Matching land and water interventions with community needs: Report of community focus group discussions in four watersheds in Ethiopia

Compiled by Catherine Pfeifer
With contributions from: Zerihun Abebe (OARI), Girma Aberra (IWMI), Lelise Ararsa (OARI), Ajabush Defar (OARI), Bayissa Gedefa (OARI), Gerba Leta (ILRI), Mulugeta Habtemichael (ILRI), Kibruyesefa Sisay (ARARI)

December 2012

The Nile Basin Development Challenge (NBDC) is funded by the CGIAR Challenge Program on Water and Food (CPWF). It aims to improve the resilience of rural livelihoods in the Ethiopian highlands through a landscape approach to rainwater management. It comprises five linked projects examining: 1) Learning from the past; 2) developing integrated rainwater management strategies; 3) targeting and scaling out of rainwater management innovations; 4) assessing and anticipating the consequences of innovation in rainwater management systems; and 5) catalyzing platforms for learning, communication and coordination across the projects.

The NBDC is implemented by a consortium comprising the International Livestock Research Institute, International Water Management Institute, World Agroforestry Centre, Oversees Development Institute, Nile Basin Initiative, Stockholm Environment Institute, Ethiopian Economic Policy Research Institute, Catholic Relief Services – Ethiopia, Oromia Regional Research Institute, Amhara Agricultural Research Institute, Bahir Dar University, Ambo University, Nekemte University, the Ministry of Agriculture and the Ministry of Water and Energy.

Contact: Alan Duncan or Simon Langan
http://www.nilebdc.org

Editing, design and layout—ILRI Editorial and Publishing Services, Addis Ababa, Ethiopia.

Citation: Pfeifer, C. 2011. Matching land and water interventions with community needs: Report of community focus group discussions in four watersheds in Ethiopia. Addis Ababa, Ethiopia, ILRI.

ilri.org
better lives through livestock
ILRI is a member of the CGIAR Consortium

Box 30709, Nairobi 00100, Kenya
Phone: +254 20 422 3000
Fax: +254 20 422 3001
Email: ILRI-Kenya@cgiar.org

Box 5689, Addis Ababa, Ethiopia
Phone: +251 11 617 2000
Fax: +251 11 617 2001
Email: ILRI-Ethiopia@cgiar.org

Contents

Introduction

The 'Nile 3' project of the Nile Basin Development Challenge (NBDC – http://www.nilebdc.org) has developed feasibility maps, this are maps that combine biophysical suitability with willingness of adoption, both for single rainwater management practices as well as for combinations of practices at landscape scale. The biophysical suitability is based on suitability condition identified through experts and literature, whereas willingness of adoption is computed based on actual data from a farm household survey (IFPRI) from 2005.

To validate these maps, the project needs to understand adoption and non-adoption of rainwater management practices and strategies. A multi-scale approach to capture dynamics from farm and landscape scales was chosen. To capture the farm scale, 600 farmers in 7 different watersheds of the Ethiopian Blue Nile were chosen (2 from the NBDC project). In the 4 new watersheds (Gorosole watershed (Ambo) and Laku watershed (Shambu) were chosen in Oromia as well as Maksenit watershed (Gonder) and Zefie watershed (Debre Tabor) in Amhara region), focus groups were run to capture the landscape scale. These focus group discussions brought together key informants from the community and asked them to imagine the best possible rainwater management strategy for their watershed and then discuss what hampers the implementation of that strategy.

This report brings together the information collected during the focus group discussions and transect walks and serves as reference for the validation process[1].

[1] Also see some short reports from this field work at:
http://catherinepfeifer.blogspot.com/search/label/N3%20field%20report%20series

Methodology

The landscape approach

We wanted to understand why farmers do not adopt some rainwater management strategies despite of their potential benefits. Under rainwater management strategies, we understand a combination of rainwater management practices that increases water infiltrations in the up-slope of a landscape, soil and water conservation in the mid-slope, and water productivity in the down-slope. Rainwater management practice is understood in very broad terms and goes beyond water harvesting to include a whole range of practices affecting crops, livestock and trees.

A range of practices was selected, making sure that all the zones and land used were covered. The selection was made based on GIZ major activities in Ethiopia. The modeled practices were soil/stone bunds, terraces, gully rehabilitation/check dams, multipurpose trees, orchards (apple and mango), river diversion, wells, water harvesting/ponds, grassland management (enclosure, limiting animal movement, over-sowing).

Selected watersheds

Four watersheds were selected by OARI (Oromia Agricultural Research Institute) and ARARI (Amhara Regional Agricultural Research Institute) using the following selection criteria:

- Making sure to encounter all the modeled practices at least in one of watersheds
- Having watershed with strong NGO intervention and watershed with little NGO intervention
- Size and slope of the watershed: the watershed should be relatively small, i.e. manageable by one or two communities and therefore fit our concept of landscape within a short distance
- Existing connection through OARI and ARARI

Based on these criteria, Gorosole watershed (Ambo) and Laku watershed (Shambu) were chosen in Oromia as well as Maksenit watershed (Gonder) and Zefie watershed (Debre Tabor) in Amhara region (see Figure 1).

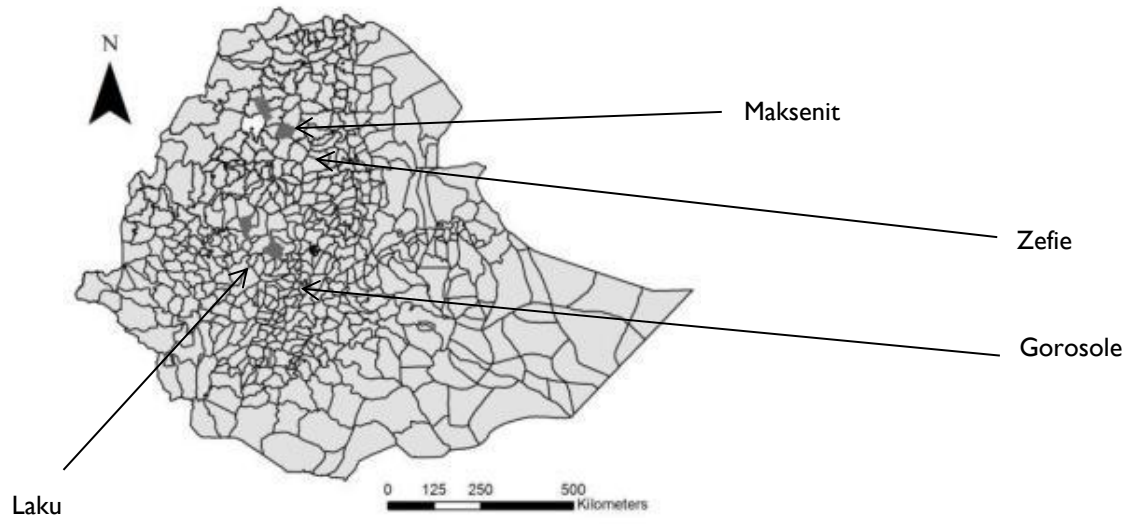

Figure 1: Locations of the selected watershed in Ethiopia

Transect walk

Each watershed was first assessed with a transect walk, allowing to all the supporting staff of the focus group discussion to understand the boundaries of the watershed, as well as the different land-uses and already existing practices adopted in the area.

Focus group discussions based on the 'happy strategies' game

The focus group discussion itself is based on three different steps:

1. Participatory mapping exercise in separate groups for men and women;
2. A adapted form of the 'happy strategies' game in separate groups for men and women;
3. A group mixed discussion (men and women together).

Preliminary to the whole focus group discussion, an extended introduction made sure that the farmers understood the purpose of the exercise including our broad definition of rainwater management and the no wrong expectations are raised.

Participatory mapping

The participants were given pencil and rubbers as well as flip chart paper and were asked to draw the border of the watershed, the rivers, the roads and the settlement. When everyone agreed on these features, **the border was marked in black, the roads in read, and the streams in blue**.

In a second stage, different land-use/land cover can be indicated with colored post-it: green for forest, pink for degraded land, grey for grazing land, yellow or what is left over (white) represents crop land.

Adapted form of the 'happy strategies' game

Initially the game was conceived for stakeholders and scientists to validate our database of practices and come up with a rational on how to combine practices into strategies. The game consists of cards that describe about 30 rainwater management practices in terms of purpose and feasibility. In its initial form, participants are ask to select a practice and to find other participant to form a 'happy strategies' (inspired by the game known as 'happy families') around a given landscape[2].

For the focus group, these cards were translated into Oromo and Amharic. In a first step the participants were asked to name all rainwater management practices they know of. It not mentioned the 8 modeled practices were explicitly asked for. Participants could then choose their favorite practice independently and come back into the discussion group. Each participant placed the card in the location on the map where it would be most suitable and reached a consensus with the other participants. If a participant had a card that had already been discussed, she/he could change the card. After the first round, one can go for a second round with the 'second favorite practice' until no new practices are suggested. The game contains innovation cards that are empty practice cards that can be filled if the suggested practice is not part of the game.

Figure 2: The cards of the 'happy strategies game' ready to be selected

Along the discussion around placing the cards, people can discuss the suitability conditions, the benefit of the practices, if it was adopted, what type of support were available, if not adopted, why and what hampered the adoption. These limitations are captured on the 'intervention cards', which describes support needed for the implementation of the strategy which goes beyond farmer's individual decision making.
Finally, beneficiaries and upstream-downstream effect can be discussed when the selected combination is discussed in more general terms.

[2] A report on the game can be downloaded from http://cgspace.cgiar.org/handle/10568/24999; more information is online at http://happystrategies.wikispaces.com

Final mixed group discussions

In a final step of the focus group, both group present each other's work and discuss the differences. In this way, the work of each group can be validated and differences discussed.

Approach to map validation

Validating feasibility maps with real observations from the ground is tricky. Indeed, one might find locations in which a given practice is suitable but has not been adopted. This does not automatically imply that the suitability or the feasibility conditions are wrong. It might be that on those locations adoption is hampered by an external issue that could not be captured correctly in the adoption model. Indeed, many factors simply cannot be and might never be represented in a spatially explicit manner, as for example, religious believes, lack of collective action, lack of access to the necessary input or lack of access to relevant and high quality training and advice cannot be mapped out.

Table 1: Comparing adoption and non-adoption with the suitability and feasibility maps outcome

	Not suitable	Suitable	Feasible
Non-adopted	Right prediction	Wrong suitability conditions OR The adoption of the practice might be hampered by an external issue	Wrong suitability conditions OR The adoption model does not capture the socio-economic and institutional constraints correctly
Adopted	Wrong suitability conditions or practice has been promoted in a governmental campaign	Right prediction	Right prediction

Also in the Ethiopian context, a practice can be adopted on a non-suitable location. Indeed a practice might have been promoted through a governmental campaign may oblige farmers to adopt practices on not suitable locations. Therefore a practice observed on the ground is not automatically a proof that suitability conditions have been met.

In order to identify if the suitability/feasibility maps are built on wrong assumptions or if adoption has been hampered by a constraint that it not 'mapable' (implying that the location is suitable even if no farmer has adopted the practice), the focus group discussion focuses on the practices farmers would like to have regardless of having adopted it or not. In this way, a farmer can indicate that the area is suitable and suggest the intervention needed in order to enable the adoption. Also when a practice has been adopted on a non-suitable location, farmers can be asked about the reason of adoption and perceived benefit.

Discussions from Gorosole watershed

The Gorosole watershed is crossed by the road from Ambo to Bako. The watershed has clearly defined boundaries. It has a hillside on both side and in the middle there is a perennial river fed by non-perennial streams. The up-slope is covered by forest.

Figure 3: View towards the outlet in Gorosole

It is a densely used landscape. Very little soil and water conservation can be seen. The few that are there are not well spaced, are not built correctly, or have not been correctly maintained. Despite that, some good practices can be seen such as keeping some crop residues in the fields.

The landscape has gullies that are vegetated and look relatively well maintained. It seems that the vegetation in the gullies is natural, and no big intervention was needed to maintain them, except restricting cutting of the trees in the gully. On one side of the watershed, the fields have spare farm trees, mainly acacia. Also some woodlot of natural forest can be found on religious locations. There is no communal grassland, and livestock intensity seems to be important and therefore access to fodder a real challenge. One of the villages is at the edge of the watershed, only very few settlements can be found in the watershed.

