Monitoring socioeconomic impacts of climate-smart agricultural practices at Doyogena and Basona Worena climate-smart landscapes, Ethiopia

Activity Report

EU-IFAD Project "Building livelihoods and resilience to climate change in East & West Africa: Agricultural Research for Development (AR4D) for large-scale implementation of Climate-Smart Agriculture"

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Summary

To achieve food security and agricultural development goals, adaptation to climate change and lower emission intensities per output will be necessary. This transformation must be accomplished without depletion of the natural resource base. Climate-smart agriculture (CSA) is an integrated approach to managing landscapes such as cropland, livestock, forests and fisheries that address the interlinked challenges of food security and climate change. CSA aims to simultaneously achieve increased productivity, enhanced resilience and reduced emissions. In Ethiopia, the CGIAR Research Program on Climate Change, Agriculture and Food Security (CCAFS) in East Africa has established two climate-smart landscapes: one in southern Ethiopia in Doyogena district and the second one in central Ethiopia in Basona Worena district. In these sites, locally appropriate CSA practices are being tested and promoted by the European Union and International Fund for Agricultural Development (EU-IFAD) funded project "Building livelihoods and resilience to climate change in East & West Africa" that is supporting large-scale adoption of CSA technologies and practices.

Although evidence from some East African countries suggests that the introduction of CSA practices among farmers contributes to the potential of agriculture to adapt to a changing climate, the impact of these CSA practices on food security and livelihoods of Ethiopian farmers is not well understood and documented. Therefore, this activity report is the result of the data collection process that was conducted to assess the impacts of CSA practices on agricultural production, income and household food security in Doyogena and Basona Worena Climate Smart Villages (CSVs). Based on the information gathered in the two CSVs, the socio-economic impacts of these practices will be estimated and documented to help donors and decision makers to justify funding and guide priorities in scaling up the adoption of CSA technologies and practices.

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Contents

Acronyms

CSA	Climate-smart agriculture
CCAFS	CGIAR Research Program on Climate Change, Agriculture and Food Security
CGIAR	Consultative Group for International Agricultural Research
CSV	Climate Smart Village
EU	European Union
IFAD	International Fund for Agricultural Development
M.A.S. L	Meter above sea level
ODK	Open data kit
SNNPR	Southern Nations, Nationalities, and People's Region
RHoMIS	Rural Household Multi-Indicator Survey

1. Introduction

Climate change has already significantly impacted agriculture (Lobell et al. 2011) and is expected to have negative impacts on agriculture and food security in many regions, particularly in developing countries that are highly dependent on rain-fed agriculture (IPCC 2014). The increased frequency and intensity of extreme events such as heavy rain, drought and flooding are clearly the most important game-changing effects of climate change in these regions (Porter et al. 2014). To achieve food security and agricultural development goals, adaptation to climate change and lower emission intensities per output will be necessary. This transformation must be accomplished without depletion of the natural resource base (FAO 2013). CSA, which emerged and evolved as a relatively new concept, is gaining wide acceptance as a credible alternative to address food insecurity in the era of climate change (Lipper et al. 2014). CSA is an integrated approach to managing landscapes such as cropland, livestock, forests and fisheries that address the interlinked challenges of food security and climate change (FAO 2013). CSA aims to simultaneously achieve increased productivity, enhanced resilience and reduced emissions (FAO 2013).

CCAFS is partnering with farmers, development organizations, and national and international agricultural research organizations in East Africa to test and promote a portfolio of CSA technologies and practices. CCAFS started piloting the CSV approach in East Africa in 2012. In each CSV, many climate-smart interventions are introduced depending on the agro-ecological characteristics of the CSV, level of development, capacity and the interests of farmers and local government partners. In Ethiopia, CCAFS East Africa (CCAFS EA) has established two climate-smart landscapes: one in the southern region in Doyogena district and the second one in central Ethiopia in Basona Worena district. In these sites, locally appropriate CSA practices are being tested and promoted by the EU-IFAD funded project "Building livelihoods and resilience to climate change in East & West Africa" that is supporting large-scale adoption of CSA technologies and practices.

