

Landscape Restoration in Tigrai: Experience and challenges

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1. Introduction

1.1. Land degradation

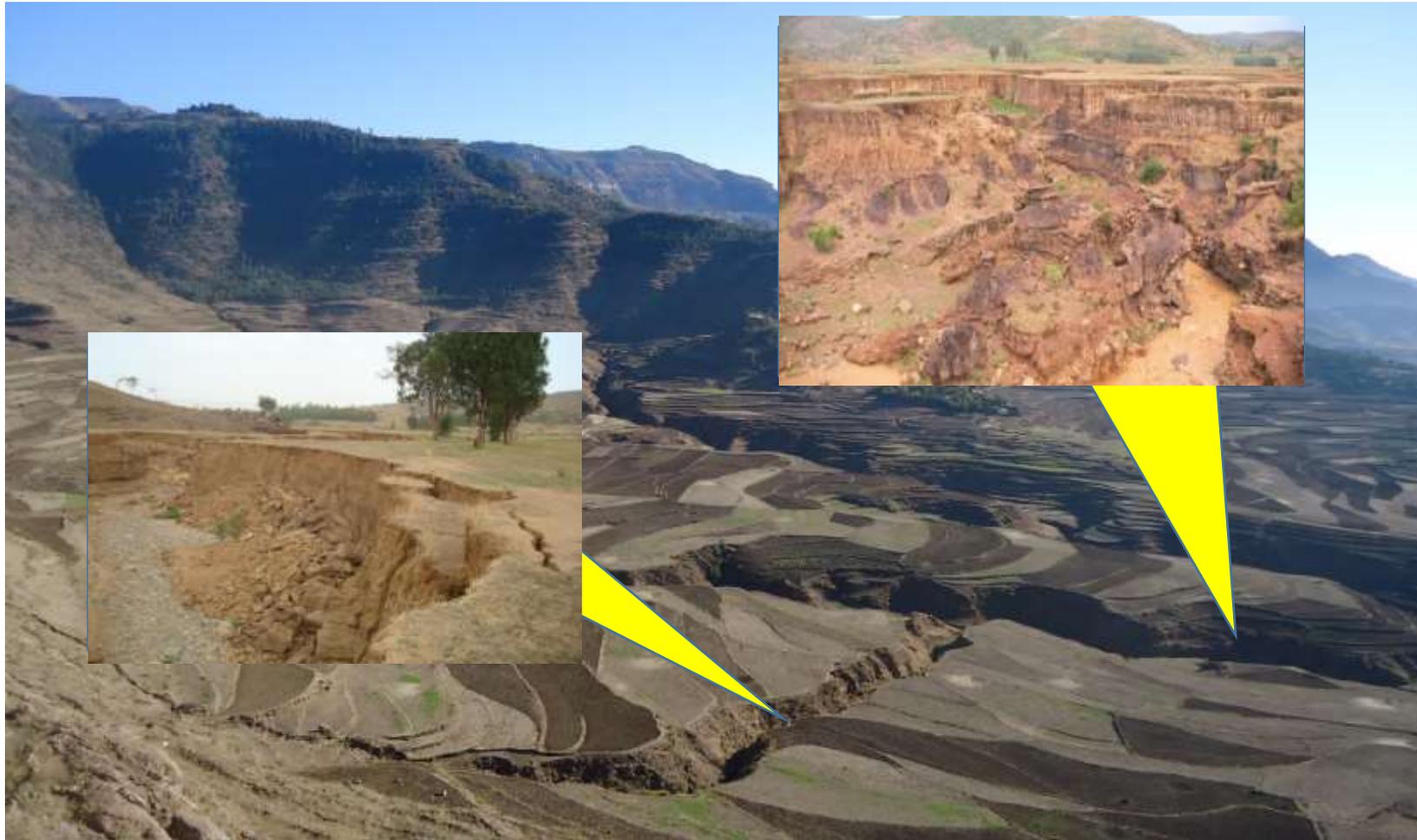
The agricultural potential and natural resource bases of the region have been continuously exploited for a long period of time, without appropriate conservation practices for sustainable use. These inappropriate uses have led to:

