CCARDESA
Centre for Coordination of Agricultural Research & Development for Southern Africa
Centre De Coordination De La Recherche Et Du Développement Agricole De L'afrique Australe
Centro para a Coordenação da Investigação e Desenvolvimento Agrário na África Austral

SADC
SOUTHERN AFRICAN DEVELOPMENT COMMUNITY
TOWARDS A COMMON FUTURE

giz Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ) GmbH

Training for extension services "Tackling Climate Change in Agriculture: Approaches to Adaptation and Climate Smart Agriculture in the SADC Region"

Facilitation: Catalina Berger
Organisers: Wiebke Foerch, Luis Waldmueller, GIZ
10 – 14 October 2016
Cape Town, South Africa

Our group

Programme

Monday	Tuesday	Wednesday	Thursday	Friday
• Welcome and Opening • Presentation of participants • Outline of the seminar • Agenda	• Presentation of four case studies, composition of working groups • Action learning: risk functions	• Module A: Presentation of results • Presentation 8: Water and land management in CSA	• Recap of excursion • Case study, Module B: Identifying adaptation options	• Preparing final presentation • Group results' presentation
• Presentation 2: Thematic introduction: Climate change, adaptation, mitigation	• Case study, Module A: Evaluating present and future vulnerabilities- part 1 current situation	• Presentation 9: Importance of post-harvest management • Preparation of excursion	• Case study, Module B: Identifying adaptation options – ctd.	• Feedback on CP approach • Evaluation of training • Certificates • Closure
Lunch break				
• Presentation 3 : CC projections and impacts in SADC	• Case study, Module A: Evaluating present and future vulnerabilities- part 2 future situation	Excursion to the Langgewens Research Farm, Malmesbury, Western Cape	• Presentation 10 : The importance of gender in CSA	
• Presentation 4: Agriculture: victim and culprit of CC and adaptation options, CSA • Exposé: concept and steps of Climate Proofing	• Presentation 5: Introduction to CSA: technologies, practices and strategies • Presentation 6: Conservation agriculture • Presentation 7: Role of livestock in CSA		• Case study, Module C: Selecting adaptation measures	
• Co-management committee (CMC)	• CMC	• CMC	• CMC	

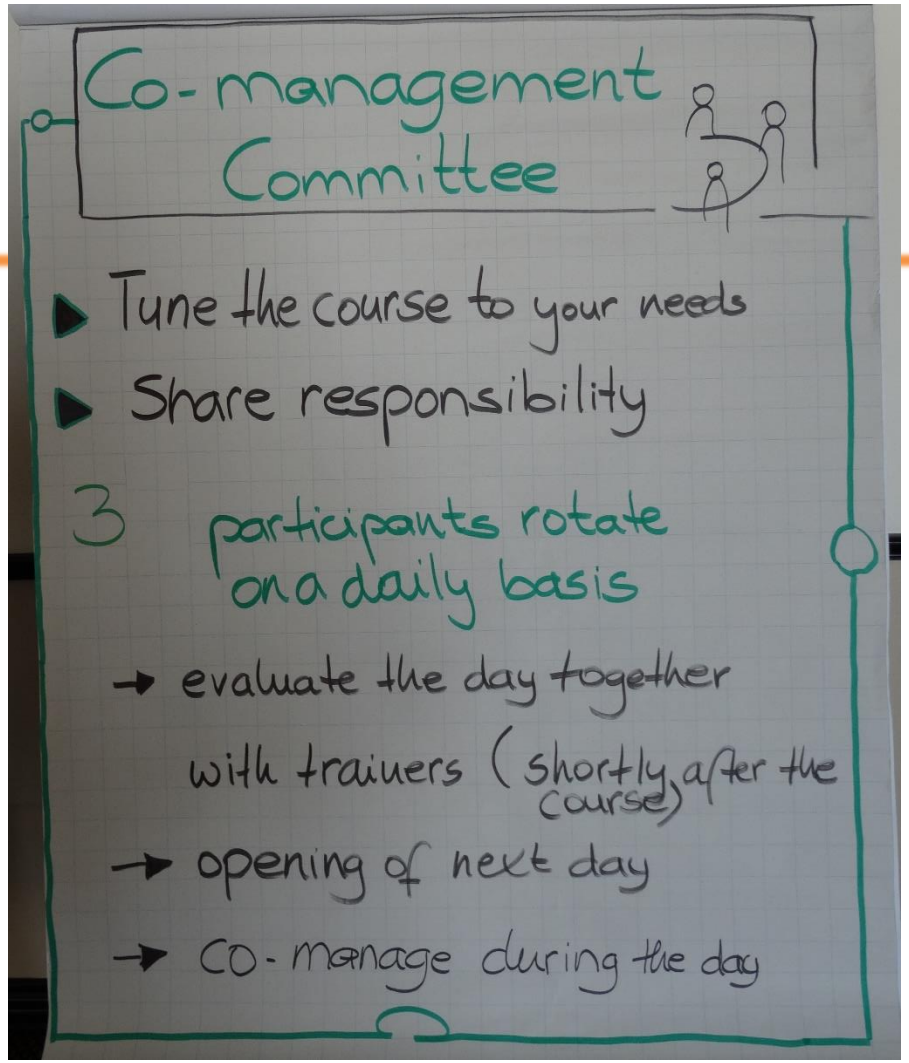
Objectives and participants

The overall objectives of the training were:

- to train participants on the Climate Proofing (CP) approach with a focus on Climate Smart Agriculture (CSA)
- to enable them to apply these concepts in their individual working contexts
- getting to know concepts of climate change adaptation and climate smart agriculture for agricultural extension services
- to enable the participants to apply such concepts in their extension work
- to use feedback and lessons to further improve the training for future application in the region

Participants:

- 26 practitioners from agricultural extension services in SADC member states
- Countries: Botswana (2 participants), Lesotho (4), Madagascar (2), Malawi (4), Namibia (1), Seychelles (2), Swaziland (2), Tanzania (4), Zambia (3), and Zimbabwe (2)
- Institutions: Ministries of Agriculture, Agricultural Agencies, NGOs, university and research
- Gender balance: 10 women, 16 men



Make the training your training…

With thanks to:

CMC 1: Sepo, Anja, James & Mmoloki

CMC 2: Monica, Richard, Oana & Shumba

CMC 3: Dorothy, Amos & Molundu

CMC 4: Lineo, Mphanya & Chipasha

Day 1 - Overview

- Welcome and opening
- Presentation of participants
- Presentation 1: Thematic introduction: Climate change, adaptation, mitigation
- Presentation 2: CC projections and impacts in SADC and importance of climate services for agriculture
- Presentation 3: Agriculture: victim and culprit of CC and adaptation options
- Exposé: concept and steps of CP

Day 1

- The first day of the training was opened by Dr. Podisi from CCARDESA who welcomed the participants from various SADC member countries.
- The opening was followed by the self-introduction of the **course participants.** During the presentation round, participants had the opportunity to present themselves and express their expectations for the training course.
- **Key expectations** raised were to gain more knowledge on CC adaptation (CCA) and mitigation strategies, CSA capacity building, SADC priorities of CCA, examples and best practises as well as sharing of experiences and networking with colleagues
- The thematic part of the course started with a presentation on **climate change basics,** followed by a more specific presentation on **climate change projections in the SADC region.** During the third presentation, participants learnt about the role of the agricultural sector as victim of and culprit of climate change at the same time.
- The day was closed by an exposé about the **Climate Proofing** approach and an explanation about the objectives, steps of implementation as well as the modules covered during the training.
- After the official training day was closed, trainers sat together with the members of the **Co-Management Committee** (CMC) to reflect the day together and to ask the CMC members to open the second day.

Welcome and opening by Dr. B. Podisi (CCARDESA)

Dr. Baitsi Podisi (CCARDESA) opened the training and welcomed the 26 participants from ten SADC countries.

He highlighted the role of agriculture for poverty reduction and reminded the audience, that the sector provides livelihood for 61% of the SADC population and contributes to 17% of the region‘s GDP.

He recalled the propose of the **Regional Agricultural Policy** (RAP) which is “to define common agreed objectives and measures to guide, promote and support actions at regional and national levels in the agricultural sector of the SADC Member States in contribution to regional integration and the attainment of the SADC Common Agenda.”

RAP is thus the legally binding instrument linked to planning and budgeting in the SADC member states. The overall objective of the RAP is to contribute to sustainable agricultural growth and socio-economic development. Dr. Podisi also mentioned the climate change interventions in the RAP, which will be implemented through the **Food and Nutrition Security Strategy 2015-2025**.

The speaker then explained the “**Comprehensive Africa Agriculture Development Programme** (CAADP)”, which is “Africa’s policy framework for agricultural transformation, wealth creation, food security and nutrition, economic growth and prosperity for all” and detailed that **CCARDESA** falls under pillar 4 (Agricultural research, technology development, dissemination and adoption) of the CAADP.

Dr. Podisi concluded his opening speech by highlighting the support of the **GIZ-ACCRA** (Adaptation to Climate Change in Rural Areas) Programme and wishing the participants a fruitful training.

Presentation 2: Climate Change, adaptation and mitigation by C. Berger, consultant

The thematic introduction from Catalina Berger, consultant, elaborated about climate change in general and adaptation and mitigation in particular.

First, an overview was given about the basic definitions on **weather, climate, climate variability** and **climate change** to make participants understand the terminology and differences.

This was followed by the explanation of the **Greenhouse effect**, the key concept to understand climate change and the different greenhouse gases **(GHG)** contributing to the effect. In an action learning exercise the **lifetime** of the main GHG and their **global warming potential** (GWP) was explained.

The **sources of GHG** can be **natural** (volcano eruption) or **anthropogenic** (agriculture, deforestation, transport etc.). The main sectors of anthropogenic GHG emissions are **energy** (66%) and **land use change/agriculture** (26%). Two slides were shown **on GHG emissions by country per capita** and by **country** only to visualize the differences in these two calculation methods.

The high and low emission scenarios from the latest IPCC report were explained with the **RCP** (Representative Concentration Pathways) slide and what **signals of global warming** scientists already detect (e.g. sea level rise, change in temperature and precipitation patterns). The chain from climate signals to **bio-physical** and **socio-economic impacts** and the two possible reactions towards CC were explained: adaptation and mitigation

Adaptation: manage the unavoidable **Mitigation: avoid the unmanageable**

Q&A

- What is ocean acidification?

It is the ongoing decrease in the pH value of the oceans, caused by the uptake of CO_2 from the atmosphere. Seawater has got a pH value > 7 (slightly basic), and the process in question is a shift towards pH-neutral conditions rather than a transition to acidic conditions (pH < 7). An estimated 30–40% of the carbon dioxide from human activity released into the atmosphere dissolves into oceans, rivers and lakes

- Why is it not possible to determine an exact lifetime of CO_2 in the atmosphere?

The atmospheric lifetime of CO_2 is estimated of the order of 30–95 years. This accounts for CO_2 molecules being removed from the atmosphere by mixing into the ocean, photosynthesis, and other processes. However, this excludes the balancing fluxes of CO_2 into the atmosphere from the geological reservoirs, which have slower characteristic rates. Although more than half of the CO_2 emitted is removed from the atmosphere within a century, some fraction (about 20%) of emitted CO_2 remains in the atmosphere for many thousands of years.

Presentation 3: Climate Change projections and impacts in SADC by Dr. C. Lennard, UCT

The thematic introduction on CC was followed by a presentation by Dr. Christopher Lennard, Senior Scientist from the Climate Systems Analysis Group of the University of Cape Town.

First, he presented and explained a table of the **weather forecast** of Cape Town for a single day in October 2016. He then elaborated on **climate data** in general and what **type of information** is really needed for practitioners (time scales, type of climate information) to take decisions.

Subsequently, he showed, how the **climate system is observed** (satellites, weather stations) in Africa and results of future climate modelling for southern Africa (temperature and precipitation). Further, he explained the **GCM (Global Climate Model) and RCM (Regional Climate Model)** scale and the downscaling types (statistical and dynamical)

Main take away points:

- We don't know the observed climate in many regions....let alone ocean "climate"
- Downscaling from global to regional scales is an imperative
- Good certainty that temperatures are getting hotter in southern Africa, but uncertainty about the "how" (days above threshold degree days, heat waves, etc.)
- Less certain about rainfall change, similar questions about how rainfall changes apply.
- Data is not information! There needs to be an interpretive chain
- We have to learn to work in a context of an envelope of climate information to reach actionable outcomes
- This is most robustly done in collaborative efforts between stakeholder community and user-sensitized climate community

Q&A

- What models should be used to determine vulnerability hotspots?
  - Need to look across the available information and not just pick one – you need to look at where is a lot of agreement and where not – there is no one best model – use as much information as you can. Bring a climate scientist in to help interpret the data
- How reliable are the models in predicting climate in the future?
  - 60 out of a 100 as a score – climatologists try to understand why models show certain results and try to improve them over time – they are the only way we have to predict the future, but they have major flaws
- Are the results influenced by the fact that we don't have much observed data in Africa?
  - The more observed data, the better the results – observations are important for weather forecasting – for climate projections, we need observations to see how far we move away from the historical past, we need the baseline to quantify change
- Mentioned challenges of rainfall predictions – but what is the general trend?
  - It depends where you are – some places are getting wetter (e.g. Sahel) – there is no average and it is very regionally specific. For SADC the picture is complex, without a clear signal with respect to future rainfall trends
- Stakeholder collaboration – have you interfaced with indigenous knowledge systems in terms of predicting climate/weather?
  - Yes, we just cannot model it, but we do incorporate it into our thinking – indigenous knowledge systems come into the knowledge translation part, not in the data

Presentation 4:
Agriculture: victim, culprit and potentials for adaptation and mitigation by L. Waldmüller, GIZ

Luis Waldmüller, Senior Advisor from GIZ Germany, summarized the **effects, CC** will have on water resources, crop yields and ecosystems to underline the importance of adaptation in general. This was followed by explaining the **effects of CC on agriculture**, whereby he stressed that this sectors suffers from CC but also contributes to it (by the release of GHG).

15% of the global GHG emissions are stemming from the agricultural sector (soil, fermentation, rice cultivation, energy, manure management and other).

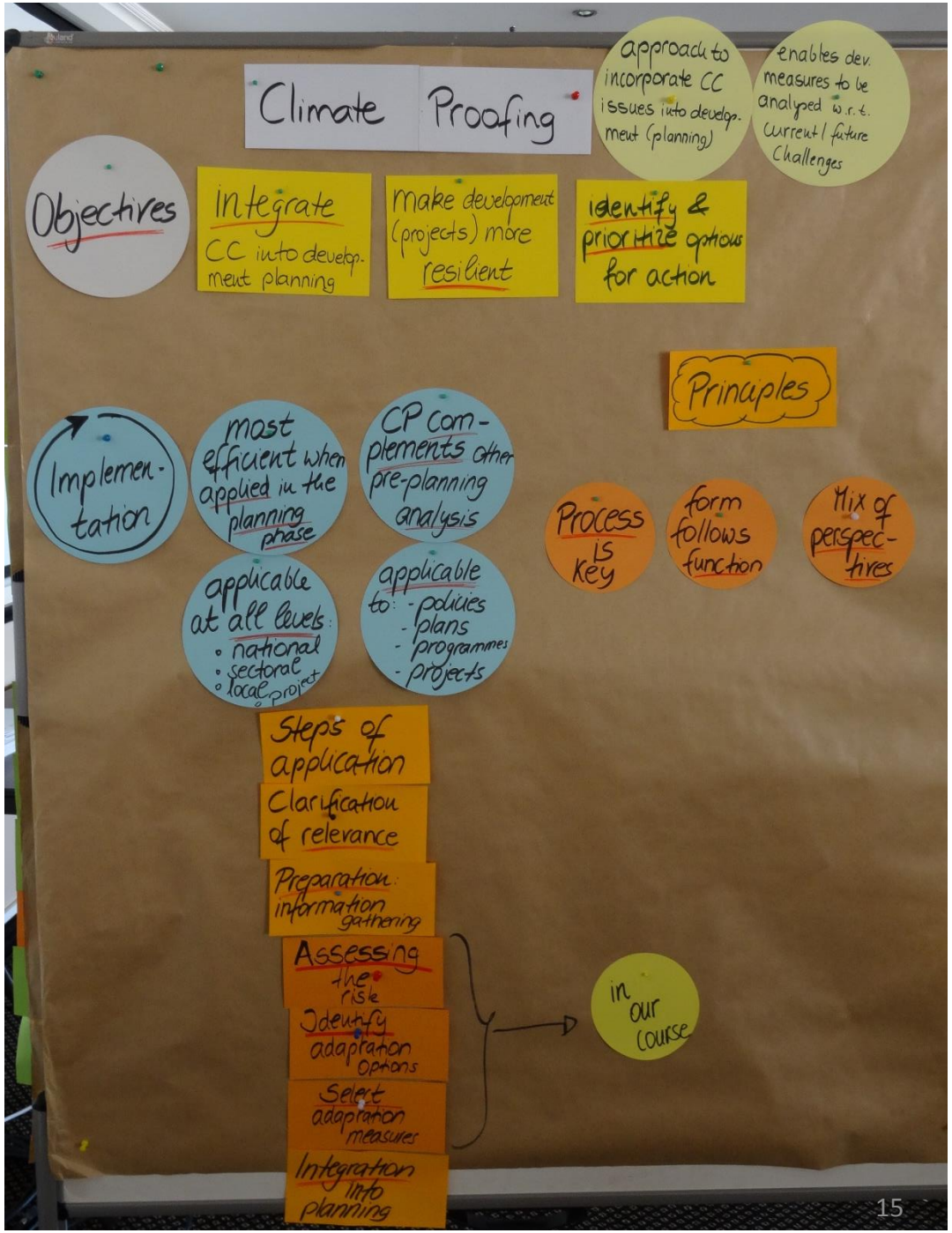
He then presented a slide on different types of ecosystems and their **CO_2 storage capacity**. It became clear that **wetlands** have got the highest storage capacity per m^2. Examples for **mitigation options** in agriculture and land use change were shown, amongst them tree planting, appropriate fertilizer application, planned land use change and reducing post harvest losses and food wastage.
Adaptation in agriculture is a multi-dimensional and multi-level process from farm to community to the public level. The presenter illustrated each level with examples and closed his presentation with criteria for **sustainable agriculture**, which will be further elaborated during the following presentations.

