Measuring Agroecology and its Performance (MAP)

Workshop Report on

Multidimensional Performance of Agroecology:

Validation of Results of the TAPE Application in Selected Districts in Ethiopia

Workshop held on 29 April 2024,
Venue: ILRI-Addis campus

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June, 2024

Acronyms

AE	Agroecology
BOA	Bearu of Agricultue
CA	Conventional Agrigulture
CG	Centers for Global Intrnational Agricultural Research
CIRAD	French Agricultural Research Centre for International Development
COE	Chief of Exicutive
DAs	Development Agenents
EBI	Ethiopian Biodiverstity Institute
EFD	Ethiopian Forest Development
EIAR	Ethiopian Institute of Research
FAO	Food and Agriculture Organization
FSP	Food Security Program
GIZ	German Agency for International Cooperation
ISFM	Integrated Soil Fertility Management
MAP	Measuring Agroecology Performance
MoA	Ministry of Agriculture
NGO	Non Governmental Organisation
NR	Nartural Resources
NRM	Natural Resource Management
RLUAD	Rural Land Use and Administration
SLMP	Sustainable Land Managment Program
SNV	The Netherlands Development Organisation
TAPE	Tool for Agroecological Performance Evaluation

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1. Introduction and Welcome

1.1. Background

*(*By Endalkachew Wolde-meskel, PhD, CIFOR-ICRAF Ethiopia)

Agroecology (AE) is a transdisciplinary field that includes the ecological, socio-cultural, technological, economic, and political dimensions of *food systems*, from *production* to *consumption*. It is no longer possible to look at food, livelihoods, health, and the management of natural resources separately. AE works to achieve a shared objective of mutually defined agroecological transition.

Building evidence on the performance of co-designed innovations is essential to supporting agroecology transitions, for knowledge-based decision-making, and to developing policies to promote agroecology principles.

The Measuring Agroecology Performance (MAP) is a collaborative project whose focus is evidence generation on the multidimensional performance of agroecology through gathering and analyzing reliable and consistent data at the farm and territorial levels, as well as the agroecological levels of transitions, using the Tool for Agroecological Performance Evaluation (TAPE). ICRAF, through its respective country offices (Benin, Ethiopia, and Kenya) will be in charge of implementing TAPE, including conducting the survey, processing of data and provision of analysis reports and providing technical assistance to relevant national stakeholders.

As part of this, CIFOR-ICRAF assessed the agroecological transition of smallholder's farms in the context of the GIZ ProSoil/ProSiliece project in three Woredas (Hula, Sodo-Zuria, and Walmara) in Ethiopia using the FAO TAPE (Tool for Agroecological Performance Evaluation) methodology. The preliminary findings, while indicating the comparative agroecological transition levels of the ISFM practicing and non-practicing farms, demonstrated the multidimensional performance of agroecology.

Generally, the purpose of this workshop is to share and validate the preliminary results from the TAPE application on GIZ Prosoil project targete and non-targete comparison farms by bring together a diversity of actors with the following specific objectives:

1.2. Workshop Objectives and Expected outcomes

Workshop Objectives

- To provide an overview of the different AE metrics frameworks and contexts
- To present the GIZ ProSoils/ProSilience/Agroecology Project background and implementation
- To share and validate the results from the TAPE application in the context of the GIZ ProSoil/ProSilience project and agroecological transition levels of farms in selected Woredas in Ethiopia

Expected outputs

- The results from TAPE application on ISFM-practicing farms and their levels of agroecological transitions shared, discussed, and validated.
- Evidence on the multidimensional performance of agroecology shared to partners, feedback received.
- Stakeholders in R4D endeavors are prompted for behavioral changes to look into their roles and contributions for food system under the “agroecology lens.”
- Report
- Blog

Partial view of participants attending presentations

1.3. The MAP Project

(by Matthias Geck, PhD, PI of the MAP project)

Agricultural and food systems are at the very center of sustainable development. They are a major driver of climate change and biodiversity loss as well as the triple burden of malnutrition, noncommunicable diseases and inequity. But let's look at the bright side: a systemic food system transformation can therefore address multiple urgent challenges simultaneously and help the world achieve sustainable development goals. Due to its holistic and transformative nature, agroecology is increasingly being viewed as a particularly important approach to achieve this change, in Ethiopia and globally.

Dr. Matthias, PI for MAP project, presenting (online) the project and the transformative nature of Agroecology.

To assess what works, where, how, and why, the Agroecology Transformative Partnership Platform (TPP) dedicates one of its eight priority domains to developing and implementing inclusive cross-scale metrics. One of the key projects of this 'Metrics Domain', the Measuring Agroecology and its Performance project (MAP), is coordinated by CIFOR-ICRAF in close partnership with GIZ, CIRAD, FAO, and Stats4SD, as well as a diversity of food system actors in each of the four countries where this project is being implemented: Benin, Ethiopia, Kenya, and Madagascar.

The MAP project aimed at assessing the performance of agroecology in the context of the GIZ ProSoil/ProSilience project in the four countries through the application of the FAO Tool for Agroecology Performance Evaluation (TAPE). Further, the organizations involved in the MAP project co-developed and implemented two important innovations to TAPE: (i) the combination of the standard TAPE assessment of

soil health with the LDSF-inspired soil sampling and analysis, led by CIFOR-ICRAF Soil and Land Health team; b) the development and application of a novel data management platform lead by our wonderful colleagues from Stats4SD.

Today, you will hear from Dr Endalkachew Woldemeskel about the insightful results of the TAPE application in Ethiopia and, above all, we would like to discuss with you what these results and conclusions mean for you and the constituencies you represent and how you feel the provided evidence can support you in developing and implementing solutions that render agriculture and food systems in Ethiopia more resilient, equitable and sustainable. Measuring the performance of agri-food systems needs to take into account the inherent multifunctionality of agriculture, which also provide numerous social and environmental benefits and services in addition to the production of food and the creation of economic gains. If any of you would like to engage further on this topic, please do not hesitate to reach out at any moment and we would be happy to support you in identifying the most suitable way to measure what matters to you and your partners.

1.4. Workshop Participants

Despite the unfortunate bad weather on the workshop day, which caused floods around various parts of the city and took 10 lives (according to the media report) and delays in the workshop start times, the turnout of participants was high. In total, over fifty participants represented a wide range of stakeholders, including government offices (representing eighteen different entities), eight different CG centers (including CIFOR-ICRAF), nine different NGOs, donors (six) and private participants (four) (Table 1). The varied institutional representation of partners enhanced the interactive conversation that ensued after the Power Point presentations on the outcomes of the TAPE application and additional pertinent topics during the session. This has made that a variety of answers and viewpoints were reflected for the questions that were posed to them at the interactive exercise session (see to the synopsis in section 4 below)

Table 1: List of different entities of partner categories represented at the validation workshop.

Government (18)	Donors (6)	NGOs (13)	CG (11)	Private (7)
MoA-NR COE	GIZ	PELUM	CMMYT	Jitu Horti. Plc.
MoA, Soils, COE	EU delegation	MELCA	IWIMI	Independent Consult. (team)
MoA SLMP, Director	Norwegian Embassy- Addis	MELCA-AEN	ICRISAT	Senior Scientists
MOA, RLUAD, Director	FAO ET	ISD	ILRI	Homegrown Vision
MoA- FSPManager	AGRA, country office	SNV-TLI Lead	Alliance Bioversity & CIAT,	Alem – Oats PLC
MoA, Soil H & F desk	SDC, Swiss Cooperation Office	SNV-TLI	World Vegetable Center	
MoA, GIZ –Focal Pers.		SNV- Veggies for P&P	WRI- Global Restoration Initiat.	
MoA, NR-Wa. shed		WVE- Regreen the Globe	CIFOR-ICRAF + (online –HQ)	
MoA, NR- Wa.Shed		CRS- P/M		
MoA- Agric. Invest		NCA-Clim. Resilience Prog.		
BoA-Oromia- NR Director		SOS Sahel		
EPA-Sen.Exp. watershed		Land for Life Ethiopia		
EFD, Senior				
EFD, Senior Forest. Ex				
EIAR- Director Gen.				
EIAR- Soils Director				
EBI – DDG				
Development Bank				

1.5. Welcome and Opening Remarks

(By: Mr. Fanosie Mekonnen, CEO, MoA-NRM Directorate)

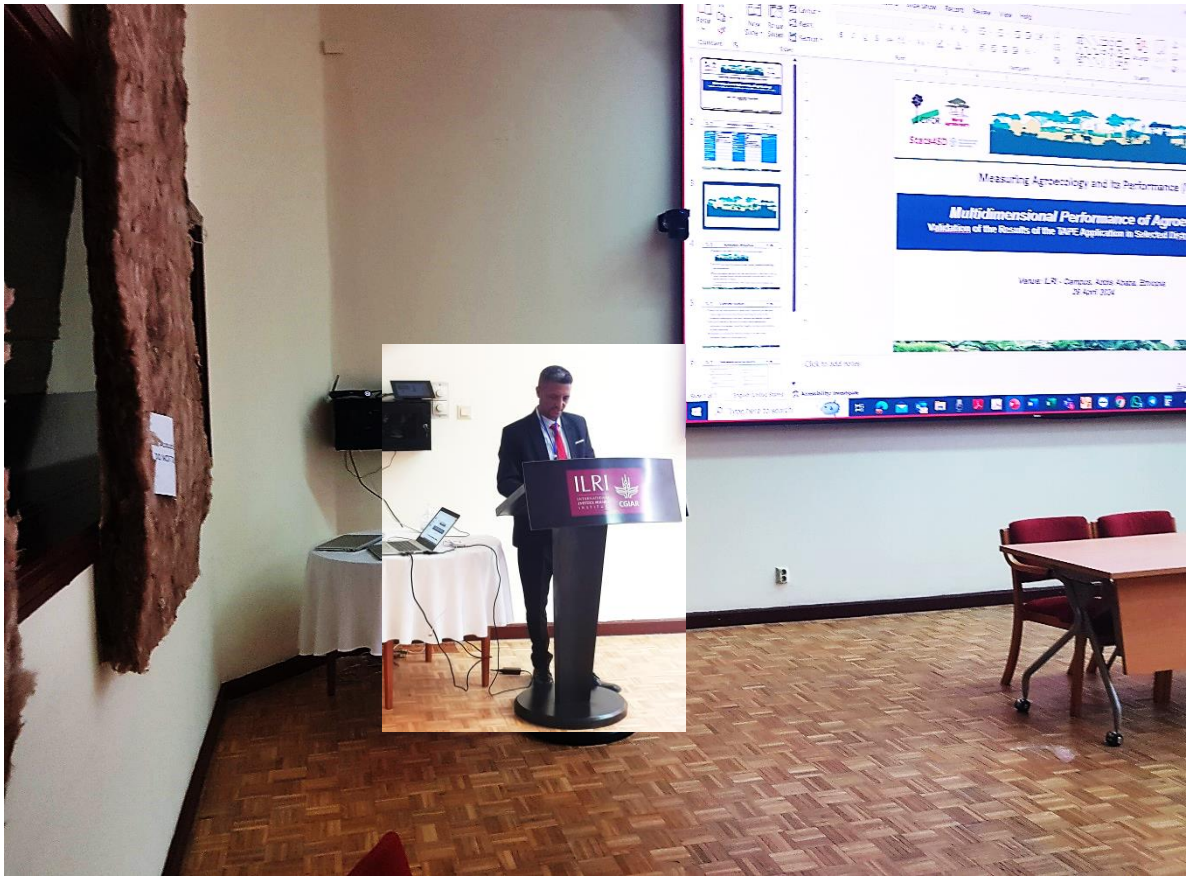
Esteemed Excellences, Distinguished Guests, Honored Participants, Ladies and Gentlemen,

Welcome, and thank you for gracing us with your presence at this pivotal workshop on multidimensional performance of agroecology for the validation of the results of the TAPE application in selected woredas (districts) in Ethiopia.

Allow me to extend my sincere appreciation to the CIFOR-ICARF (Center for International Forest Research Center—International Centre for Research in Agroforestry) for graciously hosting this significant gathering.

Ethiopia faces the pressing challenge of severe degradation and loss of forest cover, resulting in detrimental effects on our environment. Over the past two decades, our nation has witnessed a staggering loss of 448

thousand hectares of tree cover, accompanied by a 3.7% decrease since 2000 and a staggering emission of 203 million metric tons of CO_2. Furthermore, the country is highly vulnerable to various climate change-related shocks, such as droughts, floods, and disease outbreaks.



Mr. Fanosie Mekonnen, COE MOA-NRM, welcoming participants and opening the workshop.

Recognizing the multifaceted nature of the crises, it is imperative to adopt holistic approaches such as agroecological practices and production systems that integrate social, biological and agricultural sciences and local knowledge. This transdisciplinary field encompasses ecological, socio-cultural, technological, economic, and political dimensions of food systems, offering a comprehensive solution to our intertwined challenges.

The measuring of Agro-ecological performance (MAP), a collaborative project at CIFOR-ICRAF, aims to generate evidence on the multidimensional performance of agroecology through robust data collection and analysis using the tool for Agro ecological Performance Evaluation (TAPE). Concerted efforts in implementing TAPE across various levels will pave the way for informed decision making and policy formulation to facilitate the transition towards agroecology.

Related to this, the Ministry of Agriculture (MOA) is actively addressing soil health and fertility problems, including soil acidity, salinity, and organic matter depletions through initiatives such as watershed

management, soil reclamation, and green legacy. Additionally, in partnership with organizations like GIZ and Haramaya University, we are developing agroecology curricula to enhance expertise in this critical field.

As we strive towards a climate-resilient economy and landscape restoration, Ethiopia remains committed to its national and international obligations. Through initiatives like the Bonn Challenge and the Green Legacy Initiatives, we aim to restore millions of hectares of land, reduce carbon emissions, and plant billions of seedlings.

Today's workshop serves as a platform to share and validate the preliminary results of TAPE applications in the context of the ProSoil project. By bringing together diverse stakeholders, we seek to get insights into various agroecology metrics frameworks, discuss results and implementation strategies, and validate the outcomes of our collective efforts.

Finaly, I assure you of the Ministry of Agriculture's unwavering commitment to collaborate towards sustainable natural resource management and the realization of our green economy development strategy.

I extend my heartfelt gratitude to CIFOR-ICRAF for their invaluable leadership and support in organizing this workshop. With that said, I declare this workshop officially open and wish all participants fruitful and successful deliberations.

2. Plenary Presentations

2.1. An overview of AE metrics frameworks and context

(By: by Chanyalew Seyoum Aweke (PhD), Haramaya University)

Agroecology is a promising approach for transforming agriculture and food systems as it provides multiple benefits, including economic, environmental, and social benefits. It is gaining attention in national and international policies (Geck et al., 2023[1]). The presentation focused on why metrics and frameworks are required in agroecology. Agroecology has been measured at various levels, including farm, household, landscape and food system levels (Mottet et al., 2020[2]; Geck et al., 2023[1]; Lamanna et al., 2024[3])

This requires understanding the local context. In order to capture the differences in contexts, indicators relevant to the local context need to be developed. The objective of the presentation is to provide an overview of the different AE metrics frameworks and contexts.