- **Cyclic and recurrent drought**
- **Overall environmental degradation**
- **Declining agricultural productivity**
- **Poverty**

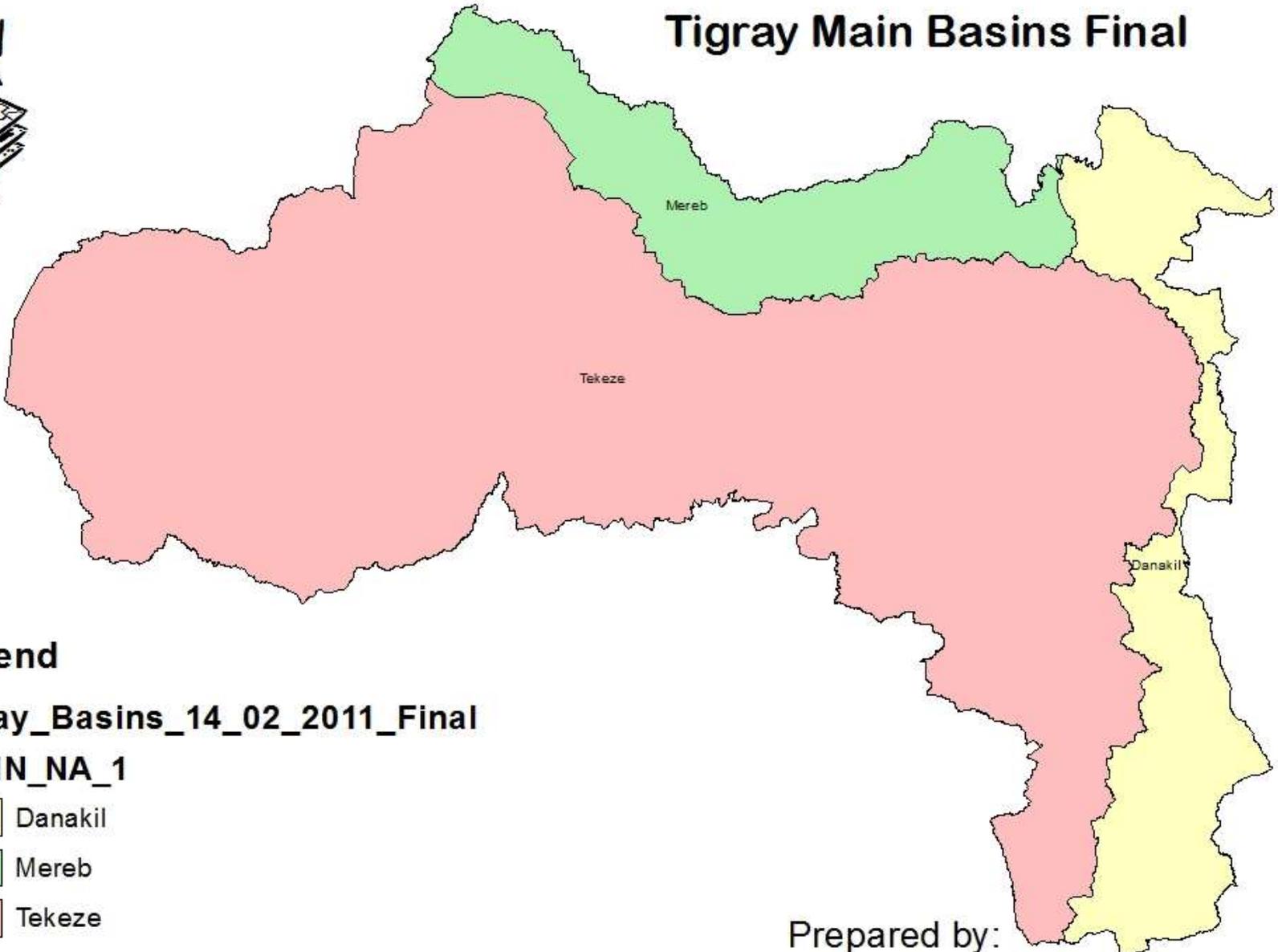
1.2. Different forms of land degradation in Tigray