Comments and Q&A

- Examples of shift of agro-ecological zones:
  - Efforts in Zimbabwe to rezone agro-ecological zones because they are no longer appropriate – done in the 1950s
  - Cultivation used to be impossible in Kalahari – since 4-5 years we are growing crops
  - Pests and diseases that are expanding in reach
  - Crops that cannot be grown in some areas any more: coffee, tea, fruit
- Burning of crop residue – to allow fresh green grass to grow – but a lot of misinformation to farmers about the benefits of burning
- Insurance – difficult to sell farmers crop insurance because the system is not well understood – but it works in Zimbabwe when combined with funeral insurance, sold as a combo, since people value the funeral insurance schemes
- Social sustainability is often overlooked, that is why we are struggling with the adoption of new technologies – we often do not understand the social conditions and the social needs, while we often focus on the technologies – and people are often not involved in the development of new technologies – the conversation with the farmers has to happen from the beginning
  - Yes, we need to be mindful of the social context – we need to look at individual communities, building on good knowledge of the social structure of the community – this needs to be considered when planning interventions
- Dairy cattle have lower emissions if productive – this holds true for all systems, if you have productive, efficient system then the emissions per unit are lower
  - Yes, but it is complex and takes time to explain the synergies and trade offs to farmers
  - We need to look beyond the field production pieces, but look at markets and value chains to have a comprehensive understanding of the climate impacts and options for interventions
- Note, that in most of the SADC countries the CC mandate is in the Ministry of Environment – yet agriculture is considered a big culprit and a big opportunity. It is a challenge that we continue to operate in silos and we are not actually involved in the process
- Similar at the regional level – SADC is actually providing controls/ incentives for RAP implementation in the countries

Climate Proofing:
A methodological approach aimed at incorporating issues of climate change into development planning. It enables development measures to be analysed with regard to current and future climate challenges and opportunities presented by climate change.

http://saaiks.net/wp-content/uploads/2017/03/SADC_Training-Manual_eng-10-2016-wf.pdf
(in English)



Day 2 - overview

- Introduction of four case studies
- Action learning: risk function
- Case study work - Module A: Evaluating present and future vulnerabilities
- Presentation 4: Introduction to CSA - technologies, practices and strategies by L. Waldmüller, GIZ
- Presentation 5: Conservation agriculture - farmer adoption of new practises and technologies by C. Thierfelder, CIMMYT
- Presentation 6: Role of livestock in smallholder adaptation and CSA by B. Podisi, CCARDESA

Day 2

- The day was opened by the CMC members with a **recap session** of the previous day
- Then, the four designated chairs of the **case studies** briefly presented the cases in plenary and gave the participants time to assign themselves for one chosen case
- The following **action learning** introduced the risk terminology as it is used according to the IPCC 5th Assessment Report and will also be used during the CP case work
- The four groups started to work on Module A of the case work, which is split into two parts: **1: Assess the risk – current situation and 2: Assess the risk – future situation**
- The group work was followed by three presentations:

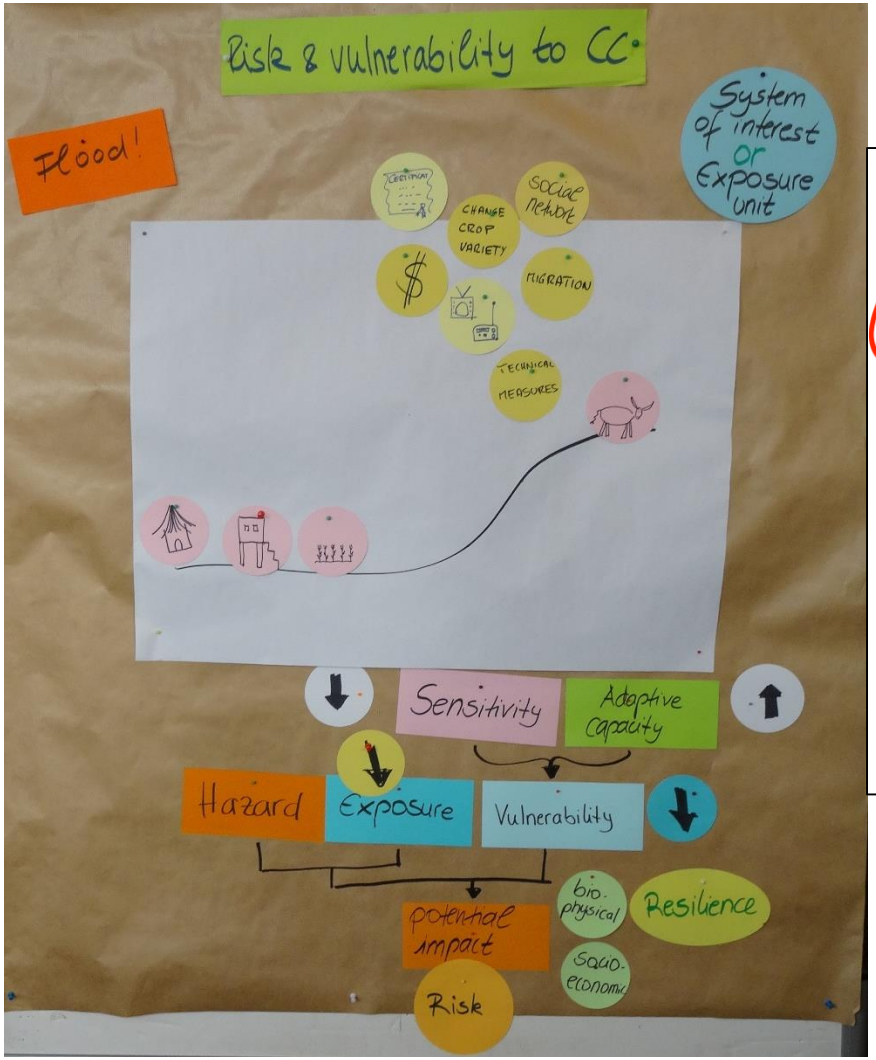
➢ **Introduction to CSA** - technologies, practices and strategies by L. Waldmüller, GIZ

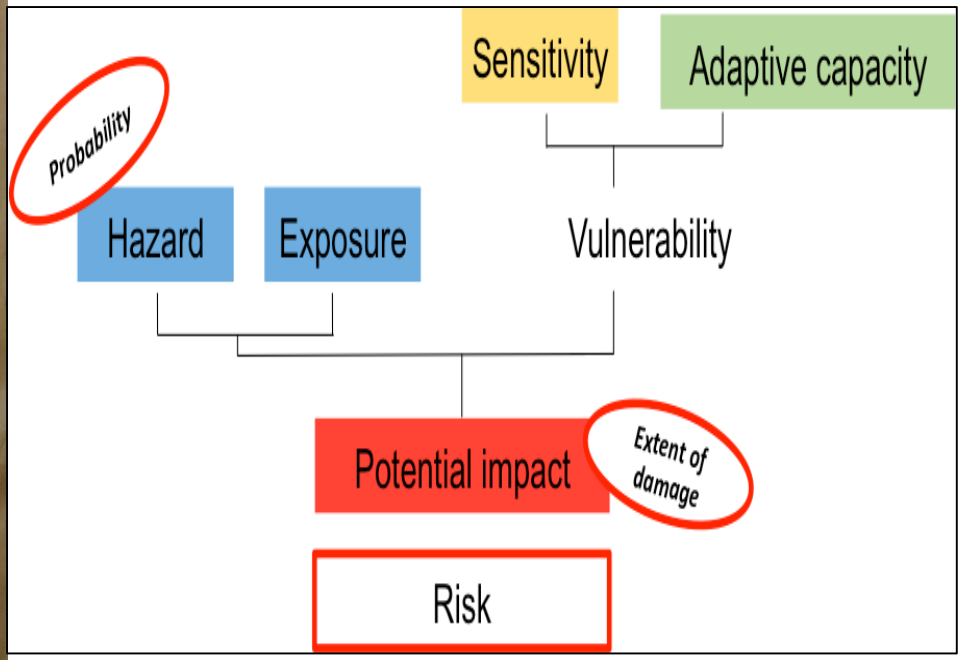
➢ **Conservation agriculture** - farmer adoption of new practises and technologies by C. Thierfelder, CIMMYT

➢ **Role of livestock** in smallholder adaptation and CSA

Each presentations was followed by a **Q&A session**

Action learning
Risk function – I





IPCC 2014

Action learning Risk function – II

Definitions:

Risk: The potential for consequences where something of value is at stake and where the outcome is uncertain, recognizing the diversity of values. Risk is often represented as probability of occurrence of hazardous events or trends multiplied by the impacts if these events or trends occur. Risk results from the **interaction of vulnerability, exposure, and hazard**. In this sense, the term risk primarily refers to the risks of climate-change impacts.

Hazard: The potential occurrence of a natural or human-induced physical event or trend or physical impact that may cause loss of life, injury or other health impacts, as well as damage and loss to property, infrastructure, livelihoods, service provision, ecosystems and environmental resources. In the IPCC AR5 report, the term hazard usually refers to climate related physical events or trends or their physical impacts.

Exposure: The presence of people, livelihoods, species or ecosystems, environmental functions, services and resources, infrastructure or economic, social, or cultural assets in places and settings that could be adversely affected.

Vulnerability: The propensity or predisposition to be adversely affected. Vulnerability encompasses a variety of concepts and elements including sensitivity or susceptibility to harm and lack of capacity to cope and adapt.

Sensitivity: The degree to which a system or species 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).

Adaptive capacity: The ability of systems, institutions, humans, and other organisms to adjust to potential damage, to take advantage of opportunities, or to respond to consequences..

Adaptation measures can 1. reduce sensitivity, 2. increase coping & adaptive capacity (and 3. potentially reduce exposure)

For a consistent overview, the results of the Climate Proofing exercise of the four cases studies are grouped together per case.

Introduction to four case studies

Four case studies have been prepared for the participants to support their learning process towards the Climate Proofing approach:

1) *Sorghum systems in Southern Africa*
2) *Maize systems in Southern Africa*
3) *Rice systems in Southern Africa*
4) *Small livestock in Southern Africa*

Module A: Assess the risk
Part 1: current situation

Learning objectives:

- Analyse the current risks and additional challenges caused by climate change in a defined system of interest
- Identify and handle the different factors contributing to “risk” in a system: sensitivity, adaptive capacity, basic vulnerability, hazard, exposure, and potential impacts
- Define the need for action according to the projected risk (the probability of climate hazards and the extent of damage) in the system

Steps:

- Discuss within your group the system of interest: the exposure unit you will assess during the training.
- List up to five key actors of the system of interest and also explore their roles and responsibilities.
- Explore further key elements of the system such as social, technical or natural components and give an estimate of their actual status quo on the tendencies.

Module A: Assess the risk
Part 2 - future situation - I

- Identify the **key climate related hazards** (observed & projected) of concern to which the system might be exposed. If possible, also note the frequency to which the system might get exposed to these signals.
- Consider next, if and how the system of interest's actors and assets are **sensitive** to climate hazards. Think of ecological and social sensitivity. Relate your assessment to the condition and trends of the system of interest. Take into consideration the actual situation and possible developments in the system (part 1).
- Note down the system's **current adaptive capacity** that would increase the adaptive capacity of a community. What is the adaptive capacity of institutions to support climate adaptation? Are national or local governments and organisations supporting planned adaptation?
- Now brainstorm the **potential impacts** of the climate related hazards to the system of interest.
  - First brainstorm the potential impacts to the **biophysical** part of the system by considering hazard in combination with the vulnerability factors.
  - Then brainstorm **socio-economic** impacts, resulting from the biophysical impacts.

Module A: Assess the risk
Part 2 - future situation - II

In the last column, assess the probability of hazard and the extent for every potential biophysical and socio-economic impact. Discuss the column using the following questions:

- How relevant are the potential impacts to the development objective?
- Define a time horizon according to the objective of your analysis
- How likely is the impacts' occurrence?
- What is the extent of expected damage?
- Asses the level of risk (low, medium, high) of each impact by combining the likelihood of each biophysical impact with the severity of its socio-economic impact.

Module B: Identifying adaptation options

Task : Brainstorming “What could be done to respond to the challenges in order to be able to meet the development objective(s)?”

1. Find the selection of impacts you have rated as “high risk” from the previous module.
2. Brainstorm as many adaptation options as possible per impact to reduce the risk of climate change
3. Add adaptation options from policy, capacity development, technical or research
4. Finally, note as main actors whose contributions are necessary to implement the adaptation options.

Before the group work started, the facilitator led the participants through an action learning exercise on different levels and types of adaptation options (see next slide)

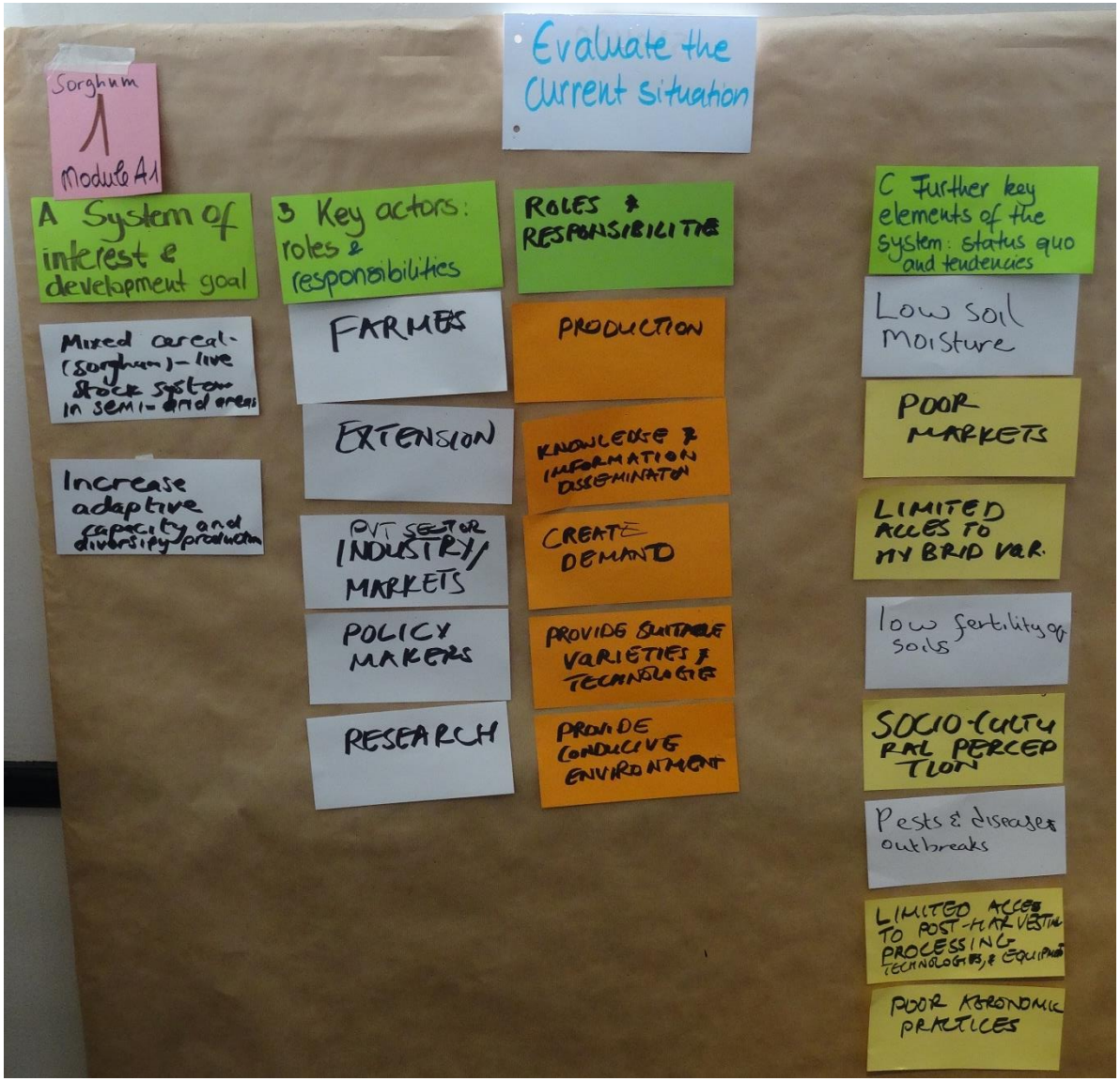
Levels and types of adaptation measures

	no-regret measures →		specific measures	
Categories of adaptation goals	Addressing drivers of vulnerability	Building response capacity	Managing climate risks	Confronting climate change
Type of intervention	*Goal: enhanced buffer capacity (individual/ community)*	*Goal: enhanced problem solving capacities*	*Goal: use climate information to take strategic decisions*	*Goal: reduce direct risks of climate change*
Policy		Enhancing local participation in land use planning	Mainstreaming of ACC into sectoral plans	Land use plans forbid settlements in flood prone areas
Technical measure	Implementation of a vaccination program to eradicate animal diseases	Revive traditional enclosures to encourage vegetation regeneration	Planning of eco-corridors on the basis of observed migration patterns	Construction of a dam to reduce the risk of outburst floods from a glacier lake
Capacity development	Alphabetisation Providing women with crossbred goats and instruction in graze-free feeding	Training local community in reforestation to combat flood-induced landslides	Training of administrative staff in using climate information	
Research			Providing regional climate data	Conservation of genetic variety in/ex-situ