Some of the commonly used frameworks, such as the Agroecology Criteria Tool (ACT), the Agroecology Marker, IFAD's Agroecology Stock, and Tool for Agroecology Performance Evaluation (TAPE), were presented. The strengths and weaknesses of these frameworks were presented to the participants. Some of the frameworks, such as, TAPE have been contextualized in Ethiopia. In the presentation, it was emphasized that contextual understanding and validation are important before we use a framework for measuring agroecology.

Finally, reflections were presented about the frameworks. There are several frameworks for measuring agroecology at various levels. The frameworks have evolved over time as the concepts evolved. The frameworks are focused on projects and households (Mottet et al., 2020[2]; Geck et al., 2023[1]). In addition, many of the frameworks so far have focused on the characterization of agroecology. There was limited evidence in terms of measuring agroecology at landscape and system levels. Finally, it was concluded that developing or contextualizing agroecology frameworks is important to measure the role of agroecology in transforming agri-food systems.

[1] Geck, M., Crossland, M., & Lamanna, C. (2023). Measuring agroecology and its performance: An overview and critical discussion of existing tools and approaches. Outlook on Agriculture, 52. doi:10.1177/00307270231196309.

[2] Mottet A, Bicksler A, Lucantoni D, De Rosa F, Scherf B, Scopel E, López-Ridaura S, Gemmil-Herren B, Bezner Kerr R, Sourisseau J-M, Petersen P, Chotte J-L, Loconto A and Tittonell P (2020) Assessing Transitions to Sustainable Agricultural and Food Systems: A Tool for Agroecology Performance Evaluation (TAPE). Front. Sustain. Food Syst. 4:579154. doi: 10.3389/fsufs.2020.579154.

[3] Lamanna C, Coe R, Crossland M, Fuchs LE, Barahona C, Chiputwa B, Orero L, Adoyo B and Geck M. (2024). Developing holistic assessments of food and agricultural systems: A meta-framework for metrics users. Working Paper 4. Bogor, Indonesia and Nairobi, Kenya: CIFOR-ICRAF: The Transformative Partnership Platform on Agroecology.

2.2. The GIZ ProSoil/Prosilience Project background

(by Tesfay Haleform, GIZ Prosoil/ProSilience project staff)

The general aim of the ProSilience Project is to support the agroecological transformation of the existing agricultural system towards sustainable agriculture and food systems in the highlands of Ethiopia (Amhara, Oromia, Tigray, Sidama, Central, and South). Overall, the project contributes towards achieving its expected outputs, i.e., (1) the adoption of technical and socio-economic measures related to innovation in agroecology is enhanced in selected woredas. (2) The political and research framework for agroecological transition in Ethiopia is improved. (3) National stakeholders make use of the co-created knowledge and evidence on agroecology shared at the national and international level.

The project has been mobilizing communities to raise awareness about the importance of agroecological concepts, approaches, and community-level agroecological principles to be used in enhancing the agroecological transformation of the farming system towards sustainable agriculture and food systems. Being implemented at the community level, the project activities have been promoted with experienced Farmers Research Extension Groups (FREGs) and Model Farmers (MFs) within the FREGs to implement and demonstrate technologies related to agroecological concepts and approaches at the farm level and disseminate the proven technologies to other farmers.

The Practices applied/promoted were;

Key technologies, activities to be demonstrated and promoted include the following:

- Capacitating and training stakeholders, which include experts, development agents (DAs), model farmers (MFs) and farmers.
- Combined use of quality seed, blended fertilizer, lime (in acidic soils), quality compost (vermicompost, effective microorganism (EM) compost, conventional compost), and improved agronomic practices
- Demonstration of various grain, cover crops, forage, and green manure legume crops in combination with the application of the appropriate bio-fertilizer (rhizobium)
- Demonstration of Conservation Agriculture (CA) technologies such as minimum tillage, mulching, and cover crops
- Apply intercropping, relay, and double cropping by including legume crops as a crop rotation in the systems to increase the overall land productivity of the smallholder farmers.
- Recycling of on-farm nutrients (cattle urine) and biomass (crop residues, manure, compost, bio-slurry, etc.)
- Use of crop residue management, agroforestry, establishing biogas to be used as bio-slurry, and alternative energy sources with other Integrated Soil Fertility Management (ISFM) technologies
- In-situ moisture conservation

- Woodlot establishment with multipurpose trees
- Zero or controlled grazing and forage development
- Coordinate and strengthen already identified community-based organizations (CBOs) regarding the implementation of agreements (community by-laws) on area closure fodder production, woodlot establishment, retaining crop residue, and bull service management, and facilitate the establishment of community agreements (by-laws).
- Monitor the improved bull management agreement and follow up on bull service and handling.
- Testing and validating new soil fertility management technologies.

Technical support given to farmers:

In addition to the farm-level activity demonstrations and implementation of agroecology activities at the community level, the project provides on-the-spot training to farmers, DAs, and experts on key agroecological concepts, approaches, and technologies. Project Woredas supervises the proper integration of livestock, crop, and forestry approaches into the farming system and also provides technical backstopping to model farmers and DAs implementing and supporting the agroecology activities. Regular monitoring and evaluation are conducted, and the required information (data) is collected on demonstrations at plot and farm levels. To enhance the wider dissemination and introduction of agroecology concepts and approaches, the project organizes farm days (at critical activity implementation and crop growth stages) and knowledge and experience sharing events.

Furthermore, the project promotes the concept of community-based seed production by MFs to ensure sustainable access for farmers to agriculture inputs like quality seed and fodder crops. Moreover, the project assesses the possibilities of establishing small businesses run by model farmers or community groups such as landless youth to engage in the production and sale of vermiworms needed to produce vermicompost.

2.3. Multidimensional Performance of Agroecology: The Results of the TAPE Application in Selected Districts in Ethiopia

(by Endalkachew Wolde-meskel, PhD, CIFOR-ICRAF- Ethiopia)

INTRODUCTION

AGROECOLOGY is a science that draws on social, biological and agricultural sciences and integrates these with traditional knowledge and farmers' knowledge (Wezel et al., 2020[4]). At the heart of the agroecology strategy is the idea that an agroecosystem should mimic the functioning of local ecosystems, thus exhibiting tight nutrient cycling, complex structure and enhanced biodiversity. The expectation is that such agricultural mimics, like their natural models, can be productive, pest-resistant and conservative of nutrients. Learning from nature allows development of agroecosystems with a minimum dependency on agrochemical inputs and energy, emphasizing interactions and synergisms among the many biological components of agroecosystems to enhance recycling and biological control, thus improving overall ecological efficiency and environmental protection.

METHODOLOGY

The FAO TAPE methodology was employed for characterization of the target farms and to measure agroecological transition. The TAPE is a global analytical framework developed in response to a request from COAG (the FAO's Committee for Agriculture) to assess the multidimensional performance of agroecology and generate evidence (FAO 2019[5]). The tool comprises the 10 elements of AE that guide the transition to a sustainable food and agricultural system. TAPE is a four-category, step-by-step analytical framework.

Of the 22 woredas where the GIZ ProSoil/ProSilience project is on implementation, the TAPE was applied in three woredas namely Hula, Sodo Zuria and Walmara in the Sidama, Southern Ethiopia and Oromia regions, respectively (Figure 1)

In each of the three woredas, 66 farmers (respondents) were purposefully selected for the study, and half of the households had actively participated in ProSoil activities (PS households). The other half had not actively participated in ProSoil activities and constitute the comparison group (referred to as NP). The later were selected from Kebeles (villages) far from the PS farmers to avoid farmer-to-farmer cross-communication and unintended adoption of the GIZ ProSoil practices. Overall, the study comprised 198 respondents (99 each for the PS and NP groups).

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[4] Wezel, A., Herren, B.G., Kerr, R.B. *et al.* Agroecological principles and elements and their implications for transitioning to sustainable food systems. A review. *Agron. Sustain. Dev.* **40**, 40 (2020). https://doi.org/10.1007/s13593-020-00646-z

[5] The 10 elements of Agroeclogy https://openknowledge.fao.org/server/api/core/bitstreams/44c781fd-1f58-4545-ab31-57844e475443/content

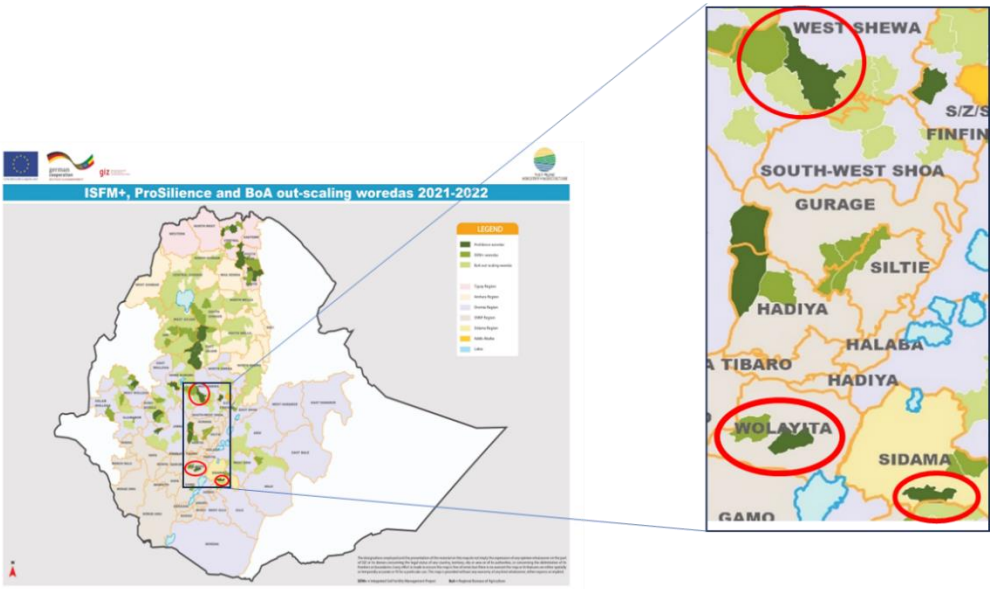


Figure : A map showing the three woredas where the TAPE study was conducted.

Before the commencement of the field survey, CIFOR-ICRAF gave a two-day training on the TAPE methodology for enumerators who will conduct the data collection on the field. During the training, but before leaving to the field for data collection, the team pre-filled the initial questionnaire sections and parts of TAPE Step 0 to contextualize the sites. Also, the team was familiarized to the data entry and submission platform (ODK tool) and to a front-end platform (by Stats4SD staff, online) so that they are able to track the process. Finally, they took a practical field pre-test of the questionnaire, each interviewing a farmer (woreda GIZ focal persons as farmer representatives), and back to the training room shared their experiences and raise any problem they encounter in the process.

Data was collected on 10 elements of AE (guiding transition to sustainable food and agricultural systems) on 36 indices and 10 core criteria of performances (comprising 56 indices) from each of 198 households, for a total of 445 columns of data over 198 rows (each representing households).

Data analysis was carried out by the Stats4SD, a not-for-profit social enterprise for statistical and data management, who collaborated on the implementation of the MAP project. The distribution of the overall CAET (Characterization of Agroecological Transition) scores and for the 10 AE elements were plotted against PS and NP groups of farmers using the violin/box plots (see fig. on page 43) depicting the agroecological transition levels of the respective farms (PS vs NP). To visualize the relationships between the different agroecological elements and the different core criteria of performances the Spearman's Rank Correlation was employed. Correlation Analysis (Spearman rho) is a bivariate analysis that measures the strength of association between two variables and the direction of the relationship. In terms of the strength of relationship, the value of the correlation coefficient (rs) varies between+1 and -1. As the correlation coefficient value goes towards 0, the relationship between the two variables will be weaker. The direction

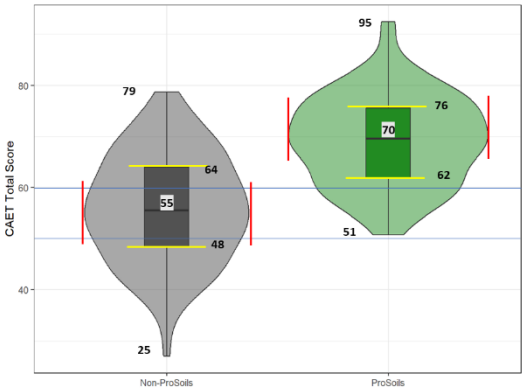
of the relationship is indicated by the sign of the coefficient; a + sign indicates a Direct relationship and a – sign indicates a Inverse relationship.

RESULTS

TAPE Step 1. Characterization of Agroecological Transitions(CAET)

Analysis of results indicated the PS-targeted farms (GIZ ProSoil project beneficiaries) have a much higher agroecological transition level, as indicated by the higher value of the total CAET score (Figure 2), which provided proof of the multifunctional performance of agroecology. Both PS and NP farms have values that are evenly distributed and in the middle of the range; however, NP farms have very low CAET scores at the lower end, whereas PS farms have higher scores.

Figure : The violin & Box plots showing the distribution of the overall CAET scores for PS and PN groups



While no prescriptive threshold is defined, systems with high CAET scores (often > 60) are considered well advanced in agroecological transition (AET), and those with less than 50 CAET are considered not agroecological. Farms with total CAET values between 50 and 60 are considered to have transient agroecological levels

Looking into the CAET scores of the 10 elements of AE (Table 2), all PS farms were highly significantly different ($p<0.001$) in all the 10 elements, indicating the effectiveness of the GIZ ProSoil project interventions for agroecological transioning of the target farms. Further, the CAET values <50 for some of the elements at the NP farms, notably efficiency, recycling, and co-creation and sharing of knowledge, indicated future project investment (from GIZ or otherwise) should consider making additional efforts (investments) to improve the situation, particularly in these agroecological elements.

Table 2: Average score of overall AE Transition (CAET) and of the 10 elements of agroecology for the 2 farm types (ProSoil=PS, NonProsoil=NP)

Treat. PS/NP	Overall CAET	Diversity	Synergies	Efficiency	Recycling	Resilience	Culture & food traditions	Co-creation & sharing of knowledge	Human & social values	Circular & solidarity economy	Responsible governance
PS	69.2***	73.4***	69.6***	60.2***	62.1***	69.5***	74.5***	69.4***	75.6***	69.5***	68.4***
NS	56.0	59.8	56.0	49.0	47.8	56.6	61.5	49.4	67.7	59.0	53.5

*** Very highly significant (<0.001 p value); ** highly significant (<0.01 p value); * significant (<0.05 p value); NS non-significant

Similarly, the results on the characterization of agroecological transition across the three districts (Hula, Sodo-Zuria, and Walmara) showed a clear pattern of the PS group showing a significantly ($p < 0.0001$) higher mean CAET score than the NP [Annex III (3), Page 44]. However, the pattern of distribution of the CAET score for the PS and the comparison group across the different Woredas differs, though the PS groups

consistently scored over 50 CAET scores, indicating a better understanding of agroecology. The lowest score range of <10 CAET was recorded at Sodo Zoria woreda, showing that more effort and investment are needed to improve performances in a number of agroecological elements, while at the same time the CAET score at Walmara woreda was distributed over a narrow range for both PS and NP farms. It is to be noted that some farms in the NP group maintain a higher CAET score at the expense of external input, and time will tell if these NP farms keep a higher score (the same level of performance) in future evaluations.