- Vegetation degradation (Deforestation & loss of species richness)
- Habitat destruction
- Loss of biodiversity
- Enhanced soil erosion leading to:
 - Declining soil fertility
 - Low agricultural Productivity
 - Loss of soil fauna & flora
- Destruction of landscape/ ecology/ ecosystems
- Deterioration of water resources
- Overgrazing and overstocking leading to degradation of grazing/pasture and rangelands
- Undesired climatic changes and variability and impacts

1.3. Manifestations of land degradation in Tigray



Tigray Main Basins Final

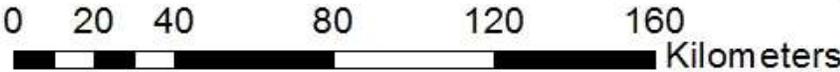


Legend

Tigray_Basins_14_02_2011_Final

BASIN_NA_1

-  Danakil
-  Mereb
-  Tekeze



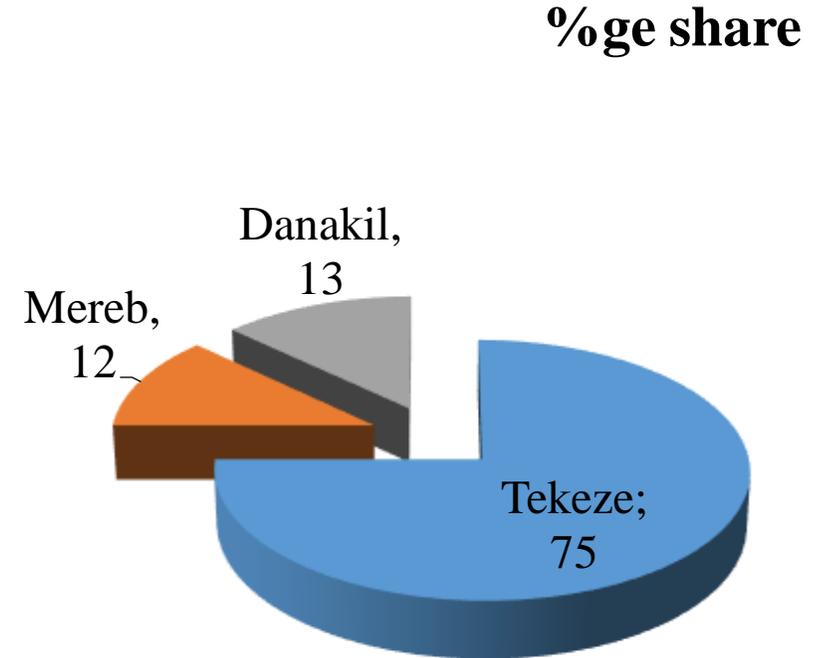
Prepared by:
Tigray BoARD GIS Working Group
October_2011EFY

TIGRAI BASINS

Three Basins:

1. Tekeze Basin
2. Mereb Basin
3. Denakil Basin

Name of Basin	Land Area (Ha)	%
Tekeze	4,097,678.97	75
Mereb	664,258.27	12
Danakil	695,250.58	13
Sum	5,457,187.82	100



2. Land restoration works and achievements

2.1. Current land restoration efforts included:

- **Intensive and integrated watershed management approach**
 - **Water harvesting**
 - **Irrigation (crop diversification and intensification)**
- and**
- **Conservation Agriculture**
- ✓ **Strong government and public commitment**



Objectives of watershed management:

Improve the livelihoods of rural communities and households through:

- (i) SWC for productive uses**
- (ii) Rainwater harvesting for improved groundwater recharge**
- (iii) Promoting sustainable farming systems and agricultural productivity adopting suitable soil, water, nutrient and crop management practices**
- (iv) Rehabilitating and reclaiming marginal lands through appropriate conservation measures, such as planting of trees, shrubs and grasses depending on existing potential;**

