditional representatives, such as village headmen or tribal leaders
Leaders of local cooperatives
Community-based organisations
Farmer associations/groups
Local NGOs
Politicians and local government officials
School teachers
Religious leaders.

It is important to note that although some identified stakeholders may not actually require any communications, those stakeholders should be identified. When identifying stakeholders and rating their level of interest and involvement in the project, it will become important to use some sort of a tool – a rating scale, an influence diagram, or a chart form to identify the level of power, influence, interest, or impact that the stakeholder may have on the project.

Note

(1) A stakeholder is any person or organisation that is actively involved in a projected action, or whose interests may be affected positively or negatively.

(2) Stakeholder analysis is necessary to determine each stakeholder's interest, influence, participation, and expectations.

Pictorial representation of stakeholders

By Rachel Thompson

Session 2: Stakeholders Analysis

Steps 1: Interactive Discussion

The trainer presents a picture from a multi-media projector (where available) or make a graphic drawing of a group of people on a flip chart paper and ask participants of their individual impression or what they can deduce from the picture. Their responses are written on a flip chat and notes are compared to see participants' ideas of stakeholders' analysis.

Step 2: Group Exercise

The trainer discusses the importance of stakeholders' analysis after actors and institutions have been identified. The trainer introduces the stakeholders' analysis chart and explains the importance of the chart. The participants are then group into three (crop, fish and livestock farmers) to enable them complete the chart. The potential areas of agreement and shared interest(s) upon which consensus and collaboration should be will be highlighted. Each group will make a presentation of their group work.

Step 3: Stakeholders Mapping

The trainer randomly picks participants or asks for volunteers. Ask them to draw circles on the flip chart paper to represent each actor or institution identified according to their power and interest and relationship. The trainer then brainstorm with participants on the map and how it relates to their activities.

Trainers Note

It is not practical, and usually not necessary, to engage with all actors and institutions also known as stakeholder groups with the same level of intensity all of the time. Being strategic and clear as to whom you are engaging with and why, can help save both time and money. This requires prioritising the stakeholders, depending on who they are, their interests, and the most appropriate ways to engage them. Stakeholder analysis should assist in this prioritisation. It is important to keep in mind that the issue of climate change is an emerging issue with its levels of misunderstanding and that both stakeholders and their interests might change over time, in terms of level of relevance to agriculture and the need to actively engage at various stages. When prioritising, it might be helpful to consider what type of stakeholder engagement is useful in climate change adaptation in agriculture.

The table below will help participants easily list out every stakeholder relevant to climate change adaptation in agriculture.

Stakeholders analysis chart

STAKE-HOLDER (List Identified Stakeholders)	Affiliation	Location	Reasons Identified	Expectations	Possible Contributions	Goal of Working Together	Benefit of Participation	Involvement

Outcomes of a stakeholder identification and analysis exercise

Exercises in stakeholder identification and analysis provide early and essential information about:

- The individuals, groups and institutions that will be affected by and should benefit from climate change adaptation in agriculture;
- The capacities that these individuals, groups and institutions possess;
- The people, organisations and institutions who could influence, and contribute to, the planning and management processes;
- The past, current and potential relationships between people and natural resources; and

- The current and potential resource use and management conflicts.

In all development processes, not just in climate change adaptation in agriculture, there is a need to understand the reality and the complexity of interests and relations, evaluate and predict impacts, and assess human capacity. It is pertinent to note that *stakeholders change over time*. New stakeholders can enter a circle, while others may lose their role or interest.

Primary and secondary stakeholders

The literature on stakeholder analysis frequently makes the distinction between *primary* and *secondary* stakeholders. This difference within the agro producers and small scale farmers in climate change adaptation in agriculture comes from the field of work, where it can indeed be helpful to distinguish between those who will be directly affected by impacts of climate change, and those who are only peripheral to that impact.

Relationships between and among people and climate change adaptation in agriculture tend to be changing and complex, so fitting stakeholders in one of these two categories runs the risk of marginalising some of the stakeholders and could exclude less obvious, powerless and voiceless groups like women.

Assessing stakeholder rights and responsibilities

One of the critical perspectives that may need to be considered in a process of stakeholder analysis is that of the *rights* and the *responsibilities* of the stakeholders. Analysing stakeholders may bring to the fore the varied demands and expectations of a range of stakeholders. It also helps to rank the interests of the various stakeholders.