TAPE Step 2. Criteria of Performance

Step 2 of TAPE measures 10 core criteria of performance under five key dimensions of sustainability, including economic, environmental, and social. The overall pattern in the relationship between the variables, i.e., the various performance indicators and the total CAET scores, across the PS and comparison group, has been plotted on a number of scatter plots (please see Annex III (3), pages 44-46), together with a moving average trendline where the 95% confidence intervals around this pattern were indicated. In addition, to explore the relationship between various performance indicators and the CAET scores (overall and each of the 10 AE elements) the Spearman's rank correlation analysis was employed.

- **Economic performance:** The mean total value of farm output and value added showed a significant increase ($P<0.05$) with PS practicing farms over the comparison group. Also, the correlation analysis has indicated a positive and statistically significant relationship between these variables and total the CAET score ($r = +31$-32). A strong positive correlation was particularly evident between these economic variables and a number of agroecological elements, including with diversity ($r = +0.31$ - 0.50), resilience ($r = +0.32$ - 0.35), and co-creation of knowledge ($r = +23$ - 025), showing a strong and positive impact of the agroecological practices (in the PS group of farmers) on the economic performance indicator variables assessed in this study. The mean total expenditures for inputs (seeds, fertilizers, and pesticides) for both groups of farms did not show a significant difference. As would be expected, however, the correlation coefficient between the mean total expenditure and a number of CAET scores (overall and most of theagroecological elements) showed a weak but negative relationship, indicating implementation of agroecological practices result in reduced production input costs and any increase on total value of farm output with the NP farms might be attributed to external inputs.

  At all the Woredas, the total value added showed a significant increase with the ProSoil practicing farms and was positively and significantly correlated with the total CAET score as well. In contrast, the observed increase in the total value added with the NP farms could be attributed to an increase in external production inputs, which is assumed to not be sustainable over time. This is evidenced by the decreasing trend of total value added with the NP group at increasing total CAET scores, particularly at Sodo Zuria and Walmara woredas.

When respondents were asked to compare their present agricultural revenue to that of three years ago, their qualitative judgment of earnings and expenses revealed that they are now making more money since they began using agroecological practices promoted by GIZ ProSoil project.

- **Environmental sustainability**: level of agrobiodiversity (number and diversity of crop varieties, animal breads, natural vegetation, and pollinators) and soil health were the two main indicators assessed to measure environmental sustainability. Accordingly, the number of species and breeds of animals, and prevalence of natural vegetations and pollinators were significantly higher ($p < 0.001$) with PS farms. Further, the correlation analysis between these variables and total CAET and individual agroecological elements showed a highly significant and positive relationship, corroborating the established fact that agroecological practices favor the functioning of natural ecosystems where biodiversity, complex structure, interactions and synergies among components are enhanced (Wezel et al., 2020[4]). While the highly significant positive relationship, particularly with the CAETs of "diversity" and "resilience" elements ($r = 0.61$ and 0.37, respectively), was relevant to this and interesting to note, a similar relationship obtained between agrobiodiversity indeces and the CAET on "culture and food tradition" AE element has important implication and indicates the impact of agroecological practices on the food security issue. Interestingly, the quantity of chemical pesticides used has a highly significant negative correlation with the total and individual agroecology elements (synergy, efficiency, and recycling). This could be attributable to the enhanced presence of natural vegetation and pollinators, which in turn favors ecological pest managment practices (biocontrol and IPM practices), thus reducing the need for chmical pestiside control.

  The mean soil health index, which is measured through a qualitative assessment of 10 soil health indicators, was significantly higher ($P<0.01$) with PS farms and has a positive and significant ($p<0.01$) relationship with the total CAET ($r = 0.3$) and the number of AE elements ($p<0.5$). The positive correlation, particularly with synergy, efficiency, and recycling AE elements ($r = 0.24$, 0.28, and 0.31), thus evidenced the role of agroecological practices for soil health maintenance. However, the positive and significant relationship that has been observed between CAET scores and the soil health index for NS farms could be attributed to increased use of external inputs (as no agroecological practices were implemented for them).

  Social sustainability: women's empowerment (involvement in production and income decisions, time use and leadership, etc.), youth opportunities, and emigration indices were indicators assessed to measure social sustainability. The analysis of the data indicated no significant difference between PS and NS farms for these parameters, nor did the correlation analysis indicate any relationship (with few exceptions) between these variables and the total CAET and almost all the CAETs of the AE elements. These results indicated that the GIZ ProSoil project intervention has little or no influence on the social dimensions studied and calls for further investigation.

Interestingly, the youth emigration index has a positive and significant relationship with the total CAET score (r = 0.21) and some of the AE elements assessed (r = +0.20, r = +0.22, and r = +0.25 for the circular and solidarity economy, resilience, culture, and food tradition, respectively). This is contrary to the expected trend where increased agroecological practices create job opportunities (and lower youth emigration) and strengthens our recommendation for further investigations.

- **Conclusions**
  - ✓ PS targeted farms are significantly at a higher AE transitions levels, providing evidence that the GIZ ProSoil project intervention has positive overall impact and contributed for multifunctional performance of agroecology
  - ✓ New investment should consider filling gaps in ecological elements on which the CAET scores were low (<50 CAET), particularly diversity, efficiency, co-creation, and sharing of knowledge.
  - ✓ The ISFM effort focused its investment on important components or sectors of the production system (the soils), but investments in other sectors such as health, value chain (input supply and market access) natural resource conservation, etc. would bring more overall advance on the food system.
  - ✓ The preliminary result from the TAPE application in the context of the GIZ ProSoil/ProSilience indicates the multidimensional performance of agroecology and calls for more all-sector inclusive investment to bring fundamental transitioning.
  - ✓ The TAPE results did not explain all factors in the system but opened up or call for more investigations
  - ✓ Using the right metrics framework (including TAPE), stakeholders and development partners are encouraged to evaluate their roles through an “agroecological lens," i.e., as to how their investments contribute to the AET and overall transformation of the food systems.
  - ✓ Donors and decision-makers are recommended to consider AE evidence when targeting investments.

3. Discussions and Reflections by participants

Overall, the participants were happy about the presentations and the findings of MAP project using TAPE application. Opinions and questions forwarded for clarity are summarised as below;

Few quotations, 'this is first of its kind'; 'Thanks for an interesting workshop accompanied with evidence'; 'Participants earnestly requested for the Report/Result to be shared.

ILRI- Senior Scientist, Kindu Mekonnen (Dr.)

1. What are Prosols mean-good to specify as there are various ISFM+
   Answer: the GIZ staff indicated that this includes the interventions presented at session 2)
2. Most of the 443 column data came from the households' survey. How do you comment about the reliability of the data? Too much data for a single respondent.
   Ans: Eumerators were given a thorough traning before field survey
3. Data generated from various sources and various scales (numbers, scales, nominal data)-How is possible to use parametric tests (e.g. t-test. Pearson, correlation)?
   Ans: Analysis taken care by Stat4Dev (collaborating institution)
4. How is possible to use average to aggregate the values of 10 –elements given that there are different weight?
5. Is there any threshold to say it is agro ecology or non-agro ecological farming system?
   Ans: Often CAET <50 are non agroecological, while CAET >60 are advanced, those between 50 and 60 referred as transient.
6. Is there any tradeoff among the 10 elements of Agroecology?

WRI- Global Restoration Initiative [Yigremachew Seyoum (Dr.)]

1. The observation on Total CAET level, minimum and maximum level with PS - 52 vs 95, what are the factors that contribute to this discrepancy? May be
   a. Institutional
   b. Perception
   c. Market
   d. Policy Tenure

This will allow us to determine the most important or critical factors to transfer households from lower CAET level to the highest? This helps us to advocate the scaling up of Agro ecology.

Ans: this is a mean of the 10 elements and lots of contributory factors. But, the performance/efficiency of the individual farmer (the respondant) matters a lot

Private participant: I am desperate and looking for such question because I know that research work in Ethiopia is very important but not active enough to implement with relevant stakeholders to practices. I was once up on a time a research assistant. Now a private sector who needs a lot of advice and practices for my farmers around me.

GIZ/ISFM – M&E Adivisor, Sophie Vontobel

Methodology: Who was interviewed? (Women/men)? HH heads? Model Farmers? Farmers who have received ISFM training?). Where farmers asked how long they personally have been applying ISFM/AE? Regardless of duration of project intervention in the area? Female empowerment: generally high both no-prosol/prosol is the same time? Can it be said that women in rural Ethiopian are already much empowered? If not why is the collected data making this suggestion? For discussion email: suphate.vantobe@giz.de

Green Flower Foundation, Adeline Provent

Very good presentation. Thank You! It was informative. I hope we receive the slides/later the report.
What to do about youth motivation? We see there are job opportunities but what can be done to create demand from youth? Access to (micro) finance?; Access to quality inputs in line with AE Principles (organic seeds, bio-pesticides, bio-fertilizers).

ISD, Head, Gebremedhin Belay

I request the reports to be shared with Participants;
As information SDC and FAO are collaborately to assess accoridng to TAPEanother project: Promotion of Ecological Organic Agriculture around Holeta-Results will be shared by FAO.

Dr Zenebe (ICRISAT)

It looks the TAPE methology is commplicated, and it would be good to have an alternative focused faramework which is easy to use.

Mr. Daniel Valenghi, SDC (Swiss Cooperation Office), Regional Program Officer

This is a great workshop, evaluating agroeclogical performance of farms and the evidances are relevant for descision makers and for future investments. It is clear and presented in very interesting way (many thanks). We hope CIFOR-ICRAF will share the workshop report and its experiences in future.

4. Participants Response to Participatory Exercise Questions

To obtain the opinion of participants about the multidimensional performance of agroecology, AE transition, and the results from using the TAPE application, whether participants or their organizations have ever used TAPE to measure the agroecological transition levels of farms, participants were asked a set of questions to respond to (see below).

The summary result indicated that 50% of the participants have responded, one way or another, that they have been involved in monitoring and evaluation (though it is not exactly with TAPE application); 32% have not, and 18% are not sure about agroecological transition itself. Interestingly, 97% of the participants were very happy with the results and the findings reported to them and found them useful for decision-making and for targeting investments/new projects (Q #7).

Participants had responded/voted, in equal proportion, to activities geared towards more advocacy, investment at the landscape level, and capacity building to enhance the agroecological transition of food systems in the Ethiopian context. In connection with this, the need to establish an agroecology platform or community of practices at the national level was supported by 85% of the respondents, while 5% of them indicated that platforms of similar nature (such as the National Watershed and Agroforestry Platform) are already available and it is not necessary to establish a new one but rather strengthen the existing.

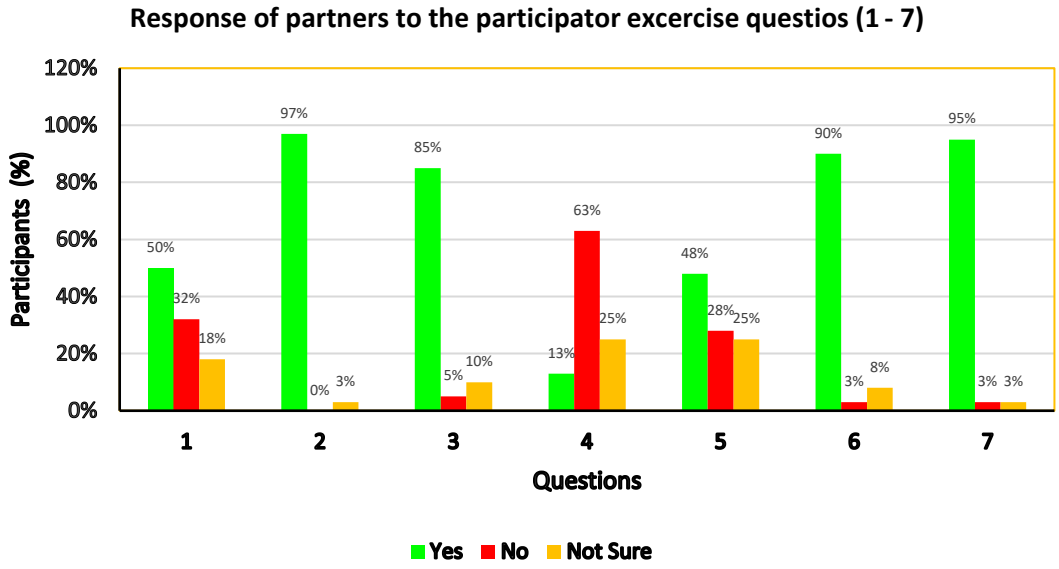
Since agricultural practices fundamentally affect the production environment, 63% of respondents feel that a holistic approach to transforming the food systems could advance agroecological transition levels; 13% disagree, and 25% are unsure. Furthermore, 48% of respondents think that providing incentives is a good way to encourage farmers in Ethiopia to adopt agroecological practices, compared to 28% who disagreed and 25% who were unsure.

In addition, 90% of respondents concur that agroecological farming in Ethiopia has the potential to transform the country's food systems, with 8% remaining unsure. Nearly all of the attendees (95%) expressed satisfaction with the TAPE application and the findings presented at the workshop on the relevance of the results and the evidence on the multifunctional performance of agroecology.

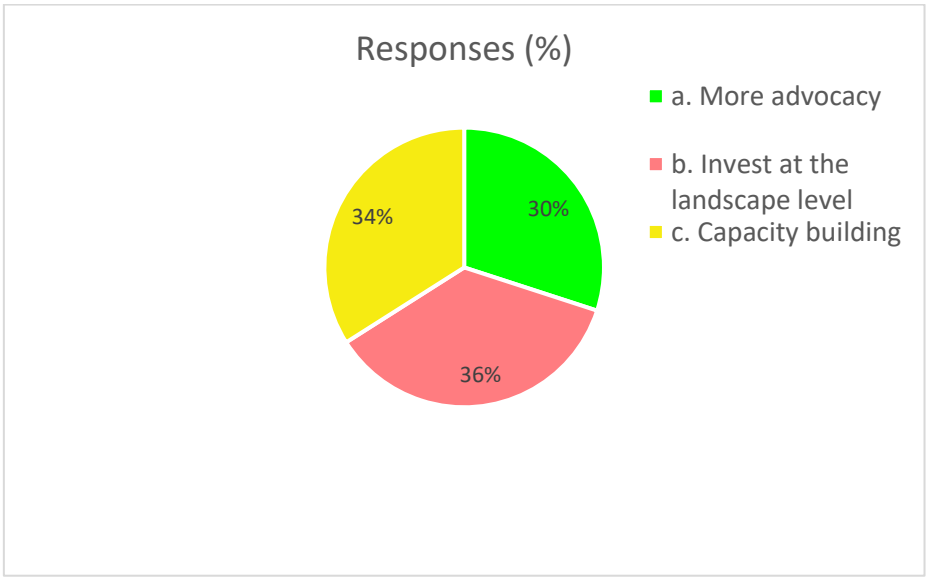
At the end of the workshop, participants were provided with the following participatory exercise questions to give them a chance to reflect on their views on measuring agroecological transitions: Each question was followed by a multiple-choice answer, and partners were asked to reason out their answer. The responses are summarized (% responses) and plotted (see below)

1. Do you or your institution evaluated or assessed the agroecological transition level of farms and landscapes where an agricultural project is being or has been conducted?
   a. Yes b. No c. not sure ; Why? (please give a reason for your choice _____
2. Is information on the agroecological transition level useful for targeting new projects on landscapes? (for an investment or implementing a development project on a landscape)
   a. Yes b. No c. not sure; Why? (please give a reason _____
3. Do you think that establishing an agroecology platform or community of practice at the national level is relevant?;
   a. Yes b. No c. not sure; Why? (please give a reason _____
4. Agricultural practices unequivocally affect the production environment anyway, so the transformation of the food systems into advanced agroecological transition levels is unachievable.
   a. Yes b. No c. not sure; Why? (please give a reason _____

5. Are there incentives for farmers to implement agroecological practices in Ethiopia?
   a. Yes b. No c. not sure ; Why? (please give a reason _____
6. Can agroecological based farming transform food systems in Ethiopia?;
   a. Yes b. No c. not sure ; Why? (please give a reason _____
7. Are you happy with the evidence on the multidimensional performance of agroecology shared with you today?
   a. Yes b. No c. not sure ; Why? (please give a reason _____



8. What should we do more to enhance agroecological transition of food systems in Ethiopian context?
   a. More advocacy; b. Invest at the landscape level c. Capacity building
   Why? (please give a reason _____



5. Closing Remark

By Zelalem Teklewold (FAO-Ethiopia office)

TAPE represents a collaborative global methodology, developed with contributions from numerous international organizations, with FAO serving as the host. We at FAO are gratified to see the TAPE methodology employed in evaluating the agroecological performance of projects spearheaded by diverse entities, including GIZ.