Discussion from the women's group

Participatory mapping

Participants started with drawing the main river called Kile, then the perennial affluent (blue line) and then the non-perennial affluent (doted blue line).

Then they drew the border (black line) and finally they draw the asphalt road (red line) crossing the middle of the basin and the seasonal paths (doted red lines).

Then they placed the land uses. They started with the forest (green papers), placing them on the right locations and indicating the name of each location. Then they looked degraded land and grazing land.

They mentioned that there is only very little grazing land which is a problem for the community.

Preferred landscape

Table **2** shows the practices proposed by women in the Gorosole watershed as well as their location.

Apples were proposed in the up-slope, because they are suitable in the highlands and are perceived as potentially high income generating because apple price is high.

Around the perennial rivers, traditional river diversion can be found. On locations around the river where diversion are not feasible, a motor pump could be used for irrigation. On the degraded land, gully rehabilitation including check-dam and tree planning is suitable and has been implemented. Better community mobilization would be needed to maintain the structures.

Sesbania is a nitrogen binding fodder tree that can be found in many cropland areas in the watershed.

Finally the women mentioned that livestock intensity is a big problem in the watershed and there is not sufficient grazing land.

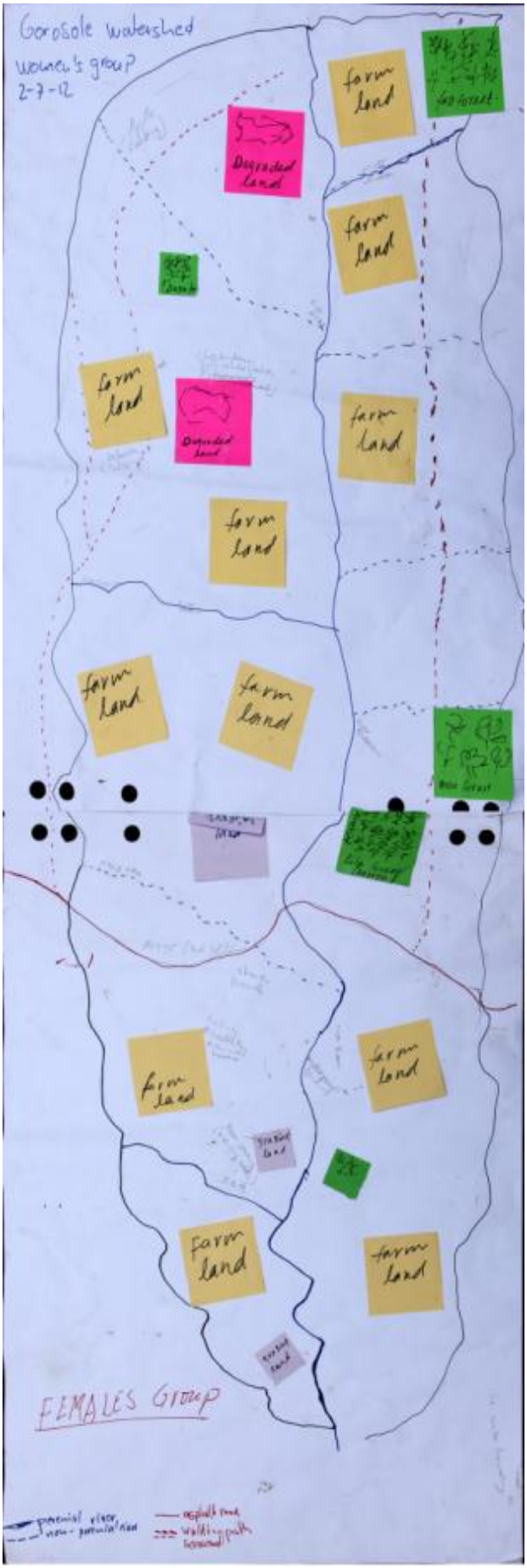

Figure 4: Map of Gorosole developed by the women's group

Table 2: Practices proposed by the women's group in Gorosole

Practice chosen	Location	Status in the watershed	Intervention
Apple	Up-slope	Not adopted	Access to apple seedlings
River diversion	Around the perennial rivers	Adopted	Access to material to improve the diversions
Motor pump	Around the perennial river where diversion is not possible	Not adopted	Access to the pump Access to finances
Stone bunds	Mid-slope	Adopted	
Check-dam/gully rehabilitation	Degraded land	Adopted	Better community mobilization of maintaining the infrastructure
Sesbania	Crop land	Adopted	
Oversowing	Grazing land	Not adopted	Access to forage seeds Training
Destocking livestock	Everywhere	In process (push by the government)	
Limiting animal movement	Everywhere	In process (push by the government)	
Stone bunds	Mid-slope, lack of adoption in the lowland	Adopted but not sufficiently	Better coordination among farmers to address labor shortage

Multipurpose trees: Sesbania grows in all agro-ecological zones of the watershed

Orchards: Fruit trees are not grown in the watershed. Women would like to have apple trees, as they can expect some cash income from the apples. They cannot plant apples tree because they don't know where to obtain the seedlings.

Roof rainwater harvesting, ponds, wells: Water harvesting is not perceived as necessary, as there is sufficient water the whole year round in the watershed.

Gully rehabilitation: Women indicated that the degraded land were very degraded and needed to be rehabilitated. In the upland this has been done by planting sesbania. More could be done in terms of gullies in the lowlands.

Stone bunds: As there are enough stones in the watershed, it is a relatively easy practice. But as it is very labor intensive, the women expect that those should be built in some kind of community action.

River diversion +pump: The plots that are irrigated thanks to river diversion are used to grow onions. The river diversions are traditional diversion weirs constructed by the farmers themselves. Women perceive that river diversion has been adopted wherever possible. Other areas could be reached if they would have access to a pump. Unfortunately a pump is too costly, as well as the access to the pump and to its spare parts its difficult.

Limiting animal movement and destocking: Livestock is very intensive and in seen as a polluting factor in the community. Therefore women think animal movement should be limited and numbers of livestock reduced.

Difference with the existing landscape and interventions needed

The women's group proposed three practices that were not adopted. Apple trees are not planted despite their suitability. Smallholders think that apple trees could improve their livelihoods as apples have a high market price. The reason for non-adoption is the lack of access to seedlings.

Livestock intensity is very high in the watershed and fodder is a limitation. Therefore they would like to over-sow their grazing land both communal and private in to produce better quality forage. This practice has not been adopted because they lack access to the seeds. The women also mentioned that even if they get the seeds, they would need some training to exploit them. Finally the women proposed to use a motor pump for irrigation around the perennial river where river diversion is not possible. But a motor pump in out of reach, as it is not possible to access it in the area, even if they could afford it. They would consider this if there would be access to the pump and to credit.

Figure 2: Women discussing the border of their watershed in Gorosole

Trade-offs discussed

Women mentioned that with the river diversion and the proposed pumping downstream, farmers might not get sufficient water anymore.

Discussion from the men's group

Participatory mapping

Farmers preferred to start the sketch mapping by drawing the main river called Kile (in Blue). The main river helps the group as a reference point. Then, the boundary of the watershed that lies across two kebeles Chancho Obi and Kile Borodo was mapped with contributions from all participants. An all-weather road and various paths across and along the watershed were subsequently drawn. Settlement and land use/cover were also denoted on the sketch map with relative precision. During the process, farmers commented that virtually all parts of the watershed are characterized by terrain feature or step slope. On top of this, they pointed out that the watershed is largely occupied by crop production. In most cases only pockets of grazing land that seasonally are put under fallow and then back to crop production are privately owned by the farmers. In addition, there are also pieces of grazing land found scattered on the river side and marshy area. Almost all the grazing reserves are privately owned though free grazing during the off season gives access to all. At the end the group categorized the watershed in to three different zones (Z_1-Z_3) based on the altitude and agro ecology, and also affixed legend for the watershed. This initial exercise ultimately simplified playing the happy strategies game.

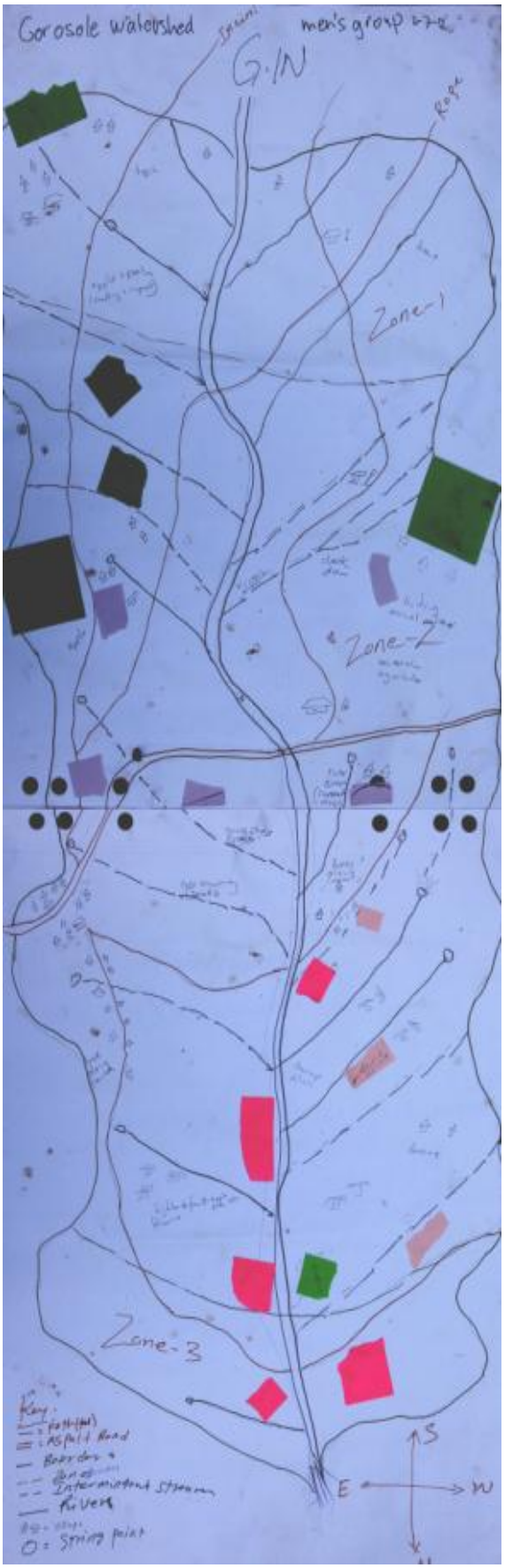

Figure 3: Map of Gorosole developed by the men's group

Preferred landscape

During the process of describing the preferred landscape, farmers were asked to mention all the rainwater management practices. Farmers in the group mentioned numerous conventional and modern rain water management technologies/practices in their area, including:

- Drainage ditch (conventional practices)
- Furrow (contour) tillage
- Small scale river/stream diversion
- Bunds (both stone and soil)
- Cut off drain
- Grass strip
- Multipurpose trees particularly Sesbania
- Check dam

Figure 4: A farmer from Gorosole placing the apple tree card into the up-slope of the watershed

Apart from the conventional practices, most of the rainwater management technologies are largely implemented on the zone 1 or upper watershed areas of Chancho Obi kebele. The resident farmers have got the input and experience largely from some NGOs and the office of Agriculture (DAs).

Table ***3*** shows the list of practice that the farmers have selected for their watersheds.

Table 3: Practices proposed by the men's group in Gorosole

Practice chosen	Location	Status in the watershed	Intervention
Apple	Up-slope	Not adopted	Access to apple seedlings
Peach tree	Up-slope	Not adopted	Access to apple seedlings
Trench	Upland	Adopted	
River diversion	Around the perennial rivers	Adopted	Access to material to improve the diversions (better design) Access to finances
Grass strips	Mid-slope	Adopted (upland only)	Access to forage seed
Bunds	Mid-slope, up-slope	Adopted	
Drainage ditch	Mid-slope	Adopted	
Cut of drains	Mid-slope	Adopted	
Trees along contour	Farm land	Adopted	
Conservation agriculture	Up-slope	Adopted	
Check-dam/gully rehabilitation	Non-perennial streams	Adopted	
Sesbania	Crop land	Adopted	
Oversowing	Grazing land	Not adopted	Access to forage seeds

During the first round of the game, farmers selected and allocated cards both for the **innovation** and from existing practices. As an entry to the individual exercise/ game, farmers selected large scheme irrigation (**river diversion)** in groups as an innovation with which they kicked off the game. Associated interventions like financial support were needed to upgrade the scarce and scattered

irrigation endeavor limited to a few farmers. Hence, farmers envisaged the need to outreach the existing benefit to more currently non-benefiting farmers. To this effect the farmers need materials (cement) and technical support I in layout, design and development of the diversions.