Evidence from some East African countries suggests that the introduction of CSA practices among farmers contributes to the potential of agriculture to adapt to a changing climate (e.g. Mugabe 2020). However, the impact of these CSA practices on food security and livelihoods of Ethiopian farmers is not well understood and documented. Therefore, the objective of this activity report is to present to the reader the steps and procedures followed while collecting data to assess the impacts of CSA practices on agricultural production, income and household food security and diversity in Doyogena and Basona Worena CSVs.

This activity report proceeds as follows. The next section presents descriptions of the districts where the CSVs are located. Section 3 deals with survey tool and sampling methodology. In Section 4 enumerators training and survey implementation will be discussed. Sections 5 and 6 discusses challenges encountered during the data collection and feedback gathered in the process. Finally, Section 7 describes the expected outputs from the survey.

2. Survey locations

2.1. Doyogena climate-smart landscape

Doyogena district is located in the Southern Nations, Nationalities, and People's Region (SNNPR) of Ethiopia. The altitude of the district ranges from 2420 to 2740 meters above sea level (m.a.s.l). The mean annual rainfall and temperature of the district ranges from 1,000 to 1,400 mm and 12.6°C to 20°C respectively. Doyogena climate-smart landscape is located in this district. Figure 1 shows the treatment group and control group landscapes in Doyogena CSV. The farming system in the district is characterized by Enset (Ensete ventricosum) – cereal - livestock production system. Main crops grown in the area include wheat, barley, legumes and vegetable like beans and potato. Enset (Ensete ventricosum), which is an important source of food, is grown in the area by almost all households. The average cropland size in the area is 0.5 hectare. Livestock production includes cattle, sheep and poultry.

In Doyogena climate-smart landscape, 11 CSA practices are being implemented. These are terraces with Desho grass (*Pennisetum pedicellatum*) a soil and water conservation measure; controlled grazing; improved wheat seeds (high yielding, disease resistant and early maturing); improved bean seeds (high yielding); improved potato seeds (high yielding, bigger tuber size); cereal/potato-legume crop rotation (nitrogen fixing & non-nitrogen fixing); residue incorporation of wheat or barley; green manure: vetch and/or lupin during off-season (nitrogen fixing in time); improved breeds for small ruminants; agroforestry (woody perennials and crops) and cut and carry for animal feed. Appendix I shows pictures and descriptions of the CSA practices implemented in Doyogena climate-smart landscape.

Treatment group Control group

Figure 1. Treatment and control groups landscapes in Doyogena CSV.

2.2. Basona Worena climate-smart landscape

Basona Worena district is located in the Amhara Regional State of Ethiopia. The altitude of the district ranges from 1,300 to 3,650 m.a.s.l. The average temperature ranges between 6 and 20^0 C while the mean annual rainfall varies from 950 to 1200 mm. Basona Worena climate-smart landscape is located in this district. Figure 2 shows the treatment group and control group landscapes in Basona Worena CSV. The main farming system in the district is characterized by mixed crop-livestock systems. Major crops grown in the area are barley and wheat. The average cropland size in the area is less than 0.5 hectares. The most important CSA practices being implemented in the area are terraces (soil bunds), terraces (soil bunds) with biological measures (phalaris and tree lucerne), trenches, enclosures, percolation pits, check-dams (gabion check-dams and wood check-dams) and gully rehabilitation. Appendix II shows pictures and descriptions of the CSA practices implemented in Basona Worena climate-smart landscape.

Treatment group Control group

Figure 2. Treatment and control groups landscapes in Basona Worena district.

3. Survey tool and sampling technique

The Rural Household Multi-Indicator Survey (RHoMIS) tool was employed to monitor the uptake of socioeconomic components of CSA practices in the CSVs in Doyogena and Basona Worena. RHoMIS is a household survey tool designed to rapidly characterize the state and change in farming households by a series of standardized indicators. It includes a modular survey tool which takes 40–60 minutes to administer per household, a digital platform to store and aggregate incoming data as well as analysis code to quantify indicators and visualize results. The main topics covered in the survey include: household characteristics, farm size, land management and inputs, crop and livestock production, food security status and food insecurity experience scale, nutritional diversity, off farm income, gendered control of resources and progress out of poverty.

