Introducing Rain Water Harvesting for Household Level Drip Irrigation: Pilot study Haramaya smallholder farmers

By: Meseret Dawit Teweldebrihan

Introduction

Shallow wells/Ella is one among the existing water harvesting technologies to improve agricultural production at household level.

Smallholder drip irrigation technologies can provide small-scale farmers with an affordable means.

Benefits of drip irrigation:

- ✓ Save water and Increase crop production
- ✓ Alleviate hunger and generate additional income
- ✓ Flexible system and minimize women's workload

Challenge:

- ✓Maintenance of drip lines and hand dug wells
- ✓Lack of access of drip kits in local markets
- ✓Require installation skills
- ✓Require more investment than surface irrigation systems

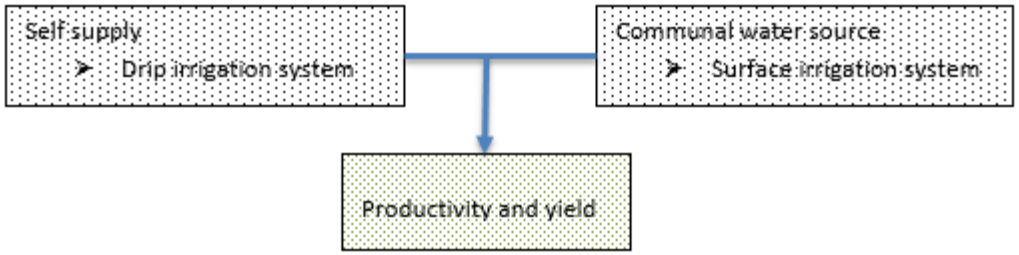
Cont…

The overall, objective is to improve the livelihoods of Haramaya small-scale farmers, without degrading the scarce water resources, by increasing crop water productivity ratio with an appropriate, feasible and affordable irrigation technology.

To achieve these objectives, the following components were identified:

- ✓ Enhancing farmers' technical and institutional capacities
  - To increase the resilience of communities to climate change through water management
- ✓ Development of drip-irrigated farming plots
  - Agriculture is mainly pluvial because only 1.86% of the arable land is irrigated or 1/3 of the identified irrigation potential in the country.

Interviews and focus group discussions were used to evaluate the presumption and acceptance of farmers to self supply and drip irrigation systems.



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The missing link in global irrigation has been systems for smallholders who need access to irrigated water or a way to stretch a scarce supply of water (Postel et al., 2001). Such systems would meet the following criteria:

- *Affordability*
- *Divisibility and Expandability*
- *Rapid payback*
- *Water efficiency*

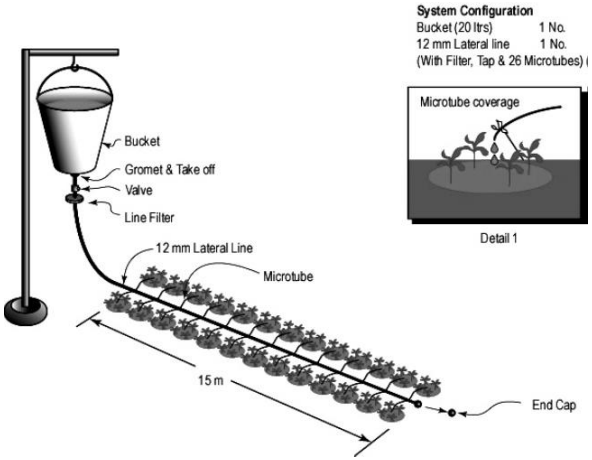


Fig: Schematic of a Bucket Kit System [source: Postel et al. (2001)]