As a follow-up of the game, practices like highland fruit (apple and peach), grass strips, cut off drain (2), check dam, contour hedge/life fence (2), conservation agriculture, drainage ditch and stone/soil bund were initially opted in that order and allocated by the farmers to the respective sites where the benefit can be accrued if properly implemented by the resident farmers.

Figure 5: The men's group in Gorosole listing to the instructions

Large scheme irrigation (river diversion): On the sketch map farmers located the scheme development on the northwest part of the watershed at the bottom side of the main asphalt road. If large scheme irrigation develops in that direction they believe it can command a large area of land and make large community beneficiary. Though they have tried to divert using sandbags during the dry season, rainfall and large volume of river flow collapsed every effort so far. As a result, farmers gave up the efforts because of its unsustainability. Besides, financial and technical shortages were also seen as constraints. The stony nature of the land also hinders the progress.

Highland fruit (apple and peach): A farmer chose high value crops like highland fruit particularly apple as an **innovative** practice for zone 2 (midland) and zone 1 (highland). He justified that the agro ecology is ideal for growing apple. Besides, his access to irrigation water would help him to manage the crop efficiently. Another farmer also selected peach as **innovation** practice to be implemented in similar areas. However, planting material (seedlings) supply from concerned development promoters be it NGO or GOs is welcomed by the farmers as **intervention**.
Grass strips: Grass strips first introduced to the upstream (zone 1) of the watershed by the NGO. Its benefit could also be expanding to the gentle slope area of the middle and lower part of the watershed. Apart from the use for cut and carry system for livestock feed, a farmer described the importance of grass strips for various land management practices. Particularly, reduction of soil erosion and downstream siltation, mentioned among others.

Cut off drain: This is largely recommended by the farmers for the upstream and midstream (zone 1 and 2) steep slope area where there is erosion. The implication is that the structure reduces runoff and safeguards the soil structure and fertility by arresting the erosion impact.

Check-dam: According to a participant, erosion is a serious problem in the midland (zone 2) of the watershed. The volume of the runoff is largely increased in this area. Hence, landslide and gully formation is aggravated. Therefore, a check-dam is very important to arrest the expansion of gullies. Land slide and expansion of the mouth of the river is also common in this part of the zone extending to zone 1 (upstream) area. To reduce the impact of expansion farmers plow their farmland a bit far away from the damage area to avoid landslides entering in to the heart of their farmland.

Contour hedge (life fence): Multipurpose trees (MPTs) particularly Sesbania were considered as component of contour hedges. Such plantation is favored everywhere in the watershed particularly around the homestead. Introduction of MPTs has been made by the office of agriculture in the mid to lower area and by an NGO particularly on the upstream area of the watershed. Farmers suggested they are using MPT for wind breaks, fencing, animal feed and for fuel wood.

Conservation agriculture: CA is largely favored by the farmers in the three watershed zones. Some of the beneficial contributions of conservation agriculture are:

- Supply more soil organic matter
- Improve soil fertility and crop productivity
- Reduce runoff
- Improve soil water retention capacity.

However, the practice is not yet popularized in the watershed.

Figure 6: The men's group presenting their work

Drainage ditch: Drainage ditch is a conventional practices selected by the farmers as innovation to drain excess water from the farmland. It is largely applied for in situ rainwater management by almost all farmers so as to reduce the impact of erosion.

Stone/soil bund: Bund making was discovered as an ideal practice for all part of the watershed. The Step slope nature of the watershed attribute for the widespread need of bund. However, stone bund was first introduced in the upper watershed similar to the grass strip and MPTs by the NGO.

Currently, however, soil bund targeting the degraded and largely vulnerable area has been implemented on the upper side of the watershed (z1 &z2). From our observation, however, although it is not technically appropriate we have also visited soil bund in the downstream of the watershed. Development agents have assisted the introduction of the practice at larger scale.

Difference with the existing landscape and interventions needed

According to the farmers, the watershed in which they are currently living has been gradually evolving to have more negative features and associated consequences. This implies that the features and the benefits it offered in the past have been completely changed. Elders tried to see the hindsight to recall and relate what the watershed looked like in the old days. Less crop land but higher yield per unit area, more forest cover and massive biodiversity pool, uniform rainfall intensity and distribution, green land, etc., were suggested. Currently, however, the rainfall pattern has become more erratic, reduced crop production and productivity and other climate and land use related anthropogenic calamities are escalating. As a result, several threats confront agricultural production.

In contrast, farmers anticipated a positive future as a dream or ideal watershed that could replace the existing one. The dream could become a reality by integrating appropriate rainwater management practices in to the existing system. In such a way the ideal watershed feature mimics the past watershed where the ecosystem was resilient and very less disturbed and ideal to obtain reliable production and ecosystem functioning. Therefore, farmers envisaged the future as the place where food security was ensured while conserving natural resource bases. Among the major expectation list under the dream watershed are green area, food secure community, increased ground water level, reliable rainfall and its distribution, reliable and friendly weather, access to adequate and clean water for both human and livestock.

Based on their perception, four practices were not sufficiently adopted in the watershed: improved river diversion, highland fruits (apple and peach), over-sowing, and grass strips.

River diversion could be improved, with better design and concrete material. Both the access to the material and to the needed finances hampers the development of better irrigation schemes. Highland fruits are like in the women's group seen as a high potential to improve incomes. Non-adoption is linked to the lack of access to seedlings. Grass strips are adopted only in the up-slope. Smallholders think that it would be appropriate to have them on other locations also, but lack access to grass seeds. Similarly, over-sowing private and communal grazing land was suggested, but cannot be implemented as long as it is not possible to access the right seeds.

Trade-offs discussed

According to the participants, if all the selected practices are integrated and properly implemented, every farmers residing in different part/zone of the watershed will benefit. However, farmers believed that actions should begin in the upstream ($zone_1$) of the watershed. In line with this, a

farmer told us a local saying ‘once the water touches the head, it never fails to reach the foot.’ Similarly, both the positive and the negative impact of the watershed management equally reach all other zones of the watershed. Explicitly, positive consequence that begins in the upstream would gradually extend down to reach the downstream. Hence, farmers envisaged tradeoff among the integrated watershed management practices. Accordingly, all farmers become beneficiaries of the proper implementation. However, if the practices fail to integrate or are improperly implemented the middle and lower watershed area are highly vulnerable to runoff and siltation. Hence, they would become losers.

Comparison with the first version of suitability maps

The suitability map for Ambo district suggested that we should find apple trees, river diversion, grassland management, soil bunds and terraces. All of them were mentioned in the focus groups. Apple trees as well as grassland management were not adopted due to the lack of access to seeds and training but could in principle be adopted with the correct interventions.

Final mixed discussion, participant’s reflection

At the end of the exercise, participants reflected on the day. A farmer starts with the statement ‘our period is the time to make choice between either to live or not to live’. As crop production is highly vulnerable to climate uncertainty, the future is full of gloom and despair. Hence a country like Ethiopia could only develop if there is integration/sharing of resources and knowledge like this one. Hence, they would be able to think about resilient crop production system that safeguards the natural resource base. On top of this, he added that the lesson they were offered during the exercise is part of the knowledge sharing effort that enable them to have broad insight about the present and the future in terms of rainwater or land management so as to ensure sustainability of the system. They were largely impressed by the exercise and highly grateful for that.

Figure 7: A female farmer presenting the work of the women’s group

Discussion

Men and women came up with very similar landscapes. The men's group mentioned more practices that are not part of the game cards but were adopted in the watershed, suggesting good knowledge of the area. Women seemed to have a less good knowledge about the watershed, reflected by the less detailed map and the much longer discussion about the maps. Also they have not mentioned practices that have been adopted but were not in the game. Nonetheless they came up with more non-adopted but suitable practices for the watershed, namely the livestock related practices and the motor pump.

Discussions from Shambu watershed

Shambu watershed can be split into 3 zones, upland midland and lowland. Each can be considered as a landscape with an up-slope, mid-slope and low-slope. The highland area corresponds to our classical landscape where the low-slope is a flat area with grazing land; the mid-slope has agricultural production year-round due to a river diversion, combined with apple trees. The up-slope is forest.

Figure 8: The upland of Shambu watershed with up-slope, mid-slope and low-slope

The midland has a forested up-slope, soil and water conservation on the mid-slope and no low-slope. The lowland has an important slope and is mainly sparse forest; it has no low-slope at the outlet.

Figure 9: Midland of Shambu watershed, with forested up-slope, soil and water conservation on the mid-slope and no low-slope

Farmers in the upland on the mid-slope, have river diversions that allow them to cultivate around the year, especially high value crops during the dry season. We visited a farmer that had apple trees, irrigated all his land through a river diversion, had modern beehives, a storage room for fodder and

collected manure in one place so he could spread it on his land. This farmer seemed very well educated as he understood the questions in English and answered in Oromo. There is no NGO active in the watershed and all the initiatives taken in this watershed is bottom up, supported by the DA and extension service.

Many farmers live in the two settlements Laku and Shambu. Both settlements have access to electricity.

Discussion from the women's group

Participatory mapping

In a first step, the key informants drew the boundary of the watershed and then, after sketching the major river stream, found the watershed. The group selected one active woman farmer who led them during the map sketching.

Figure 10: Women starting the mapping exercise in Shambu

Using different markers and colour cards, the women's group identified in their resource map the upper, mid and the lower streams, the roads (seasonal and all-weather), seasonal rivers, crop land, forest land, degraded land, grazing land. During the focus group discussion, the participants/ key informants also included the most relevant community development institutions found in the watershed. These included the village administration, primary school, cooperatives and farmers training center. The women's group started with defining the mountain that border the watershed. Once they agreed on the watershed boundaries, they added the rivers, perennial and non-perennial (blue dotted line) as well as the gravel road (red line) and walking path.

Figure 11: Map of Shambu developed by the women's group

Preferred landscape

The women's group came up with a landscape composed of the practices found in Table **4**.

Table 4: practices proposed by the women's group in Shambu

Practice chosen	Location	Status in the watershed	Intervention
River diversion	Around the perennial river	Adopted	
Motor pump	Around the perennial river where river diversion is not possible	Not adopted	Access to motor pump Access to finances
Soil bunds	On the slope	Adopted	
Soil fertility management (crop rotation, intercropping)	Cropland	Adopted	Timely availability of all input (fertilizer, seeds)
Improved seed	Cropland	Not adopted	Timely availability of all input (fertilizer, seeds) Access to credit
Sesbania	Cropland	Adopted	
Well	Upland	Adopted	
Improved breeds	Grazing land		
Apple trees	Mid-slope	Adopted	
Cut-off drain	Mid-slope	Adopted	
Limiting animal movement	Grazing land		Community organisation
Area enclosure	Grazing land	Not adopted	Community organization
Cut-and carry system		Not adopted	Community organization
Over-sowing	Up and mid land	Not adopted	Community organization

Orchards (Apple and papaya): On the map, farmers put the orchards (apple tree and papaya) at the upper side of the watershed. Farmers perceived these soils as more suitable for planting apple rather than crops, due its high slope/steep. On top of that farmers understood that planting apple on sloping area can reduce high water runoff and increase water infiltration. In other words, it decreases soil erosion when the technology is properly planted on the steep slope of the watershed. Though they have tried to allocate this practice at upper side of the watershed, most farmers have not implemented this practice on their farm due to poor availability of seed, lack of awareness on the benefit of this technology and shortage of finance.

River diversion: During the focus group discussions, the women group recommended river diversions for the lower as well as for midlands of the watershed area. The reasoning is that these two zones of the watershed contain most of the crop land and several river streams. The topography in these zones is also suitable for irrigation schemes. Farmers mentioned that the existing irrigation scheme is not efficiently used by the community and they produce only a few horticultural crops. Limited water availability for irrigation during the winter season and poor maintenance of the schemes are the major constraints faced the farmers.