Module C:
Select adaptation measures

1. Agree on the set of selection criteria
2. Discuss each option using the criteria and score them by using 1 – 5.
3. Do the overall score
4. If too many options have similar evaluations, try to be more specific by introducing another criterion or weighting the criteria.
5. Add an estimation of the mitigation potential for each measure

Module A.1 – current situation
Case 1: Sorghum



Module A.2 – future situation
Case 1: Sorghum

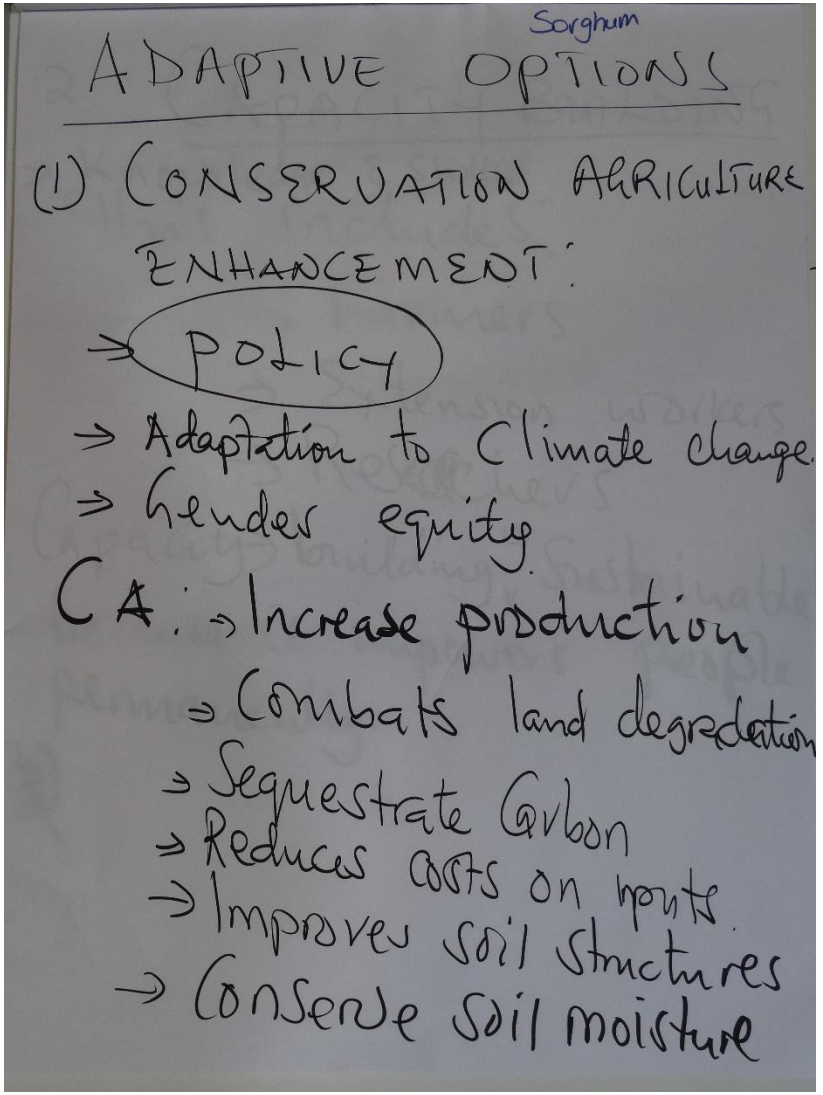
Module B – Case 1: Sorghum

Module C - Case 1 - Sorghum

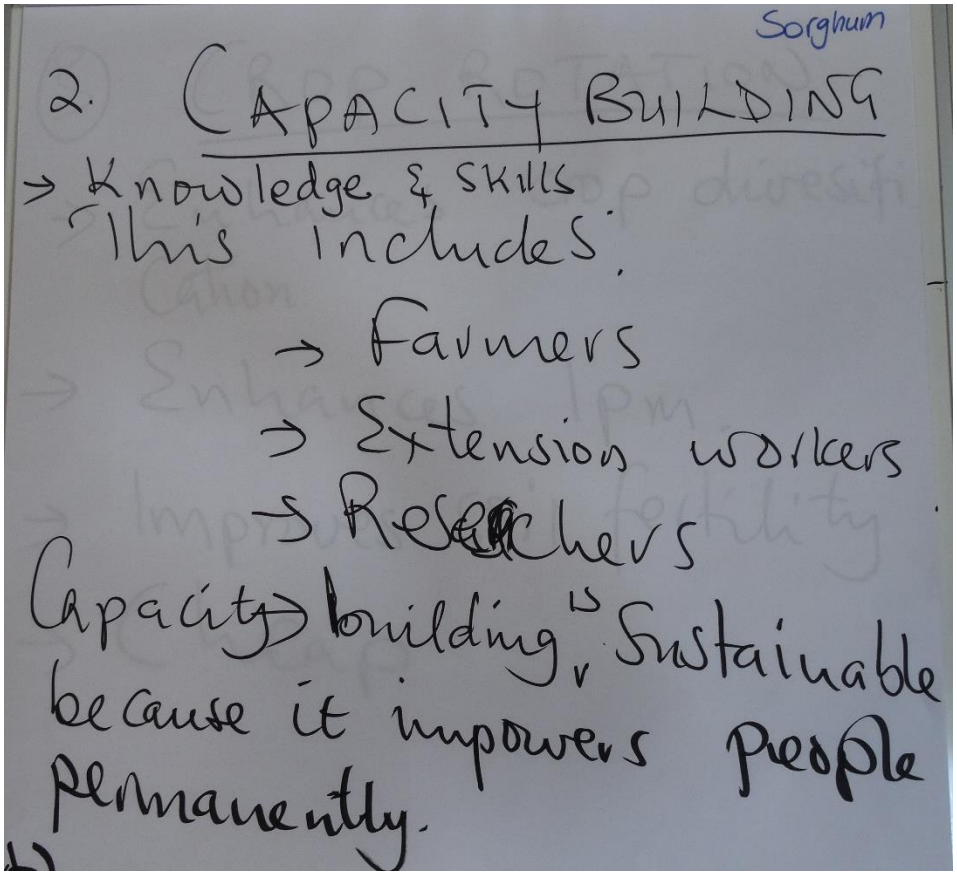
Presentation of final adaptation measures: Case 1: Sorghum - I

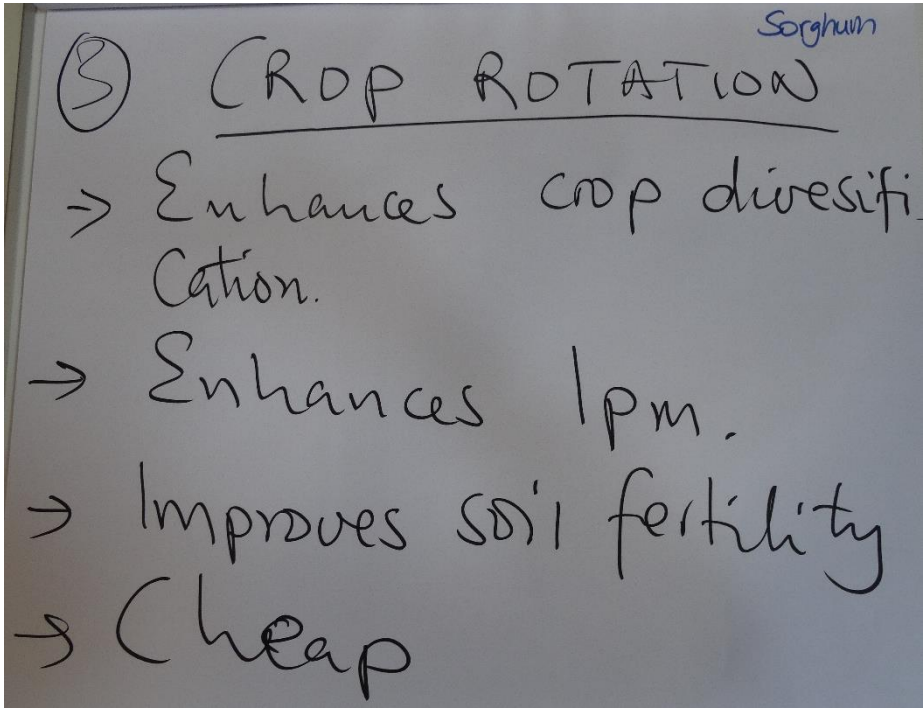
System of Interest: Sorghum-Livestock systems in semi arid areas

Development goal: Increase adaptive capactiy to increase produnction through diversification



Presentation of final adaptation measures: Case 1: Sorghum - II





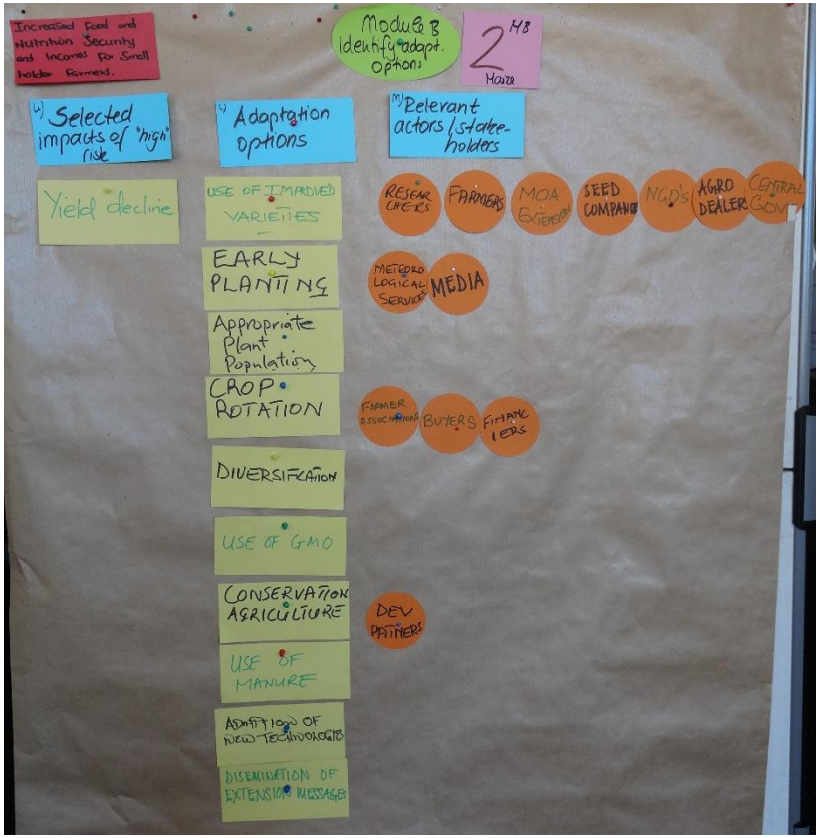
Q & A Final pres. Sorghum

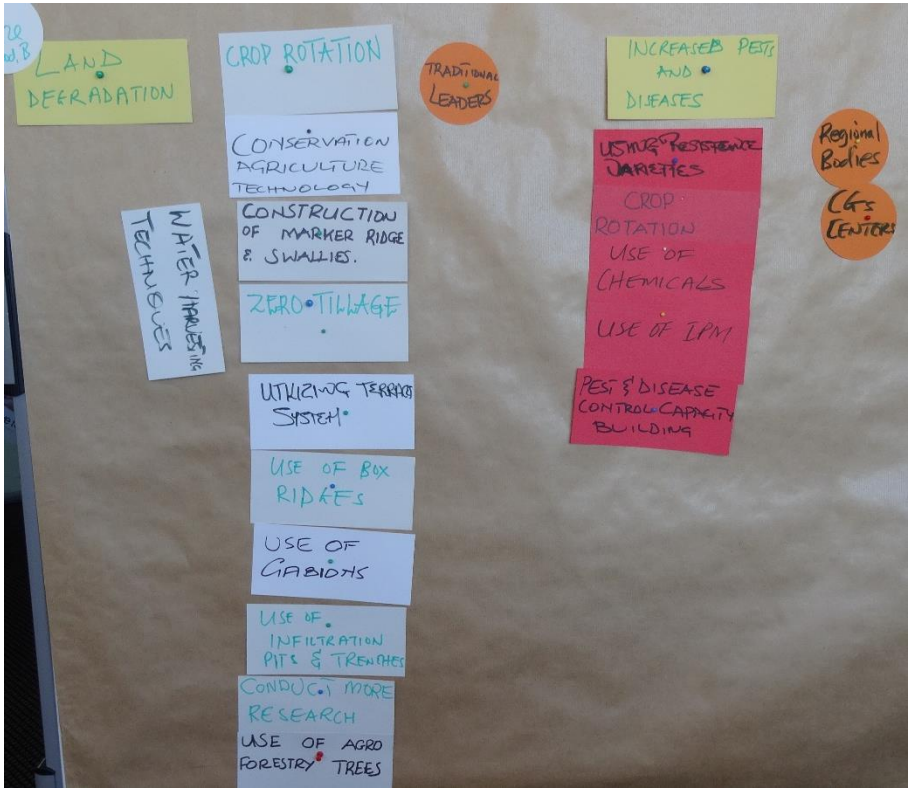
- Mitigation potential of the adaptation options?
  - Most of these are adaptation options
  - CA has a high mitigation potential due to the increase in carbon levels over time
- Is crop rotation independent from CA?
  - They are not independent, but we consider CA more as a policy intervention – more policy support is needed for CA – since currently there is not much emphasis on sorghum and therefore there is poor market linkage and poor support from the government
- CA takes a lot of time – so how will the farmers feed their families during that time?
  - CA brings in crop diversity and there are savings from the first year – farmers will save money on nutrients, he has different options in terms of getting crops to harvest, water retention benefits are more immediate
  - 3-5 years for conversion
  - Farmers can include cash crops
- If I was a minister, I would not buy this and I am confused, everything is mixed together – markets for sorghum, land tenure rights, CA… I am not clear what you want to do
- I don't really see a diverse system – there are so many technologies out there
  - In the policy we need those things to be implemented…. We need markets near the farmers
  - We want to build something for the future and not just have a short term political gain
- Regarding breeding – we have varieties and they are not on the field, why should we invest in more breeding programmes?
  - The focus is on maize and we don't have the right varieties….
- How much does it cost and how many farmers can you reach?
  - First year 10k farmers, second year another 10k…. so we cover area by area….
  - Budget: we have chosen options that have cost benefits – we have left out the expensive options. These ones are manageable