Simple random sampling technique was employed to select 400 farmers from each district. Out of the 400 farmers in each district, 200 were selected from the CSVs (treatment group) and the remaining 200 from villages with similar agroecological conditions except for the involvement of households in the CSA practices (control group). By comparing outcomes between the treated and untreated households, it is possible to assess the impacts of the treatment (the CSA practices) on agricultural production, income, food security and food diversity. Table 1 presents the list of villages and number of respondents selected from each village in Doyogena and Basona Worena districts.

Table 1. List of respondents in the sample villages in the two districts

District name	Treatment group			Control group			Farmers list
	Village name	M	F	Village name	M	F	
Doyogena	Tula; Suticho; Gewada; Cholola; Genjo; Duna	173	27	Minatofa; Lay-Barbaricho; Bankora	160	40	Doyogena.xlsx
Basona- Worena	Gina- Beret; Gudoberet- Ketema; Mewkeria- Ager; Misage; Mush; Selafa; Tosign- Amba; Worage; Kese- Amba; Woregune; Kolo- Amba; Koshim	167	33	Nefage; Dube hager; Aregaye- Belge; Enate Hode; Dube hager; Tach amba; Woldab ager; Dube Ager-Lay Amba; Woldab ager; Tach Mush; Tef Amba; Gedeba; Amba Mado; Woldabager; Tach Mush- Lay Amba; Weregune; Kolo Amba; Koshim;	174	26	Basona.xlsx

Note: In Woregune, Kolo- Amba and Koshim villages, data was collected from both treatment and control groups.

4. Enumerator training and survey implementation

Enumerator training was an important part of the data collection process in both districts. The enumerators recruited for data collection were university graduates with experience undertaking surveys. In Doyogena, 12 enumerators who work at Areka Agricultural Research Center and Wachamo University were engaged while in Basona Worena 15 enumerators from the Central Statistics Authority Debre Berhan Branch and Debre Berhan University were employed (Appendix III presents a list of enumerators from both districts). A three-day training (from December 21-23, 2020 in Doyogena and from February 1-3, 2021 in Basona Worena) was conducted on the use of the RHoMIS tool to ensure that enumerators were confident with using the RHoMIS software and the digital interface of data collection. The questionnaire, which runs on open data kit (ODK) software was discussed one by one with enumerators. The discussion provided a forum for questions about the software and the survey. During the training, enumerators were requested to interview each other and each one of them filled out one survey question as an interviewer. Pretesting the survey questions was the second task in both districts. A field practice was organized to test the survey in the field with real farmers. Nine household heads from each district who were not part of the main survey participated in the pretest interview. Both in Doyogena and Basona Worena districts, the pretest exercise helped us to ensure that respondents understood the questions posed to them and followed the interview process with interest and attention. Based on the feedback, data collection was started the day after the pretest in both districts. The data was collected from December 24, 2020 to January 05, 2021 in Doyogena and from February 4 - 16, 2021 in Basona Worena. On average, enumerators in both districts used to fill in three survey questions per day resulting in a total of 399 and 396 completed questionnaires from Doyogena and Basona Worena districts, respectively. Day to day supervision of the enumerators was a vital part of the data collection process.

5. Challenges

Although enumerators in both districts used to introduce themselves and the purpose of the survey before they began asking questions, some respondents were reluctant to give information, particularly on household income, number of livestock owned and land size. In addition, few respondents were not willing to make themselves available for the interview, in such cases we replaced them with other household heads with similar household characteristics.

6. Feedback

Enumerators in both districts appreciated the user-friendly nature of the RHoMIS survey tool. No complaints were received regarding its operation.