Gully rehabilitation (check dam): The key informants allocated gully rehabilitation to the upper and mid lands of the watershed where there is serious soil erosion due to overgrazing by livestock and frequent ploughing. The land on the upper side of the watershed is more degraded as compared to the mid land of watershed due to high runoff water and overgrazing.

Figure 12: Women playing the 'happy strategies' game

Cut off drain: During focus group discussion, farmers choose the cut of drain for the upper side of the watershed. They justified that this is where there is high water runoff due to the steep slope of the land found in the zone. If the cut off drain is properly implemented, it will minimize soil erosion for the mid land and lower sides of the watershed.

Grazing land management: Forage grass is one of the most important rainwater management practices used by farmers in the watershed. During the focus group discussion, farmers selected and allocated this practice for the **mid land and upper** levels of the watershed. This is mainly due to the suitable land availability in these zones. Overall however, there is a shortage in availability of the improved forage technology in the watershed. In general, in order to increase fodder, grazing land management should come with *over-sowing*, *area enclosure*, *cut and carry system, and limiting of animal movement.*

Soil bund/ stone: Thanks to the government campaign this year, many farmers in the watershed have started to make stone/ soil bund on their farm land. Due to this, farmers were already aware about this technology and they easily allocated the practice at the mid and upper levels of the watershed which have steep slopes.

Multipurpose tree (Sesbania): Farmers preferred to allocate multipurpose trees, particularly sesbania, to the mid and lower levels of the watershed, specifically around their homestead. This is because the tree is mainly used for forage purposes and as a fence around the homestead.

Figure 13: Women's group presentation

Improved dairy breeds: Farmers allocated this technology to the mid and upper levels of the watershed, because these areas have ample grazing lands with suitable quality type of grass and easily accessible to roads to buy feed and sell products. Farmers living in the upper level of the watershed have already adopted improved dairy technology. However farmers reported that the milk productivity of this breed is not attractive due to limited concentrate feed availability in the area.

Fertility management (Crop rotation, intercropping): Farmers allocated technology to the mid and lower levels of the watershed. Farmers justified this according to the suitability of the cultivable land found in these zones. Farmers practice crop rotation several years and they also know the benefit of this practice, though intercropping is not used by farmers in the watershed. This may be due to lack of awareness on the economic and agronomic benefit of the intercropping practices. Crop productivity is declining from year to year mainly due to dominant mono cropping and serious soil erosion in the area. Farmers adopted improved cereals crop like tef, wheat, barley and also horticultural crops like potato and apple to improve their livelihoods.

Figure 14: The men following the women's presentation

During the focus group discussion, the women farmers identified practices which can be suited to the Shambu watershed but have not yet been adopted. Though the practices were not used by the farmers in the watershed, they have created a desire for the technologies. If the farmers have got the opportunities to access to the practices mentioned below they have high demand to adopt them. These are practices like ponds, cropping systems like intercropping, large scheme irrigation (river diversion), growing improved grass like Rhodes grass and elephant grass and practicing furrow tillage which has been tried out by few farmers but not yet popularized in the watershed.

Wells: One farmer owns a well near to the grazing land.

Improved seeds: Farmers mentioned they would like to have improved seeds, but they don't have access to them.

Difference with the existing landscape and interventions needed

Many rainwater management practices have been promoted in this watershed regardless of site-specific biophysical, socio economic and institutional environments, yet their adoption is low. Reasons mentioned by farmers for this include lack of awareness, lack of access to inputs like planting materials (seed/seedlings), lack of cooperation among the farmers, shortage of finance and lack of farm tools. Interventions mentioned in the table below were identified/ recommended by the key informants:

No	Type of intervention	Institution should be involved
1	Awareness creation on some rain water management practices through farmers training	• Bureau of agriculture • NGOs
2	Farmers organization for collective action like participatory natural resource management (Bond making, area enclosure and	• Bureau of agriculture • NGOs, • Research institute • Cooperatives
3	Provision of credit for purchasing of different farm tools	• Bureau of agriculture • NGOs • Oromia Credit and saving company
4	Since majority of the farmers faced shortage of finance to purchase rain water management technology like water pump, provision of water pump in the form credit for group of the farmers very important	• Cooperatives • NGOs • Research mechanization institute • Bureau of agriculture
5	Provision of forage and apple seed for the farmers	• Bureau of agriculture • NGOs, • Research institute
6	Unavailability of the improved dairy technology	• Research Institute • Bureau of agriculture

During the focus group discussion farmers reported that the existing natural resources found in the landscape are deteriorating over time. In other word the trends of crop productivity, natural resource conservation (particularly forest, soil and water conservation) and livestock productivity were continuously declining over time. The distribution of rainfall and pattern of rainfall have also changed. Land degradation is another factor aggravated by mono-cropping, deforestation and overgrazing of the land. In the future, farmers wish that appropriate implementation of rainwater management technologies can change these scenarios.

Trade-offs

Sometimes it is difficulties to get practices that can work across the whole watershed - due to socio economic, biophysical and institutional factors, improper implementation of practices or a lack of integration among the technologies. Some groups benefit from the new technology, while others groups are technology losers. Due to the scarcity of natural resources, conflict may exist between the people living in the upper and lower sides of the watershed. For instance in the Gorosole watershed, farmers perceived that if the river diversion is allocated at the mid lands, the lower side may not benefit as much as the upper. Interventions need to be integrated to benefit all groups.

Figure 15: Women defending their work

Discussion from the men's group

Participatory mapping

The men's group started to draw the boundaries from the west, using mountains and settlements as reference points. Later on they added the secondary school. After the boundaries and mountain and settlements where set, they draw the rivers, starting with the perennial ones and then passing to the non-perennial ones. They identified the forest areas and differentiated between natural forest and planted forest. Then they identified the degraded land and the causes of degradation. The degradation on the left river bank is mainly due to deforestation, whereas the degradation on the right river bank is erosion mainly due to wrong soil management. Finally they identified grazing land and indicated if it is private or communal. Private grazing land in the upland seems to be used as communal grazing land.

Figure 16: Farmers starting to map their watershed

Farmers identified one non-seasonal road (non-asphalt) from Shamboo town to Sekela and one seasonal road to Gitilo, the highest part of the watershed (red line). Moreover, two main paths (on foot) also cross within the watershed (red dotted lines). One crosses the watershed from Sekela to Shambo and from Gitilo to the same town. Although Lakku River is the main perennial river, there are also nine small tributary (perennial) rivers which flow to the main river and have only one outlet, called chancho. Farmers also identified seasonal tributary rivers. They identified that most of the rivers in the watershed like Lakku, Deju, Aba ingida, Getahun, homi kuro and Gucho offer potential for river diversions. Settlement (around Shambo town and Lakku village) and land use/cover were also denoted on the map.

Group members also classified the land as cultivated land, grazing land, degraded land and both plantation and natural forest land. According to their classification, most land is for crops in all zones. There is common and private grazing lands at the upper (shifted from forest land to grazing land due to over grazing and deforestation) and along riverbanks. Farmers complained among one another on the issue of common grazing land. Farmers who have enough land have equal rights to use common grazing as those with very limited land. Occasional conflict happens due to competition on common grazing land. They also categorized some parts of the area, particularly along rivers, to be degraded land due to continuous deforestation and intensive cultivation.

Figure 20: Map of Shambu developed by the men's group

Preferred landscape

Almost all the farmers were aware of rainwater managements options like soil and stone bunds, river diversion, ponds, wells, cut-off drains, cut and carry system, use of multipurpose trees, gully rehabilitations, uses of improved breeds of livestock, poultry production, area closure, conservation tillage (residue managements), different fruit production (like apples), motor pumps and live fence as contour planting. Farmers have also been trained and have experience largely from development agents, agricultural experts from district office and even NGOs.

In the game, one farmer selected improved breeds of poultry production as the innovation since it is easy to intensify on small plots of land and needs less initial capital. According to the farmer, poultry production is suitable in the middle parts of the watershed as it has suitable weather condition. He argued that this technology definitely ensures income generation, particularly for households who don't have enough land to produce their annual food requirements. To this effect, the farmers need improved breeds and materials, like incubators and other technical and financial support. The farmers also called for improved access to improved breeds of livestock and seeds, particularly wheat, barley, beans and linseeds.

As the game continued, practices like highland fruit (apple), cut off drains, check dams, contour hedge/life fence, conservation agriculture (residue managements), ponds, motor pump, cut and carry system, area closure, stone/soil bund, wells and over sowing on crop land (innovation) were initially chosen and allocated by the farmers to the various watershed zones. The selected technologies and purpose (suitability, benefits and interaction) were:

Highland fruit (apple): Even though some farmers practice apple productions in the watershed area, a farmer chose this high value crop mostly for mid land and even for upper land if there is good soil condition and soil depth. His justification is that the agro ecology is ideal for growing apples. Besides, access to irrigation water and mulching practices are other opportunities to grow the crop efficiently. Demand of planting material (seedling), supply of different improved varieties, strong market linkages are the main areas where the farmers need support.

Figure 17: Farmer studies a card

Contour hedge (life fence): Multipurpose trees particularly vernonia, Sesbania (but not common) and other bush types which are characterized as co-friendly with crops are considered as life fence/hedge rows. Such is common everywhere in the watershed around the homestead. They indicated that such types of trees are used for animal feeds, to improve soil fertility, life fence, for construction and even for wind breaks.

Conservation agriculture (residue management): Conservation agriculture was mainly selected and even practiced in the middle and lower parts of the watershed. They want this particularly on degraded land because of its multiple benefits, which improve more soil organic matter of degraded land, improve soil fertility and crop productivity, reduce runoff and improve soil water retention capacity. High competition for residues by livestock is the main bottleneck to ensure sustainable residue incorporation in the area. A farmer suggested that the main solution is diversion of overstocking livestock production to cut and carry systems using improved breeds and intensification of poultry industry to reduce residue competition. Conservation agriculture improves soil moisture and fertility and contributes to other technologies like fruit and feed production.

Stone/soil bund: Both stone and soil bunds were started some time ago though not sustainably practiced. Currently soil bunds targeting the degraded and largely steep areas have been implemented on the upper and along some river sides of the watershed.

Cut off drains: These are largely recommended by the farmers for the upper level or steep slope areas where erosion is accelerating in the middle and low slope areas. Most farmers who live in the upper areas believe that cut off drains significantly reduce and save the soil biophysical characteristics and impact on soil erosion.

Motor pump: A farmer preferred this technology in the lower parts of watershed areas since there are potential rivers for irrigation. He preferred motor pump as a solution because of the nature of the river, which is in a deep valley and is difficult to divert. However, the farmer needs both technical and financial support for effective utilization of the technology.

Ponds: According to the participants, ponds are suitable in middle parts of the watershed since they can easily capture run-off and for irrigation purposes. Though the farmers know the technology, they did not so far practice it in the watershed due to limited awareness and lack of materials, financial problems and even no technical supports.

Check-dam: As per the farmers' suggestion, erosion is a serious problem in the middle and upper levels. They prefer to implement check dams in the middle parts. Check dams effectively reduce the speed of soil water erosion, improve soil fertility and increase infiltration rates. This technology has positive effects for other interventions, particularly fruit production, it increases the biomass of feeds, increases spring sources, and it enhances water availability in the watershed. Some farmers explained that they have been constructing such dams in gully areas using wood (woodlot check dam). However, they need additional technical support and inputs for construction of the check dam.

Poultry farming: Famers suggested that increasing their amount of chicken would give them good additional income. This would allow them to overcome the losses of livestock needed to decrease the pressure on the land. Destocking would be much easier.

Wells: The farmers also preferred this technology for middle parts of the watershed areas since there is potential availability of underground water at 12-15 meter depth.

Figure 22: The poultry innovation card

Over sowing improved forage crops on crop land: Though some participants who do not have enough crop land reserved themselves, sowing of improved forage varieties on cultivated land is one of the main solutions to reduce the shortage of animal feeds. It is suitable in every watershed area around the homesteads and on good soil so that it is easy to protect from animals. However, the farmers did not get enough improved forage varieties for intensive production in the watershed. Financial and technical support is what they seek.

Area closure: This technology was preferred by the participants in the upper mountain where bushes are very common and where diversity of trees and bushes can be regenerated if well-protected. Participants regretted their previous deforestation practices on natural forest that resulted in land degradation. They were eager to close the areas (upper parts) where bushes are very common. They also need to interplant fast growing trees in the closed areas though there is limited access to such trees.