Stakeholders' mapping

Stakeholders mapping is to prioritise the identified actors and institutions by power and interest, and to plot relationships. Mapping helps to understand the situation better and see clearly the relationship between actors and clarify where power lies. A stakeholder mapping analysis can provide useful material for a description of the relationships between stakeholders, looking at functions, influence, significance and the quality of these relationships.

Analysing power and power relations

Another perspective that is important in stakeholder analysis is that of *power* and

power relations. This is particularly critical for two reasons. First, it provides an understanding of some of the principal factors of inequity in resource use, access and distribution. Who makes the rules? In whose favour? Who has the political, financial, technical or cultural capital needed to control access and use? Who has influence and voices? Which groups have the ability to represent their interests better than others, to articulate their claims more forcefully than others? Who is likely to be opposed to the introduction of fairer and more transparent rules of decision-making?

A stakeholder analysis exercise will aim at answering questions such as:

- What are the current and future interests of the various stakeholders in agriculture?
- What are their needs and expectations?
- How do they use the resource and what benefits do they derive?
- What are their past and current power, rights and responsibilities, both formal and informal?
- What are the networks and institutions of which they are part?
- What are the social and environmental impacts, both positive and negative, of their past and current uses of and relationships?
- How ready and willing are they to respond to issues of climate change?
- What are the potential areas of agreement and shared interest, upon which consensus and collaboration can be developed?
- What are the human, technical and financial resources that they are prepared to contribute to climate change adaptation?

Session 3: Networking

Steps 1: Brainstorm

The trainer writes the word NETWORKING on the flip chart at the beginning of the session and asks participants what is networking? Individual responses should be written on a flip chart paper by the trainer as participants' volunteer answers. The trainer highlights what networking is all about and how it could be useful in climate change adaptation in agriculture.

Step 2: Plenary Discussions

The trainer discusses the concept of network which includes definition, types, elements, purpose, how to form and maintain; and it can be effectively used for information sharing in climate change adaptation in agriculture.

Step 3: Observing Good Practice

The trainer asks participants to share experiences of existing networks in their community highlighting the elements and benefits of networking to climate change adaptation in agriculture. A typical example that participants can relate with should be used in emphasising the suggested points.

Trainers Note

A network is any group of individuals or organisations who, on a voluntary basis, exchange information or undertakes joint activities and who organise themselves in such a way that their individual autonomy remains intact (Paul Starkey, IFRTD, 1998:2).

Networking builds links and connections among people who have different perspectives – different takes on the world they see. When they start communicating about those perspectives, opportunities to discover new insights, new ideas and to shape new approaches come to life. Networking can be approached as a way of measuring what happens in development projects – such as the Outcome Mapping approach to programme evaluation – or as a development activity in its own right, an intervention that can benefit from evaluation and analysis to distill lessons and document learning.

Effective networking does not happen automatically . . . networks that work well are very carefully, deliberately and consciously built and managed. Networking therefore stands for the following:

- A process of acquiring resources and building power by using or creating linkages between 2 or more individuals, groups or organisations;
- Establishing, maintaining and fostering relationship with persons or groups who share common values, interests or needs that leads to the satisfaction of personal/group goals or objectives;
- The composition of individuals or organisations that share information, ideas and resources to accomplish individual or group goals.

Elements of Networking

Three elements therefore become key in developing a Network:

- A common cause to address an issue
- An organisation (A structure)
- An Identity (a mark that makes them different from others)

Purpose of Networking

The primary objective of networks as well as their design and degree of formalisation may differ and may also change over time. But independent of how they are organised, networks always tend to be [or become] exclusive. They summon a group of people or organisations that share certain values and/or objectives. They arise out of a need to gain access to power, finance, information and anything else that is relevant to their constituencies. They depend on inputs and contributions from all their members.

The following are the purposes of networks:

- To work as a forum of updating issues
- To furnish member organisations with new ideas
- To pull together meagre resources
- To facilitate the use of resources
- To build capacity of members in achieving benefit
- To protect smaller organisations in the group
- To create bigger recognition

- To provide framework for carrying out activities
- To have systematic mechanism of strengthening relations
- To build a strong front for advocacy
- To learn from each others' experiences.

Elements for Forming the Network

- Establish a clear purpose or mission.
- Involve individuals and organisations that share the mission.
- Build a commitment to participatory process and collaboration.