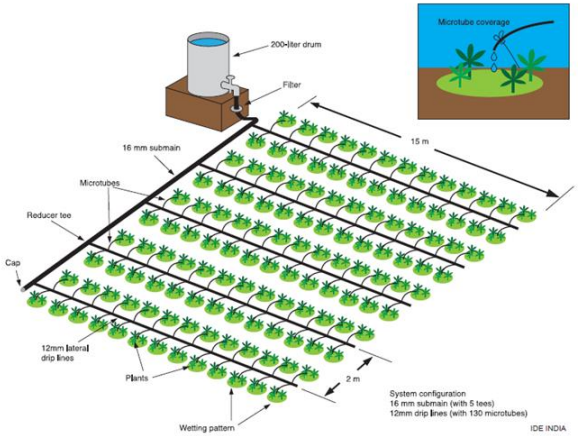


Fig: Schematic of a Drum Kit, micro tube version [source: Palada et al. (2011)]

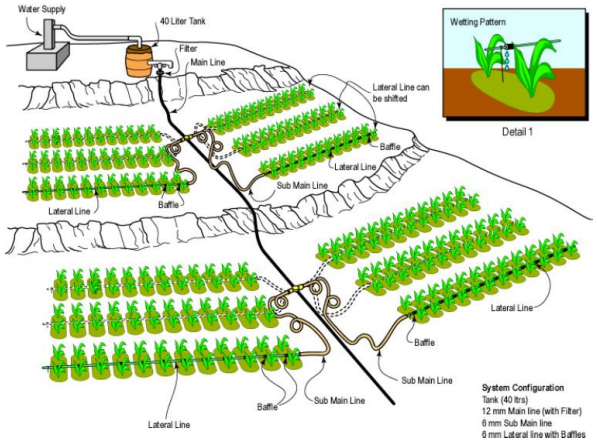


Fig Schematic of Shiftable Drip Systems [source: Postel et al. (2001)]

Optimizing Intensified Runoff from Roads for Supplemental Irrigation,Tigray Region,Ethiopia

By: Meseret Dawit Teweldebrihan

Introduction

Agriculture is the foundation of the country's economy:

- ✓about 50% of GDP
- ✓83.9% of export
- ✓80% of total population engaged

Unmitigated hydrological variability**:**

- ✓increases poverty rates by 25 %
- ✓costs the Ethiopian economy about 40% of its growth potential