Table 5: Practices proposed by the men's group in Shambu

Practice chosen	Location	Status in the watershed	Intervention
Bunds	Mid-slope	Adopted	
River diversion	Around the perennial river	Adopted	
Motor pump	Around the river where diversion is not possible	Not adopted	Access to finances
Well	Upland, low-slope	Adopted	
Check dam/ gully rehabilitation	Degraded land	Adopted	
Area enclosure	In the planted forest, lowlands	In process	
Cut and carry livestock system	The whole watershed to protect the grazing land	Simultaneously with the area enclosure.	
Apple trees	Up-slope, mid-slope	Adopted	Improve output market access Access to seedlings
Mulching	Everywhere but mainly combined with apple trees	Adopted	
Contour planting	Cropland	Adopted	
Improved livestock breeds	Grassland	Adopted but could be more	Access to more cross breed livestock
Over-sowing	Grassland	Not adopted	Access to forage seed
Over-sowing on cropland border	Cropland	Not adopted	Access to forage seeds
Poultry farming (=20 chicken per farm)	Midland	Not adopted	Access to incubator or one day chicken
Improved varieties of wheat and barley	Cropland	Not adopted	Access to improved seed

The farmers have been implementing some options like river diversion, apple production, conservation tillage (residue incorporation), both soil and stone bunds, wells, gully rehabilitation, improved breeds of livestock, fertility managements (crop rotation and fertilizer application). Farmers have got training and technical support from development agents, agricultural experts from woreda office and NGOs.

Difference with the existing landscape and interventions needed

According to the farmers, the current watershed has been gradually degraded with negative consequences. Most of the crop lands are less productive, overgrazing and deforestation of the natural forest are also causing soil degradation. Farmers indicated that in the past there was dense natural forest and the soil was very productive. But now, it is declining at alarming rates due to their mismanagement. Consequently, less production per unit area, continuous soil erosion, shortage of animal feeds due to shortage of land, high variability of rain fall are currently observed in the watershed.

Figure 23: Men's group presentation

However, farmers predict future positive consequences on the watershed landscape if all selected water management options are implemented in each watershed area. High production and productivity, improved feed availability and hence high livestock productivity, ensure sustainable land resource managements, more forest cover will be the positive effect if all selected components are practiced at each selected site. One farmer argued that implementing all the selected technologies will make the country green.

Though farmers in Lakku watershed are familiar with some of the practices, other options which were not so far practiced include over sowing of improved forage crops, area closure, cut and carry systems, motor pump and ponds. Lack of collective action, particularly for river diversion and motor pump is the main issue that should be in addressed. Diversifying into poultry also seems an interesting option.

Trade-offs discussed

Participants had two contrasting ideas on the issue of winners and losers (trade-off). Some members explained that if all allocated technologies are well practiced in each watershed slope, farmers who are living in lower area will benefit more than those in the upper ones. In contrast, some farmers believe that if all selected practices are well done in integrated approaches and properly implemented, every farmer living in different altitudes of the watershed will equally benefit. As a general conclusion, most farmers will benefit if integrated water management is successfully implemented in each watershed part. Participants also suggested that if the proposed practices are not implemented in a very good manner, all farmers living in the watershed are also similarly losers

since deforestation (in upper parts), soil erosion and gully formation (middle and lower parts) and overflows and siltation(in the lower parts) will be aggravated.

Comparison with the first version of suitability maps

The project-developed maps in Shambu woreda perform relatively badly. The only prediction for this area is all types of bunds (soil, stone and fanya-juu). The map does not predict apple trees, suggesting that the suitability for apple trees has to be reviewed. Also no river diversions are predicted, because the river map used does not indicate any perennial river in the whole district.

Final mixed discussion

Participants generally compared the current feature of the landscape with last three decades. Unwise land use systems resulted in unproductive land, deforestation and uncertain rainfall. They trusted that if they implement all integrated rain water management in the watershed, land resources will recover and become productive. Finally, they promised to teach their neighbors what they have learned during the strategy game.

General impressions and lessons learned

The women's group faced difficulties in mapping the watershed, and the mapping was mainly taken over by the DA. The women were therefore less active, something that was addressed explicitly in the Amhara focus groups. The male group was a great success. The group of farmers seems to have really enjoyed the exercise. They came up with creative solutions and were very keen to learn.

Discussions from Maksenit watershed

Maksenit watershed with its 6000 ha is the largest of the four watersheds and lies at the border of Maksenit town (Southeast of Gonder). It is also one of the driest watersheds we looked at, with 700-800 mm rainfall annually. Its structure is complex, as it is formed by several micro-catchments.

Figure 24: The Maksenit landscape seen towards the west

In the highlands, there are two ranges of mountains covered with shrubs. There is very little mid land and a large lowland plain. The two mountain ranges make the border of the watershed complex, and only expert eyes can recognize the borders. Only the low land is cultivated.

Near to the outlet around the perennial rivers, river diversions allow for double cropping. In other locations around the river the topography does not really allow for diversion. In these locations, farmers sometimes irrigate with motor pumps. One farmer has a pump and rents it out to the others. River diversions can also be found near to the non-perennial rivers. These allow irrigating the plots long enough to have two or three crops. The cash crop is mainly garlic during the dry season. As the plain keeps soils moisture well, sometimes after the main crop, farmers manage to crow peas with the residual moisture. In the non-perennial rivers, micro reservoirs are built in the river bed to capture some water. Wells are also found in these river beds.

Figure 18: View towards the outlet

We met a rich female-headed household which was building a house in Maksenit for rental purposes. This household own 4 hectare of which one is in the lowland and is irrigated the whole year round. The major income comes from garlic, but also honey and from a mobile tree nursery.

On what could be recognized as mid land, one farmer had a papaya orchard. Mango is not suitable because it gets attacked by termites. Also in this mid land, we found a nursery for pepper. The farmers carry the water for about half a kilometer from a small reservoir in the river bed.

Figure 26: The ICARDA water ponds

In this watershed, ICARDA is active. Five model farmers have received a rainwater harvesting pond. One farmer got a treadle pump and a drip irrigation system. With this he can irrigate a plot of 30x18 m during the dry season and overcome dry spells with supplemental irrigation. Another farmer uses a simple bucket to irrigate during the dry season from the ponds. After one year, his income has increased significantly. Also ICARDA has built measurement gauges to assess the sediments of a

treated and an untreated micro-catchment. Finally ICARDA installed a treadle pump near the bed of the non-perennial river, allowing access to the underground stream for domestic use.

On the way to the outlet, but outside the watershed, there is a state run tree nursery that grows multipurpose trees and gives the seedlings away for free. Many farmers also have small mobile tree nurseries where they grow their own tree seedlings. We also found a private tree nursery that was attacked by termites and all the work was lost.

Discussion from the women's group

Participatory mapping

The sources and sub water sheds of both kebeles are discussed and identified. According to the participants, Bisnit, Welenbay, Chemena and Ayaye are sub-watersheds in Dinzaz kebele. But Ayaye watershed is bordered to both Degola Chinchaye and Das Dinzaz kebeles.

Figure 27: Women placing the 'land use' color papers in Maksenit

In Degola Chinchaye, the rivers Aba Kaloye, Agamge (which later join Addisge), Addisge, Enkre and Chika Wonz flow to the outlet of the Gumara River.

During the map drawing process, the following were marked:

- Rivers (all season and rainy season)
- Outlet
- Roads
- Churches and schools
- Forest
- Grazing lands
- Degraded lands

Figure 19: Women during the mapping exercise

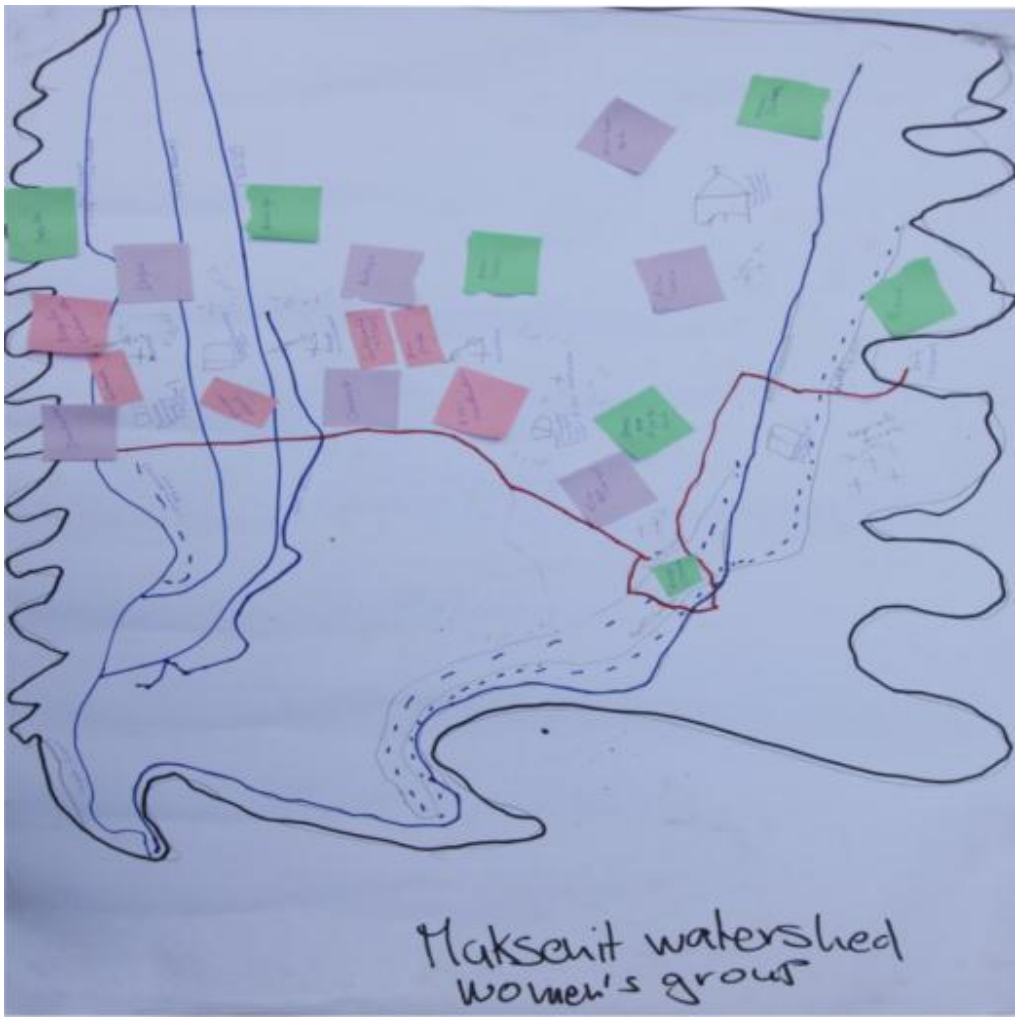

Figure 29: Map of Maksenit developed by the women's group

Preferred landscape

The farmers came up with the following preferred landscape:

Practice chosen	Location	Status in the watershed	Intervention
Improved livestock breeds		Not adopted	Lack of funds
Motor pump	Around river and sources	Adopted but not by all	Lack of funds
Hillside terraces	Mid-slope	Adopted but not always properly	
Pond	Low-slope	Adopted by not by all who wish	Lack of knowledge and funds
Improved nutrient input	Everywhere	Not adopted	Lack of awareness, lack of labor lack of money and credit (inorganic fertilizer)
Bunds	Mid-slope	Adopted	
Spate irrigation	Near to seasonal rivers	Adopted	
Afforestation	Hills	Not adopted	
Home garden	Around settlements	Adopted by not by all who wish	Lack of access to water during the dry season
Water tanker	Around settlement	Adopted by not by all who wish	
Hand dug wells	Around settlements	Adopted by not by all who wish	
Beehives	Around home gardens	Adopted but not sufficiently	Lack of flowering trees, needs to be combined with home garden.

Improved livestock breeds: Through this intervention I can get better livestock production and better animal products (milk, meat, etc). I know the technology but do not have money to use it. The second woman also chose it and the reason is to have better animal production and animal products.