7. Expected output

The aim of this activity report is to present the steps followed in the data collection process. The data collected will be used to monitor the uptake of CSA practices in the CSVs in Doyogena and Basona Worena districts. Specific outputs will be:

(i) Characterization of rural farming systems and livelihoods to determine household incomes, productivity and food availability, indicators of food security and poverty, and farm and household characteristics,

(ii) Assessment of the perceived effects of CSA options on farmers' livelihood (agricultural production, income, food security, food diversity and adaptive capacity) and on key gender dimensions (participation in decision-making),

(iii) Provision of recommendations that can help donors and policymakers to justify funding and guide priorities in scaling up the adoption of CSA technologies and practices,

(iv) Production of a CCAFS Working Paper,

(v) Production of a manuscript and submission to a peer reviewed journal.

8. References

FAO. 2013. Climate-Smart Agriculture Sourcebook. Food and Agriculture Organization of the United Nations; Department NRMaE. FAO, Rome.

FAO. 2018. Climate smart agriculture: building resilience to climate change. Natural Resource Management and Policy Vol. 52. FAO. Rome.

Lobell DB, Schlenker W, Costa-Roberts J. 2011. Climate trends and global crop production since 1980. *Science* 333: 616-620.

Lipper L, Thornton P, Campbell BM, Baedeker T. Braimoh A, Bwalya M, Caron P, Cattaneo A, Garrity D, Henry K, et al. 2014. Climate-smart agriculture for food security. *Nature Climate Change* 4: 1068–1072.

Mugabe PA. 2020. Assessment of information on successful climate-smart agricultural practices/innovations in Tanzania. In: Leal Filho W. (eds) Handbook of Climate Change Resilience. Springer, Cham. https://doi.org/10.1007/978-3-319-93336-8_180.

IPCC. 2014. Summary for Policymakers Climate Change 2014: Impacts, Adaptation, and Vulnerability. Part A: Global and Sectoral Aspects (eds Field, C. B. et al.). Cambridge Univ. Press, 2014.

Porter JR. et al. 2014. In Climate Change 2014: Impacts, Adaptation, and Vulnerability. Part A: Global and Sectoral Aspects (eds Field CB. et al.)

9. Appendices

Appendix I: CSA practices in Doyogena CSVs

This project is funded by the European Union

CSA monitoring (Doyogena) 2020

villages

01 – Tula
02 - Suticho
03 - Gewada
04 - Cholola2
05 – Tachignaw Genjo
06 - Duna
08- Minatofa ("Control")
09- Lay Barabico (**"Control"**)
10- Bankora (**"Control"**)

CSA practices

1. Terraces with Desho grass (*Pennisetum pedicellatum)* a soil and water conservation measure
2. Controlled grazing
3. Improved wheat seeds (high yielding, disease resistant & early maturing)
4. Improved bean seeds (high yielding)
5. Improved potato seeds (high yielding, bigger tuber size)
6. Cereal/potato-legume crop rotation (Nitrogen fixing & non-N fixing)
7. Residue incorporation of wheat or barley
8. Green manure: vetch and/or lupin during off-season (N fixing in time)
9. Improved breeds for small ruminants (Sheep)
10. Agroforestry (woody perennials and crops)
11. Cut and carry for animal feed.

Climate events

1. Heavy rains
2. Irregular rains
3. Storms/strong winds
4. Low temperatures
5. Frost
6. Drought

GLOSSARY OF CSA PRACTICES

CSA monitoring (Doyogena) 2020

This project is funded by the European Union

1. Terraces with Desho grass (*Pennisetum pedicellatum*) a soil and water conservation measure

Photo credit: Dawit S.

Description (and CSA pillars covered)

A landscape where cropland is maintained with soil and water conservation structures with biological multipurpose biological measures. SWC practice terrace is built and Desho grass (*Pennisetum pedicellatum*) is planted to strengthen the structure and the grass is used for animal feed.

Criteria to differentiate from traditional/conventional practices

A cropland where soil and water conservation structures are not built. A biological measure (Desho grass) is not planted on the farm either. As a result the land is exposed to soil erosion.