Maintaining the Network

- Define clear, specialised roles.
- Establish a loose or fluid organisational structure. Vertical, hierarchical structures do not build strong networks.
- Establish a communication system to devise how the members will communicate with each other. This could be through Newsletter, email, telephone and regular meetings.
- Create a member database (name, address, organisation mission, type and focus of organisation, etc.

Information Sharing

The importance of information sharing networks is gaining increasing attention and relevance from one another. The network plays a crucial role in how we acquire information, how we convey information to one another, and how we interact with other people. Many information sharing networks can help normal users with various daily activities, such as reading and recommending news, making or contacting friends and online purchasing. Nowadays, such data are continuously growing and evolving, and are an indispensable source of information for climate change and adaptation. Most of such data has either explicit or implicit link patterns, and these links are potential paths for information to spread over that entire online social environment.

Due to the wide usage of online social environments in daily lives and the availability of the data, this type of data can help farmers in sharing relevant information within the network what is of importance in people's daily activities. For example, networks of emails or online social networks are two of the major ways that people communicate and socialise with others.

Session 4: Skills for Community Mobilisation and Advocacy

Steps 1: Brainstorm

The trainer starts the session with brainstorm in question and answer pattern. It includes: What is Mobilisation? What comes first to your mind when you think or hear the word "MOBILISATION"? The trainer writes the answers on a flip chart on participants' knowledge of mobilisation. Other questions include:

(1) What is Community Mobilisation?

(2) Is community mobilisation critical to the issue of climate change adaptation in agriculture?

(3) What is Advocacy?

(4) Is advocacy relevant to the issue of climate change adaptation in agriculture?

Steps 2: Group Work

The trainer shares the participants into 3 small groups to discuss their perspective of network and report back at the plenary after 15minutes then add any of the following if not listed on the list they come up with during their 5 minute presentations:

- Identification and strengthening of community leaders, self help groups.
- Developing an on-going dialogue between community members.
- Creating or strengthening community organisations (committees, etc.).
- Facilitating horizontal linkages within community.
- Creating an environment in which individuals can empower themselves to address their own and their community's peace needs.
- Promoting community members' participation in all stages of programming.
- Working in partnership with community members.
- Identifying and supporting the creative potential of communities to develop a variety of strategies and approaches.

- Assisting in linking communities with external resources.

Step 3: Mini Lecture

The trainer should follow up the plenary discussions with a mini lecture to demonstrate that mobilisation and advocacy are a part of social change process which could be applied in training small holders agro producers on climate change adaptation in agriculture.

Trainers Note

Mobilisation can be defined as "**The process by which different individuals and groups are facilitated to form a common interest to work together to address a problem"**. It also includes the process by which that interest is sustained so as to enable the members of the group to identify and define the problem, decide on strategies and implement jointly.

Community Mobilisation is **Working with individuals, groups and institutions in a community over time in many different ways to inspire, encourage and support them in making positive changes in their lives ultimately causing a change in community norms.** (SASA p.11).

It can also be viewed as a capacity-building process through which community individuals, groups, or organisations PLAN, CARRY OUT, and EVALUATE activities on a participatory and sustained basis to address their needs, either on their own initiative or stimulated by others. It involves the building and strengthening of a constituency which can participate in program decisions and actions and on whose support program implementation can rely.

Benefits of Community Mobilisation

Brainstorm on this and add the following to what the participants suggest:

- Increase community, individual, and group capacity to identify and satisfy their needs
- Improve work design
- Improve work quality
- Improve work results
- Improve work evaluation
- Cost effective way to achieve sustainable results
- Increase community ownership of action.

Mobilisation Democratic Hierarchical

What it is	What it is not
Fostering collective power	Using power over others
Sustained engagement with the community	One-off activities
Systematic	Ad hoc or done without a plan
Multi-faceted	Done with one strategy
A process	A project
A struggle for social justice	A technical quick-fix
About fostering activism	About implementing activities
Requiring a range of people, groups and institutions	Possible with few individuals or groups
Going beyond individuals to influence groups	Focused only on individuals
Building social networks or capital	Dividing individuals or groups
Fostering alternative values	Providing only information and facts
Stimulating critical thinking	Telling people what to think
Holistic and inclusive	To specific individuals or groups
Based on principles of human rights	Based on benevolence or protectionism
Positive and supportive	Blaming and shaming
Democratic	Hierarchical
Changing norms	Changing just specific behaviors
Collective: everyone must work together for change	Possible with individuals acting in isolation
Benefits-based	Punitive
Focused on root cause (power imbalance)	Focused on manifestations of violence