Motor pump: My husband has died and I live with my young children. We moved to the new village area which is located by the riverside. There is enough water and would like to use it. If I get a motor pump I can work with it. But there is no money to put into practice. The second woman also chose the same but her reason is her land is uphill and can't divert the river. Her best choice is motor pump to take the water up and to be more productive.

Hillside terraces: It is very important at the top of watershed. The reason to choose this is to recover forest, recharge ground water, improve soil nature, increase yield and to increase cash income. Due to lack of awareness were not done properly.

Pond: I don't have water but if I get pond water I can plant vegetables and get cash income for myself and my family. I can also plant flower trees for my bees by using water pond. Both plants and animals

can use the water. Due to lack of awareness and labor cannot do it. The other woman also chooses to plant pepper, vegetables etc. but there is shortage of water resources.

Figure 20: Women playing the happy strategies game in Maksenit

Improved soil nutrient input (organic and inorganic fertilizer): They use both methods and mentioned its use increases crop production, improves livestock feed, improves human feed etc. But they believe that organic compost is very useful in the long run. The reasons why it is not used very widely are lack of awareness, no credit service, lack of labour and due to less number of animals. But one woman said that I have no animals at home but am still using home waste and residues for organic compost.

Bunds: uses for soil conservation, keeps water resources, improve crop production.

Flood diversion (spate irrigation): It increases crop production, increase cash income. We can plant vegetables (like onion, potato, etc…), crops like barley, chickpea and others. Therefore we can have production of 3 times in a year.

Afforestation: Would be needed to recover degraded lands of Degola and Enkre Medhane Alem but did not happen yet

Home garden: they prefer home gardens to lowland orchards (papaya, coffee, gesho, …) combined with pepper. These gardens can be a cash income especially for women. Lack of water is a reason why they don't have more home gardens. They should therefore be combined with other practices that give access to water during the dry season, namely wells or ponds.

Water tanker, hand dug wells and pond construction: These technologies are adopted by some people. Most of us are carrying water from very far away. Women are always staying around their homes and if we get water we can plant vegetables, fruits, etc… and get a number of uses out of it.

Fattening: it would help them us to get additional income but it is difficult to get improved breeds mainly because of the lack of funds and credit opportunities.

Beehives: We all have traditional Ethiopian beehives but we need the modern bee keeping technology, planting flowering trees and vegetables around as well as having sufficient water resources. This practice should be combined with the home gardens.

Difference with the existing landscape and interventions needed

Women mainly focused on what happens around their house. They wish to have more home gardens that allow them to feed their families on diversified food and get some additional income. With the home gardens, which have more flowers, they could have beehives and more income. The bottleneck of their perfect landscape is access to water during the dry season and therefore linked to any water harvesting technology such as ponds and tanks as well a wells and motor pumps (to access water from perennial rivers or from the wells).

Trade-offs discussed

In this watershed Enkri Got (Upstream) have been more users than Aba Kaloye Got (Downstream). The solution which is made by the got judge is to use water in shift basis. Therefore the decision by the kebele judge reduces conflict and makes both users. The water amount is very small to increase technologies/practices.

Figure 31: Women's presentation

Discussion from the men's group

Participatory mapping

Where to start drawing map of the watershed was a central point among the group members. They started from the outlet and went to North by the East side and turned back to the outlet again to the West direction. They tried their best to delineate the boundary and incorporate most of the watershed parts. The main road crossing the watershed helped them to manage their drawings. They first put the fords on the relatively exact place along the road before drawing the rivers. The nine fords were very helpful to draw the rivers and manage the connection distance between the

rivers crossing the watershed. They put major features like churches, settlements and schools in the watershed. Generally, the members' visualization and interaction was astonishing.

There are natural forests scattered mainly in the upper part of the watershed: **Tsehay** forest (State), **Belew Seged** forest (communal and enclosed in 2010), **Kulkuwal** forest (communal and enclosed in 2010), **Tila** forest (Private), **Agmas** forest (State). The forests are mainly composed of similar tree/shrub species like *Olea europaea* (Woyira), *Albizia gumifera* (Kachona), *Dodonea angustifolia* (Kitkita), *Carissa ed ulis* (Agam), *Rhus glutinosa* (Embus), etc.

There are also degraded lands in the watershed. These are owned by the community and concentrated in the central part of the watershed. Deforestation was the main reason for the degradation indicated by the focus group. Actually there are few scattered farmlands in those land covers still being tilled though not productive enough. Free grazing is the main feature of degraded lands in the watershed. A couple of these areas are being enclosed since 2010 for restoration and rehabilitation. Enrichment through tree planting is also being undertaken for the enclosed ones.

Grazing lands are another major land cover of the watershed. There are remnant trees scattered over the grazing fields. These are situated in the upper part of the watershed called **Agamye** and **Abozina**. Cattle herds coming from inside and outside the watershed freely graze in these areas. Its degradation level is somehow moderate due to its less accessible by people around the area.

The rest part of the watershed is covered by agricultural fields and settlement areas especially from middle to the lower part of the watershed.

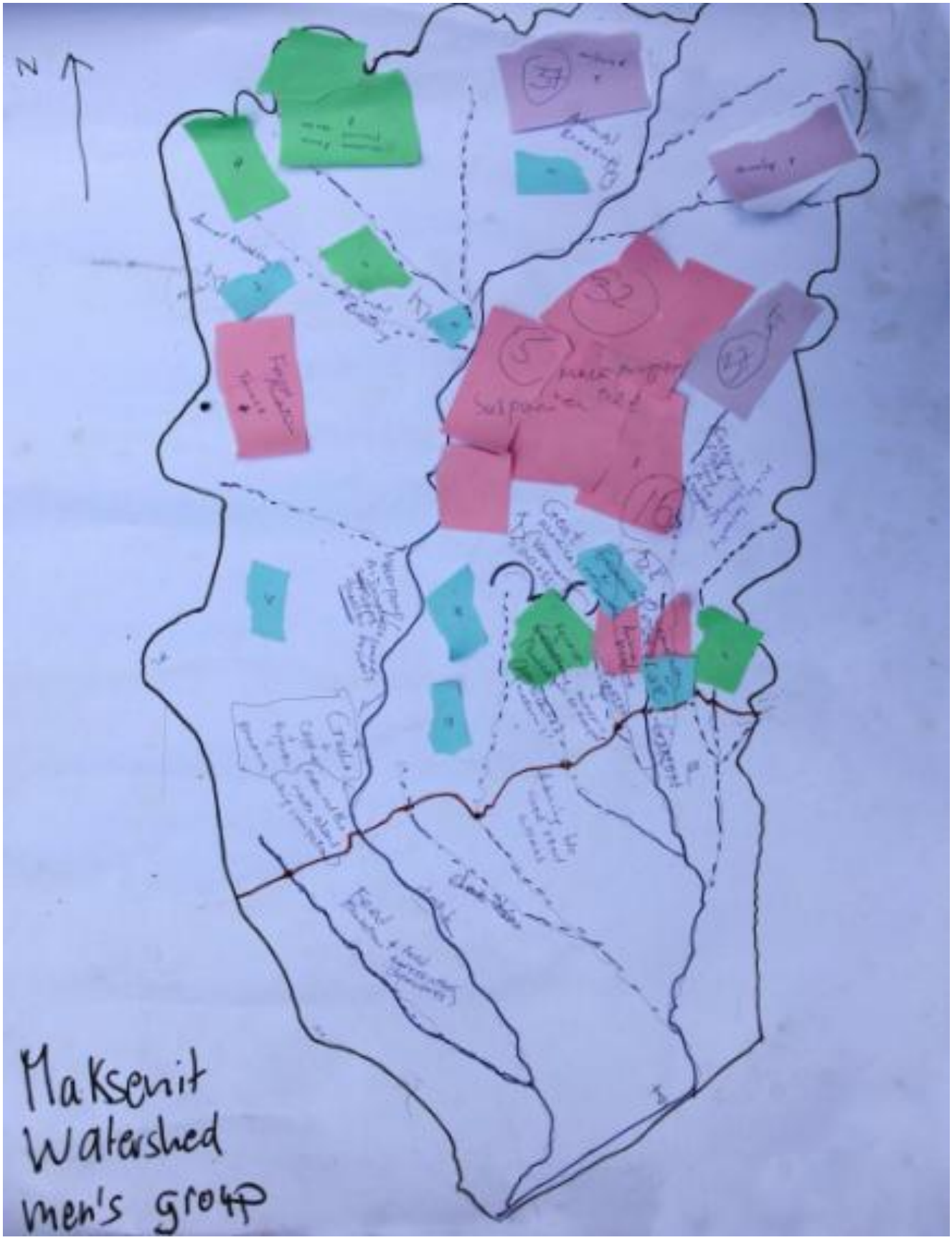

Figure 21: Map of Maksenit developed by the men's group

Preferred landscape

The farmers came up with the following preferred landscape:

Practice chosen	Location	Status in the watershed	Intervention
Stone terraces	Mountain/hillside	Adopted	Campaign 2004
Area closure	Degraded land	Adopted in some area but should be more in the uppland	
Diversion	Outlet	adopted	
Motor pump	Around rivers	Adopted but difficult to maintain	Access to good quality pump
Compost	Crop land	Adopted	
Improved livestock breeds		Adopted for cows	Access to improved goat and sheep breeds
Multipurpose trees	Cropland	Adopted	
Eucalyptus woodlot	Cropland	Adopted	
Hand dug wells		Adopted but not suitable where stone bed is too near to the surface	
Water harvesting ponds	Midland	Adopted	ICARDA program
Large scale irrigation scheme	Lowland	Not adopted	Lack of funds
Gully rehabilitation	Degraded land	Not adopted (in concrete)	Lack of funds
Apiculture	Crop land	Not adopted	Lack of trees, lack of tree nursery
Orchard (lowland fruits)	Crop land	Not sufficiently adopted	Lack of seedlings
Small poultry farming	Crop land	Not adopted	Lack of efficient disease management, medications
Mill services		Not adopted	Access to electricity

Stone terraces along the mountain and hill sides has constructed through campaign as of 2004 offseason.

Two degraded *areas are enclosed* since 2012 for rehabilitation. Tree planting has been planted as a means of enrichment. There are also different soil and water conserving structures like micro-basins constructed on the top of newly planted seedlings. The community is also preparing to enclose other degraded areas. This is because people started to observe the multiple benefits of keeping the animals and human beings out.

Irrigation practice is expanding from time to time using *diversions*.

Around 37 farmers are using *motor pumps*. But they raised the recurrent failures of the motors as a serious problem. As a result the maintenance cost is high. They wish durable water pump motors to be delivered. Group members indicated bureau of agriculture should take the responsibility for the delivery of durable ones.

Figure 33: Men during the mapping exercise in Maksenit

Organic fertilizers like *compost* are being practiced by farmers.

Improved livestock breeds: Holstein Fresian and Jersey breeds were introduced by the bureau of agriculture for the improvement of dairy production of the watershed. Goat and sheep production and fattening are common practices of the watershed community. Improved variety, disease resistant species and medication gaps are expected to be bridged by bureau of agriculture and research institutions.

Multipurpose tree/shrub and grass species are used as feed and for soil and water conservation. *Ficus thonningii*, *Sesbania sesban*, Elephant grass, cowpea were mentioned by the focus group members. Lack of seedling provision is a bottleneck. Multipurpose tree/shrub/grass species plantation is put as a solution for grazing land shortages.

Wood lot mainly composed of Eucalyptus species due to its fast growth and high value is a common practice being exercised by the watershed community.

Hand dug wells are present in the watershed. But the infrastructure is not enough to support the people and livestock in the watershed. Increasing the number of hand dug wells is a challenge: The rock bed is too near and the wells dry out before the supposed time. Technologies able to penetrate bed rocks should be used to have water wells producing year round.

Water harvesting structures for supplementary irrigation is introduced by ICARDA and being implemented. The focus group assured there is huge interest to expand the practice, however the costs hindered the community to take over the practice.

Large scale irrigation scheme is a desired practice by the focus group farmers. Constructing a reservoir around the middle of the watershed is suggested as an intervention. There is a large amount of command area down there. Its expensiveness to construct is a major problem. Government, NGOs and projects like ICARDA are listed to fill the gap.

Gully restoration was considered as a mandatory practice while not done so far. Cemented and gabion enforced check-dams in the gullies is wished by the focus group. But due to lack of capacity to afford cement and gabion, they couldn't construct the check-dams.