2. Controlled grazing

Photo credit: Meron T.

Description (and CSA pillars covered)

A cropland where animals are not allowed to freely graze. This will reduce the compaction of soil as a result better pore space which allows roots to penetrate and perform in a better way.

Criteria to differentiate from traditional/conventional practices

A cropland where animals are allowed to graze freely.

GLOSSARY

CSA monitoring (Doyogena) 2020

3. Improved wheat seeds (high yielding, disease resistant & early maturing)

Photo credit: Dawit S.

Description (and CSA pillars covered)
This improved wheat seed are high yielding, disease resistant, and early maturing. By using this CSA practice, farmers reduce the risks associated with crop failure and improve food security. It also increases yield as a result income and enhance resilience. The varieties that the farmers are planting are Hidase, Huluka, Kingbird, Shorma, Ogolcho and Kekeba.
Criteria to differentiate from traditional/conventional practices
Traditionally, farmers grow wheat varieties which are less productive, susceptible to pests and taking long maturing period.

4. Improved bean seeds (high yielding)

Photo credit: Gebermedhin A.

Description (and CSA pillars covered)
This improved bean seed are high yielding. By using this CSA practice, farmers are able to get higher yield as a result improved income and food security and enhanced their resilience. The varieties that the farmers are planting are CS200K, Oosha and Gebelcho.
Criteria to differentiate from traditional/conventional practices
Traditionally, farmers grow bean varieties which are less productive.

5. Improved potato seeds (high yielding, bigger tuber size)

Photo credit: Dawit S.

Description (and CSA pillars covered)
This improved potato seed are high yielding and have bigger tuber sizes. By using this CSA practice, farmers are able to get higher yield as a result improved income and food security and enhanced their resilience. The varieties that the farmers are planting are Gudene, Jalene and Beleta.

Criteria to differentiate from traditional/conventional practices
Traditionally, farmers grow potato varieties which are less productive with smaller tuber size.

6. **Cereal/potato-legume crop rotation (Nitrogen fixing & non-N fixing)**

Photo credit: Dawit S.

Description (and CSA pillars covered)
Cereal/potato-legume crop rotation is the practice of growing a series of dissimilar or different types of crops in the same area in sequenced seasons. This CSA practice is done so that the soil of farms is not used for only one set of nutrients. It helps in reducing soil erosion and increases soil fertility and crop yield.

Criteria to differentiate from traditional/conventional practices
Traditionally, farmers grow the same crop or same family crops (e.g. wheat and barely) in sequenced seasons.

7. Residue incorporation of wheat or barley

Photo credit: Meron T.

Description (and CSA pillars covered)
Crop residue management is the practice of incorporating crop residue to the soil. This CSA practice provides seasonal soil protection from wind and rain erosion, adds organic matter to the soil, conserves soil moisture, and improves infiltration, aeration and tilth.
Criteria to differentiate from traditional/conventional practices
Traditionally, farmers remove the crop residue from their field or burn it.

8. **Green manure: vetch and/or lupin during off-season (N fixing in time)**

Photo credit: Gebermedihin A.

Description (and CSA pillars covered)
Green manuring is a practice where farmers grown nitrogen fixing crops such as vetch and lupin during off-season for the purpose of soil amendment and mulching.
Criteria to differentiate from traditional/conventional
Traditionally, farmers leave their cropland bare.

GLOSSARY

CSA monitoring (Doyogena) 2020

9. Improved breeds for small ruminants (Sheep)

Photo credit: Gebermedhin A.

Description (and CSA pillars covered)
Community Based Breeding program is a technology of choice for genetic improvement of small ruminants; measurable genetic gains in performance traits and impact on livelihoods; ensure food security under a changing climate, providing households with both nutrition and disposable income. Their small body size, flexible feeding habits and short generation intervals make them suited to climate-risk management. Their low investment costs are affordable to subsistence farmers and are often owned and tended by women and youth.