And

- (v) Enhancing the income of smallholders by diversifying agricultural practices and income-generating activities (IGAs)**

2. 2. SLM Efforts:

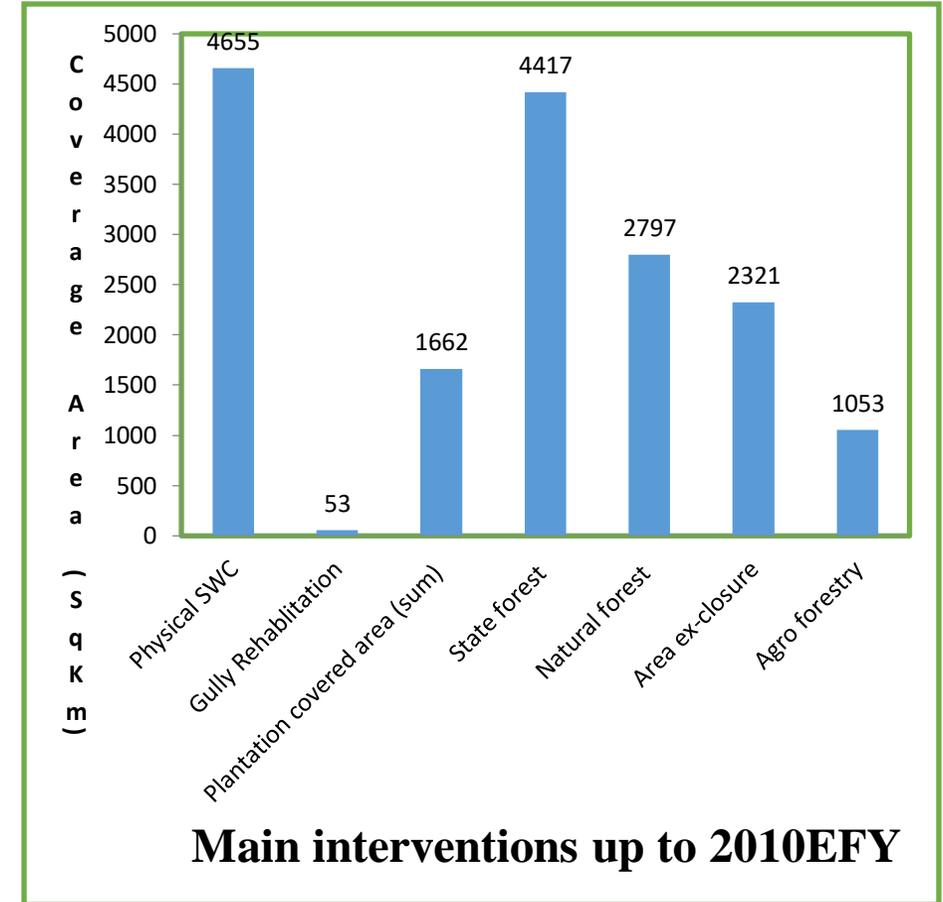
- Community Based Integrated Watershed Management (CBIWSM) approach was adopted as one of the top climate change adaptation strategies in Ethiopia.
- Massive sustainable local community based natural resource management efforts have been undertaken to reverse this situation and there are a lot of success stories in the last 30 years which includes: **Water harvesting, Irrigation (crop diversification and intensification), Zero grazing , A (re)forestation , plantation, agroforestry, closure areas, protected forests, intensive and integrated watershed management approach/ SWC and conservation agriculture.**
- SLM practices and climate change adaptation and mitigation strategies are mutually supportive and represent win-win options.