The focus group recommended *apiculture* to be practiced in the watershed. The community didn't adopt the technology due to continuing deforestations and introduction of herbicides. Enclosure, nursery establishment and manual and/or mechanical weeding are suggested interventions to be promoted by the bureau of agriculture in the watershed.

*Papaya, Banana, Mango, Orange, Coffe*e productions are the wished practices. Though a big interest and potential, lack of seedling provision, water and termite problem accounted for not implemented by the community. Nursery establishment to produce the above plants by bureau of agriculture and developmental projects is suggested as an intervention.

Small poultry farms at household level are wished by the group members. Diseases and lack of medications are the hindering factors. The group recommended delivery of such services by bureau of agriculture.

Mill services for grain in the watershed are wished by the farmers. Now they need to go to town. Electricity is needed as an intervention for the mill.

Difference with the existing landscape and interventions needed

The men's group came up with a certain amount of practices that are not yet adopted but they wish to have. Most of them are relatively big infrastructure for which the government or NGOs need to be involved, such as large scale irrigation schemes or gully stabilization with concrete check dams.

Obviously the ICARDA experience shows them that it is possible to dream big.

Despite modern bee hives being found in the watershed, apiculture seems to be underdeveloped due to the lack of flowering trees. Also farmers indicate that they lack seedlings for those trees. This despite the relative proximity to the governmental nursery, suggesting that the nursery does not produce the trees wished, or that the farmers are not aware of the tree nursery.

Farmers would like to have more hand dug wells, and also dig some new wells but face the challenge to reach the water.

Trade-offs discussed

There are a prospective winners and losers when the optimal watershed gets realized. Use of herbicides would be forbidden when apiculture get started. So farmers who wish to use herbicides will be losers. Honey producer farmers will also be favored.

Enclosing a proposed degraded land to be rehabilitated would offend nearby farmers. These neighboring farmers are used to send their cattle to those places. So when enclosure is effected, these farmers would be obliged to keep their cattle off the place. Such upset could be considered as

a loss whereas the vast community would benefit from the restoration of the areas and be considered as winners.

The focus group recommended area closure around Agamye area. The people who were collecting fuel wood would lose due to the enclosure. The largest Agamye area and of course the watershed community generally do benefit from the intervention recommended.

Final mixed discussion

The mixed discussion was relatively short, because the focus group discussion took a very long time and everyone was tired. Each group presented its work and then the group split up.

Figure 22: Listening to the women's presentation

General impressions and lessons learned

In the Maksenit watershed the participatory mapping exercise worked very well. Based on the Oromia experience where women were rather inactive, in Maksenit women drew the map and pasted land use stickers. At the end it seemed that they have really enjoyed the exercise and their yet undiscovered capacity to glue paper!

Figure 35: Men's presentation in Maksenit

Figure 36: The note-taker, keeping track of the discussion

In terms of selection of practices female farmers seemed to be very individualistic following their own interests rather than representing their community. Each woman wanted to have a pump on her specific farm, rather than discussing that the community needs more pumps around the rivers, and to discuss other options for the community. It seems that with the ICARDA experience this community has just learned to ask for things rather than develop and optimal landscape.

The game did not work very well, probably due to the lack of training of the facilitator, who found it difficult to handle the cards. The male group finally went through the discussion without using the cards. The necessary data was collected, but it took much longer time to go through the wished landscape, and participants seemed to have much less fun than participants in Oromia.

An interesting fact is that most of the farmers in this watershed make their livelihoods from garlic, which is irrigated though a traditional river diversion scheme near to the outlet. Farmers did not mention this at all. This might be the result from not being able to play the happy strategies game correctly.

Discussions from Zefie watershed

Description of the watershed

Zefie is located some kilometers away from Gassay, near Debre Tabor. It is the smallest watershed we looked at. It consists of only one clear and relatively steep slope where the upland is also the up-slope, the mid land the mid-slope and the low land the low-slope.

It is a well-managed watershed, where terraces and bunds can be found with right spacing and direction on farmers' private land and built with own labour (no mass mobilization).

Figure 37: Terraces in Zefie

Also most of the gullies are rehabilitated. They are private land and often are the natural boundaries of the farms. The low land is mainly grazing land and a tree nursery run by the NGO Tana-Beles. This NGO has also recently introduced apple trees in the area.

Figure 38: The tree nursery at the outlet

Major crops: Triticale, Potato, Barley, Faba beans, Field peas, Flax, and chickpea. Livestock: Cattle, Sheep, Goats, equines (mainly horse, donkey and mule) and chickens.

Discussion from the women's group

Participatory mapping

The sources of watersheds and sub-water sheds of Zefie watershed site were discussed. According to the participants, Ensefere (the source), Enkoko Godir (Got), Tilik Meda (Got) and Enbes Mender (Got) are sub-watersheds in Zefie which flows to the outlet of Gumara River through Ganido valley.

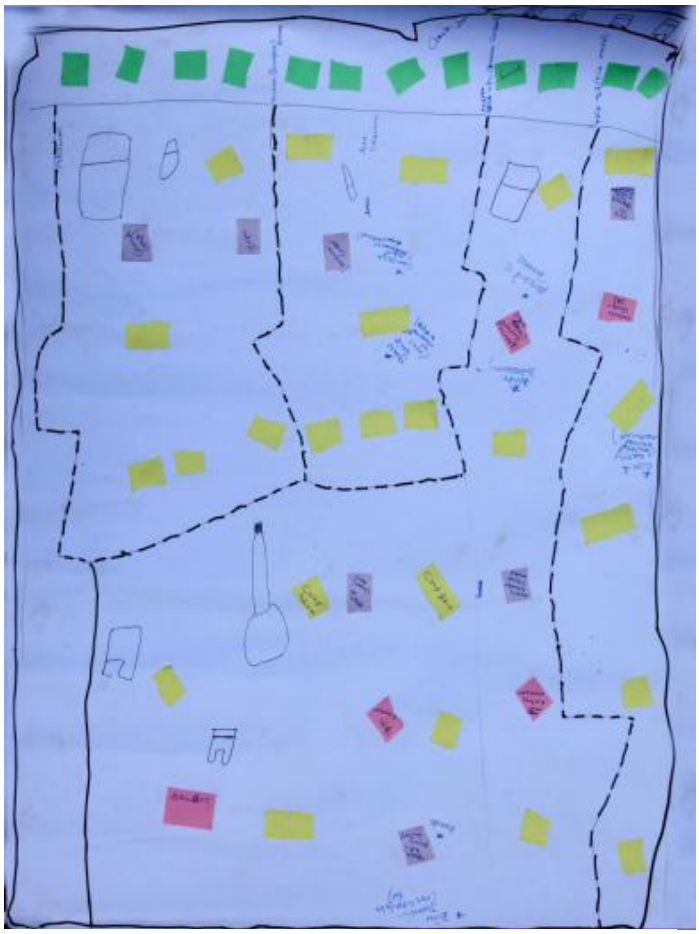

Figure 39: Map of Zefie watershed developed by the women's group

The mapping process started by marking the following:

- Rivers (all season and rainy season)
- Villages
- Grazing lands
- Degraded lands
- Forests
- Cultivated lands (Crops)
- Outlets

Preferred landscape

For their preferred landscape the farmers came up with the following practices.

Grass strips along contour: The woman who selected this practice mentioned that they use it as a border which makes less conflict on border issue and good animal feed. It is a new practice introducing by the Ministry of Agriculture. She suggests it is a very important process and they want to have more of it.

Bunds: The use of bunds is for soil conservation. It is implemented by Ministry of Agriculture and is not enough, therefore we want to work more.

Limiting animal movement: We use cut and carry system for our animals feed. The practice has been using for many years and we have trained from the family. We need to improve it in a better way due to shortage of farming and grazing lands.

Figure 40: Mapping exercise in the women's group in Zefie

Hillside terraces: It improves our soil conservation and crop production. The practice is implementing by Ministry of Agriculture. We want still to work hard and save our soil.

Diversion weir: Not adopted. But she use hand-dug wells and plant vegetables, apple, spices and Rhamnus prinoides (Gesho in Amharic) in her home garden.

Improved soil nutrient input (organic fertilizer): She has mentioned that the practice is well known. It improves crops and vegetables production. It also reduces the cost of inorganic fertilizer. The practice was implemented by Ministry of Agriculture but still expected that we must work hard in future.

Figure 231: Mapping exercise in the women's group

Area enclosure with enrichment planting: Due to the shortage of grazing lands the practice has advantages. We use cut and carry system and feed our animals at home. The practice was introduced by Ministry of Agriculture but we wish to do more.
Hand-dug wells: We uses for plants, livestock and humans. I have pepper; apple and eucalyptus tree by using water from hand dug wells. It needs less labor especially for a woman who has children less

than eight years old. I have got training by regional women's EPRDF conference. We are trying to work in a better way to improve our livelihood.

Improved livestock breeds: Not adopted. It is not widely introduced in the area but there are very few in numbers. We know the use but thinking that there will be feed problem for them. There is also economical problem to have improved livestock breeds and manage.

Orchards: I just planted apple this year and will see the use in future. We have got lesson from EPRDF conference. In this watershed there are some farmers who have apple fruit ready for sell now.

Check dams: We have been doing this practice for the last three years in highlands and midlands. The lowlands are still need it but not used yet. There is an improvement which we can see on soil and water conservation in addition to soil fertility. The practice was trained by EPRDF conference.
Community pond: Especially in the upland area we need community pond. It can help us for both humans and livestock. We can plant also potato, onion and other vegetables. We know the practice but do not have money.

Pedal pump: It has different advantages. We can use it for vegetables and spices production. It is also less labor need and can be managed by women's.

Practice chosen	Location	Status in the watershed	Intervention
Grass strip along contour	Crop land	Adopted but not sufficiently	Lack of awareness
Bunds	Slopy lowland	Adopted but not sufficiently	Address labor shortage
Limiting animal movement	Crop land	Adopted	
Hillside terraces	Crop land	Adopted	
Area enclosure	Upland	Adopted	
River diversion	Near to the river	Not adopted	
Hand dug well	Homestead	Adopted	
Improved fertility management	Crop land	Adopted	
Improve livestock breeds		Not adopted	Feed shortage Access to improved breeds
Orchard (apple)	Mid-slope	Adopted	
Check dam	Gullies	Adopted	
Community pond	Upland	Not adopted	Lack of funds
Pedal pumps	Wells	Not adopted	Lack of funds

Difference with the existing landscape and interventions needed

Three practices have not been adopted yet, namely improved livestock breeds, community pond and pedal pumps.

Improved livestock breeds are not adopted for two reasons. Firstly it is difficult to access the improved breed variety. Secondly the improved breeds need better quality and more fodder. The watershed at this stage cannot provide sufficient high quality fodder and therefore some fodder oriented practices need to be implemented first.

Figure 242: Women having fun with the happy strategies game

The women imagined a community pond in the up land and allowing farmers to irrigate their fields through a river diversion. Nice idea, but not feasible, as it is not clear where the water would come from to fill the pond. Second, with the river diversion system, most of the water is likely to be lost on its way. Clearly this was a creative idea from one of the women and not an idea pushed by the government. Unfortunately it is not a realistic option.

Pedal pumps to pump water from the well are also still missing.

Discussion from the men's group

Participatory mapping

The farmers started the mapping exercise by identifying the North direction and used the school as bench march. Then they continued to map the Argenit river, then the Zefie river then the Alekit river. In terms of land use they identified the Zefie Forest (1-green) that is composed of Eucalyptus. Fridrew forest (2-green) is a community forest of eucalyptus. It has been planted for rehabilitation of the areas and livestock is kept out of the areas. Tilik meda forest (3-green) is a state owned eucalyptus forest and Kolew mareja (4-green) is a privately owned eucalyptus forest. There is a nursery established by an NGO that produced seedlings for endogenous trees.

Figure 43: Men's group discussing how to start to map the Zefie watershed

In terms of degraded area, they identied Zingero gedla (1-pink), despite of the fact that some people still make use of them, the land is very degraded and unproductive both for crop and grazing as well as Chebrew (2-pink) and Nadew (3-pink).

In terms of grazing area, Eyensen god (1-grey) is a communal grazing land, where also the tree nursery is located. Model bed (2-grey) is a grazing area which during the rainy season is closed and cut and carry system is applied.