Module A.1 – current situation
Case 2: Maize

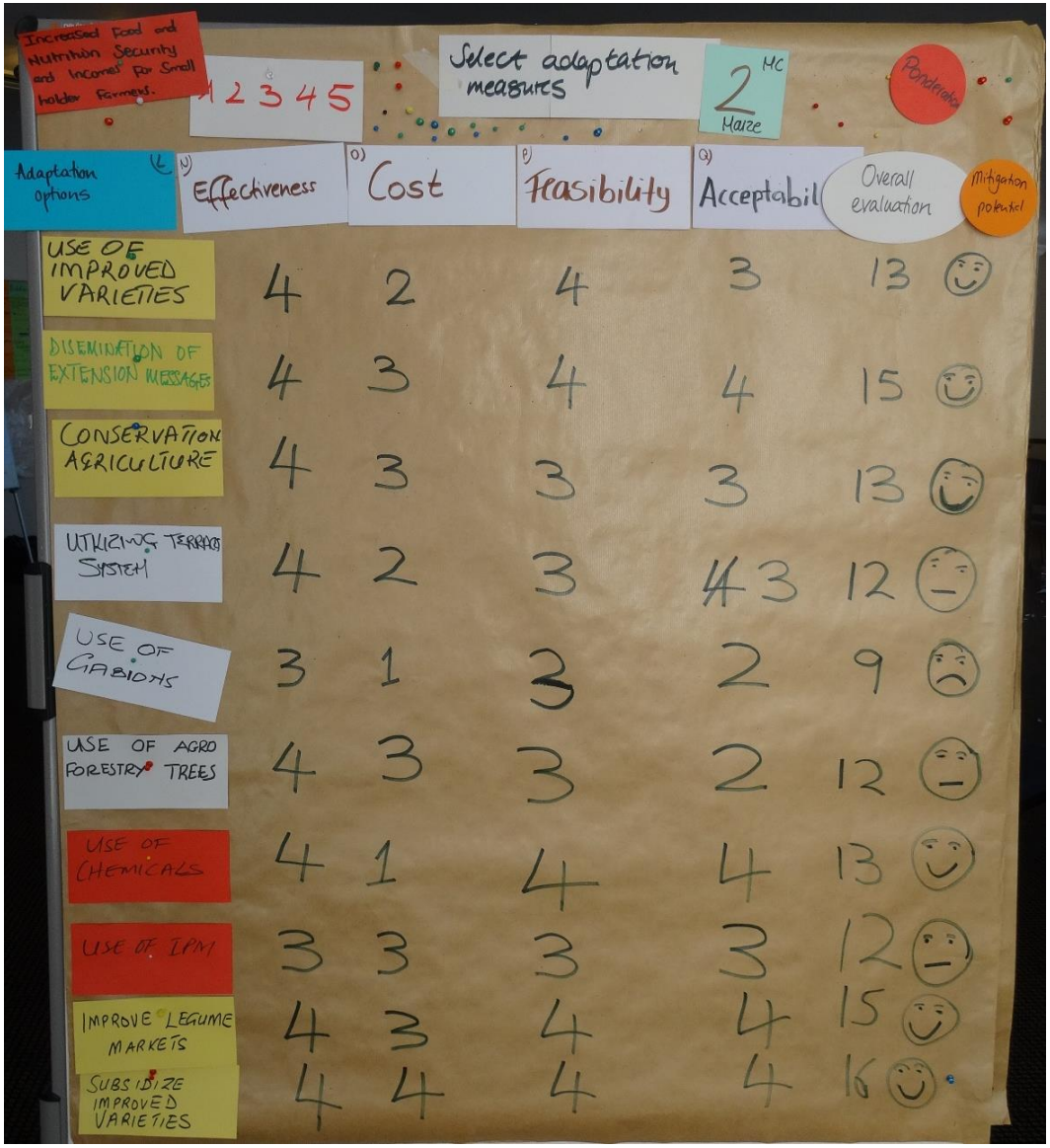
Module A.2 – future situation
Case 2: Maize

Module B – Case 2: Maize

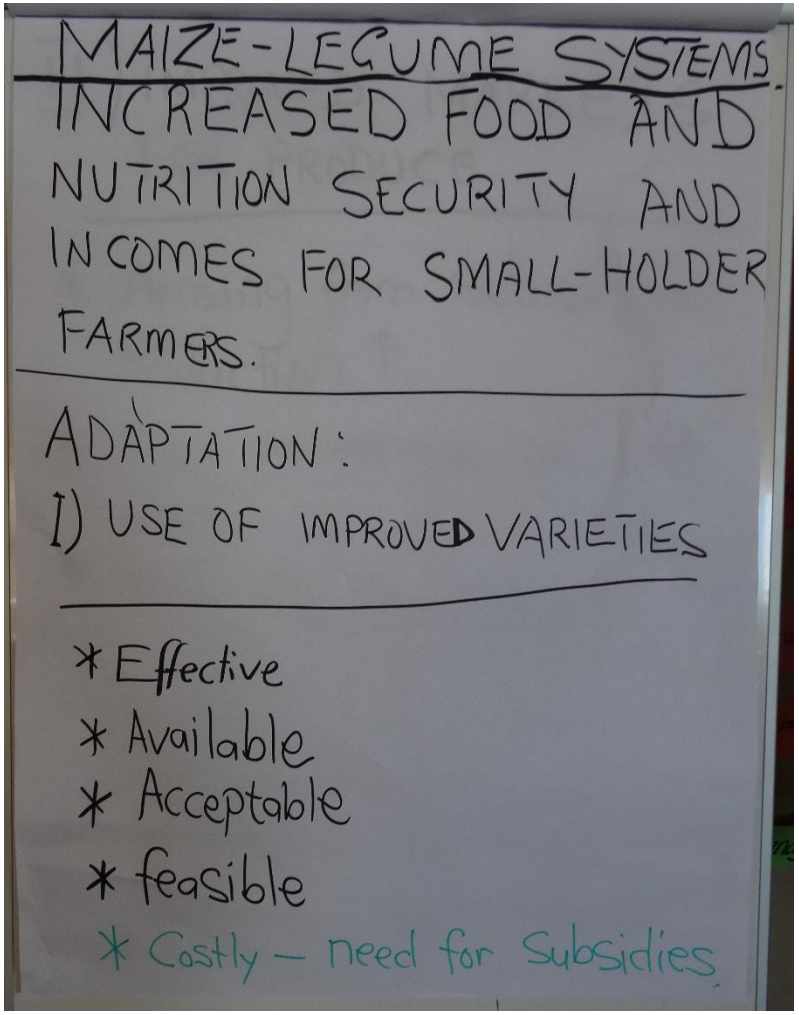


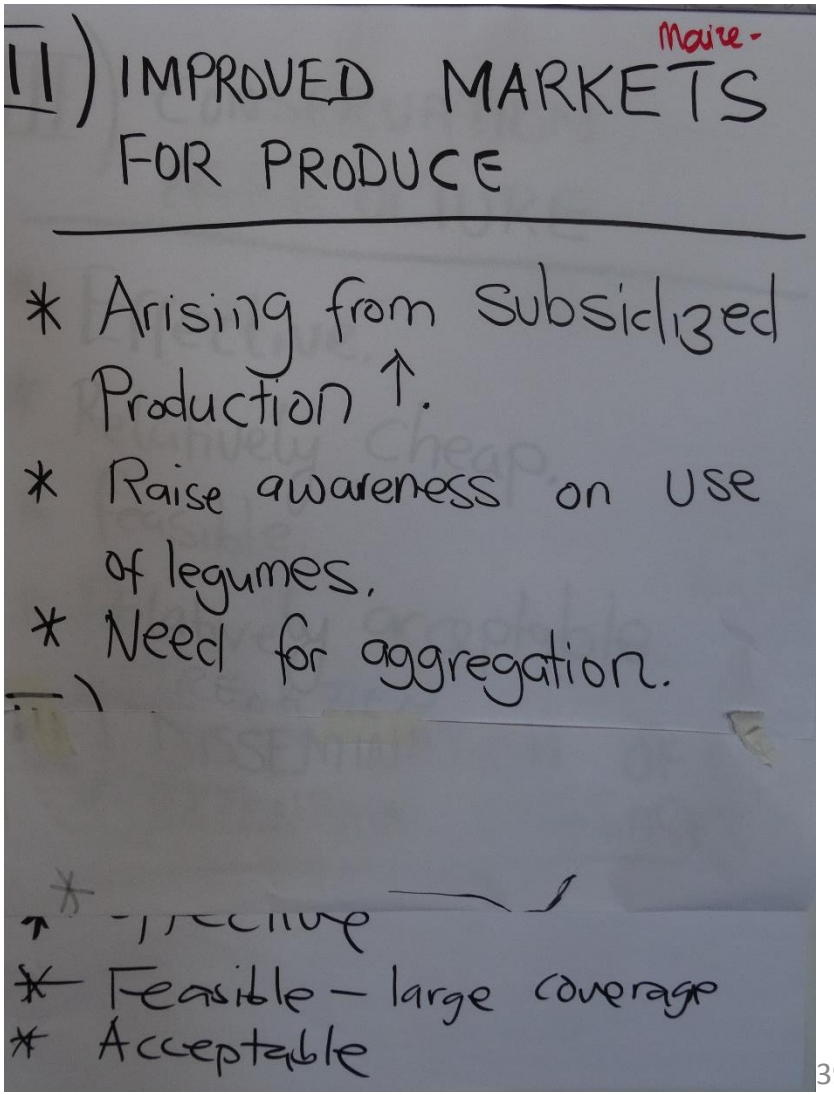


Module C - Case 2: Maize

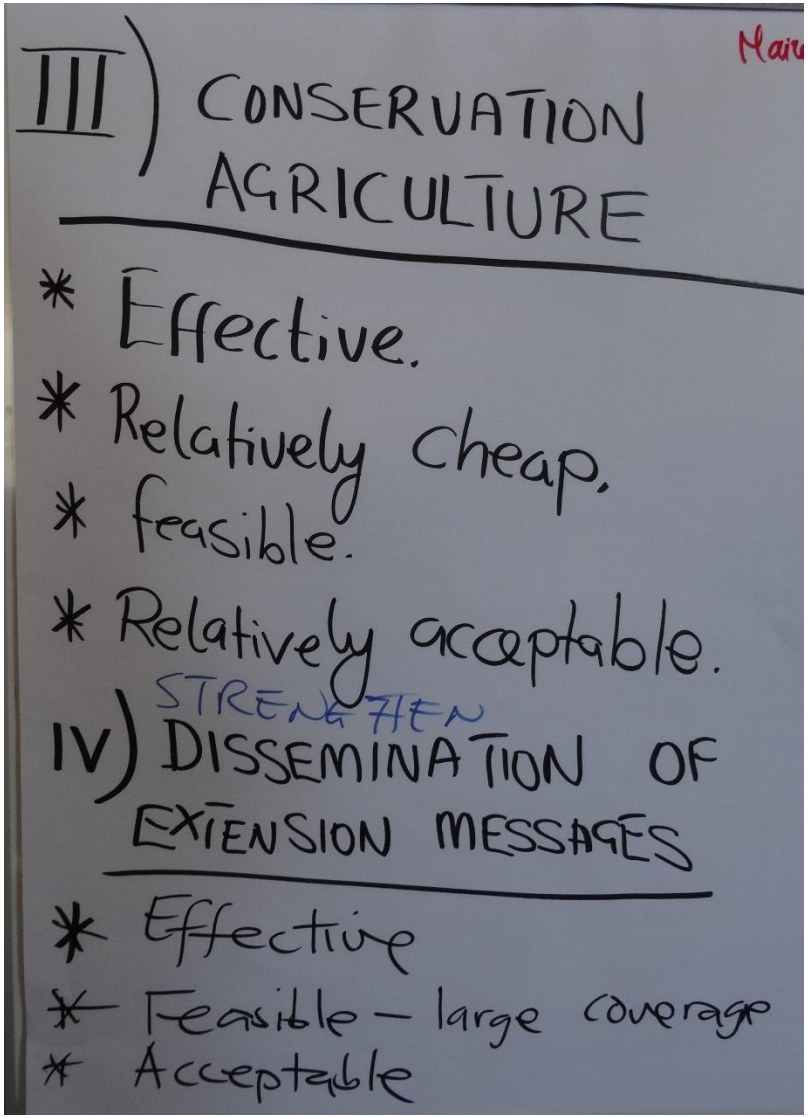


Presentation of final adaptation measures: Case 2 – Maize - I





Presentation of final adaptation measures: Case 2 – Maize - II



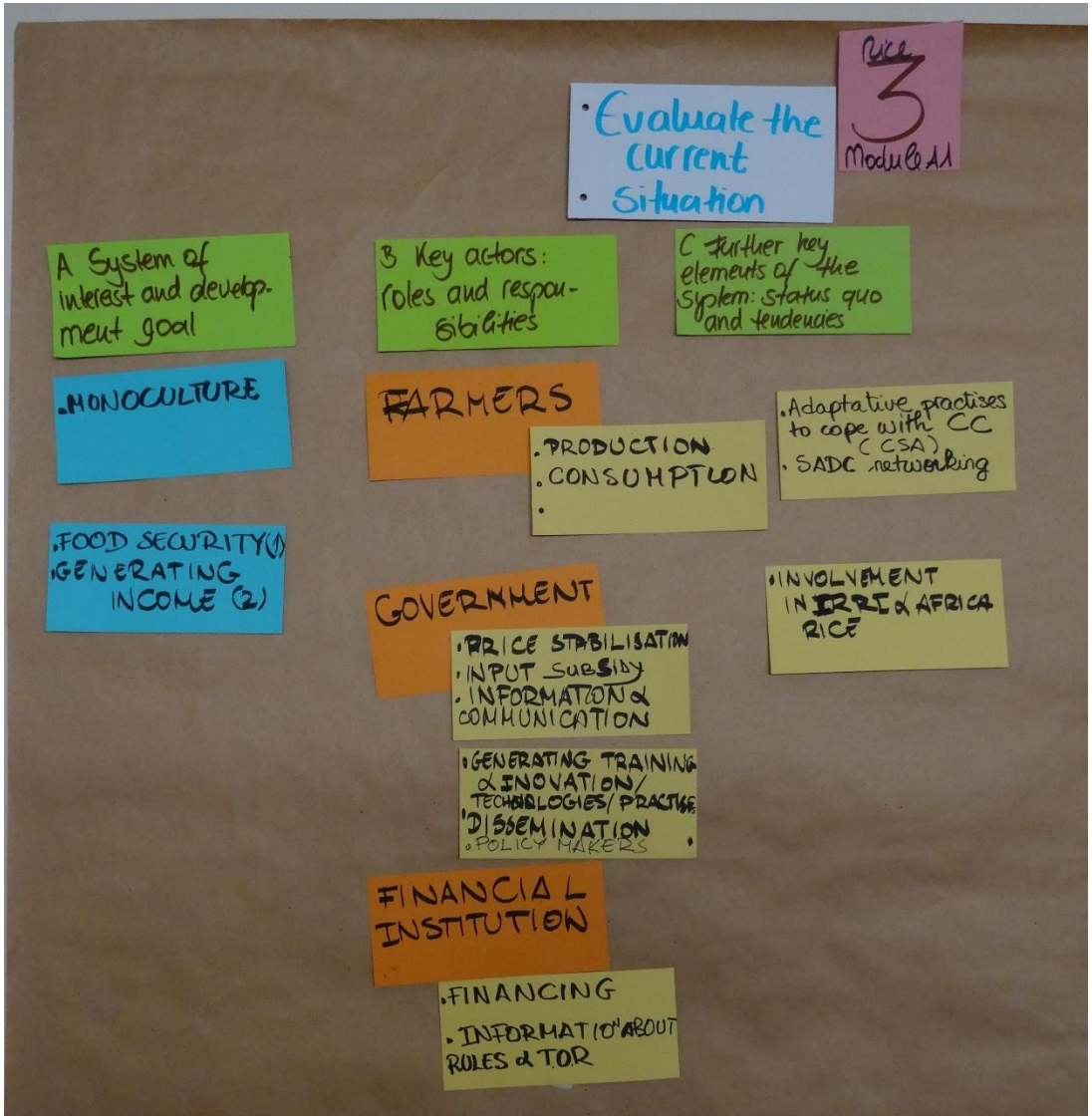
Q & A Maize

- Extension services exist
    - We do not have enough extension officers on the ground to work with the farmers
    - Need to strengthen dissemination of extension messages, they lack transport
    - We need to focus much more on the recruitment of women