Efforts made to date: IWSM

Activities	hectares	
Treated cultivated area	960,000	
CBIWSM	1078335	
	2038335	37.4%
New plantation	764765	
<ul style="list-style-type: none"> • State forest, • wild life park, and • Area closure management 	266240 217643 1288445	
	2537093	46.6%

NRM all interventions (Km2, Ha) in Tigrai Region up to 2010 EFY

SN	Main interventions up to 2010EFY	Area_K m2	Area_ ha
1	Physical SWC	4655	465,477
2	Gully Rehabilitation	53	5,293
3	Plantation covered area (sum)	1662	166,224
4	State forest	4417	441,689
5	Natural forest	2797	279,690
6	Area ex-closure	2321	232,146
7	Agro forestry	1053	105,317
	Total	16,958	1,695,836



IWSM Activities

- Environmental restoration and rehabilitation
- Rain Water Harvesting (RWH)
- Irrigation Development
- **Integrated natural resources conservation**

RWH includes:

- ✓ **Insitu water harvesting,**
- ✓ **Ponds,**
- ✓ **Dams,**
- ✓ **Runoff diversion,**
- ✓ **Shallow wells, and river diversion.**

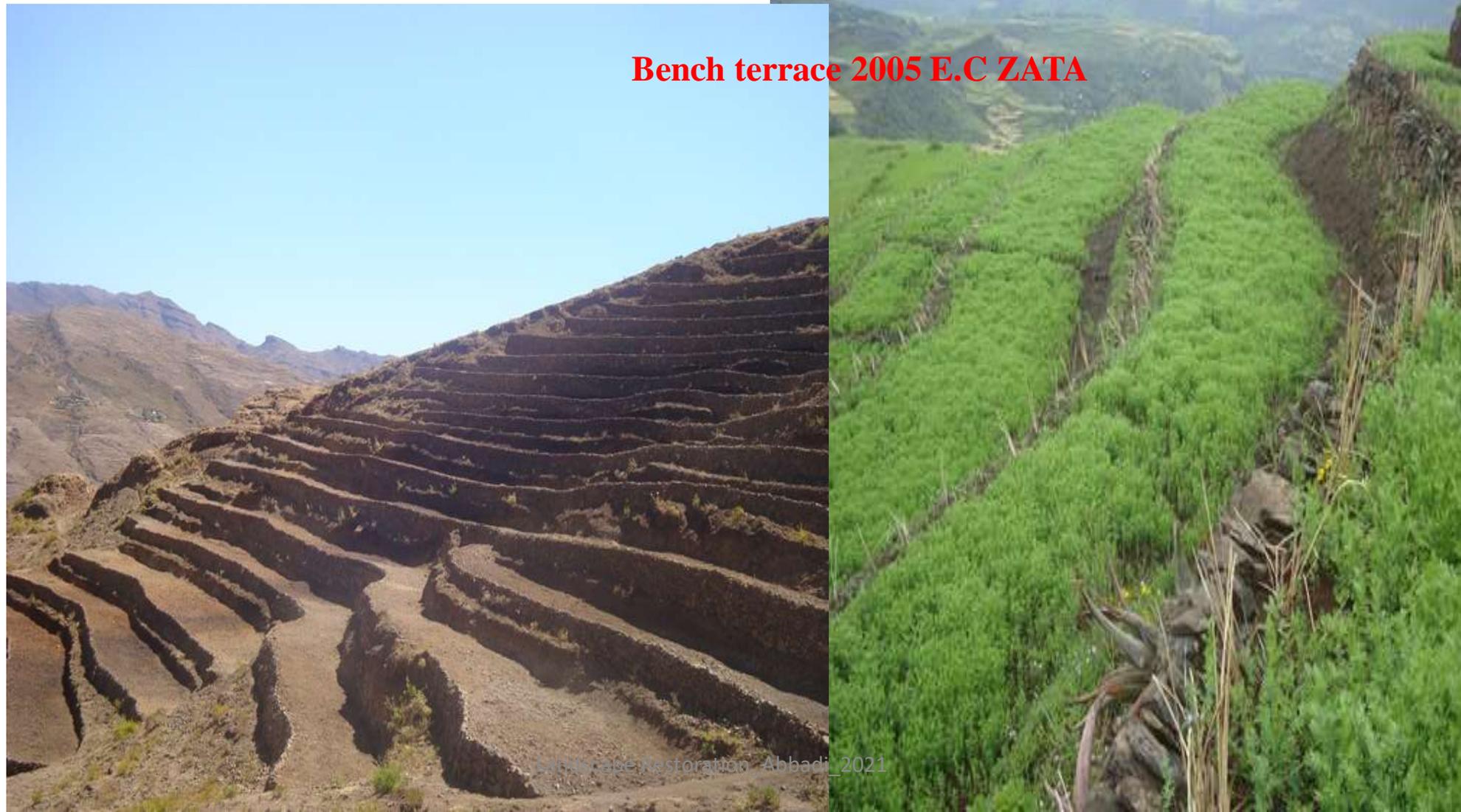


Sources: The author and BoANRD, Tigray

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Now the mountains are starting to transform to direct economic benefit : **Slope modification and land creation**





Landscape Restoration_Abbadi_2021