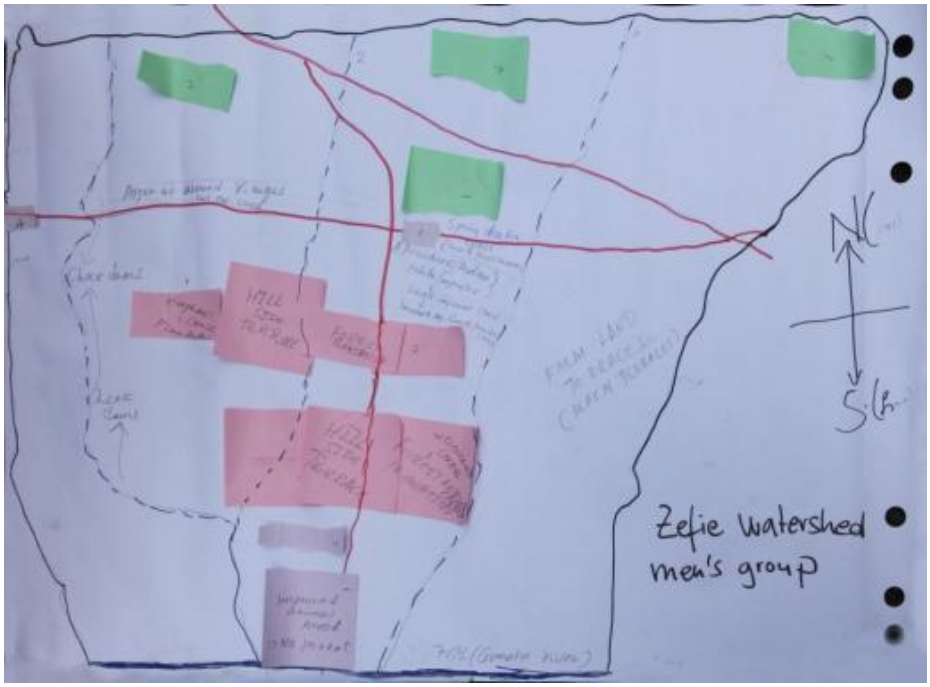

Figure 44: Map of Zefie watershed developed by the men's group

Preferred landscape

The farmers came up with a list of practices to populate the preferred landscape as shown in the table below.

Practice chosen	Location	Status in the watershed	Intervention
Improved potatoes	Crop land	Adopted but not sufficiently	Get access to more improved seeds through the bureau of agriculture
Compost	Cropland	Adopted	
Apple	Around settlement	Adopted but not sufficiently	Get access to seedlings
Improved livestock	Around the communal grazing land	Not adopted	Access to the breeds
Hand dug well	Around settlement	Adopted but not sufficiently	Lack of expertise
Check dams	Gullies	Adopted but not concrete	Access to concrete material and funs
Stone terraces	Mid slope	Adopted	
Afforestation	Degraded land	Not adopted	Government provided seedling
Elephant grass	On the soil bunds	Adopted	
Modern beehives	Around settlement	Not adopted	Access to credit or credit cooperative
Bunds	Mid slope	Adopted	Thanks to the campaign

Improved potatoes: Improved potatoes are available mainly around Enkokow gode. But they are facing shortage in improved seeds. They feel that the bureau of agriculture should provide more.

Compost: Compost is used in the whole watershed and they don't feel any issue linked with it.

Apple: Apple should be planted around settlements. They initially did know very much about the technology. Some of the farmers have apple know and more and more all the farmer have the feeling that it could become a profitable business. They lack in seedlings and knowledge to grow apple trees. Apples could also be planted on degraded area.

Figure 255: Men's group discussing land use in Zefie

Improved livestock breeds: The farmers have the feeling that they could intensify for livestock as fodder and water would be available, but they cannot access the parent material.

Hand dug wells: There are some wells in the watershed. But more farmers would like to have wells but they lack in capacity to select the right locations. They also feel that by cooperating more among themselves and some governmental support to access material they could maybe get some more wells.

Check dams: There would be a need for concrete check dam on the Alekit river. They are lacking in capacity to build it. They wish to get some governmental support from the bureau of agriculture could prove the cement, the community would bring up the labour.

Stone terraces and bunds: Stone terraces and bunds have been built on the sloping fields. These have been built through governmental campaigns and all the suitable area are now terraces.

Afforestation: The afforestation of degraded area should be part of the governmental campaign. Afforestation goes very slow as seedlings are not made available by the government. The recent nursery from Tana Beles might address this issue.

Elephant grass: Elephant grass is used for stabilize the bunds and terraces. As they have the material, they are using it for multiplication.

Modern beehives: Modern beehives around settlement should be developed. But they cannot buy the hives and nor the bee colony mainly due to the lack of funds. By forming cooperatives combined with credit service they could get it right.

Figure 46: Farmers discovering the happy strategies game

Difference with the existing landscape and interventions needed

Farmers suggested two interventions that have not been adopted: afforestation and modern beehives. Afforestation seems to have been planned but not yet implemented by the government. Farmers lack seedlings. Also farmers sometimes would prefer to plant eucalyptus trees. But both the governmental nursery as well as the Tana-Beles nursery does not provide eucalyptus seedlings, only multipurpose tree. There is an agreement in the community that the afforestation should take place mainly through governmental intervention.

Modern beehives were suggested as practice that is not yet adopted, mainly because they do not have access to the necessary credit to start up. In principle this is a good idea, as they have apple trees that are a flowering.

Apples combined with hand-dug wells are there but more people would like to adopt the practices. They are mainly hampered by the lack of access to seedlings as well as access to water during the dry season and therefore would need a well or a pond.

Also they have improved potato seeds but would be happy to get more.

Figure 47: Women presenting their work to the men's group

Trade-offs discussed

Farmers suggest that if the optimal landscape is implemented everyone is a winner. There are no trade-offs.

Final mixed discussion

During the discussion, men challenged the women's map, who bravely defended their map which was less detailed and accurate than the men's. They were happy to contribute to this exercise and they felt that they could learn from each other, also from the fact that they could share practices between highland and lowland farmers.

General impressions and lessons learned

This was the last dscussion. For the first time the women's took longer than the men's. More women showed up than invited. Among the newcomers were women who cannot read or write but who wanted to participate. We decided to allow these additional women to participate. The women's group was extremely interactive, and some women despite not being able to read or write, decided to draw houses and churches on the map. It ended up in a very funny competition. One woman asked the other one 'why is your house so small?', the lady answered 'don't worry, I just draw the toilet'.

Both men and women's group enjoyed the mapping exercises and men seem to have discovered that their women are much smarter and literate than they had imaged.

Map validation

In general, much more is happening on the ground that is predicted by our maps. The reasons for this are very different for the different technologies. For apple trees for example, the suitability conditions seems to be assessed wrongly, instead of minimum temperature, elevation seems to be a better proxy. For other practices we rely on accuracy of available layers. Our river map suggests fewer perennial rivers than what we have found on the ground. Also we found river diversion around non-perennial streams on vertisols, which are used as sort of spate irrigation or irrigation for parts of the year only.

Our ground water map is very rough and is based on geological substrate. This map does not allow us to identify water pockets in the landscape due to local geological conditions, nor to take underground water streams of non-perennial rivers into account. We might rethink our proxy for groundwater access.

Furthermore, our water harvesting suitability is based only on land use. Maksenit watershed shows us some evidence where these technologies work and Shambu were they do not work. In the worst case we can use this evidence to come up our own proxy.

Soil and water conservation techniques seem to be predicted relatively accurately.

Lessons learned

Promising innovations from the communities

In every watershed we came across farmers with innovative ideas that could be a good entry point for rainwater management. Whereas in some watersheds, the entry point is a rainwater-related practice we have or modeled or listed in our extended list of rainwater practices, some of the practices such as poultry were quite unexpected, but the community could make a clear case why it contributes to water management.

Table 6 shows from our perspective the most promising practice in each landscape, the limiting factor and what and who is needed to make it happen. A promising practice is a practice that is not yet or insufficiently adopted within the watershed, it is a practice that makes sense in terms of water management and that is wished for by the community.

Table 6: most promising practice in the watershed

Watershed	Most promising practice	Hampering factor	What is needed?	Who could help
Gorosole	Apple	Lack of access to seedlings		?
Shambu	Small scale poultry	Lack of knowledge	Poultry training	?
Maksenit	Beehives combined with lowland fruit trees	Access to seedling	Increase the offer from the governmental tree nursery	Governmental nursery (ICARDA)
	Small scale poultry	Disease control	Poultry training	?
Zefie	Apple	Lack in seedling	Get the local tree nursery to produce apple seeds	Tana-Beles
	combined with wells and beehives	Lack of credit	Set up an 'equub'	Tana-Beles

In Gorosole, the most promising practice is the apple tree. The community would like to have apples but does not know how to access seedlings. The community did not mention that apples need water during the dry season and therefore needs to be combined with a water access such as diversion, well or pond. This suggests that they might not know what is needed for apple trees and they might need to get some training. As no NGO is active in the area, it is difficult to identify who could help with the apple trees. Seedlings could be brought from Shambu.

In Shambu, small scale poultry came out as the most promising practice. As chickens are expensive farmers could get more income through poultry and more easily destock on livestock. The farmers

claim that they cannot have more chicken, because it is too cold and lots of fecund eggs do not survive. They think that they need an incubator, which does not really help if there are power cuts and no back-up system. There might be option to get more chickens without an incubator, by keeping more chickens together during the breeding. Also as soon as the chicken population increases, disease control in needed. Expert knowledge and training would be needed to enable them to get more healthy chickens at very little costs.

Like in Shambu, poultry has been mentioned in Maksenit and the same rationale applies. In addition, the home gardens combined with beehives seems to be a promising practice, as more tree are planted and income of the farmers can be diversified. For those farmers who have access to water during the dry season, the major hampering factor is the access to tree seedling other than the multipurpose tree (which they produce themselves). Cooperation should be sought with the governmental tree nursery and with ICARDA for practices that increase water access during the dry season.

In Zefie, similarly to Maksenit, a combination of fruit tree with beehives is a promising combination of practices. Apple trees are already in the watershed and the knowledge is available, but no one is producing seedlings. One could approach Tana-Beles and propose that the new tree nursery also produces apple trees.

For both poultry and the tree, it is not sufficient to make sure that the farmer can supply the products but also that they have sufficient market linkages. If too many fruits or chickens come on the local market, the price is likely to fall. Therefore making a functioning market linkage is crucial among the promotion of the practice. The Shambu case showed that it is relatively difficult to sell the apples, despite of their high prices in the major Ethiopian cities.

Adapting the happy strategies game for farmers

This focus group discussion was the first trial of the happy strategies game with communities. In general the approach went well. The mapping exercise went very well for all the focus group discussions.

Figure 48: Briefing the OARI team in Ambo

In Oromia region, involving women and get them actively involved was difficult. Facilitators in Amhara were asked to involve women more actively which worked well. Also women are more likely to be illiterate, making it more difficult to read the cards. After the Oromia experience,

women where therefore allocated a card (whereas men could choose their cards). Every card was explained for every woman making sure that she knows what card she has. This worked better than letting them choose the cards.

The game worked better in locations where farmers had a clear vision of where they want to be in 5 years from now. As such, the happy strategies tool could be a very interesting tool to involve communities as part of a longer process, if a vision building exercises is implemented beforehand.

Finally, working with young people with little experience and variable level of motivation made it sometimes very difficult to implement the focus group. This also explains the difference in quality in the reporting from the different sites. But every person that contributes to the focus group in a second round, made progress. Therefore these focus group discussion should also been seen as a capacity building to our partners and our own staff in facilitation and participatory approaches. Getting a pool of facilitators who know how to implement the happy strategies game for communities could ensure better quality data collection in future.

The International Livestock Research Institute (ILRI) works to improve food security and reduce poverty in developing countries through research for better and more sustainable use of livestock. ILRI is a member of the CGIAR Consortium, a global research partnership of 15 centres working with many partners for a food-secure future. ILRI has two main campuses in East Africa and other hubs in East, West and Southern Africa and South, Southeast and East Asia. ilri.org

CGIAR is a global agricultural research partnership for a food-secure future. Its science is carried out by15 research centres that are members of the CGIAR Consortium in collaboration with hundreds of partner organizations. cgiar.org