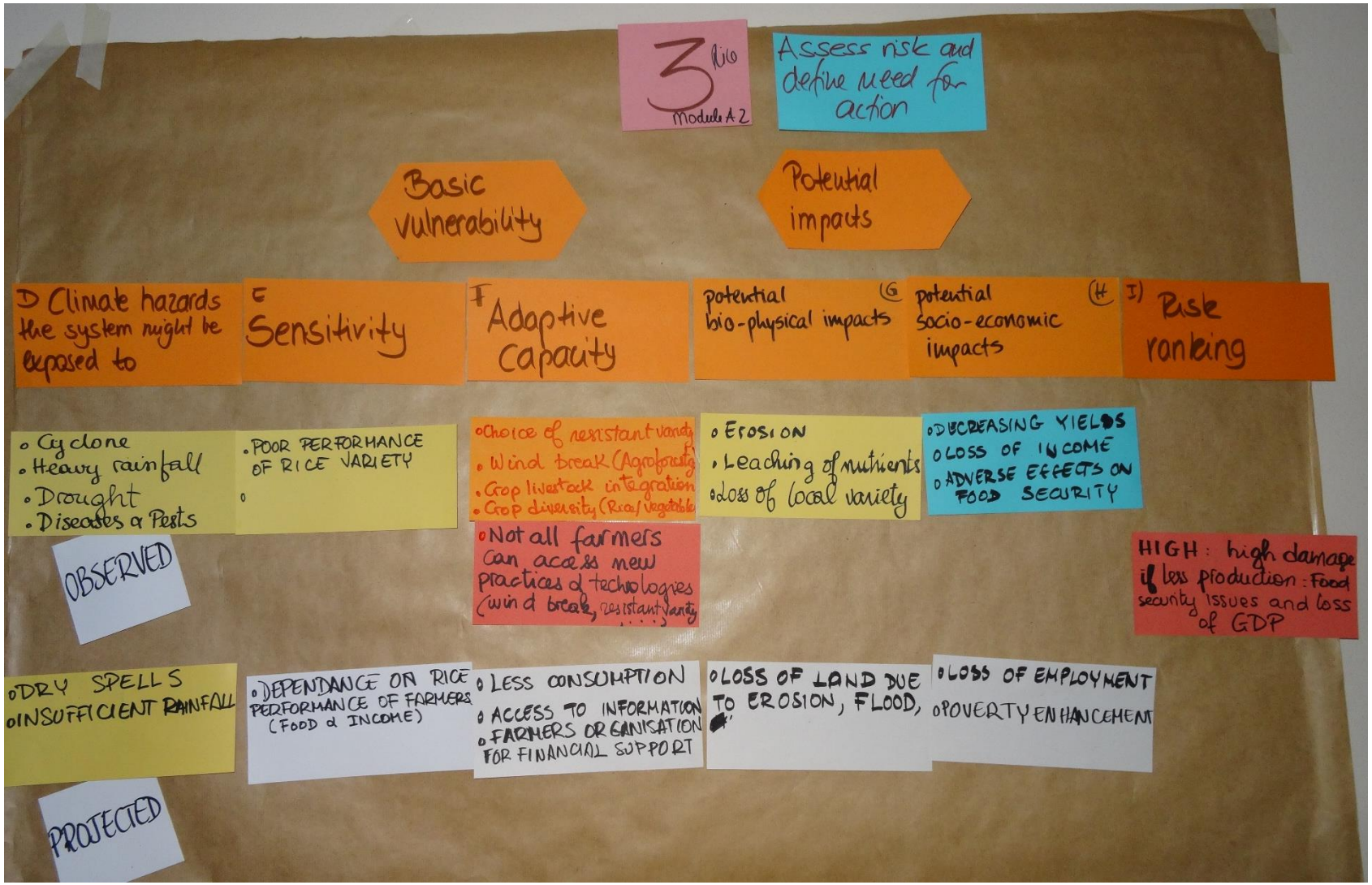
- We already have a high wage bill in the public service – we need to look at other options of disseminating our messages
    - We have started with peer farmers to triangulate messages in the communities
    - We need to strengthen extension messages – there are different ways of doing that

- It is not the employment of extension that will make farmers more adaptive, but we need to increase their mobility

Module A.1 – current situation
Case 3: Rice

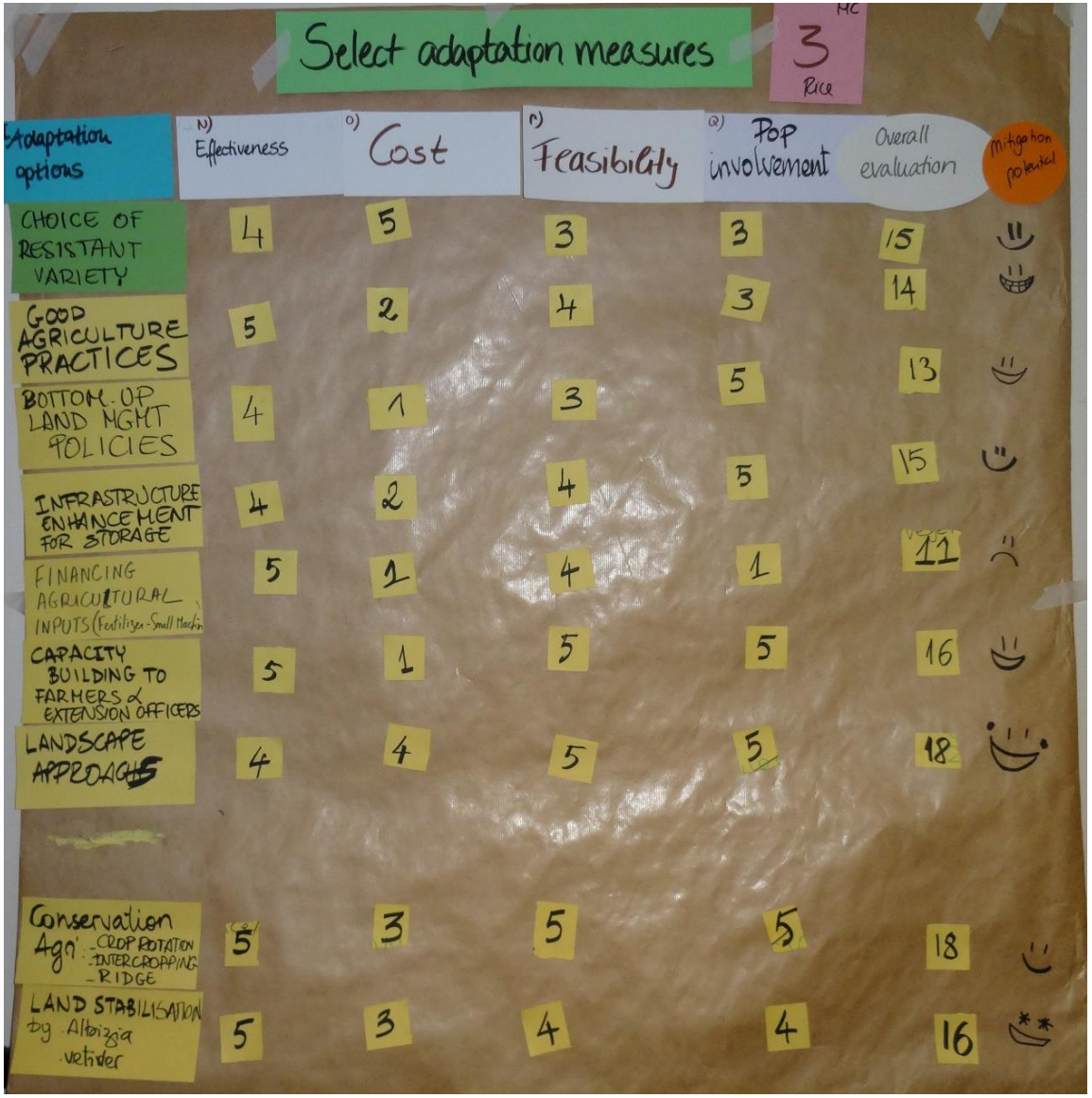


Module A.2 – future situation
Case 3: Rice



Module B – Case 3: Rice

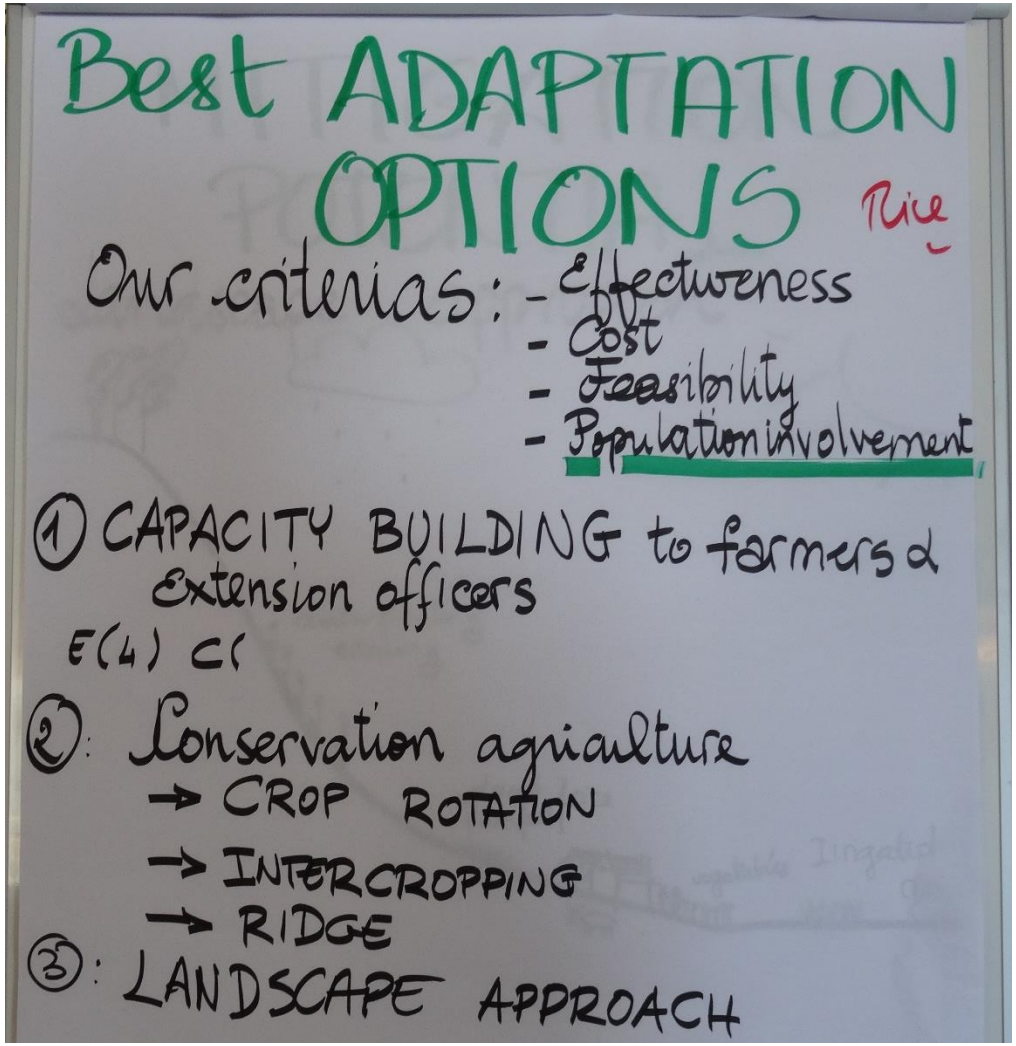
Module C - Case 3: Rice



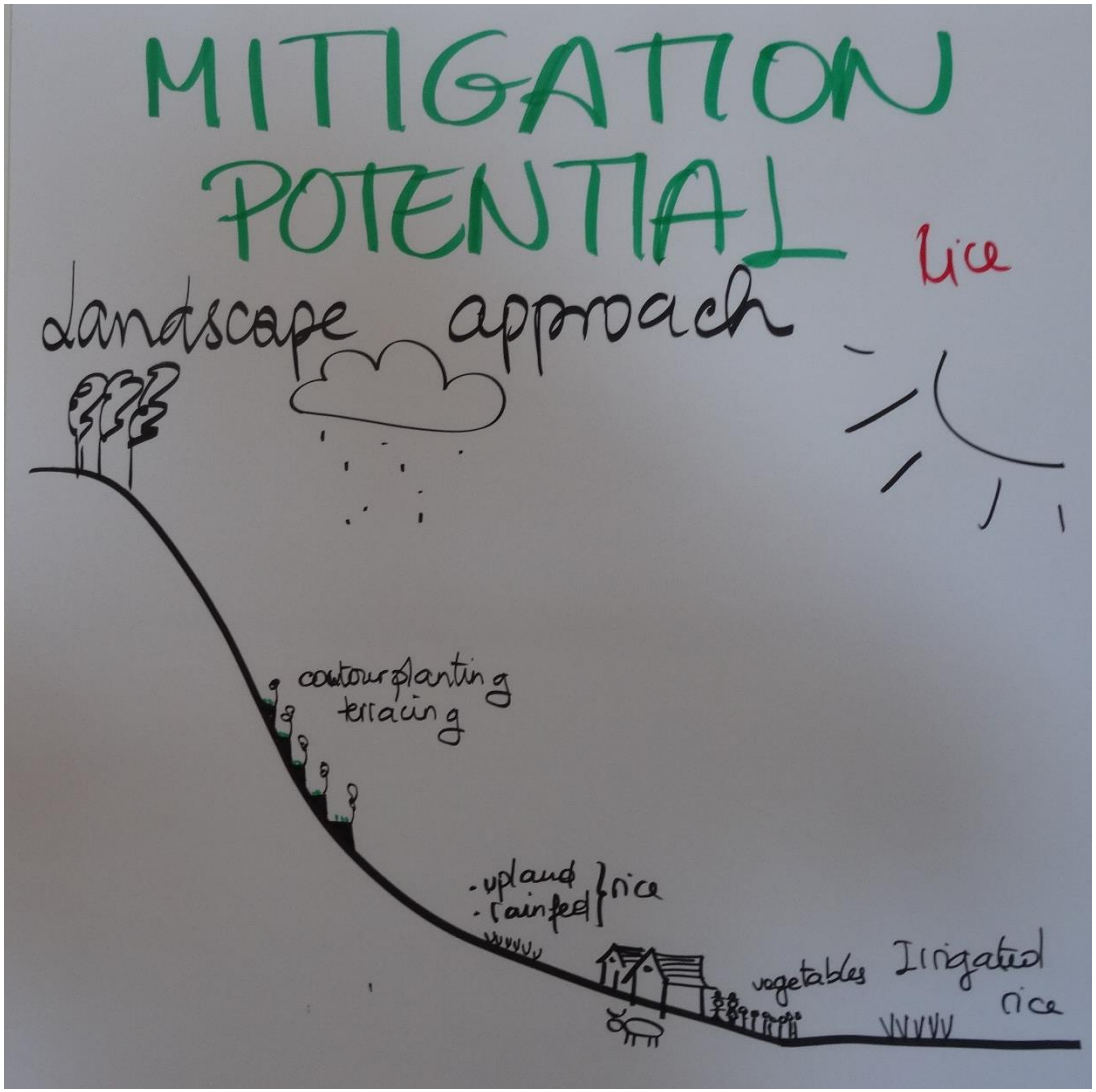
Presentation of final adaptation measures: Case 3 – Rice I

System of Interest:
Rice/vegetables
→ irrigated
→ rainfed

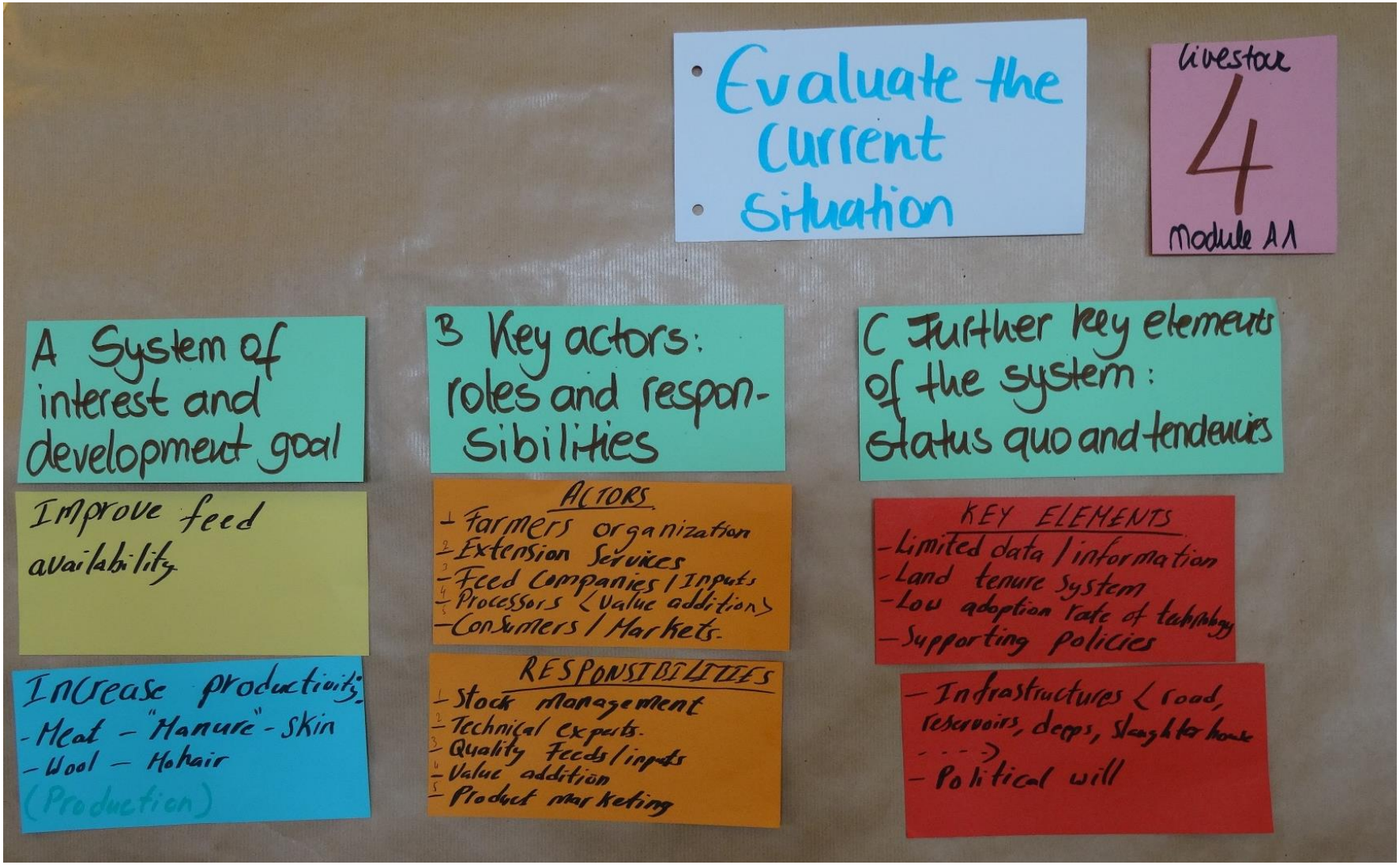
Development goal:
1. Food security
2. Generating income