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Advocacy

Advocacy can be defined as organised efforts to effect systemic or incremental change. Whatever the issue, advocacy campaigns seek to involve citizens in the policymaking process. Whatever the level – community, state, or national – activists use similar advocacy strategies. According to the Advocacy Source Book on frameworks for

planning, action and reflection (IDR 1997:11-12), it states that definitions of advocacy vary, and change over time. The definitions of advocacy are shaped by different understandings of the strength behind the action, e.g. power and politics. It also depends on the frame of the groups and what they are involved in. Many groups would define advocacy to suit their particular activity or their immediate understanding of their action. The book goes further to give some definitions of advocacy as defined by different groups:

In India Advocacy was defined as an organised, systematic, intentional process of influencing matters of public interest and changing power relations to improve the lives of the disenfranchised. While experts in Latin America defined Advocacy as a process of social transformation aimed at shaping the direction of public participation, policies and programs to benefit the marginalised, uphold human rights, and safeguard the environment.

Our African experts described their advocacy as being pro-poor, reflecting core values such as equity, justice and mutual respect, and focusing on empowering the poor and being accountable to them.

The Collins Paperback English Dictionary defines Advocacy as, "an active support of a cause or course of action." Advocacy is also the act of building a collective action for the purpose of creating change by the use of participatory and well-defined mechanisms that can lead to that change for the benefit of the target populace.

Methods of advocacy

According to Alan Hudson, in his paper "Organising NGOs' International Advocacy: Organisational Structures and Organisational Effectiveness" (1999:2), he stated that advocacy takes various forms -letter writing, meetings, education- trying to persuade different groups of actors or targets - individuals, states, international organisations, corporations-to alter their policies and behaviors in relation to development issues. Whatever the target, the aim of Northern NGDOs' international advocacy work is to "alter the ways in which power, resources, and the ideas are created, consumed and distributed at the global level, so that people and organisations in the south have a more realistic chance of controlling their own development" (Edward, 1993:164).

There are different methods of advocacy and networking that will be looked in the review and this will be in line with some of the advocacy and networking actions taken by different groups in other parts of the world.

Note

To advocate effectively, the followed must be at the back of our minds:

- Advocacy is a process over time.
- Advocacy is strategic (you create a plan).
- Advocacy has well-designed activities targeted at decision makers.
- Advocacy is directed at influencing policy, laws, regulations, programmes or funding decisions.

Why do we advocate?

- We advocate to build support for a cause.
- We advocate to encourage others to support us.
- We advocate to influence laws that affect our cause.
- We advocate to make a difference in people's lives.

Characteristics of an effective advocate

- Must be committed to a cause.
- Must be a good mobiliser of people.
- Must be patient and recognises that change is a slow process that requires commitment and persistence.
- Can build a network.

Steps needed to develop an advocacy strategy?

- Identify issues
- Select goals and objectives
- Identify target audience
- Shape message
- Build support
- Develop action plan
- Raise funds
- Implement strategy
- Evaluate Strategy

What is an advocacy message?

The message is the heart of advocacy and communication for change. The message is what people think about naturally when they think about your cause. The

effectiveness of the message – whether it succeeds or not – depends largely on the following:

- Quality (language, length, appropriateness, facts, relatedness) of the message.
- Effectiveness (Presentation, skill style) of the message.
- Medium (means and mode) of transmitting the message to the targeted audience.

For the message to make the desire impact, the advocate would need to:

- Avoid use of complex terms or jargons.
- Humanise the message, i.e. describe how they affect people.
- Involve representation of the various stakeholders in developing the message.
- Ensure that the message gets across to all the key stakeholders.
- Government/policy maker.
- Opinion leader.
- Media.
- Community.
- Make the message action-oriented, i.e. be specific on action required to be taken on the issue.
- Convey a central point in her/his message.

Element of a message

- Content/Ideas
- Language
- Message/Source
- Format/Medium
- Time/Place

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APPENDIX

Monitoring and Evaluation of Training

Understanding Monitoring and Evaluation

Monitoring can be said to mean a regular observation and recording of activities in a project lifecycle. It involves a process of routine/continuous information gathering on all aspects of the project. To monitor is to check on how project activities are progressing toward achieving pre determined objectives. This can also sometimes be referred to as process evaluation because it focuses on the implementation process with emphasis on the process input, activities and output devoted to the project.