The insights shared during this workshop stand as a testament to TAPE's practical application. The outcomes discussed offer valuable lessons on the impact of technologies advanced by the GIZ project on the Characterization of Agroecology Transition (CAET) elements. Additionally, they shed light on the requisite policy and financial support from governments and other key players for agroecology's broader implementation.

While the results were detailed, certain aspects remained opaque, especially to those new to the tool. We suggest circulating the report among FAO-HQ's TAPE specialists, who can provide feedback to refine and simplify the presentation of the findings.

Our presence at this workshop, representing FAO, is opportune and beneficial in several ways. We are on the cusp of employing the TAPE tool to assess Ecological Organic Agriculture initiatives in Walmara, funded by the Swiss Development Cooperation (SDC). We anticipate ongoing collaboration with CIFOR-ICRAF, and other stakeholders present at this workshop.

We extend our heartfelt thanks for the application of the TAPE methodology and for the enlightening presentation of its findings in a validation workshop that saw a diverse group of stakeholders in attendance.

Annex I: Workshop Program:

The workshop is a day participatory event. Presentation will be made on overview of different AE metrices frameworks and context, the GiZ ProSoil/ProSilience project background and the results of the FAO TAPE application and assessment of the agroecological transition levels of farms at the selected woredas. Participants will have a chance to reflect on the results presentations, contribute through participatory interpretation of the results, share their thoughts on the results, and provide their feedback and recommendations for similar future works.

Time	**Agenda**	**Resource person**
8:30 – 9:00	Registration	Organizers
9:00 – 9:30	Introduction of participants, (5m) Welcoming Remarks (5m) Workshop program, objectives, & Expected Outputs (8 m) Opening (7m) Opening remark -Project Background (5m)	Endalkachew Niguse (ICRAF country Rep.) Fanosie, MOA – NRM Director Matthias (PI, MAP project)
9:30 – 9:45	Overview of the AE metrics frameworks and contexts	Chanyalew Seyoum
9:45 – 10:15	The GIZ ProSoil/Prosilience project background	Tesfay/Julia (GIZ)
10:15 – 10:30	**Q & A and reflections**	Participants
10:30 - 11:00	Presentation of the TAPE result (I)	Endalkachew
11:00 – 11:10	Participatory Exercise (i)	Participants
11:10 – 11:30	**Tea break and Photo**	**Organizers**
11:30 – 11:40	Results of the participatory exercise (I)	Fekadu
11:40– 12:30	Presentation of the TAPE result (II)	Endalkachew
12:30 – 13:00	General discussion, way forwards	Niguse
13:00 – 13:05	Participatory Exercise (ii)	Participants
13:05 – 13:10	Closing	(Guest of honor)
13:00 – 14:30	**Lunch break**	**Organizers**

Annex II: List of workshop participants

SN	Name	Organization/Position	Gender	Location	Category
1	Tesfay Halefom	GIZ/Technical Advisor	M	Addis A.	Donor
2	Sophie Vontobel	GIZ/ISFM – M&E Adivisor	F	Addis A.	Donor
3	Kidist Yilma	GIZ-ISFM -M&E Advisor	F	Addis A.	Donor
4	Fanosie Mekonnen	MoA, NRM	M	Addis A.	GO
5	Yosef Assefa	MoA, watershed case team leader/CALM	M	Addis A.	GO
6	Aklilu Mesfin	MoA, NR- Watershed expert	M	Addis A.	GO
7	Teshome Tamirat (Dr.)	EFD, Senior Forestry Expert and national focal point UNCCD,	M	Addis A	GO
8	Anteneh Teshome	EPA, Senior Expt, Water bodies&wetlands Monitoring & Control Dept	M	Addis A.	Go
9	Chanyalew Seyoum (Dr.)	HU, Director for Research Extension and Publication	M	Addis A.	GO
10	Feto Esimo (Dr.)	EIAR, DG	M	Addis A.	GO
11	Abere Minalku	EIAR, Researcher	M	Holota	GO
12	Tamene Yohannes	EBI, Researcher (delegating Dr. Feleke, EBI DDG)	M	Addis A.	GO
13	Bacha Mekonnen	BOA- Oromia, soil fertility expert (delegated by Elias Kemal, DDG)	M	Addis A.	GO
14	Bayush Tsegaye (Dr.)	Manager, AEN_MELCA	M	Addis A.	NGO
15	Solomon Kebede	MELCA Ethiopia, Director	M	Addis A.	NGO
16	Mahlet Yohanis	SNV, Project Lead: Transformative Land Investment Project	F	Addis A.	NGO
17	Gemechis Jaleta	SNV, Veggies for People and Planet	M	Addis A.	NGO
18	Yordanos Berhe	WVE- National Chapter Advisor/ Regreen the Globe project	F	Addis A.	NGO
19	Malefia Tadele	CRS- Project Manager	F	Addis A.	NGO
20	Yemane Salih	NCA- Climate Resilience Program Coordinator	M	Addis A.	NGO
21	Adeline Provent	Green Flower Foundation	F	Addis A.	NGO
22	Tsedeke Abate	Homegrown vision	M	Addis A.	NGO
23	Mersha Argaw	EU delegation	M	Addis A.	Donor
24	Zelalem Teklewold	FAO ET,	M	Addis A.	Donor
25	Daniel Thomas Bordi	FAO ET	M	Addis A.	Donor
26	Daniel Valenghi	SDC, Swiss Cooperation Office, Regional Program Officer	M	Addis A.	Donor
27	Amsalu Andarge	SDC, Swiss Cooperation Office	M	Addis A.	Donor
28	Adeline Provent	Head of projects and operations, Green Flower Foundation	F	Addis A.	NGO
29	Kinde Tesfaye	CIMMYT, Senior Scientist	M	Addis A.	CG
30	Birhan Abdulkadir	CIMMYT, Research Officer	M	Addis A.	CG
31	Kindu Mekonnen (Dr.)	ILRI- Senior Scientist, systems	M	Addis A.	CG
32	Degefie Tibebe (Dr.)	Alliance Bioversity & CIAT, Spatial Analyst |MF Landscapes	M	Addis A.	CG
33	Yodit Balcha	Alliance Bioversity & CIAT, Expert, Climate change	F	Addis A.	CG
34	Yigremachew Seyoum (Dr.)	WRI- Global Restoration Initiative	M	Addis A.	INGO
35	Amelework Demewoz	General Manager, Jitu Horticulture PLC, Bishoftu	F	Bishoftu	Private
36	Alem	Oats farmer	F	Addis A.	Private
37	Fikadu Getachew Tolosa	Independent Consultant	M	Addis A.	Enumerator
38	Dinka Geleta	Enumerator	M	Addis A.	Enumerator
39	Wegida Bekele	Enumerator	F	Addis A.	Enumerator
40	Hanna Teklu	Enumerator	F	Addis A.	Enumerator
41	Tilahun Gizaw	Enumerator	M	Addis A	Enumerator
42	Abiyot Kebede	GIZ Sodo-Zuria Woreda focal person, South Region	M	Sodo	GIZ Focal
43	Lamiso Lankamo	GIZ Hula Woreda focal person, Sidama Region	M	Hula	GIZ Focal
44	Gemeda Dibaba	GIZ Walmara Woreda focal person, Oromia Region	M	Holleta	GIZ Focal
45	Eyob Getahun	CIFOR-ICRAF	M	Addis A.	CG
46	Niguse Hagazi	CIFOR-ICRAF	M	Addis A.	CG
47	Habtemariam Kassa	CIFOR-ICRAF	M	Addis A.	CG
48	Abrham Abiyu	CIFOR-ICRAF	M	Addis A.	CG
49	Mulugeta Mokria(Dr.)	CIFOR-ICRAF	M	Addis A.	CG
50	Girma Eshetu	CIFOR-ICRAF	M	Addis A.	CG
51	Endalkachew W/Meskel	CIFOR-ICRAF	M	Addis A.	CG
52	Mekdes Sime	CIFOR -ICRAF	F	Addis A.	CG
54	Kalkidan Damte	CIFOR -ICRAF	F	Addis A.	CG
55	Samuel Hailu	CIFOR -ICRAF	M	Addis A.	CG

Annex III: PowerPoints

Annex III (1) PPt Presentation on ProSilience Ethiopia Highlight

Project Overview

- Duration **ISFM+**: 01/2015 - 06/2026
- Countries: Ethiopia, Kenya, Madagascar, Benin
- Duration **ProSilience**: 06/2021 - 03/2025
- **Implementers:** Oromia, Amhara, South Ethiopia, Central Ethiopia, Sidama and Tigray
- Financed by BMZ – ***for ISFM+***
- Co-financed by BMZ and the EU - ***ProSilience***
- Expected Outcomes:
  - ISFM practices are applied on > 200,000 ha
  - Teff, wheat and maize yields increased by 67%
  - ISFM input supply ensured through private sector
  - ISFM concept incorporated into extension system, University and ATVET's curricula

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Project Overview

- Expected Outcomes:- for ProSilience
  - Adoption of agroecological measures enhanced
  - Framework conditions for agroecological transformation improved
  - Knowledge sharing and engagement of national stakeholders

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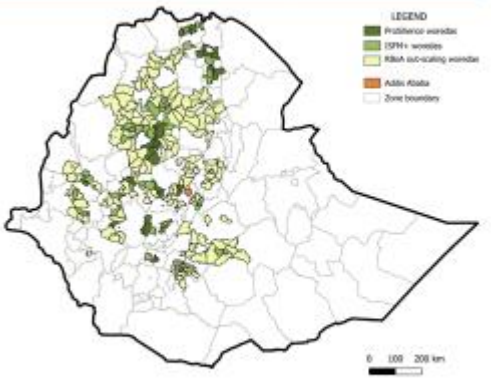
Project Intervention Area

- ISFM+ Woredas:
  - 38 National (2 Sidama, 3 South Ethiopia, 6 Central Ethiopia, 11 Oromia, 10 Amhara and 6 Tigray)
- ProSilience Woredas:
  - 22 National (1 Sidama, 1 South Ethiopia, 1 Central Ethiopia, 7 Oromia, 6 Amhara and 6 Tigray)
- ISFM+ Out scaling Woredas:
  - 188 National

ISFM+, ProSilience and RBoA out-scaling woredas in Ethiopia



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Partners

- **Extension:** MoA, RBoA, ZoA and WoA
- **Research**: RARIs, EIAR, ICRISAT, ICRAF, Haramaya University, Jimma University, Hawassa University
- **Other partners:** MELCA Ethiopia, National Biogas Programme, SDA and other GIZ projects

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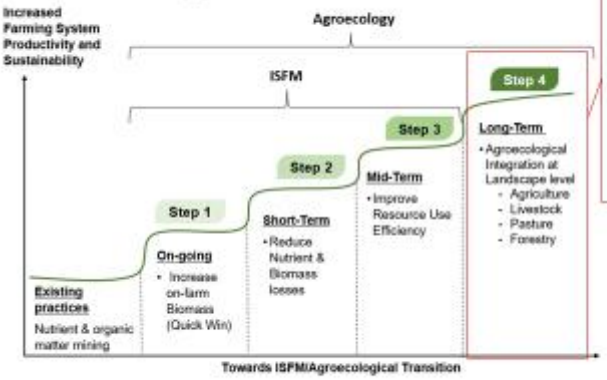
Step-wise Approach



Long Term: ProSilience

- Field to farm level
- Integration of crops, livestock and forestry (holistic approach)

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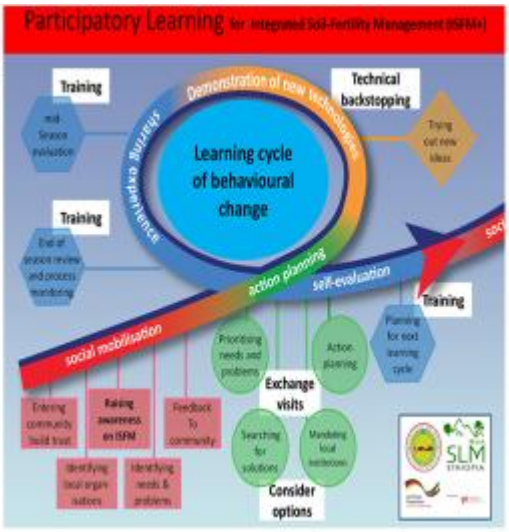
Implementation Approach

- MFs and ambassadors
- CBO agreements on watershed level
- WoAs and BoA
- ATVETs
- Haramaya University + Jimma University
- MoA



Agroecology

Agronomy

- ISFM
- Cover crops (lupine, desmodium,Vetch mucuna?)
- Fodder production on borders/gaps
- Agroforestry
- Crop rotation
- CBO agreements on crop residue management (free grazing)
- Animal urine and biodigesters




Forestry/Energy

- **CBO agreements on area closure (natural regeneration) → fodder for productive use**
- **Woodlots**
  - 50,000 tree seedlings planted
- **Multi-purpose trees (fodder legumes, bee forage, fruits etc.)**
- **NOAH stove**
  - Pyrolysis cooking stove – charcoal/biochar

Animal production

- **Switch to cut-and-carry system**
- **Germplasm to plant fodder/cover crops**
- **CBO agreement on free grazing**
- **Genetic upgrading of dairy cows**
- **Collect manure and urine**

Animal production…

- Breeding Bulls distributed (16 in total)
  - Investment cost was very high: ETB 136,531 (2448 €)/Bull = 2.2M ETB
  - 6 (37.5%) of the Bulls died
  - 117 calves born so far (26 in Central, 91 in Amhara)

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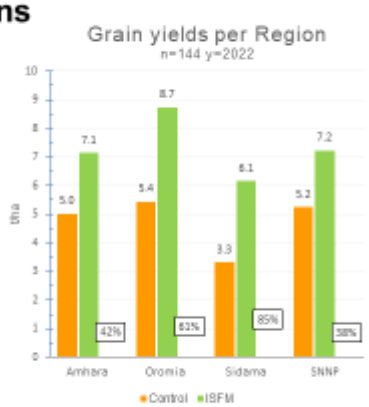
ISFM+: Highlights from the Regions