Presentation of final adaptation measures: Case 3 – Rice II

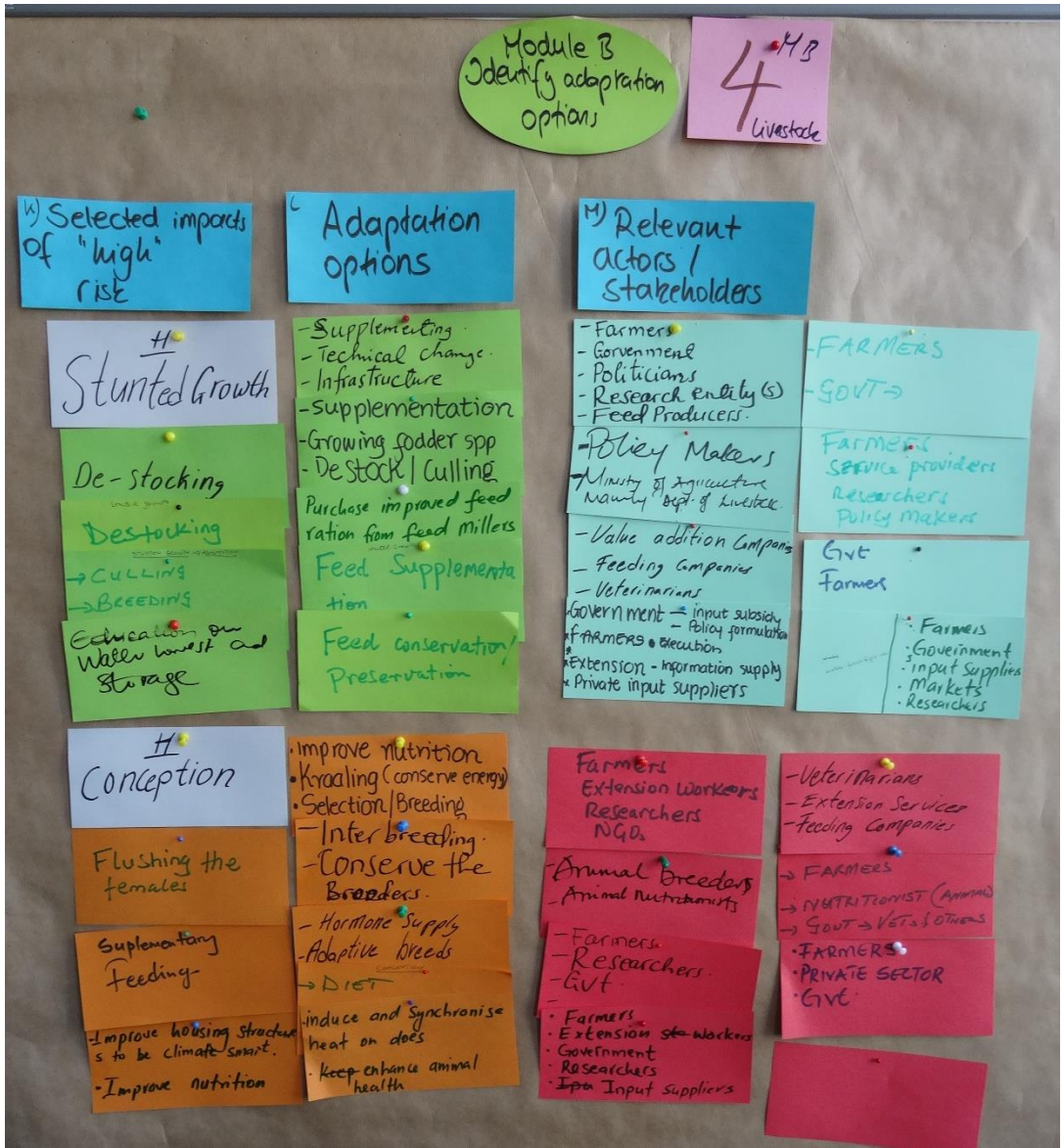


Module A.1 – current situation
Case 4: Livestock



Module A.2 – future situation
Case 4: Livestock

Module B – Case 4: Livestock

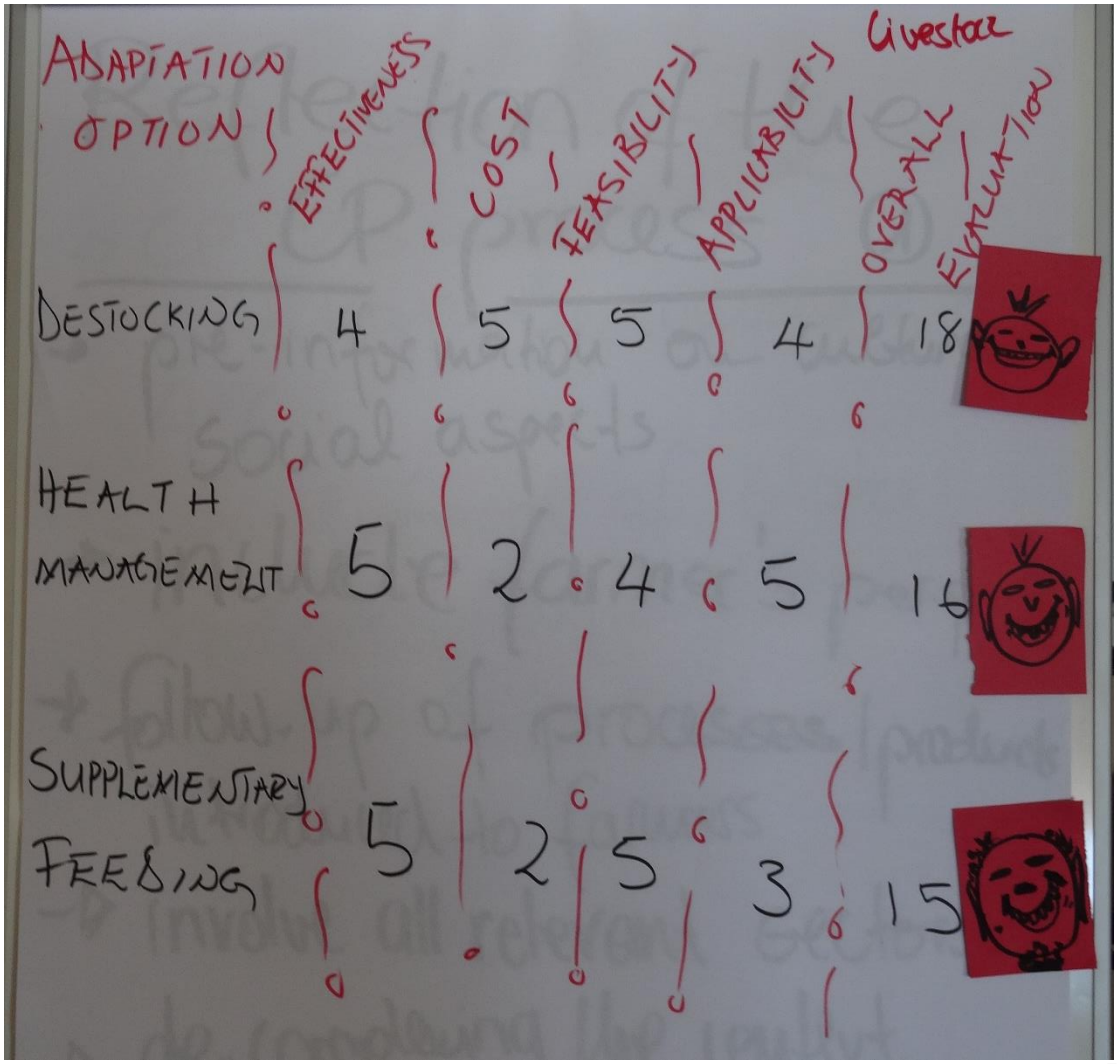


Module C - Case 4: Livestock

Presentation of final adaptation measures: Case 4 - Livestock

System of Interest: Small holder goat production in semi arid regions

Development goal: Increase of productivity (meat, mohair, skins)



Q & A livestock

- How is destocking a national concern? For us to be rich, we need many animals, they provide incomes. How can you tell me to destock when I need these animals and I can do supplementary feeding?
    - Under CC fodder resources are becoming more scarce, we are trying to reduce the number of animals to match with the feed resources
    - Having many animals does not mean that you are rich – if you have low productivity and low quality
    - Destocking in semi arid areas – you need to cull the least productive animals instead of letting them die – so you still have a profit. With that money you can buy supplementary feeding to maintain those animals that you have left through the drought
    - We need a mindset shift: livestock owners need to be engaged to show them that they can make more money with less numbers – we need to look at livestock as a business at the end of the day

- Goats are good to fight bush encroachment – so this is good, it helps maintaining pastures
    - Namibia already gives out animals to farmers as means for income generation and food security

Reflection and lessons learnt by participants - Module A

- Difficulties in defining „Climate hazard“, it was intermixed with impacts (e.g. pests & diseases)
- All groups struggled to do the risk ranking properly
- The groups were too focused on the negative aspects of CC and thus let aside possible positive effects
- The systematic approach helped to get a „bird‘s eye view“ on the system of interest

- The CP approach helped to learn the technical language of adaptation and the underlying terminology
- It was sometimes a bit difficult to distinguish current adaptive capacity from (future) adaptation options.
- If you do a „real-life“ climate proofing you need various sources of information (climate data)

Reflecting the Climate Proofing process by participants – I

- Pre-information on cultural and social aspects need to be considered
- The farmer‘s perspective should be included
- The process should be followed-up, products should be introduced to farmers
- All relevant sectors need to be involved

- CP has helped to strategize the adaptation priorities
- The CP helped to de-complex the context through step-wise approach
- The involvement of stakeholders helps to get different views on board and maintain objectivity.

Reflecting the Climate Proofing process by participants - II

- Often when we do CP we leave out the social impacts – we leave out how people live, cultural barriers… we need to do some surveys to better understand the perceptions of people about options – technologies are there and people are not adopting and we need to be more familiar with these – we need technologies that address both aspects
  - In reality you will do information gathering in the beginning – and that has to include survey data and all other sources

- Processes are key – we need to include farmers in the planning and decision making – we cannot keep doing this top down; we leave things with the farmers but never go back to check whether they are being used and then we complain if they haven't taken effect.

- Stepwise approach was helpful to help us understand the process
  - CP is a pretty standard tool, vulnerability assessment is another one
  - Other tools exist to help you make decisions about options – e.g. farms of the future, CSA prioritization

- If you involve different stakeholders, be prepared for different views – we need to listen to each other and be objective – we need to show people we have been empowered with knowledge, we need to explain things better

Presentation 5: Introduction to CSA: technologies, practices and strategies by L. Waldmüller

The speaker presented the new challenges for agriculture addressed by several organisations which led to the development of the **CSA concept in 2010** by the FAO.

He also mentioned the Agenda 2030, the Paris Agreement as well as the INDCs, who are also incorporating the agricultural sector. He then gave a definition of CSA which is: "**CSA is an approach to help guide the management and transformation of agriculture for food security under the realities of climate change**".

NGOs and Civil Society Organizations raised some concerns about this concept, e.g. the strong focus on mitigation and carbon markets and the danger of small-scale farmers to focus too much on carbon certificates rather than improving resilience.

The presenter further explained the **five components of CSA** and also gave examples of **climate-smart practices** in smallholder agricultural production.

He closed with showing an ideal **climate-smart landscape** and **eight steps in planning CSA measures.**

Q & A

- How to minimize/avoid conflicts between farmers and herders?

→ crop-livestock interaction: land use planning: corridors for cattle and grazing areas to settle conflicts

- The introduction of new tree species is often not accepted by farmers.

→ preferably use indigenous crops & trees. Be careful with new species, as they might also push aside local plants (example form the Kalahari region, where more trees got planted to break the wind, but not the "right" species was chosen → this species is now invasive, pushing aside local tree species

- There is no "copy-pasting" of new technologies to African villages. Sometime there is not enough evidence on how/what to adapt. A missing link between knowledge, practice and research in some areas

Presentation 6: Conservation agriculture: farmer adoption of new practises and technologies by Dr. C. Thierfelder

Dr. Christian Thierfelder, researcher at the International Maize and Wheat Improvement Center (CIMMYT) in Harare, Zimbabwe, joined in with a presentation on Conservation Agriculture (CA).

He explained that CSA is in the intersection of Sustainable increase in productivity, climate change adaptation and climate change mitigation. Practices under the CSA roof are: conservation agriculture, agroforestry, rangeland management and others.

He stressed that there is not one CSA practice, but different and complimentary combinations of practices to achieve the greatest CSA potential in a landscape. CA provides a good foundation for CSA**. CA reduces soil and land degradation**, helps to **adapt production** to CC, is more **water-, nutrient-, and energy-efficient and improves the productivity** of current farming systems. This was undermined with graphics of research results.

Some **challenges of CA** were also mentioned, amongst them residues, weeds, fertilizer, donor driven adoption and slow adoption/understanding of the CA issues. A **multi-agent** innovation system may be required for CA, brining together **various players** (innovative farmers, input suppliers, extension agents, researchers etc.). He then explained some **practical steps** on how to get started on CA.

The presentation finished with some **reflexions and recommendations** on CA.

Q&A - I

- Is maize production in Africa mono-cropping?

→ Rotation and diversification are very site-specific (small plots!) and often farmers have these techniques not as top priorities. They need to care in the first place about consumption and food for their family. So rotation is often neglected. Sometimes, farmers grow maize and sorghum and rotate every three years. Intercropping (e.g. of maize and cowpeas can be found in southern Malawi). In Zambia, full rotation of maize/cowpeas and sunflower can be found. This is due to often bigger plot sizes.

- Advice on moisture retention of soils

→ Conservation agriculture has got certain limits. Enough biomass has to be produced to be put on the top soil. Not all soil types are suitable (sandy soils are rather unsuitable for CA). In this case it is better, to leave the soils as rangeland for animals. In Zimbabwe, CA is practised on a small-scale. Livestock keeping would be more efficient in this case.

- Termites and CA

→ Termites do eat the dead material and thus increase fertility of soils. But the benefit of the soil cover gets lost. This is very site-specific and not a "one fits all" solution to it. Maximal soil cover, so that termites do less harm to the plants.

- Competition livestock/crop residues on commercially utilised land (e.g. Lesotho)
- Weed control if no herbicides are available

→ In conventional systems, ploughing controls weeds. Rotation with strong manure helps suppressing weeds, as well as increasing the mulch level and planting maize densely. But some weeds are very difficult to control, herbicides can be used at the beginning of CA, later phase them out.

- Better livestock management needed to reduce pressure on crop residues.
- Marketing issues: when farmers grow maize, they can sell it on the local market. For new products, there might not be a market niche.

Q & A - II

- Conversion to CA takes time to see results – we need a participatory approach to make sure the timeframe is understood. Need quick economic wins!
- Need push factors, not just pull factors – incentive for transformation
- Not all is transferable – in MAD farmers own less than 1 ha – they know they have to change, but with that little land there is no room to experiment with new things, financial resources are missing
- Need government support for conversion to CA
- Trade offs – need to have a balance of making profits with conversion – need to understand the trade offs between food security and profit needs
- Need to have rules that are enforced, need to address conflict – e.g. livestock needs to be managed while we have primarily systems of communal grazing after harvest – need community land use planning
- Integration of legumes into the rotation
- Integration of cash crops into rotation
- Aim towards organic CA – to reduce the herbicides
- Increased cropping diversity via rotations is good – increasing biodiversity

Need quick economic wins in between – opportunity of CSA which aims to balance those components

What of CA is CSA and what is not?