Criteria to differentiate from traditional/conventional practices
Traditionally, farmers use local breeds with less body weight and less ability to produce offspring. As a result, the productivity level is below its genetic potential. In addition, different production constraints and lack of appropriate breeding strategies developed for the breed in the production system contribute to less genetic potential.

10. Agroforestry (woody perennials and crops)

Photo credit: Gebermedhin A.

Description (and CSA pillars covered)
This practice is a dynamic, ecologically based natural resource management system through the **integration of trees on farms** and in agricultural landscapes which diversifies and sustains production for increased economic, social and environmental benefits for land users.

Criteria to differentiate from traditional/conventional practices
The main criteria that helps farmers are (i) if intentional (combinations of trees, crops and/or animals are intentionally designed and managed) (ii) if intensive (management wise to maintain their productive and protective functions) (iii) if interactive (biological and physical interactions between the tree, crop and animal components) (iv) if integrated (the tree, crop and/or animal components are structurally and functionally combined into a single integrated management unit)

GLOSSARY

CSA monitoring (Doyogena) 2020

11. Cut and carry for animal feed

Photo credit: Gebermedihin A.

Description (and CSA pillars covered)
In this CSA practice farmers produce forage on soil terrace built on their cropland and around their house. In addition to feeding to their livestock, farmers sell the forage to get additional income.

Criteria to differentiate from traditional/conventional practices
Traditionally, farmers don't produce forage on their cropland or around their house As a result, their livestock allowed to free graze.

Appendix II: CSA practices in Basona Worena CSVs

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GLOSSARY

CSA practices (Basona) – 2020 Monitoring

Villages/ Kebeles

1. Gina Beret
2. Gudoberet Ketema
3. Mewkeria Ager
4. Misage
5. Mush
6. Selafa
7. Tosign Amba
8. Worage
9. Woregne
10. Kese Amba
11. Kolo Amba
12. Koshim
13. Woregne control
14. Kolo Amba control
15. Nefage
16. Dube Hager
17. Aregaye Belge
18. Enate Hode
19. Dube Hager Tach Amba
20. Woldab Hager
21. Debe Ager Lay Amba
22. Tach Mush
23. Koshim Control
24. Tef Amba
25. Gedeba
26. Amba Mado
27. Woldabager
28. Tach Mush Lay Amba

CSA practices

1. Terraces (soil bunds): Soil and water conservation structures
2. Terraces (soil bunds) with biological measures (phalaris and tree lucerne)
3. Trenches
4. Enclosures
5. Percolation pits
6. Check-dams (gabion check-dams and wood check-dams)
7. Gully rehabilitation

Climate events

1. Heavy rains
2. Disappearance of the short rainy season
3. Strong winds
4. Increased Temperatures
5. Low temperatures in certain seasons
6. Frost

GLOSSARY

CSA practices (Basona) 2020

1. Terraces (soil bunds)


Photo credit: Lulseged T.

Description (and CSA pillars covered)
In the landscape, cropland is maintained with soil and water conservation structures. Terraces reduce soil erosion protecting organic matter rich top soil important for maintaining soil fertility and adaptation to climate change.
Conventional practices
A landscape where soil and water conservation structures are not built. As a result the land is prone to soil erosion.

2. Terraces (soil bunds) with biological measures (phalaris and tree lucerne)


Photo credit: Lulseged T.


Photo credit: Lulseged T.

Description (and CSA pillars covered)
In the landscape, cropland is maintained with soil and water conservation structures with multipurpose biological measures. As SWC practice, soil bunds are built and phalaris grass and tree lucerne are planted to strengthen the structure and used for animal feed.
Conventional practices
A landscape where soil and water conservation structures are not built and biological measures are not planted on the farm. As a result the land is prone to soil erosion and feed shortage for livestock.