- **ISFM works:** Yield increases of 65% on a national average was achieved.
  - Sidama: 85% yield increase
  - SNNP*: 38% yield increase
  - Oromia: 61% yield increase



* The SNNP region split to Central and South Ethiopia Regional States in August 2023, however, results were collected before that, which is why they are still reported as SNNP

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Successes

- Farmers innovation and observation
  - Cattle urine
  - Vermitea as pesticide, acaricide, liquid fertilizer
  - Bioslurry as fungizide (rust)
- MSc. Agroecology at Haramaya University
- 343 MFs, ~1200 ha fodder planted, 2k ha area closure, 88 biodigester…

ProSilience: Way forward

- Optimization of organic & inorganic fertilizer applications with EIAR
- Supporting communities to establish watershed users cooperatives
- Cover cropping and fodder production
- Foster exchange and learning on agroecology
- Generate economic evidence
- Assessment on performance/ success & failure of bull management

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Annex III (2) PPt Presentation on Overview of the Agroecology Metrics Frameworks & Contexts

Overview of the Agroecology Metrics Frameworks and Contexts

Presented by
Chanyalew Seyoum,
Haramaya University
and Business
Development
Coordinator at PAD
Ethiopia

April 29, 2024
ILRI-Addis Campus
Addis Ababa,
Ethiopia

Outline of the presentation

1. Background
2. Overview of agroecology frameworks
3. Reflections and Lessons

1. Background

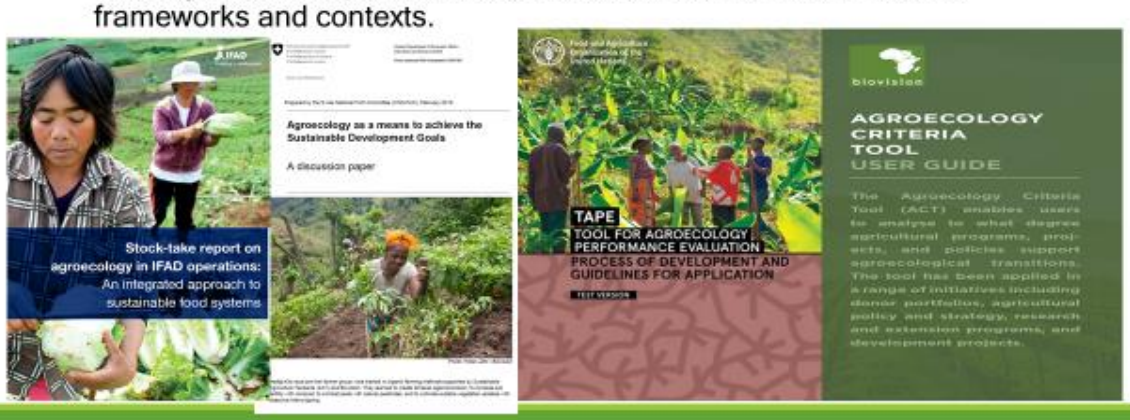
- Agroecology is a promising approach for transforming agriculture and food systems.
- It is multi-dimensional (provides economic, environmental and social benefits).
- It is gaining focus on national and international policies (Geck et al.,2023)
- Growing interest and commitment towards agroecology.
- Agroecology has been measured at farm, household, land scape and food system levels.

1. Background…

- The evidence regarding the contribution of agroecology remains fragmented (Mottet et al., 2020).
- Evidence is required on the multi-dimensional performance of agroecology.
- It requires the development of indicators or metrics.
- The agrifood systems varies across various contexts which requires the development of frameworks and metrics.
- Developing a holistic system has been recommended recently (Lamanna et al., 2024)

1. Background…

The objective is to provide an overview of the different AE metrics frameworks and contexts.



2. Overview of Agroecology Frameworks…

2.1. AGROECOLOGY CRITERIA TOOL (ACT)

- Helps to understand the extent to which programs, projects and policies integrate agroecology.
- Can be applied for farm level and wider food systems analysis. Integrates the ten elements of agroecology (Geck et al., 2023).
- Five levels of food system changes ranging from no agroecological (0) to food systems that is sustainable and equitable for all (5).
- A monitoring and evaluation tool.
- Focuses on characterization
- Project focused…

2. Overview of Agroecology Frameworks...

2.2. Agroecology Marker

- Swiss Agency for Development and Cooperation
- Developed to assess the contribution of projects to agroecology
- Based on 13 principles of agroecology (HLPE, 2019)
- Focused on projects

2. Overview of Agroecology Frameworks...

- 2.3. IFAD's Agroecology stock
- Integration of agroecology in IFAD-supported projects.
- Farm level, land scape level, market level and policy level (Geck et al., 2023).
- Identify whether projects entirely or partially applying agroecological approaches (type of agroecological activities and practices supported).
- Focuses on three core elements of agroecology such as efficiency, recycling and diversity.
- Projects: agroecological, partially agroecological or non-agroecological.
- It focuses on characterization and is project focused

2. Overview of Agroecology Frameworks...

2.4. **Tool for Agroecology Performance Evaluation** (TAPE)

- FAO in collaboration with other organizations have developed TAPE to produce evidence on multiperformance of agroecological systems.
- First draft of TAPE methodology was developed in 2019 and has been refined since then.
- Developed through a participatory process.
- TAPE has been contextualized in several countries/across various contexts.

2. Overview of Agroecology Frameworks…

- **2.4. Tool for Agroecology Performance Evaluation (TAPE)…**
- It can be applied in a variety of geographic regions and agroecosystems

2. Overview of Agroecology Frameworks…

2.4. TAPE …

TAPE is a four step process:

- **TAPE step 0**: Description of a system and context (production systems, enabling environment, and existing policy and legal frameworks)
- **TAPE step 1**: Characterization of Agroecological Transitions based on 10 elements of agroecology
- **TAPE step 2**: Core Criteria of Performance (Governance; Economy; Health and Nutrition; Society and Culture, and Environment)
- **TAPE step 3**: Participatory evaluation of results

2. Overview of Agroecology Frameworks…
2.4. TAPE …

TAPE can be used to

- measure agroecological transition among agricultural producers in a community or a territory,
- monitor and evaluate projects
- evaluate widely diverse agricultural systems against agroecological elements

2. Overview of Agroecology Frameworks...

2.4. TAPE....

- It focuses on both characterization and performance of agroecology.
- Farm or household focused
- Limited integration between TAPE step-0 and other steps (Step 1 and 2).

3. Key Reflections or Lessons

- There are a wide range of frameworks and metrics.
- Frameworks employed various indicators of agroecology.
- Various levels (farm, household, agroecosystem and whole food system).... (Lamanna et al., 2024)

3. Key Reflections or Lessons...

- Many of the frameworks focused on farm level or project level analysis.
- Many of the frameworks have mainly focused on productivity and profitability while performance at land scape and food system levels were given less emphasis (Geck et al., 2023).
- There is a growing interest to develop frameworks for measuring agroecology that can be applied across various contexts
- Developing a metrics that can be applied across various levels and contexts is important.


THANK
YOU!

III. Measuring Agroecology and its Performance

Measuring Agroecology and its Performance (MAP)

Multidimensional Performance of Agroecology
Validation of the Results of the TAPE Application in Selected Districts in Ethiopia

By
Endalkachew Wolde-meskel, CIFOR-ICRAF–Ethiopia

Validation Workshop Venue: ILRI - Campus, Addis Ababa, Ethiopia
29 April 2024

Presentation outline

Introduction

- ✓ Agroecology defined (to bring the presentation into context)

Methodology (TAPE and its Genesis)

- ✓ The study sites – description of the districts
- ✓ The FAO TAPE and its application

Sampling and the study design (enumerators training, data collection and analysis)

Results

- ✓ CAET analysis (Step 1) – Distribution of CAET scores
- ✓ CAET Analysis (Step 2) – CAET score in R/N to the performance indicators

Concluding Remarks

Participatory discussions, and feedback

Agroecology

AGROECOLOGY is a science that draws on social, biological and agricultural sciences and integrates these with traditional knowledge and farmers' knowledge (Wezel et al., 2020)

Diversity-rich garden production in central Kenya

Multipurpose legume intercrops (pigeon pea and groundnut) next to maize fields in Malawi

Agroecological practices and production systems:
Mimic functioning of local ecosystem; **tight nutrient cycling, complex structure; enhanced biodiversity, interactions, synergisms among components** ...

Agroecology

Locally produced and marketed products. Shows diversity of products based on short commercialization circuit

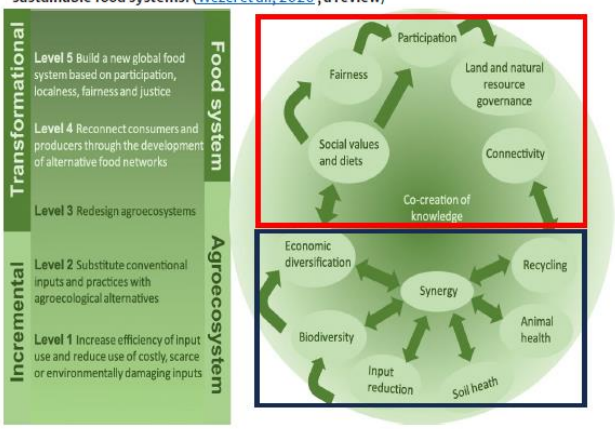
Organic street market, Rio Grande, Brazil

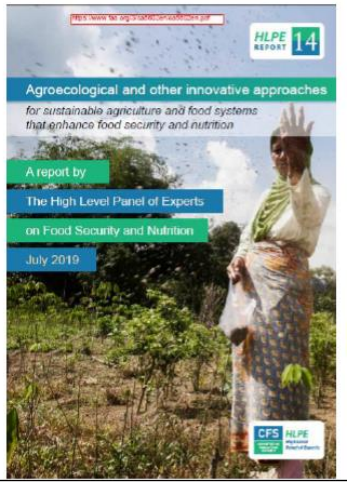
Traditional and locally marketed dairy products, Uzbekistan

Locally produced vegetable & fruits in s. France

AGROECOLOGY is a science that draws on social, biological and agricultural sciences and integrates these with traditional knowledge and farmers' knowledge (Wezel et al., 2020)

Agroecological *principles and elements* and their implications for transitioning to sustainable food systems. (Wezel et al., 2020 , a review)





Agroecology

How do we assess performance in agriculture?

Yield/ha? $/farm? Kcal/person?
Nitrogen leaching/ha? Number of healthy people?

Need A tool to evaluate Performances
– preference is a global analytical framework for multidimension assessment of performances

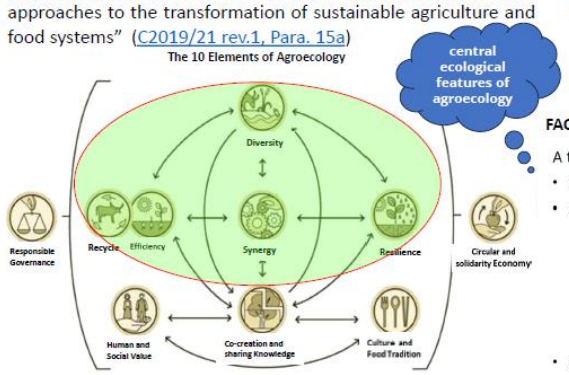
- ✓ Inform policy makers, development institutions, and other stakeholders → **contribute to multiple SDGs;**
- ✓ Build knowledge and empower producers through the collective process of producing and sharing data and evidence based on their own practices;
- ✓ Support agroecological transition processes - transformation of sustainable agriculture and food systems

COAG 26 (2018) request to FAO

" to assist countries and regions to engage more effectively in the transition processes towards sustainable agriculture and food systems by strengthening normative, science and evidence-based work on agroecology, developing metrics, tools and protocols to evaluate the contribution of **agroecology** and other approaches to the transformation of sustainable agriculture and food systems" (C2019/21 rev.1, Para. 15a)

Food and Agriculture Organization of the United Nations

The 10 Elements of Agroecology



FAO: International and Regional Multistakeholder meetings

A total of 1350 participants from 162 countries

- 2014 : International Symposium « *Agroecology for food security and nutrition* » (Rome)
- 2015-2017 : A series of 7 regional seminars

LATIN AMERICA AND THE CARIBBEAN	SUB-SAHARAN AFRICA	ASIA AND THE PACIFIC	EUROPE AND CENTRAL ASIA	NEAR EAST AND NORTH AFRICA
Brasília Brazil June 2015	Dakar Senegal October 2015	Bangkok Thailand November 2015	Budapest Hungary November 2016	Tunis Tunisia November 2017
La Paz Bolivia (Plurinational State of) September 2016		Kunming China August 2018		

- 2018: 2nd International Symposium « *Scaling up Agroecology to achieve the SDGs* » (Rome)

TAPE- A global analytical framework

Responding to COAG → FAO TAPE (a global analytical framework) to assess multidimensional performance of AE and to generate evidence (FAO, 2019)

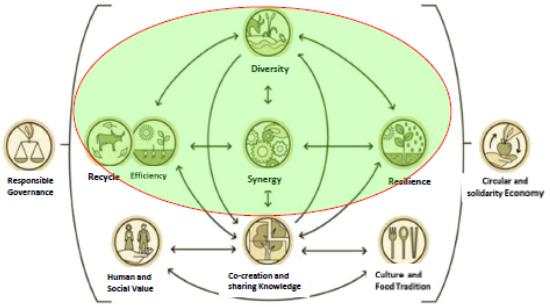
TAPE: A step by step analytical framework

Step 0	Description of systems and context	1° & 2° Information: - Prodⁿ syst., HH type, AE zone
Step 1	Characterization of Agroecological Transitions (CAET)	On farm/HH survey : - Describe current status - Based on 10 elements of AE
Step 2	Criteria of Performance	On farm/HH survey : - Measure progress & quantify impact - Address 5Key dimensions for policy makers
Step 3	Analysis and Participatory Intrpritation	Territorial/Community scale : - Review CAET results, explain with context - Review Performance results & explain with CAET

Description of the 3 Woredas: - Hulla, S. Zuria, Walmara & GIZ treatments

This Workshop

The 10 Elements of Agroecology



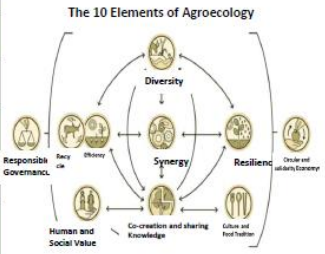
TAPE Indices

The 10 elements of AE – guiding transition to sustainable food and agricultural system 36 indices

STEP 1 dimensions - The 10 Elements of Agroecology (FAO.org)

10 Elements	36 CAET indices
Diversity	• Crops • Animals, including fish and insects • Trees and other perennials • Diversity of activities, products and services
Synergies	• Crop-Livestock-Aquaculture integration • Soil-Plants management system • Integration with trees (agroforestry, silvopastoralism, agrosilvopastoralism) • Connectivity between elements of the agroecosystem and the landscape
Efficiency	• Use of external inputs • Management of soil fertility • Management of pests and diseases • Productivity and household's needs
Recycling	• Recycling of biomass and nutrients • Water saving • Management of seeds and breeds • Renewable energy use and production
Resilience	• Stability of income/production and capacity to recover from perturbations • Mechanisms to reduce vulnerability • Environmental resilience and capacity to adapt to climate change • Average diversity
Culture and food tradition	• Appropriate diet and nutrition awareness • Local or traditional identity awareness • Use of local varieties/breeds and traditional knowledge for food preparation
Co-creation and sharing of knowledge	• Platforms for the horizontal creation and transfer of knowledge and good practices • Access to agroecological knowledge and interest of producers in agroecology • Participation of producers in networks and grassroot organizations
Human and social values	• Women's empowerment • Labor (productive conditions, social inequalities) • Youth employment and emigration • Animal welfare (if applicable)
Circular and solidarity economy	• Products and services marketed locally (or in fair trade schemes) • Networks of producers, relationship with consumers and presence of intermediaries • Local food system
Responsible governance	• Producers' empowerment • Producers' organizations and associations • Participation of producers in governance of land and natural resources