- CSA: use of crop rotation, vegetation cover, the principles contribute, soil fertility/structure improvement, better water holding capacity, humus has mitigation effect
- Not so much: little tree integration, application of herbicides is controversial for emissions, health and soil flora/fauna,
- Promotion of CA in the region's smallholder systems does not include use of herbicides

Presentation 7: Role of livestock in smallholder adaptation and CSA by. Dr. B. Podisi

Dr. Podisi (CCARDESA) highlighted the **importance of livestock** in the SADC region, also taking into account the **fishery sector**, upon which 3 billion people rely worldwide. He then drew the line between **livestock and GHG emissions** of the sector, but also mentioned the climate related challenges the sector is facing. Vector-borne diseases are adversely impacting livestock.

Resilience can be enhanced by using adapted breeds. He also explained option for **climate smart practice** in livestock as well as practices with mitigation potential.

He concluded his presentation with the following wrap-up:

- Livestock offer options for land use in marginal areas and offer resilience in arid areas.
- Provide efficient feeds/ diets and manage manure
- Improving productivity of breeds and efficiency of use of feed resources provides mitigation options
- Breed productive and adapted animals
- Improve management of grazing and over sow pastures with improved varieties & agroforestry
- Enabling environment needed to for smallholders to adopt efficient approaches and technologies.

Q & A

- Competition with regard to water between human and animals. How will the increase of livestock productivity be used in this situation as an adaptation strategy?

→ In drought-prone countries, small livestock (sheep and goats, chickens) is often given out to affected populations. These are more resilient towards drought than cattle. Preferably, use breeds that do not need water on a daily basis (traditional breeds). This is to save water and maintain the same level of productivity.

- Livestock management is often a social and cultural issue. Livestock should be managed more carefully and properly.

→ take care of good quality of fodder for the animals to reach a good level of productivity. Have as few animals as possible and manage them properly. Consumers should rethink their consumption habits regarding animal products.

Day 3 - overview

- Module A: presentation of results
- Presentation 7: Water and land management in CSA: opportunities and constraints
- Presentation 8: The importance of post-harvest management
- Excursion to the Langgewens Research Farm, Malmesbury, Western Cape

Day 3

- The day was **opened by the CMC**
- Directly after, each of the working groups presented the **results of the Module A**. Questions and some corrections were made by the group and the facilitator (especially on the topic of „Climate hazard“ and „Sensitivity“ and the risk ranking).
- The presentation of the results was followed by a reflection of module A in plenary – lessons learnt, difficulties in executing the tasks etc.
- Two presentations were held thereafter:

➢ **Water and land management** in CSA

➢ The importance of **post-harvest management**

- The whole group then started to their **excursion to the Langgewens Research Farm**, 1.5 hrs drive North from Cape Town

Presentation 8:
Water management and soil conservation for a climate-resilient agriculture by S. Beerhalter, GIZ

Ms. Beerhalter programme manager of GIZ's ACCRA programme in Botswana showed a map of **rates of land degradation** worldwide and a second map with of global physical and economic **water scarcity**, pointing out the SADC region which suffers from economic water scarcity. From all available water on earth, **97,5% is salt water, only 2,5% fresh water**. She explained that Southern Africa is a very **water scarce region**, and the impacts of CC are worsening the situation. Water of several big transboundary rivers is already over allocated this leads to negative consequences for the environment, increases business risks and also has political implications. Currently, the SADC region is going through the **worst drought since 35 years** (2015/16), and regional drought disaster has been declared in July 2016.

The **competition** for water is high, with many actors involved like industry, power generation, urban development and agriculture. Agriculture is the biggest water user world wide and accounts for approx. **70 %** of the total fresh water withdrawal. It is therefore the question, how to increase the water use efficiency. This can be done by applying water directly where it is consumed, irrigate plants in the early morning or evening, support water storage capacities etc.

Ms. Beerhalter also explained the subject of **soil and water conservation** and showed a lot of practical examples and a film on it.

Presentation 9:
The importance of post-harvest management: best practices by S. Sibanda, Agricultural Research Council

Mr. Sibanda from the Agricultural Research Council in Pretoria explained that **postharvest handling in agriculture** is the stage of crop production immediately following harvest. The instant a crop is removed from the ground, or separated from its parent plant, it begins to deteriorate. **Postharvest treatment** determines final quality, whether a crop is sold for fresh consumption.

The **aims of postharvest** practices are twofold:

- Maintain quality of harvested produce and
- Reduce loss (quantitative & qualitative) between harvest and consumption

Factors affecting postharvest systems, can be environmental, technical, biological and chemical and mechanical ones. On the impacts of increasing temperatures on postharvest handling he elaborated more in detail. He concluded his presentation with the overall impacts of CC and that Africa needs to reduce postharvest losses, which means that postharvest management is one of the critical issues that as a region we need to focus on.

Excursion to the Langgewens Research Farm Malmesbury, Western Cape

Contact: Johann Strauss
JohannSt@elsenburg.com

Farm information- I

Introduction by Senior Research Officer **Johan Strauss.**

The research station is one of 8 research stations in Western Cape Province. The station is **38 ha** in size with research of 8 cropping systems all applying **conservation agriculture (CA)** . The average **rainfall** of the station is **380 mm** (rainy season is from April to September) with **Mediterranean** climate (hot summer and cool winter).

In the 1980s, the cropping system in the area was wheat monocrop. In 1983, heavy rainfall and flooding caused severe loss of topsoil in the area. The consequence was a continuous decline in soil fertility and reduced yield of wheat. It was that year that minimum tillage was introduced and first trials started.

The farm started in **2003** with CA and presently applies it on 95% of their fields with a predominantly **3-4 year crop rotation**, e.g. wheat – canola – wheat; wheat – lupine – canola – wheat; animal pasture (including *Medicago ssp*.) – wheat – fallow; saltbush as early pasture.

The **organic matter content** on the farm is 1.5 to 2%. In undisturbed fields with natural follow the carbon content is 4%. This is significantly higher than in conventional systems.

Farm information- II

In CA the following three principles are followed:

1. minimum soil disturbance
2. inclusion of a cover crop
3. crop rotation

Up to now the results from the trials are as follows:

- CA conserves moisture in the soil
- input costs are lower because of crop rotation
- per part of organic matter increase, two parts of water are saved in the soil
- improve the soil, then yield will also improve
- the best system up to now is a system with no tillage and cover crop
- the worst system is a system with no tillage and no cover crop
- on sandy soils, it takes longer to build up organic matter content of the soil
- livestock has to be part of CA in Africa (the question is how to manage them)
- livestock is important for sustainability and income
- the average yield of wheat under monoculture is 2.7 t/ha, with crop rotation and CA about a 50% higher yield will be achieved (4t/ha)
- in 2014, they produced 2.1 t/ha of wheat with 170 mm of rain only
- the highest yield of wheat they had achieved was 6 t/ha with medium rainfall

Farm information- III

Future trials on the farm:

- reduce and finally get rid of farm chemicals (low input)
- test and apply more cover crops in order to increase diversity
- finally apply organic conservation agriculture
- Testing of new cover crops such as: black oats (*Avena strigosa*) - they grow very prolific, lupines (*Lupinus ssp.)* - as cover crop in summer it is better than only keeping plant residues on the soil, linseed or flax (*Linum ssp*.) as part of an extended crop rotation – 10 years; linseeds are very valuable as oil and for consumption and provide a good income for the farm.

Animals on the farm:

Livestock fits very well in the system of CA in order to reduce the risk of dependency on one farm enterprise only (that is cultivation of wheat only) and increases farm income, as well as bring manure onto the fields. The farm has included Merino sheep (they can have two times lambing per year) in the crop rotation; now they keep 2 to 3 breeding units per ha. If the stocking rate is too high, the trampling of the livestock compacts the soil which makes intensive tillage necessary. With a reduced stocking rate of one breeding unit/ha the soil is not so compacted. Systems including saltbush in rotation to let pasture establish early in the season had a beneficial impact on productivity.

Discussion:

Site-specific knowledge is very important for application of CA. When including livestock in CA, the selection of type of livestock breed is important and dependent on the specific site.

In South Africa the question of trade-offs for small farmers in CA is important – the opportunity costs for having residues on the fields are higher than feeding the residues (for example as hay) to livestock

Recapitulation of the excursion

The next morning after the field visit the participants brainstormed about the key take home from the field visit. These were:

- Look at the cropping system
- CA and the integration of livestock
- Site specific knowledge
- CA conservation takes time
- „push factor“ to convert to CA
- Trade off in CA: leave residues versus feed to live stock
- Integration of legumes in crop rotation essential
- Crop rotation can include „cash crop“ (linseed) to increase income
- CA orientation towards organic
- Follow 3 CA principles:

I. Minimum soil disturbance
II. Keep soil converted
III. Crop rotation

Day 4 - overview

- Recapitulation of the excursion
- Case studies Module B: Identifying adaptation options
- Presentation 9: Importance of gender in CSA
- Case studies Module C: Selecting adaptation options

Day 4 - overview

- The day was **opened by the CMC**
- The **recapitulation of the excursion** was done in plenary – what were your main learning points during the farm visit?
- The four groups started then to work on **Module B: Identifying adaptation options**
- A presentation of the "**Importance of gender in CSA**" followed the group work.
- During the presentation the participants were asked to brainstorm in four sub-groups about the question **how women can benefit from CSA.**
- Before participants went back to work further on the climate proofing, an **action learning exercise on "types and intervention depth of adaptation options"** was done in plenary
- The day was closed with group work on **Module C: Selecting adaptation options**

Presentation 10:
Importance of gender in CSA by L. Waldmüller

The presenter gave background information to "gender and rural development": **70%** of world's poor people live in rural areas in developing countries, generally depending on agriculture, women provide on average more than 40% of agricultural labor force (up to 50% in Sub-Sahara Africa), women generally **produce food** for (household) consumption, men are involved in wage labor and cash crops, women are often involved in unpaid or low paid labor and women and children are affected by migration of men. If women had the same access to productive resources as men, they could **increase yields on their farms by 20-30%.** This could raise the total agricultural output in developing countries by 2.5 – 4%, which could in turn reduce the number of hungry people by 12 – 17%.

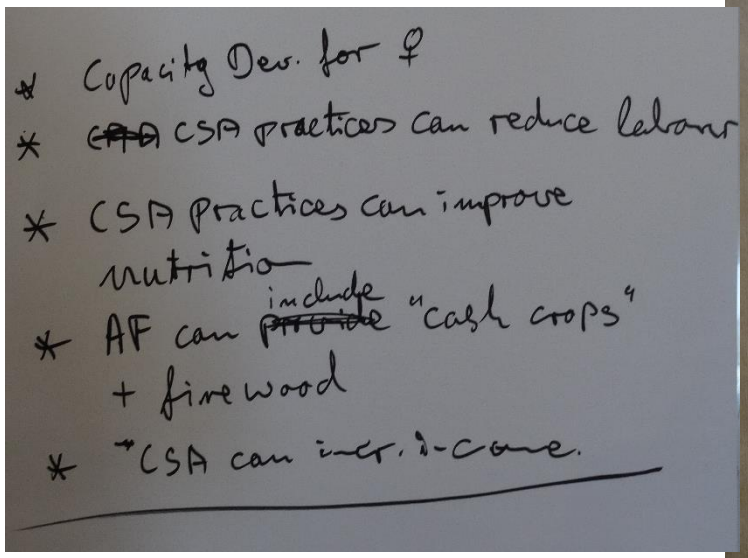
The Global **Gender Gap Index** examines the gap between men and women in four fundamental categories:

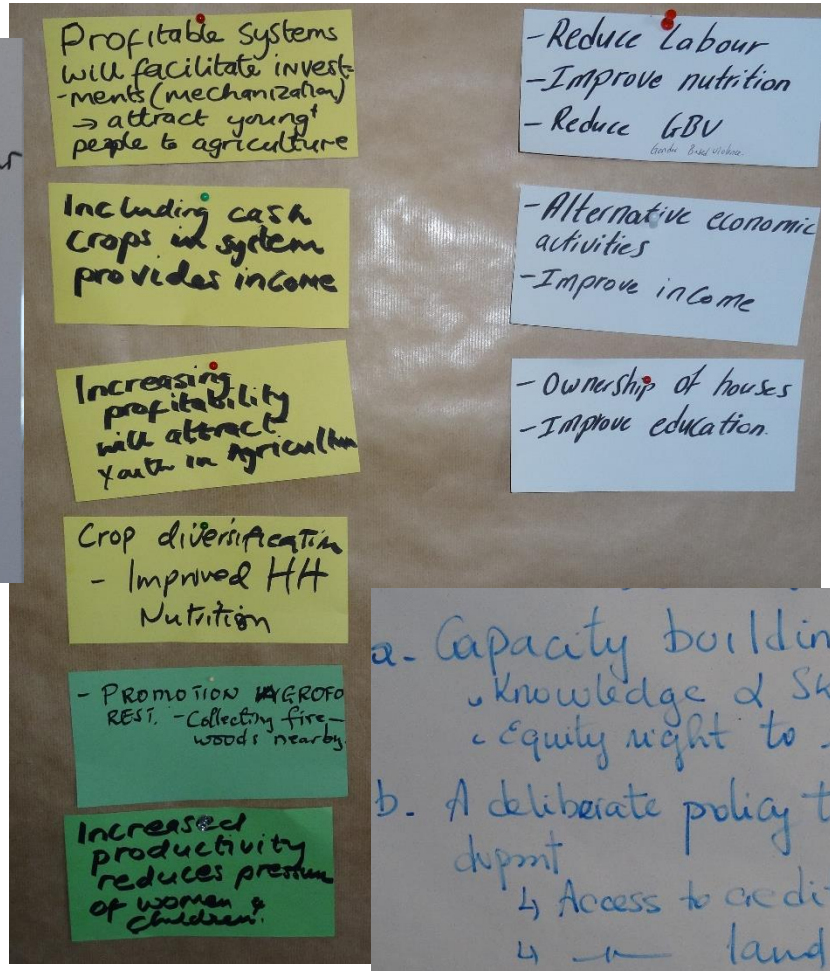
a) economic participation and opportunity,
b) educational attainment,
c) health and survival
d) political empowerment

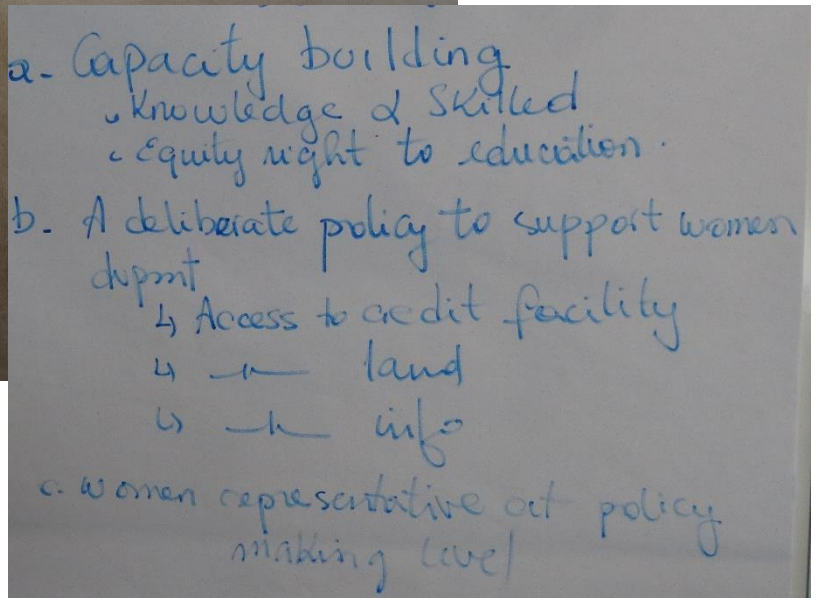
The group of participants was split up in sub-groups to discuss the question: How can women benefit from climate smart agriculture? (Results: see next slide)

After the presentation of the discussion results, Luis presented a table on **CSA practices and gender considerations**. He finished his presentation with an overview of what is needed to empower women: capacity building, involvement of women in decision making processes, avoidance of additional burden, improvement of policy and legal framework and increased income.

Group work: how can women benefit from CSA?