Area exclosure



Area exclosures----



Closing and enriching with forage trees



State forests: 6 state Forests



Name	area	woreda
Higumbrda-Gratkahsu	21564	R/alamata,ofla,E/mehoni,R/azebo
Hirmi	30987	T/koraro,A/tismbila,M/zana
Wujigmahgowaren	16507	E/mehoni,R/azebo,E mbaalje,H/wajerat
Waldiba	94000	Tselemti
Asimba	4253	Erob
Desea	89000	A/wonberta,S/tsaeda emba
Total	256,311	

Des'a Forest Overview



Landscape Restoration_Abbadi_2021

Des'a Forest---



Landscape Restoration_Abbadi_2021

Des'a Forest



Landscape Restoration_Abbadi_2021

Gra Kahsu-Hugmbrda Forest



RWH in Dryland of Ethiopia

- Currently, environmental rehabilitation and agricultural development efforts in Tigray are supported with a tremendous water harvesting works (ponds, shallow and deep wells, series of ponds, run off and river diversion, dams, roof and rock catchments, in-situ moisture conservation and catchments treatment) to tackle recurrent drought and to bring about the desired agricultural transformation, sustainable development and alleviate poverty.
- These development endeavors should be translated into economic terms and our grass-root community (farmers) should gain economic benefits and generate income to improve their livelihoods.