GLOSSARY

CSA practices (Basona) 2020

3. Trenches

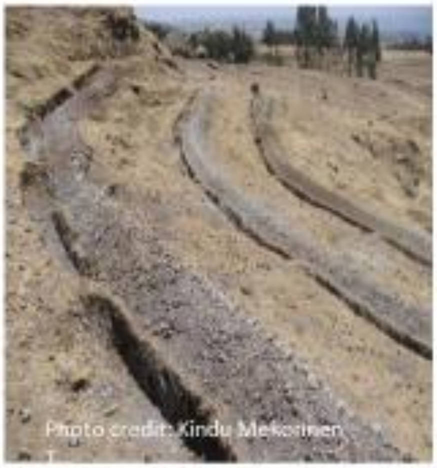

Photo credit: Kindu Mekonnen T.

Photo credit:

Description (and CSA pillars covered)
In the landscape, trenches are formed by digging short ditches across the slope to trap water as a means of soil and water conservation measure to reduce soil erosion, improve soil moisture and recharge underground water.

Conventional practices
A landscape where there is no soil and water conservation structures. The soil is prone to erosion and water is lost through runoff.

4. Enclosures

Photo credit: Lulseged T.

Description (and CSA pillars covered)
In the landscape, degraded lands are enclosed from human interferences and let to rehabilitate and regenerate. This practice is very beneficial for biodiversity conservation and ecological regeneration.

Conventional practices
A land exploited beyond its carrying capacity and left untreated leading to sever land degradation and carbon release from soils.

GLOSSARY

CSA practices (Basona) 2020

5. Percolation pits

Description (and CSA pillars covered)
Percolation pits are dug in the landscape to reduce the speed of water flow and trap the water, allowing it to percolate to the soil and stabilize gully downstream. The percolation pits reduce the erosive power of runoff, recharge ground water and improve soil moisture as a means of adaptation to climate change.

Conventional practices
A landscape where soil and water are lost through runoff in the absence of climate smart technologies to reduce the velocity and trap the water improving percolation.

6. Check-dams

Description (and CSA pillars covered)
Check-dams are constructed with gabion and wood to reduce the speed of water flow to prevent gully erosion.

Conventional practices
Check-dams not constructed resulting in runoff and exacerbating erosion and gully formation.

GLOSSARY

CSA practices (Basona) 2020

7. Gully rehabilitation

Description (and CSA pillars covered)
In the landscape, gullies are stabilized and rehabilitated through check-dams and biological options.

Conventional practices
Gullies are left untreated leading to further degradation, sever damage to agricultural lands and carbon release from soils.

Appendix III: List of enumerators in Doyogena and Basona Worena districts

List of enumerators in Doyogena

	Name	Organization
1	Mesfin Mengistu	Areka Agricultural Research Center
2	Tilahun Kifle	Areka Agricultural Research Center
3	Sewawit Yohannes	Areka Agricultural Research Center
4	Biniyam Biru	Student
5	Mebratu Asrat	Areka Agricultural Research Center
6	Tucho Tumato	Areka Agricultural Research Center
7	Tessema Watumo	Wachamo University
8	Teshale Tigistu	Doyogena Agricultural office
9	Kebede Habtegiorgis	Areka Agricultural Research Center
10	Tesfaye Fatalo	Areka Agricultural Research Center
11	Berhanu Wolde	Student
12	Tesfaye Abiso	Areka Agricultural Research Center

List of enumerators in Basona Worena

	Name	Organization
1	Kassa Alemu	Central Statistics Agency
2	Tesfaye Moges	Central Statistics Agency
3	Workye Gebrewold	Central Statistics Agency
4	Asabnesh Alene	Central Statistics Agency
5	Abreham Kefelew	Debre Berhan University
6	Getahun Alemayehu	Debre Berhan University
7	Sinknesh Lema	Central Statistics Agency
8	Kabite Abebayew	Central Statistics Agency
9	Engidasew Demissie	Central Statistics Agency
10	Mindahun Abebe	Central Statistics Agency
11	Wegagen Missawey	Central Statistics Agency
12	Ayele Negash	Debre Berhan University
13	Belayhun Tesfaye	Debre Berhan University
14	Mebrate Getabalew	Debre Berhan University
15	Argaw Moges	Central Statistics Agency