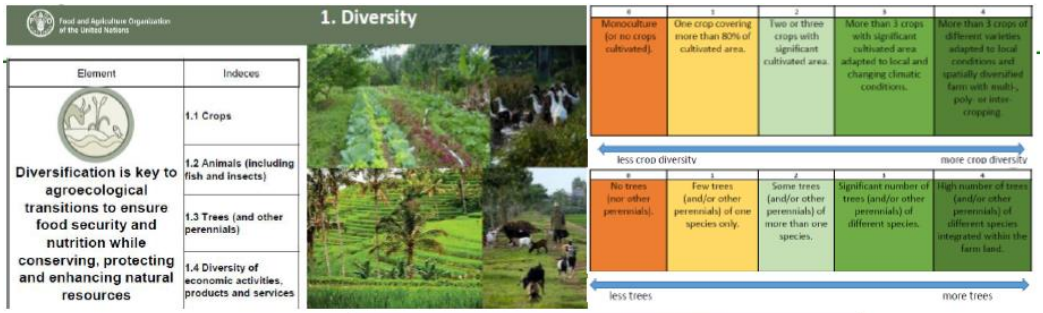
The 10 Elements of Agroecology

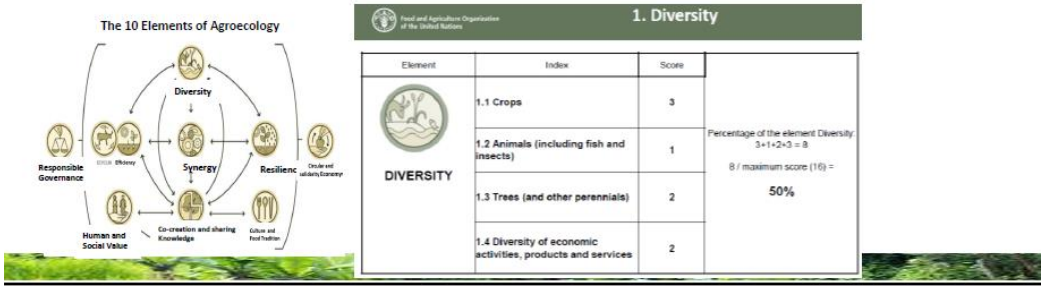


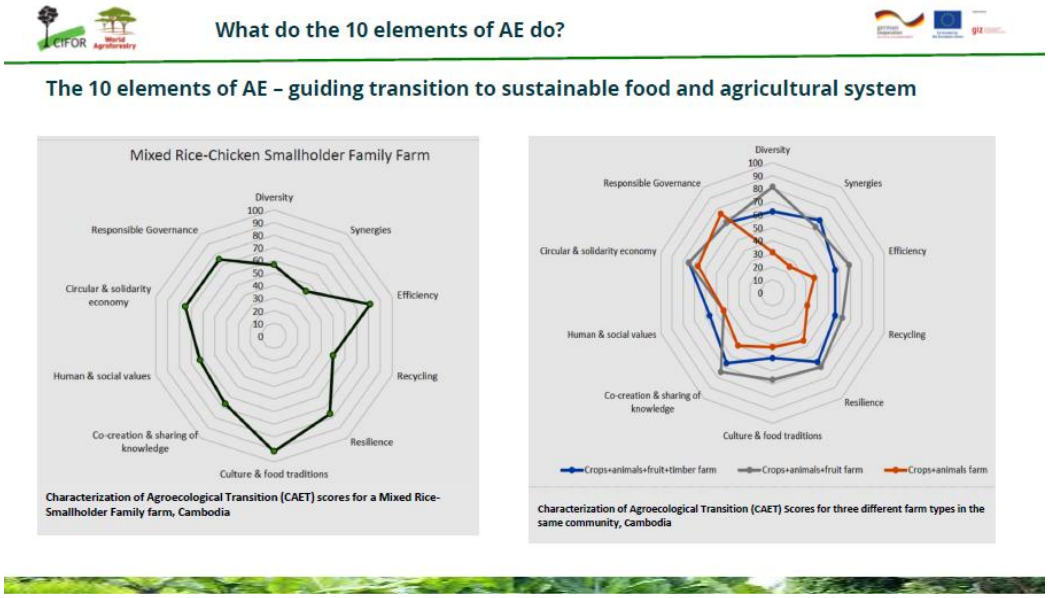
The 10 Core Criteria of Performance – 56 indices

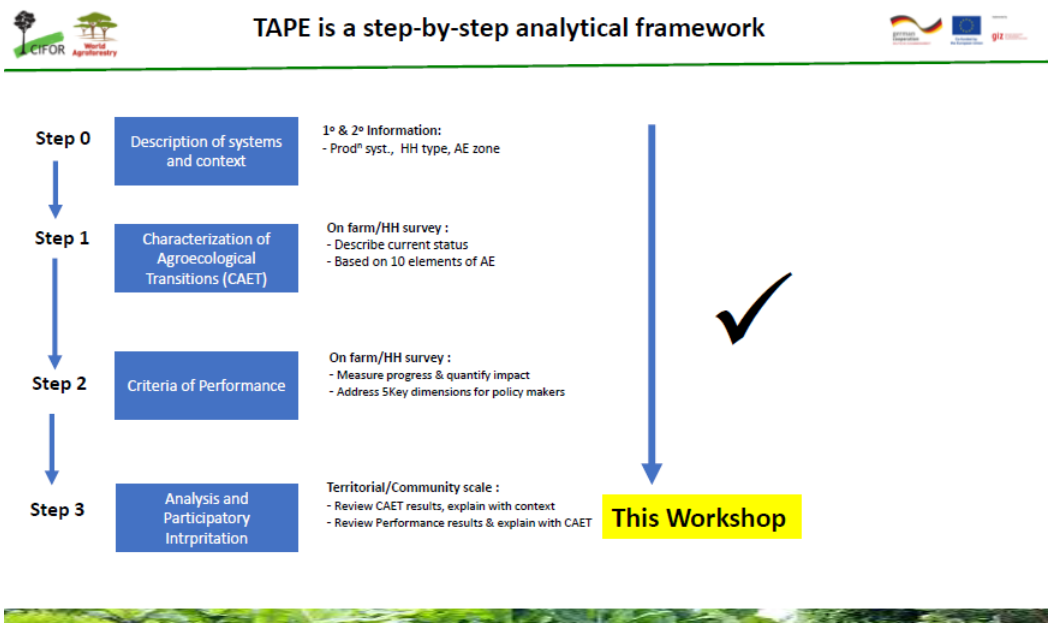
STEP 2: Dimensions of sustainability - The 10 core criteria of performance indicators

Dimensions of sustainability	10 core criteria of performance	Indicators measured in the standard version of TAPE Step 2
Governance	Secure land tenure	• Existence of legal or traditional recognition of land • Existence of legal or traditional recognition of mobility for pastoral people • Perception of secure access to land (or secure mobility) • Right to sell / (Utterly / bequeath land
Economy	Productivity	• Quantity of crop and forestry products produced • Quantity of animals and livestock products produced • Monetary value of agricultural production • Gross value of the agricultural production (per ha and per person)
	Value added	• Total expenditures for the purchase of seeds, fertilizers, pesticides, machineries • Total expenditures for the purchase of livestock • Value added (per ha and per person) • Value added on Gross value of the production (VA/GVP)
	Income	• Revenue derived from crop and forestry products • Revenue derived from animals and livestock products • Revenue derived from other activities • Financial expenditures • Net revenue from agropastoral activities per person and per household • Net revenue from agropastoral activities after taxes and subsidies per person and per household • % of revenue derived from crops and livestock • % of people under poverty level • Depreciation • Expenditure for wages
Environment	Agrobiodiversity	• Gini-Simpson index of diversity for crops • Gini-Simpson index of diversity for animals • Index of diversity for natural vegetation and pollinators • Number of species and varieties/breeds of crops and animals • Livestock Unit
	Soil health	• 19 indicators of soil health (structure, composition, depth of superficial soil, states of moisture, water retention, presence or organic matter, water retention, soil cover, erosion, and microbiological activity)
Health and nutrition	Exposure to pesticides	• Quantity of chemical pesticides used • Quantity of organic pesticides used • Level of toxicity of the pesticides used • Area of use of pesticides • Use of mitigation statistics when applying; • Implementation of practices for the ecological management of pests
	Dietary diversity (& food security)	• Number of food groups consumed • Food Insecurity Experience Scale (FIES) • expenditures for purchase of food per capita
Social	Women's empowerment	• Productive decision, Decision on income, perception of decision making, leadership, time use, access to credit for both men and women • Gender Parity Index • % of women living and working in the farm • all social indicators disaggregated by sex
	Youth empowerment	• Youth employment opportunities • Youth education and willingness to anticipate or working in agriculture • % of youth living and working in the farm
	others	• Number and composition of the household • % of the family employed on farm • % of children working on farm


1. Diversity
Element
Indeces
Diversification is key to agroecological transitions to ensure food security and nutrition while conserving, protecting and enhancing natural resources
1.1 Crops
1.2 Animals (including fish and insects)
1.3 Trees (and other perennials)
1.4 Diversity of economic activities, products and services
Monoculture (or no crops cultivated).
One crop covering more than 80% of cultivated area.
Two or three crops with significant cultivated area.
More than 3 crops with significant cultivated area adapted to local and changing climatic conditions.
More than 3 crops of different varieties adapted to local conditions and spatially diversified farm with multi-, poly- or inter-cropping.
less crop diversity
more crop diversity
No trees (nor other perennials).
Few trees (and/or other perennials) of one species only.
Some trees (and/or other perennials) of more than one species.
Significant number of trees (and/or other perennials) of different species.
High number of trees (and/or other perennials) of different species integrated within the farm land.
less trees
more trees


The 10 Elements of Agroecology
Diversity
Synergy
Responsible Governance
Human and Social Value
Co-creation and sharing Knowledge
1. Diversity
Element
Index
Score
DIVERSITY
1.1 Crops
3
1.2 Animals (including fish and insects)
1
1.3 Trees (and other perennials)
2
1.4 Diversity of economic activities, products and services
2
Percentage of the element Diversity
3+1+2+2 = 8
8 / maximum score (16) =
50%


What do the 10 elements of AE do?
The 10 elements of AE – guiding transition to sustainable food and agricultural system
Mixed Rice-Chicken Smallholder Family Farm
Diversity
Synergies
Efficiency
Recycling
Resilience
Culture & food traditions
Co-creation & sharing of knowledge
Human & social values
Circular & solidarity economy
Responsible Governance
Characterization of Agroecological Transition (CAET) scores for a Mixed Rice-Smallholder Family farm, Cambodia
Crops+animals+fruit+timber farm
Crops+animals+fruit farm
Crops+animals farm
Characterization of Agroecological Transition (CAET) Scores for three different farm types in the same community, Cambodia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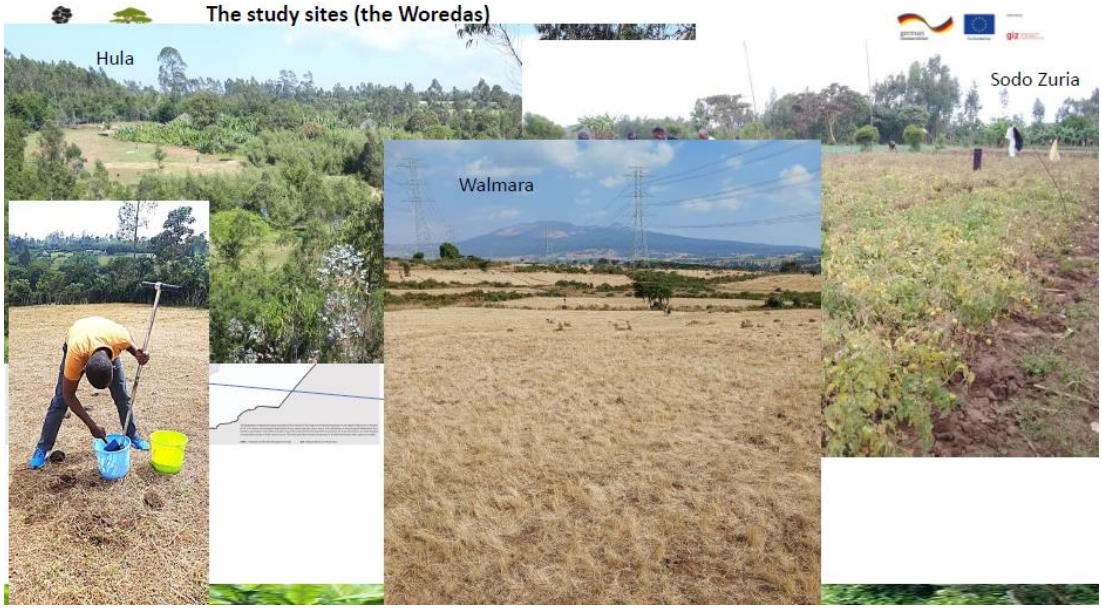
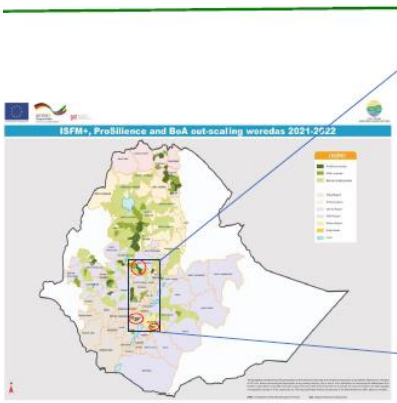
Territorial/Community scale :
- Review CAET results, explain with context
- Review Performance results & explain with CAET
This Workshop

The study sites (the Woredas)



Characterization of the study sites (the Woredas)

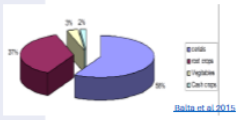


Sample size : 66 HHs/Woreda i.e. 2 Kebeles (1 each for PS & NS from the 3 woredas) n=198hh

Characterization of the study sites (the Woredas)