Monitoring involves giving feedback on the progress of the project to the donors, implementers and beneficiaries of the project. Reporting on progress made on the project enables the gathered information to be used in making decisions for improved project performance. It requires the collection of data at multiple points throughout the program cycle, including at the beginning to provide a baseline. Monitoring reports can be used to determine if activities need adjustment during the intervention to improve desired outcomes.

Common Types of Monitoring

There are mainly three types of monitoring that are utilised for project/programme management:

- Management and administration: staff/personnel (performance, absenteeism etc.), vehicles (mileage, repairs, etc.) and supplies (training materials, costs, quality etc.) among others.
- Finance: Budget and expenditure, staff salaries, cash flow analysis, etc. Monitoring actual expenditure on the training against planned budgets and training schedules.
- Program: focus is on project inputs, activities, outputs, progress according to objectives. For example for this training, inputs include the trainer, the manual, finance while activities include the actual training and evaluation of the training, outputs include the number of people trained and skills acquired at the training.

Evaluation is the measurement of program activities towards meeting the expected objectives and/or the extent to which changes in outcomes can be attributed to the program or intervention. Evaluation can also be referred to as impact audit/ evaluation. It posses to ask questions on the change that has taken place as a result of an intervention. For example small-scale farmers are willing and able to come together to develop a community based climate change adaptation plan as a result of this training. Trained farmers are able to step down the training at their community level for improved response to climate change issues are questions that evaluation brings out in a project to ascertain changes made so far in the project.

Relevance of Monitoring and Evaluation of Training

- To assess the level of knowledge gained from the training.
- To understand the needs of the target beneficiaries.
- Forms baseline for future assessment and recommendation.
- It helps the trainer to understand how best to achieve result from the training.
- It helps the trainer to know the core learning objectives of all participant and as well as make trainers able to strive towards achieving them.
- It helps organisation to document their successes and challenges from each training session.
- It helps participants reflect on those skills and knowledge they have acquired throughout the training sessions.
- It gives room for assessment of progression of knowledge.

Approaches to Evaluating Training

There are several ways of evaluating a training program depending on the tools employed which can either be qualitative or quantitative.

- Qualitative: This is a descriptive approach to data gathering or analysis, It helps to sieve out other relevant information that are may be hidden using qualitative approach. The approach has been criticised for being subjective in nature but it is brings out quality report on project with change objective.
- Quantitative: This is a statistical approach to data gathering or analysis. It is very objective in nature and very reliable for decision making. It provides direction for information gathering and brings about uniformity in data gathering.

Types of Evaluation Process in Training

- Pre-project evaluation: This is to gather a baseline study to ascertain the current situation before the proposed intervention. This provides a check list against which the observed changes from the intervention are measured.
- Daily Evaluation: This is an evaluation of the process of intervention to check the extent to which activities will achieve the pre determined objective of the project.
- Post Evaluation: this helps to monitor the real change that has taken place as a result of the project intervention, this kind of evaluation asks questions on the extent to which the objectives of the project has been achieved.

Reports from all the evaluation process is analysed to see the observed change that has taken place for informed decision.

Sample Post Training Assessment

Time: 30 Minutes.

Which of your learning objectives were met?
What will you do differently as a result of the training activity/event?
What skills/ knowledge have you acquired during the training
Mention the most important knowledge that you have acquired during the training
What steps will you take after this training on educating other farmers on Climate Change Adaptation for small scale farmers
What measures can you put in place towards Climate Change adaptation in Agriculture Which part of the training did you find most important

Which part of the training do you consider least important
Mention other types of Agriculture different from the one you practice and the impact of climate change on their Agricultural Practices?
How can Climate Change bring about conflict in Agriculture
What is your understanding of Climate Change and its impact on Agriculture
What are the benefits of Mobilization in Climate Change Adaptation for small Scale Farmers

Sample Prior Training Assessment

Time: 30 Minutes

What are your learning objectives?
Mention some climate change adaptation measures that you can be put in place
What are the impacts of climate change in Agriculture?
Can climate change in Agriculture bring about conflict
What are the benefits of Mobilization in Climate Change Adaptation for small Scale Farmers

Sample of Daily Evaluation Assessment

Which aspect of the training today did you find most interesting
What are the new things/skills acquired today
Were you able to meet any of your learning objective(s) for the day
What went well today
What do you find irrelevant in the training of today
What would you suggest to be modified/changed in tomorrow's training