Comments from participants:

- In Zimbabwe more women come to trainings, are more available – but they don't have the decision making power on land use – need to target the men
- Labor in agriculture is done by women, but there are very few female extension officers – often men are in supervisory roles, but more women at local level
- In Zimbabwe and in Malawi, more women work in extension than men

Day 5 - overview

- Preparing the final presentations
- Presentations and discussion of results
- Reflections and conclusions of the CP approach
- Evaluation
- Hand over of certificates
- Closure

Day 5 - overview

- After the **opening of the day by the CMC** the participants went back to their working groups to **prepare their final presentations**
- Each group had about 15 minutes to **present and "defend" their chosen adaptation measures** in plenary
- They were asked to also explain again the **system of interest and the development goal(s)** the measures are aimed at.
- The audience, now in the role of Ministers of Agriculture from SADC, asked **critical questions**
- The climate proofing part ended with **reflections and conclusions of the CP approach**
- The last step of the whole training was the **evaluation part** which was done as a **carrousel of pin-boards** and the filling in of **questionnaires**
- **Ms. Beerhalter closed** the training by giving an **outlook of the roll-out** of the training on a country-basis and encouraged participants to approach GIZ/CCARDESA for (training) and support requests
- Finally, the **certificates and USB sticks** with photos and relevant documents were handed over to each participant

For further information

- ✓ www.ccardesa.org
- ✓ www.africacsa.org
- ✓ www.fao.org/gacsa/en
- ✓ http://saaiks.net
- ✓ www.wocat.net
- ✓ www.agriwaterpedia.info
- ✓ www.fao.org/climate-smart-agriculture/en
- ✓ www.adaptationcommunity.et
- ✓ www.cip.csag.utc.ac.za
- ✓ https://csa-guide.ccafs.cgiar.org
- ✓ Join-climate-l@lists.iisd.ca
- ✓ www.worldbank.org (then search for climate change knowledge portal)

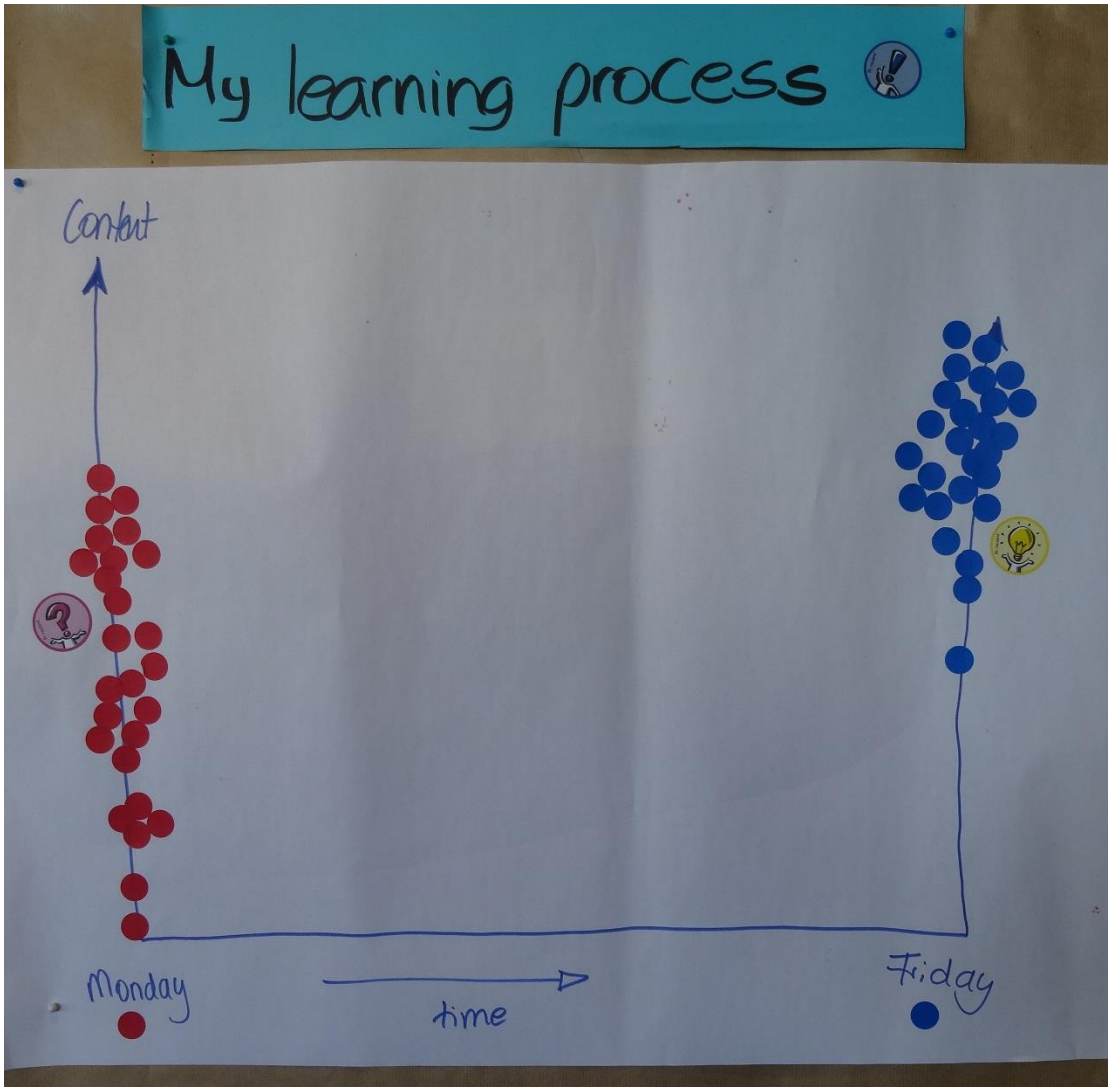
Tools for measuring sustainability on a farm:

Self-evaluation and Holistic Assessment of climate Resilience of farmers and Pastoralists (SHARP)
http://www.fao.org/in-action/sharp/en/

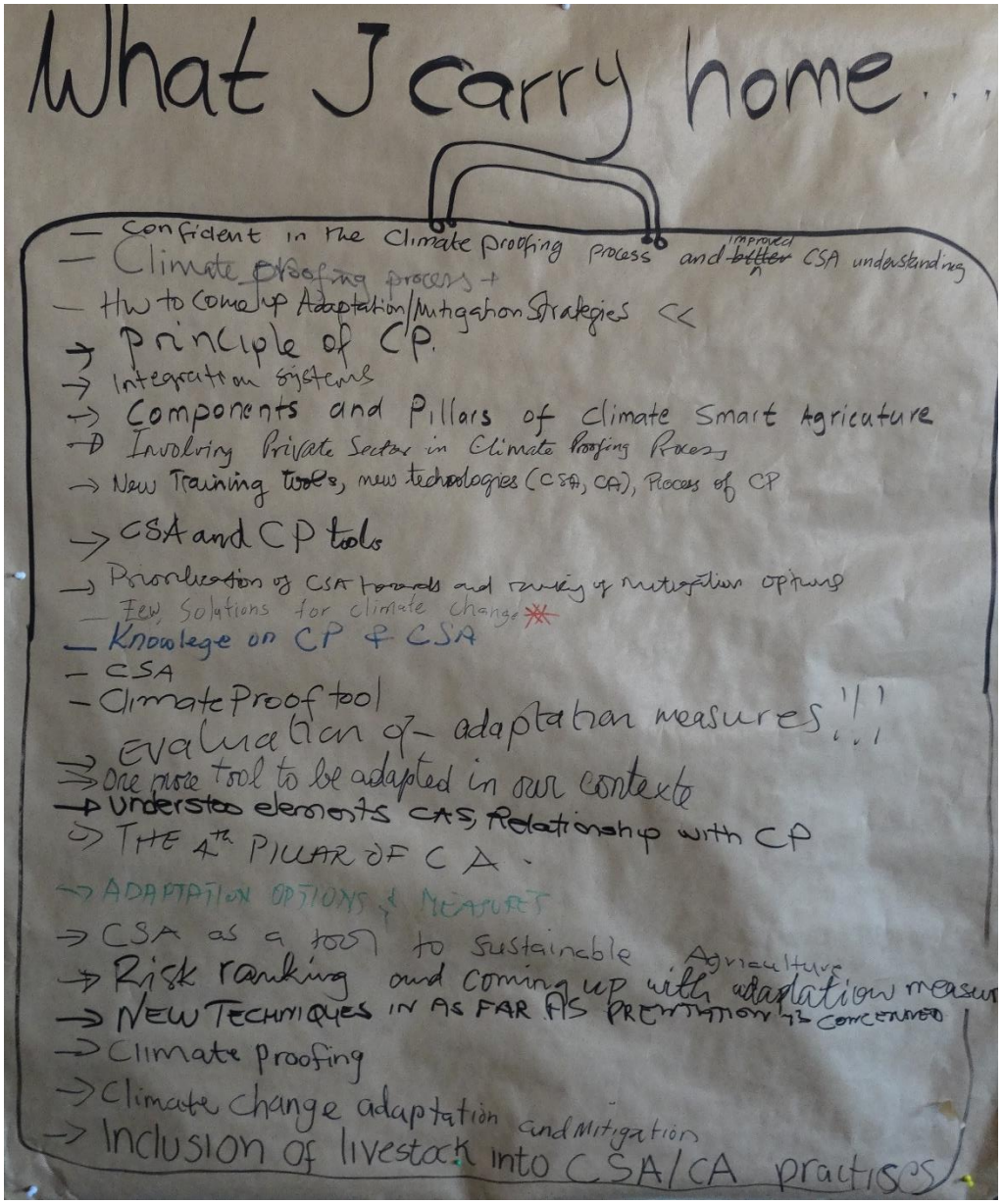
RISE – getting sustainability down to earth
https://www.hafl.bfh.ch/en/research-consulting-services/agricultural-science/sustainability-and-ecosystems/sustainability-assessment/rise.html

Sustainability Assessment of Food and Agriculture systems (SAFA)
http://www.fao.org/nr/sustainability/sustainability-assessments-safa/en/

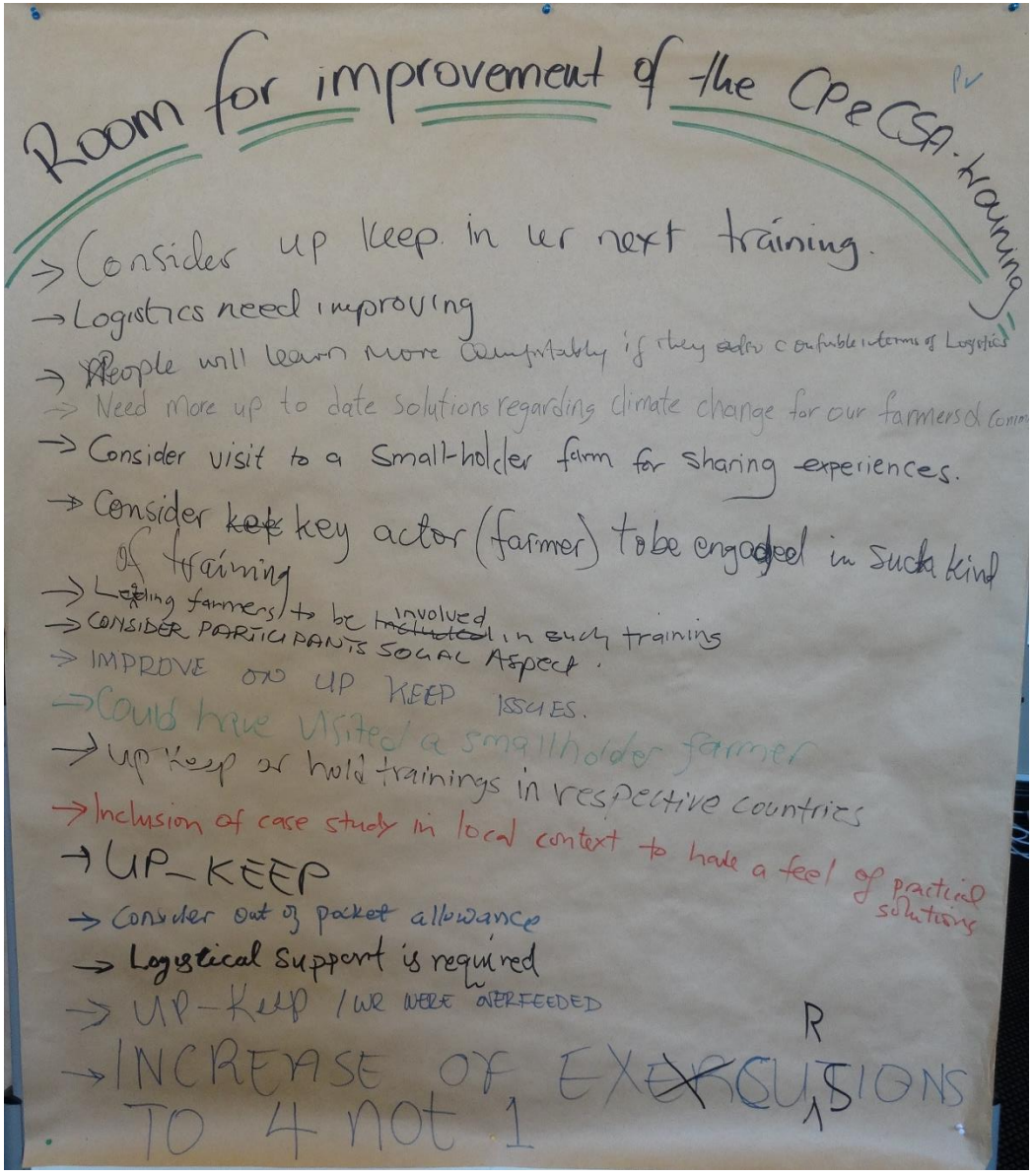
Evaluation I



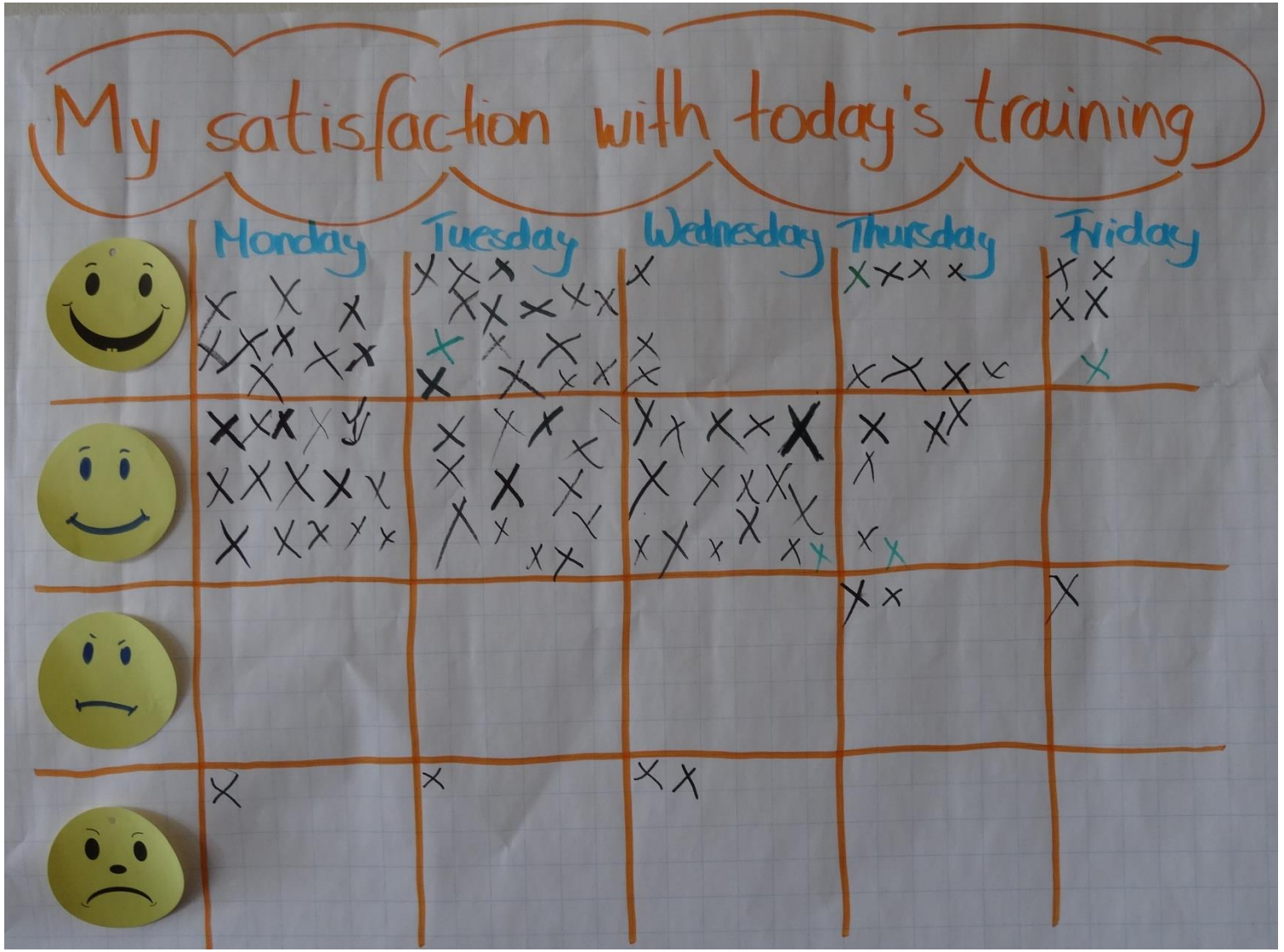
Evaluation II



Evaluation III



Daily evaluation



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Thank you!!