Table: Description of the districts

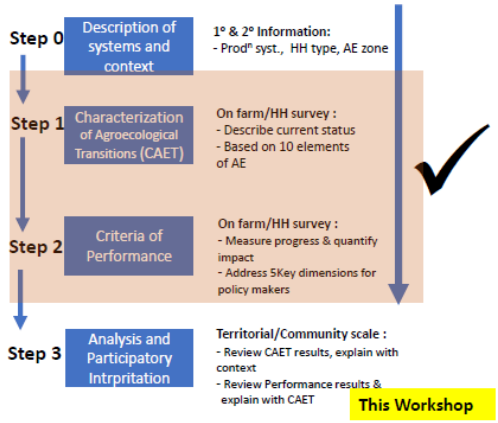
Parameters	Hula	Sodo Zuria	Walmara
Total area (ha)	15,961	33,749	43800
Mean annual T°C	16.5 (8 – 19)	19.7 (17.7 – 21.7)	17 (7 – 27)
Rain Fall(mm)	1200-1600 (bimodal)	1200 – 1355 (bimodal)	800-1350 (Bimodal)
Altitude (m asl)	1801 - 3000	1500 – 2958 m	2060-3191
Thermal zones	Dega (72%). W/Dega (28%)	Dega (10%) W/Dega (90%)	Dega (61%) W/Dega (39%)
Total Population	103,367	161,096	104,143
Farming Practices	Mixed Agriculture (Crop-livestock smallholder)	Mixed Agriculture	Mixed Agriculture
Main Crops Cultivated	**Cereals**: Barley, Wheat, Maize, Teff **Pulses:** F. bean, Field pea, H. bean **Root:** Irish Potato, Enset only **Fruits**: Avocado, Mango, Banana, Apple **Vegetables**: Cabbage, Carrot, Beetroot, Lettuce, Tomato, Onion, Garlic, Peper **Species:** Tena adam, Besobila, Dinbilal **Cash Crop**: Coffee, Sugar Cane **Stimulant:** Khat, Gesho	**Cereals** (….all Sorghum+ Rye) **Pulses**: (….all+ Field pea, Lentils, Chickpea, Pigeon pea, Cow Pea) **Root:** (….all+ Taro and Cassava, Sweet Potato) **Fruits:** (….all + Papaya) **Cash Crop**: (…. all + Ginger) **Industrial Crop**: Cotton, Rapeseed, Ground nut, Gullo/Jatropha	**Cereals:** Wheat, Barley Teff, Maize, & Sorghum **Pulses**: same as with S. Zuria **Root**: Irish potato, Enset only **Fruits**: (insignificant) **Cash Crop**: Coffee only
Trees (Agroforestry & Woodlot)	Wanza, Zigiba, Bisana, Birbira, Woira, Tsid, Bamboo, Korch, Acacia Spp., Eucalyptus, Sesbania	….all + Sessa (Albizia sp.)	Olia, Kosso, Wanza, Tid, Acacia Sp., E. globulus (less diversity of tree sp).
Livestock	Cattles, Small ruminants, Poultry, Pack Animals (Donkey, Horse, Mule), Bee	Same	Same
Total kebele	19	27	18
Total Farmland (ha)	10, 879 (68% of total land area)	16,440 (49% of total land area)	37,144 (85% of total land area)
Soil Type	Loam, Silty loam, Silt	Loam, Silty loam, Silt, Clay, Clay loam, Sandy loam,	Black (37%), and Red (63%) heavy clay

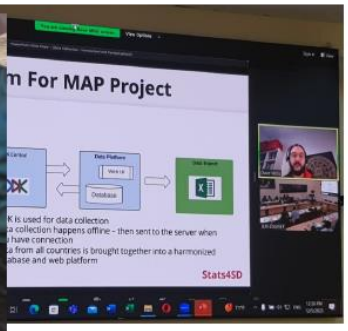


Reita et al 2015

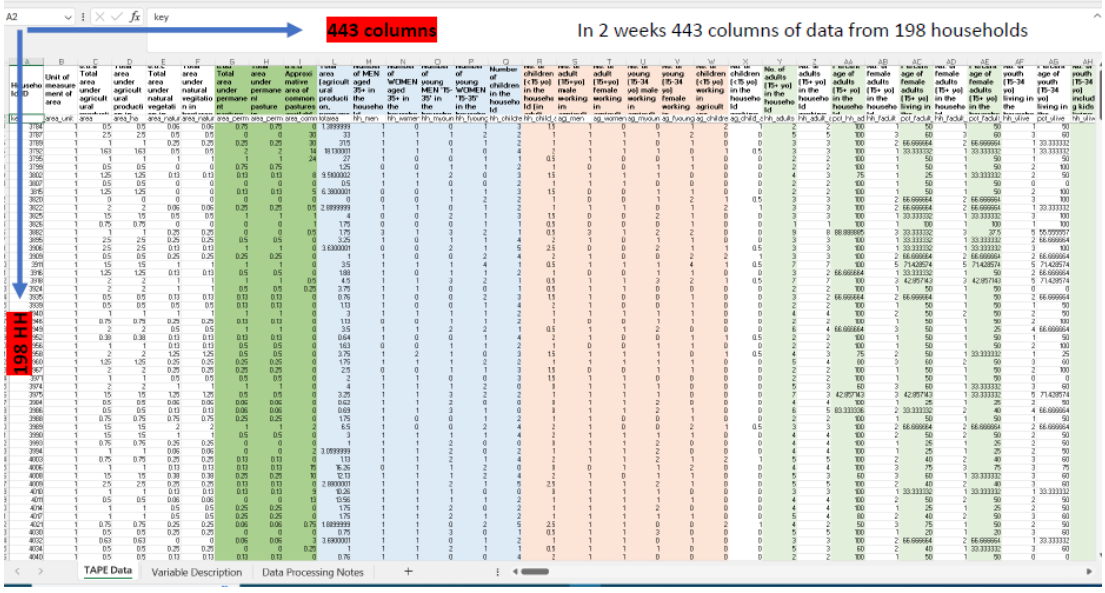
MAP project – project background

TAPE: A step by step analytical framework



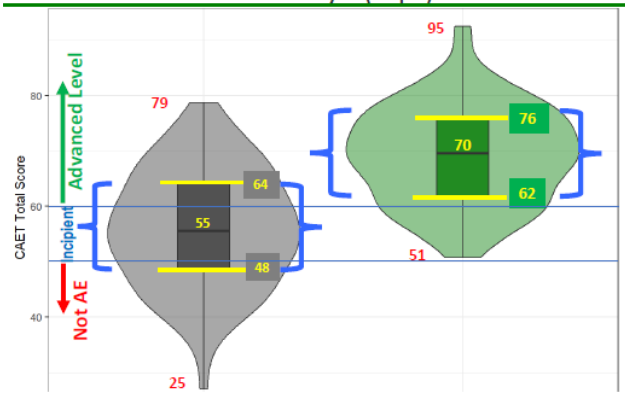


Enumerators training (at ILRI) and heading for field survey



Results:

CAET analysis (Step 1) – Distribution of CAET score, Overall (n=198HH)



- ✓ Violin & Box plots:
  → density of distributions of **CAET scores** PS vs NP (comparison group)
- ✓ Distribution of values concentrated around the middle (consistent across the range in both PS & NP) but NP farms with extremely low CAET score at the lower end, while PS farms are with higher scores

Sample Statistics	PS	NP
Median	70	55
IQR (the middle 50% of the data lie)	62 - 76	48- 64
Maximum & Minimum	51 - 95	25 - 79

t-test of overall means

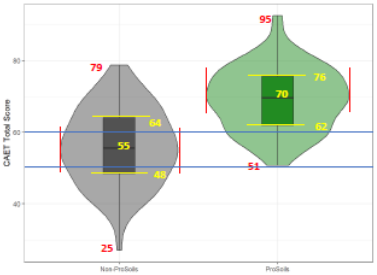
Group	Non-ProSoils	ProSoils	Difference	t-value	p.value
Overall	56.0	69.2	-13.2	-9.6	0.000

- ✓ Meaning
  PS targeted farms are significantly at a higher AE transitions levels, providing evidence on multifunctional performance of agroecology

Table: Average score of overall AE Transition (CAET) for the 2 farm types (ProSoil=PS, NonProsoil=NP), n=198 and of the 10 elements of agroecology

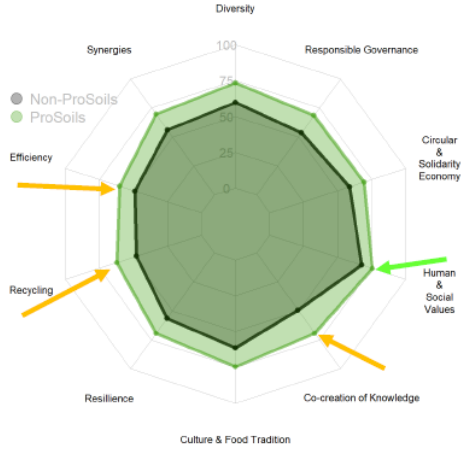
Treat. PS/NP	Overall CAET	Diversity	Synergies	Efficiency	Recycling	Resilience	Culture & food traditions	Co-creation & sharing of knowledge	Human & social values	Circular & solidarity economy	Responsible governance
PS	69.2***	73.4***	69.6***	60.2***	62.1***	69.5***	74.5***	69.4***	75.6***	69.5***	68.4***
NS	56.0	59.8	56.0	49.0	47.8	56.6	61.5	49.4	67.7	59.0	53.5

*** Very highly significant (<0.001 p value); ** highly significant (<0.01 p value); * significant (<0.05 p value); NS non-significant



Future studies & interpretation:

- ✓ *Shift in **"the distribution of the CAET score"** is expected to occur*
- ✓ *The differing levels overtime tells the levels of progress towards agroecology*
- ✓ *Assessing the movement tells how the project is affecting all farms and not just the average farmer*



The mean scores of each of **the 10 dimensions** of the CAET index on a Radar Plot

- ♀ empowerment
- Social inequalities – labor, productive con
- Youth employment & emigration
- Animal welfare

Table: Average score of overall AE Transition (CAET) and of the 10 elements of agroecology for the 2 farm types (ProSoil=PS, NonProsoil=NP)

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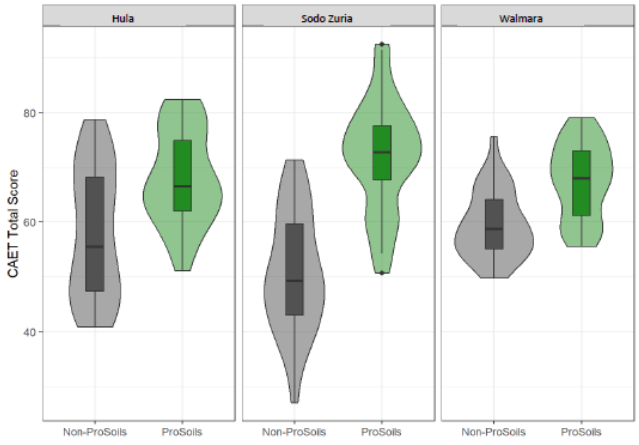


Distribution of CAET score, by Districts

Overall: Across all three districts, a clear pattern of the PS group showing a **higher mean CAET score** than the NP

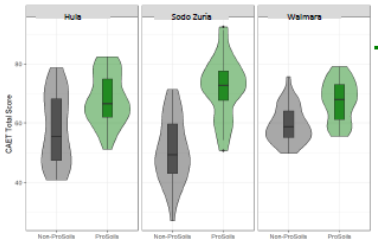
t-Test of means

District	Non-ProSoils	ProSoils	Difference	t-value	p.value
Debubawi Sidama - Hula	57.9	68.1	-10.2	-4.0	0.000
Waliyta –S. Zuria	50.7	72.1	-21.4	-8.3	0.000
Weset Shewa - Walmara	59.5	67.5	-8.0	-5.0	0.000

Hula: NP farms evenly distributed across the range, 41 – 79. PS at higher AE transitioning, better understanding of AE

S. Zuria: Most of PS at a higher CAET score, & the NS are at the lowest score range, <10 CAET - more effort expected !

Walmara: CAET scores distributed relatively over a narrow range for both PS & NP farms. The NP maintained a higher score in the expense of external input and time will tell if the NP keep a higher score in the future



Distribution of CAET score, by Districts

Across all three districts, a clear pattern of the PS group showing a higher mean CAET score than the NP

t-Test of means

District	Non-ProSoils	ProSoils	Difference	t-value	p.value
Debubawi Sidama - Hula	57.9	68.1	-10.2	-4.0	0.000
Waliyta –S. Zuria	50.7	72.1	-21.4	-8.3	0.000
Weset Shewa - Walmara	59.5	67.5	-8.0	-5.0	0.000

Hula: NP farms evenly distributed across the range, 41 – 79. PS at higher AE transitioning, better understanding of AE

S. Zuria: Most of PS at a higher CAET score, & the NS are at the lowest score range, <10 CAET - more effort expected !

Walmara: Overall, CAET scores distributed relatively over a narrow range for both PS & NP. The NP maintained a higher score in the expense of external input and time will tell if the NP keep a higher score in the future

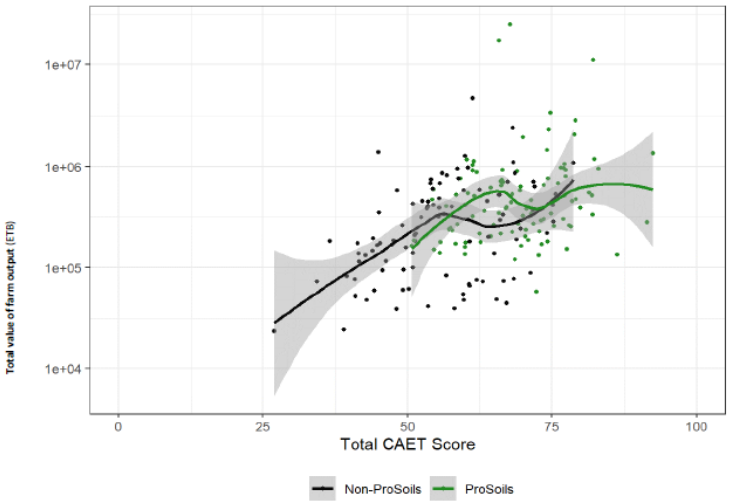
Table: Average score of overall AE Transition (CAET) (n=198) and of the 10 elements of AE for the 2 farm types (PS, & NP) in each of the 3 Woredas (n=66)

Woreda	Treat. PS/NP	Total CAET	Diversity	Synergies	Efficiency	Recycling	Resilience	Culture & food traditions	Co-creation & sharing of knowledge	Human & social values	Circular & solidarity economy	Responsible governance
Walmara	PS	67.5***	69.1^{NS}	62.7^{NS}	58.4***	58.7***	67.1**	78.3**	67.0***	78.5*	68.3^{NS}	67.3**
	NP	59.5	66.9	58.1	48.6	47.6	61.1	71.8	47.1	73.1	63.5	57.4
Hula	PS	68.1***	74.7**	71.5*	59**	59.9**	68***	70.3***	66.8*	72.5^{NS}	68.2^{NS}	69.9***
	NP	57.9	63.1	61.4	48	49.8	55.6	61	57.3	67.2	61.7	53.8
S. Zuria	PS	72.1***	76.6***	74.9***	63.1***	67.8***	73.2***	74.9***	74.5***	75.8***	72.0***	68.1***
	NP	50.7	49.5	48.5	50.3	45.9	53.2	52	43.6	62.8	51.8	49.5
Overall	PS	69.2***	73.4***	69.6***	60.2***	62.1***	69.5***	74.5***	69.4***	75.6***	69.5***	68.4***
	NS	56.0	59.8	56.0	49.0	47.8	56.6	61.5	49.4	67.7	59.0	53.5

*** Very highly significant (<0.001 p value); ** highly significant (<0.01 p value); * significant (<0.05 p value); ^{NS} non-significant

