

#### Impacts of SWCPs on sediment trapping,

#### landscape disconnectivity & sustainable

#### reservoir use, NW Ethiopia

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Introduction



#### The northwest highlands of Ethiopia are the

#### major water sources of Abay River/GERD

More than 80% of the water is from these

highlands



#### Besides the highlands are



#### Suitable for human settlement (>60% popn)

#### Origins of many crop & tree species

#### Most suitable for agriculture, agriculture

widely practiced, etc.

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#### Land degradation in the form of soil

#### erosion, soil fertility depletion, water

#### resources reduction, forest deterioration, etc.

is a prime problem in the highlands

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Consequently:



Reservoirs/lakes sedimentation

Reduced agricultural productivity

Infrastructures damage, etc.

are common problems

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To halt such nature devastating problems:



SWCPs both physical, biological & bio-

physical have been practiced for half of a

generation age

4 - 5 decades





#### The natural resource conservation &

management works aren't sustainable,

Farmers' are destructing the constructed SWCPs claiming lack of benefits,







Slope gradient reduction,

Soil loss reduction

Soil fertility improvements

Crop productivity increment, etc.





#### The objectives of this investigation in the

#### Koga catchment representing the northwest

#### highlands of Ethiopia is,



#### • To investigate the impact of SWCPs on

#### sediment trapping, slope gradient reduction

#### & Maize grain yield improvement

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- Field measurement
- Field observation
- Statistical analysis
- GIS software









SWCPs are trapping a dry sediment of:

■ ~55 kg m<sup>-1</sup> yr<sup>-1</sup> (Mekonnen et al. 2016)

 $\sim 25 \text{ kg m}^{-1} \text{ yr}^{-1}$  (Mekonnen & Getahun, 2020)

■ STE ~54%





#### SB with retention basin trapped more

#### sediment than FJ ridge

Reason, availability of the retention basin with enough space to trap sediment,





- FJ ridges trapped more sediment than SB
- Reason, retention basin was filled by sediment &
  - STE of SB reduced
    - No maintenance
  - But STE of FJ increased



#### SWCPs are reduced slope gradient by:

1.2 % (below 5 yrs)

■ 2.2% (5 - 10 yrs)

**3.2%** (10 - 20 yrs)

2-3 % in 20 yrs (Mekonnen et al. 2016)



#### SWCPs are improving crop yield by:

- $\sim$  920 kg ha<sup>-1</sup> yr<sup>-1</sup> Maize
- ~700 kg ha<sup>-1</sup> Barley (Mulat et al. 2020)
- 10 -15% (Teshome et al. 2013)



On the contrary,



No significant soil loss reduction

Water reservoirs sedimentation is high

• Farmers are using the same rate of fertilizer

as before

Nutrient load to water reservoirs is high



& causing weed emergency

like water hyacinth

In general land degradation is still a prime problem

#### Highlands degradation



### Rivers carrying sediment to water reservoirs NW highlands of Ethiopia





## Rivers carrying sediment to water reservoirs NW highlands of Ethiopia

### Impact of sedimentation on water reservoirs

Tana Lake



#### Koga man-made reservoir

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Although the existing SWCPs are

Trapping large amount of sediment, Reducing slope gradient/landscape connectivity,

Increasing crop yield,



Soil erosion not significantly reduced

Sedimentation is critical,

Slope gradient is not minimized,

- Land degradation is the main problem
- After half of a generation age



### So What ???

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Therefore,



Researchers & experts, are expected to

develop alternative approaches or modify

the existing practices, after half of a

generation age experience.



# Thank you

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