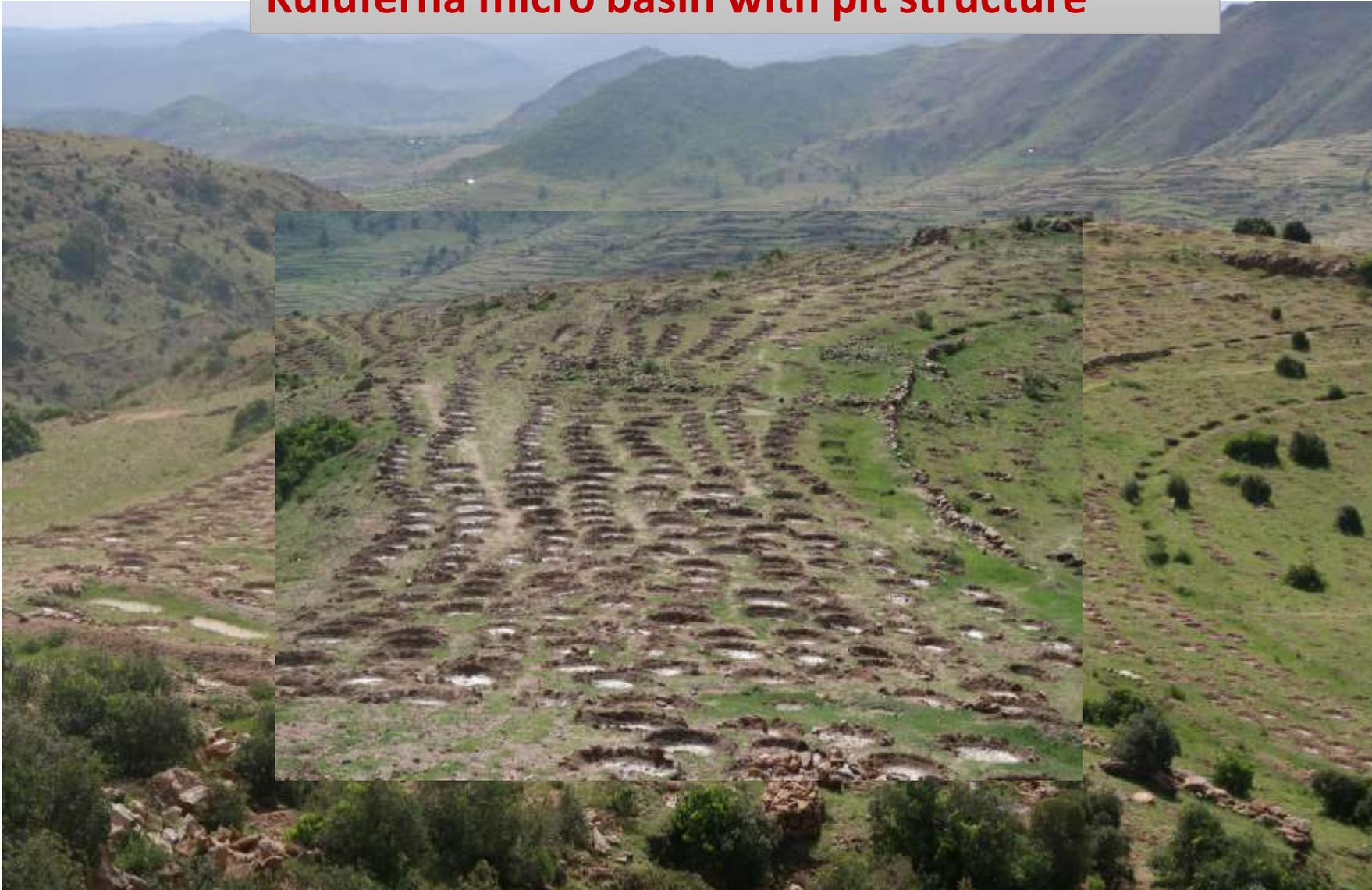
Well designed micro Basins, hill side terraces and trenches