CAET Analysis (Step 2) – Total CAET score vs the performance indicators, accompanied by a moving average trendline (n=198)

Economic performance : Total Value, Expenditure, Value Added (mean, correlation with total CAET and with each of the 10 AE elements)



CAET Analysis (Step 2) – Total CAET score vs the performance indicator, accompanied by a moving average trendline (n=198)

Economic performance

↑ CAET in the expense of external inputs/ecological services not valued

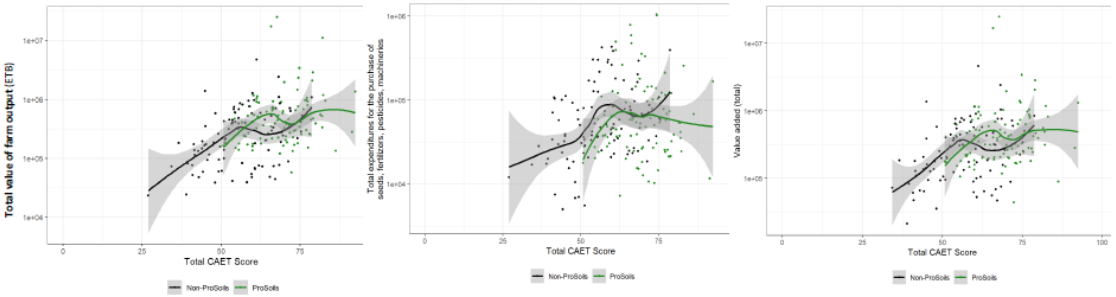
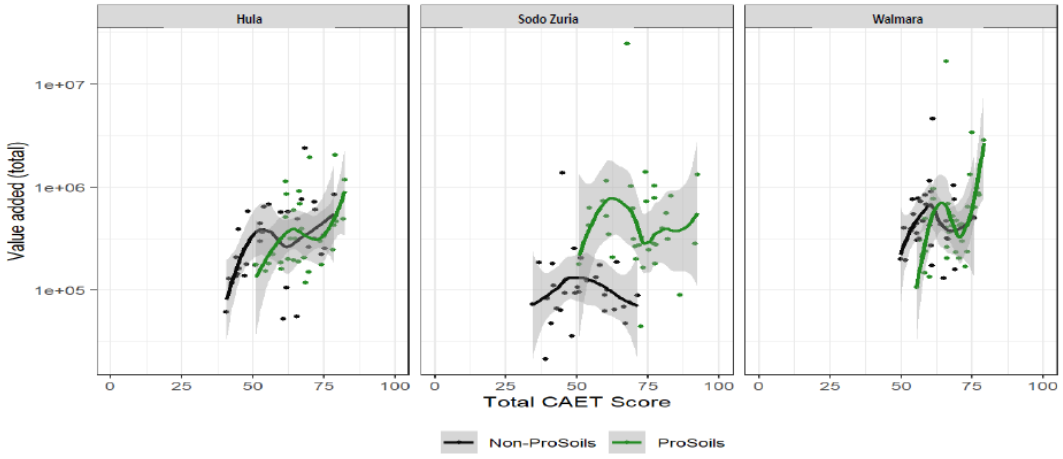


Table: Results (mean) of the indicators of **economic performance** per treatment (PS vs PN farms) (n=198) (values are in '000 ETB)

Types of Farms	Total output	Total Expenditure	Value Added	Qualitative perception of earning & expenditures	Respondents were asked how they perceive their current agricultural income to that of 3 years ago on the following scale: 5 - Much more income 3 - same income 4 - More income 2 – Less income 1 - much less
PS	1,089*	114^{NS}	950*	3.5 *** (4) ***	
NP	401	87	394	2.7 (2)	
Correlation with CAET	+0.32**	^{NS}	+0.27**	+0.31**	
Correlation with other Elements	+0.50*** (Diversity) +0.32*** (Resilience +0.23* (Coc& Shr Kn)	-0.044 (recycling) -0.020 (Efficiency) -0.050 (Circ. & Solidari Ec.)	+0.31**(Diversity) +0.35*** (Resilience +0.25* (Coc& Shr Kn) +0.33** (Cu& Food T.	+0.25* (Diversity) +0.23* (Synergy) +0.22*(Resilience)	+0.21* (Human & Social Values) +0.25* (Circular & Solidarity Economy) +0.22* (Responsible Governance)

*** Very highly significant (<0.001 p value); ** highly significant (<0.01 p value); * significant (<0.05 p value); ^{NS} non-significant

Total Value added, CAET vs PS, NS farms across the 3 woredas.



..... CAET Analysis (Step 2) – Total CAET score vs the performance indicators, accompanied by a moving average trendline (n=198)

Environmental Sustainability – Agrobiodiversity (# of Sp. And breeds of animals, # of sp. & var. of crops, G.S. Index of div.) IPM & Soil

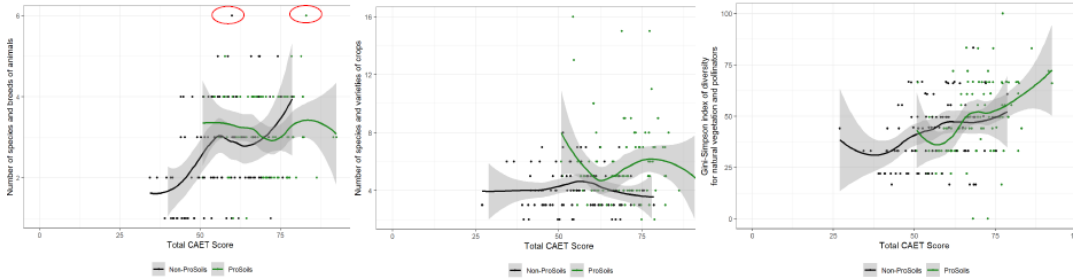


Table: Results of the indicators of environmental sustainability per type of farms (PS vs PN farms)

Types of Farms	# of sp. & breeds of animals	# of species & var. of crops	Presence of Natu. veg & pollinators
PS	3.2***	5.6***	48.7**
NP	2.6	4.2	42.2
Correl. with CAET	+0.37	+0.12 NS	+0.47***
Correlation with other Elements	+0.61***(Diversity) +0.37*** (Resilience) +0.22* (Synergy) +0.42*** (Culture and food Tradition) +0.27* (Human and social value) +0.20* (Circular and solidarity Economy) +0.20* (Responsible Governance)	+0.2* (Resilience)	+0.52***(Diversity) +0.53*** (Synergy) +0.53*** (Resilience) +0.31** (Efficiency) +0.38*** (Cocreation & Sharing of Knowledge) +0.34*** (Circular &Solidarity Economy) +0.42*** (Responsible Governance)

*** Very highly significant (<0.001 p value);
** highly significant (<0.01 p value);
* significant (<0.05 p value);
NS non-significant

..... CAET Analysis (Step 2) – Total CAET score vs the performance indicators, accompanied by a moving average trendline (n=198)

Environmental Sustainability – IPM & Soil

Strategy	PN	PS
Cultural control	24.5% (24)	25% (25)
Favor biodiversity & spatial diversity within the AE	0% (0)	2% (2)
Favor the reprodn of beneficial org.for bio-control	5.1% (5)	10% (10)
Other	0% (0)	0% (0)
Plantation of natural repelling plants	33.7% (33)	41% (41)
Use of cover crops to increase bio-interactions	21.4% (21)	40% (40)

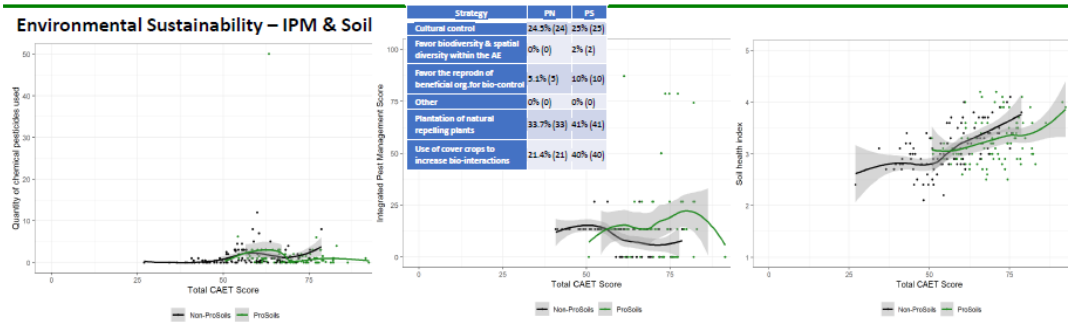


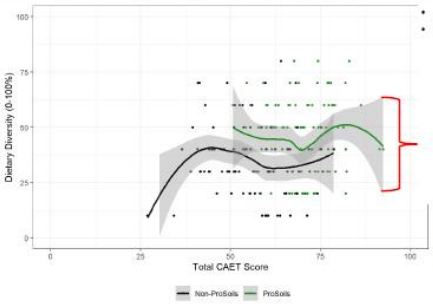
Table: Results of the indicators of environmental sustainability per type of farms (PS vs PN farms)

Types of Farms	Quant. of chem. pesticides used	IPM score **	Soil Health Index
PS	16 NS	16.5**	3.2**
NP	13	10.5	3.0
Correl. with CAET	-0.25*	NS	+0.30**
Correlation with other Elements	-0.25*** (Synergy) -0.39***(Efficiency) -0.21* (Recycling)	NS	+0.20*(Diversity); +0.24* (Synergy); +0.28* (Efficiency), +0.31* (Recycling); +0.25*(Resilience); +0.29* Cocreation & Sharing of kn. +0.26*Circular &Solidarity Econ.

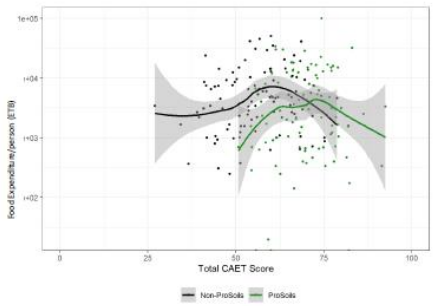
Soil Parameters Scored
Structure
Compaction
Depth
Res. Decom. Status
Color, Odor, OM
Water retention
Soil cover
Erosion
Presence of Invert.
Microbial activity

..... CAET Analysis (Step 2) – Total CAET score vs the performance indicator, accompanied by a moving average trendline (n=198)

Social Sustainability – Dietary Diversity Index, Expenditures for Food (mean, correlation With total CAET and with each of the 10 AE elements)



- Refers to ***Minimum Dietary Diversity for Women***
- Food consumed last 24 hrs on ***10 food groups***
  - Grains, white roots and tubers, and plantains
  - Pulses (beans, peas and lentils)
  - Nuts and seeds
  - Dairy
  - Meat, poultry, fish
  - Eggs
  - Dark green leafy vegetables
  - Other vitamin A-rich fruits and vegetables
  - Other vegetables
  - Other fruits

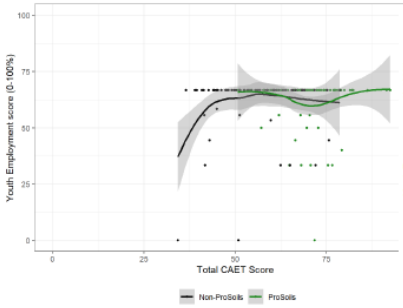


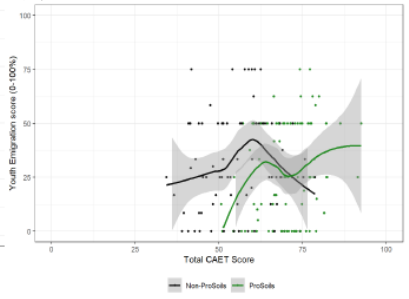
Types of Farms (Group)	Dietary Diversity Index
PS	45.4***
NP	35.6
Correl. with CAET	NS
Correl. Wz other Elements	NS

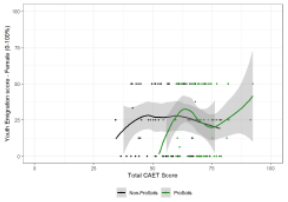
Types of Farms (Group)	Expend. for food /person (ETB)
PS	8,083 NS
NP	7,367
Correl. with CAET	NS
Correl. Wz other Elements	NS

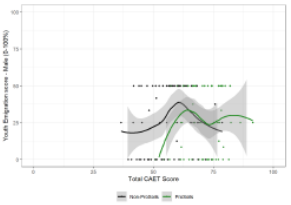
..... CAET Analysis (Step 2) – Total CAET score vs the performance indicator, accompanied by a moving average trendline (n=198)

Social Sustainability –Youth Opportunities Index, emigration index







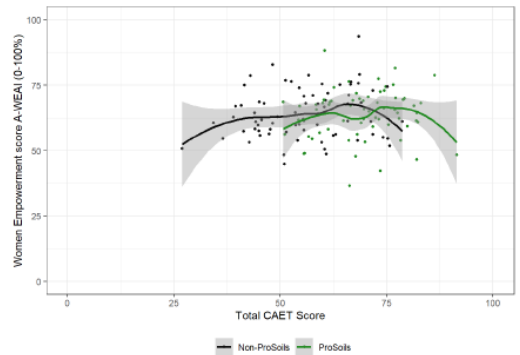


Types of Farms (Group)	Youth opportunities index
PS	62.8 NS
NP	62.2
Correl. with CAET	NS
Correl. Wz other Elements	NS

Types of Farms (Group)	Youth emigration index
PS	28.8 NS
NP	30.8
Correl. with CAET	+0.21*
Correl. Wz other Elements	+0.22* (Resilience) +0.20* (Circular & Solid. Econ.) +0.25* (Cul & Food T.)

..... CAET Analysis (Step 2) – Total CAET score vs the performance indicator, accompanied by a moving average trendline (n=198)

Social Sustainability –Women empowerment score



Women Empowerment :

Based on 5 dimensions of A-WEAI (Abbreviated Women Empowerment in Agriculture Index)

1. **Productive assets** (Production) – Who decides?
2. **Asset Ownership** (Resources) – Who is the owner?
3. **Income** - generated from crop, animals, others who decides ?
4. **Leadership** – agric. related organizations
5. **Time use allocation** –spent on Agric produ. food prep.....

Types of Farms (Group)	Women Empowerment score
PS	67.4 NS
NP	66.5
Correl. with CAET	NS
Correl. wz other Elements	+0.31** (Cult. & Food Tradition)

Conclusions

- ✓ New investment should consider filling gaps in ecological elements where CAET showed less performance (<50 CAET), particularly **diversity, efficiency, co-creation, and sharing of knowledge.**
- ✓ The ISFM effort focused its investment on important components or sectors of the production system (SOILS), but investments in other sectors such as health, input supply, market access, natural resource conservation, etc. would contribute bring more advanced AET/food systems.
- ✓ The preliminary result from the TAPE application in the context of the GIZ ProSoil/ProSilience indicates the **multidimensional performance of agroecology** and calls for more all-sector inclusive investment to bring fundamental transitioning.
- ✓ The TAPE results did not explain all factors in the system but opened up/guided for more investigations
- ✓ Stakeholders and development partners are recommended to apply TAPE (appropriate metrics frameworks) to evaluate their roles and contributions to AET (how transformative to the overall FS - -ve/+ve)
- ✓ Donors and decision-makers are recommended to consider AE evidence when targeting investments.

Thank You