Well designed micro Basins

Medebay Zana

Kuluferha micro basin with pit structure

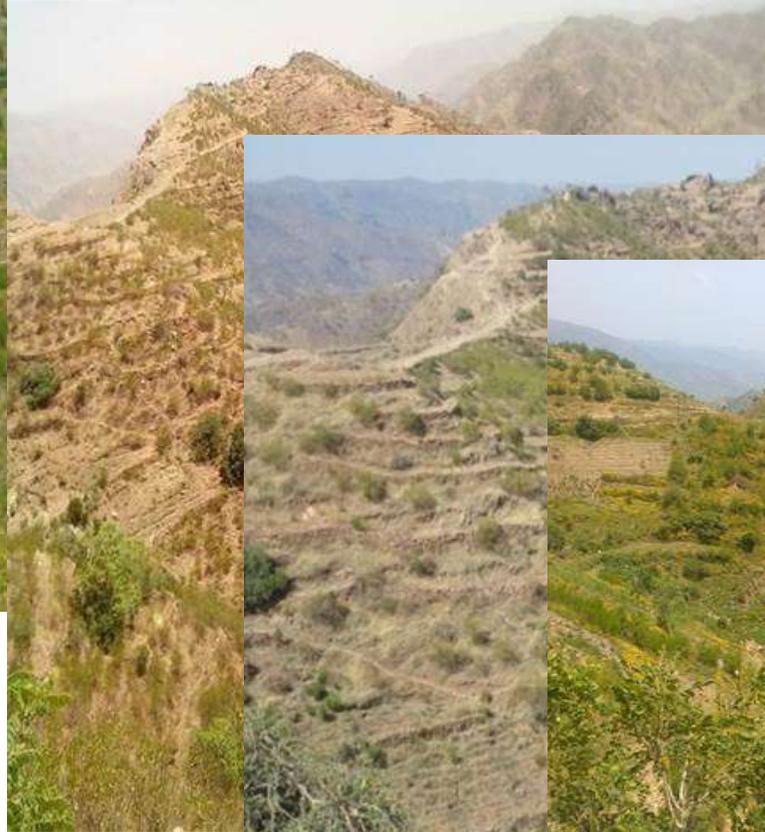




Reshaping



**Well developed hillside treatment
in Kola Sheka Micro Watershed**





*Woreda_Kolla Tembien Miska MWs
July12/2011*



*Woreda_Kolla Tembien Miska MWs
September21/2016*

Farm land closure



Faidherbia albida



An increment of 43% in wheat yields

3. The Impacts

Overall impacts of environmental rehabilitation include:

- **Reclamation of gully and degraded lands in to productive lands**
- **Enhanced surface and ground water availability**
- **Modification of microclimates**
- **Increased productivity**
- **Soil fertility and moisture availability enhanced use of chemical fertilizers**
- **Environmental and ecological rehabilitation**
- **Habitat and biodiversity restoration**
- **Feed and water availability for livestock**
- **Overall impacts on household incomes and livelihood outcomes; and**
- **Enhanced resilience to climate change**

Crop production enhanced

Year	Ha	Production	Productivity (Qt/ha)
1983/84	1,115,321	4,015,155	4.0
1988/89	997,310	7,725,291	7.7
1990/91	1,057,383	8,523,635	8.5
1993/94	1,130,969	9,209,675	9.2
1997/98	1,022,957	11,622,019	11.6
1998/99	1,064,595	13,537,913	13.5
1999/00	1,097,034	15,840,816	15.8
2000/01	1,136,621	16,386,452	16.4
2001/02	1,224,598	19,609,798	19.6
2002/03	1,349,902	34,065,000	25.24
2003/04	1,328,327	31,033,455	23.36
2004/05	1,351,633	35,232,739	26.06
2005/06	1,314,692	35,347,838	26.89



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Jatropha plantation



4. Challenges: Multifaceted

1. Free grazing



2. Forest fire



3. Emergence of new pests and diseases

- A new pest (*Plerochila australis*) has emerged on olea at Desea forest



4. Quarry and traditional mining areas



Challenges-----

5. Poor survival rates of seedling

- Free grazing
- Poor seedling quality
- Improper plantation handling
- Poor soil depth
- Low moisture availability
- No close follow up after planting (fencing, watering, cultivation)
- Lack of adequate or/and selection of required type of seed or planting material

6. Lack of clear management and use system

Challenges-----

7. Economic drivers such as Indigenous economic trees spp (Eg Boswellia) deforestation and diminishing.

8. Ownership of rehabilitated areas

9. Equity and benefit sharing

10. Conflicts among landuses and landusers

11. PLUP????

12. Tigray under ecosystem threat:

✓ Uncontrolled destruction during the current crisis: Cutting, fire, and charcoal making

5. Recommendation

1. **Enhancing SLM practices and principles: Biophysical and socioeconomic sustainability.**
2. **Developing and utilizing the mountainous area of the region as means of job opportunity to landless youth and has to be scaled up.**
3. **Central Data Repository:** Data infrastructure and facility for knowledge sharing, dissemination, and management.
4. **Regeneration of Boswellia and Acacia woodlands as economic drivers.**
5. **Harnessing integration, partnership, linkage, and synergy at all levels**
6. **Linking local efforts to Global Climate Mitigation funding**

Recommendation---

- 7. Institutionalization of governance and conflict management practices**
- 8. Framework for carbon accounting and trading.**
- 9. Capacity building at grass root level**
- 10. Create smart villages and enhance local integrated basic services for agrarian transformation.**
- 11. Agroforestry-based landscape diversification for landuse optimization.**
- 12. Holistic silvicultural management: From nursery– post planting (Like raising a kid!!!!)**

THANK YOU