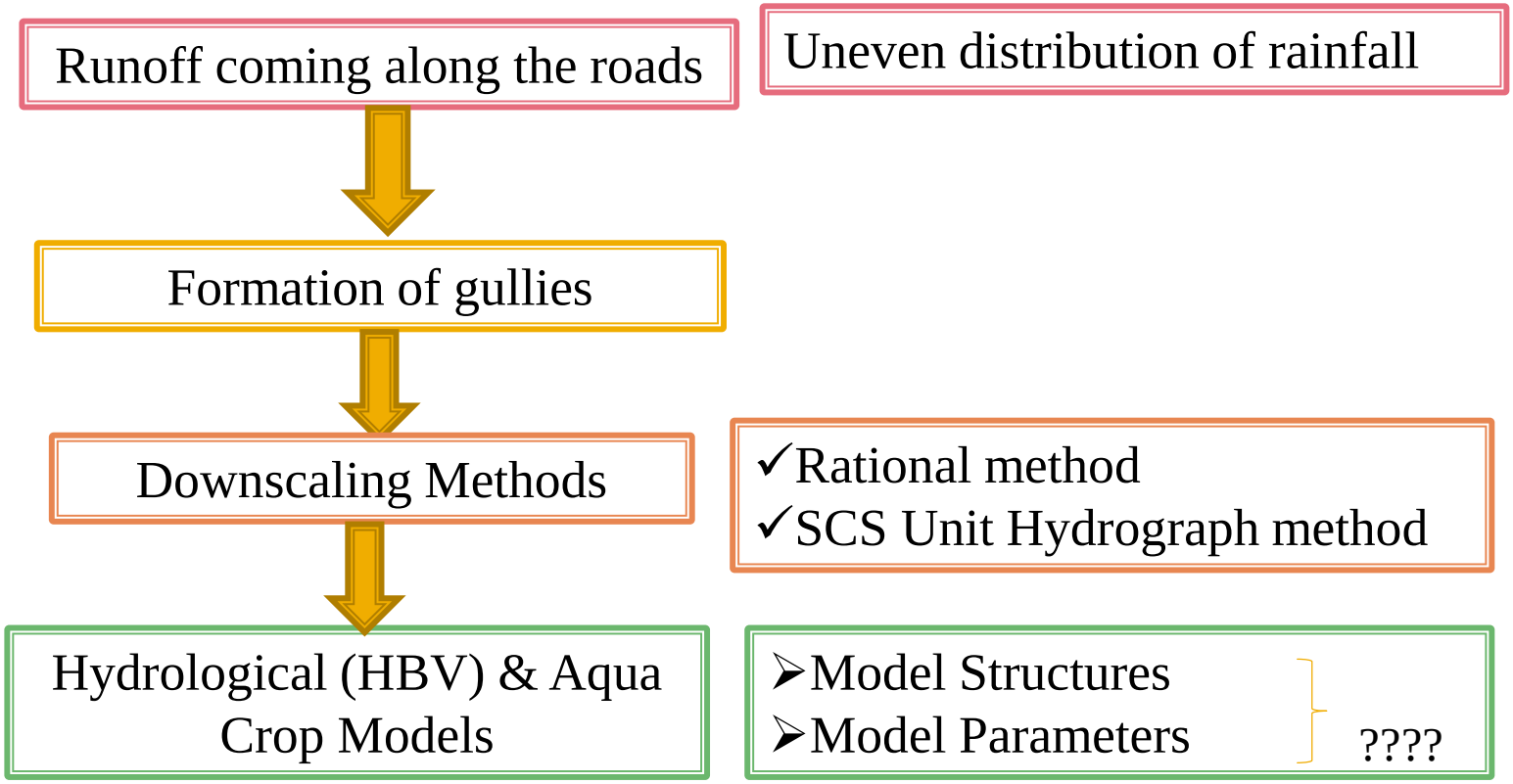
Fig: View *of the plains at Freweign area which the road under construction passes through. The communities at down side of the road are endangered by the flood from culverts.*

- ➢ Soils along the plains which the roads cross is dominantly sandy
- ➢ Flood from culverts is affecting dwelling houses and farm lands
- ➢ Water logging at the road sides

Problem Statements

Assessment of the impact of road construction

- Different sources of Uncertainties

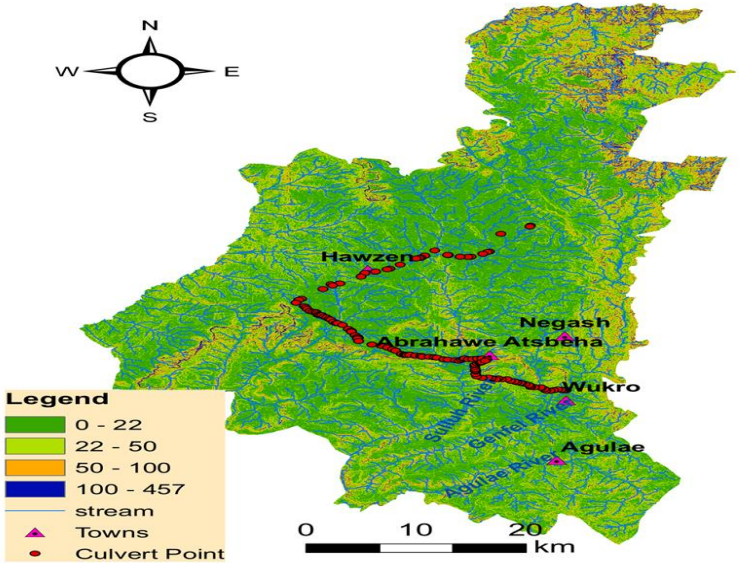


- How uncertainty introduced by roads runoff and erratic nature of rainfall is important in assessment ?

Study area

- The study: road connecting Senkata through Hawzen to Abreha-we-Atsbeha in the Northern Region of Ethiopia

- Is categorized among Arid and Semi-arid regions of Ethiopia



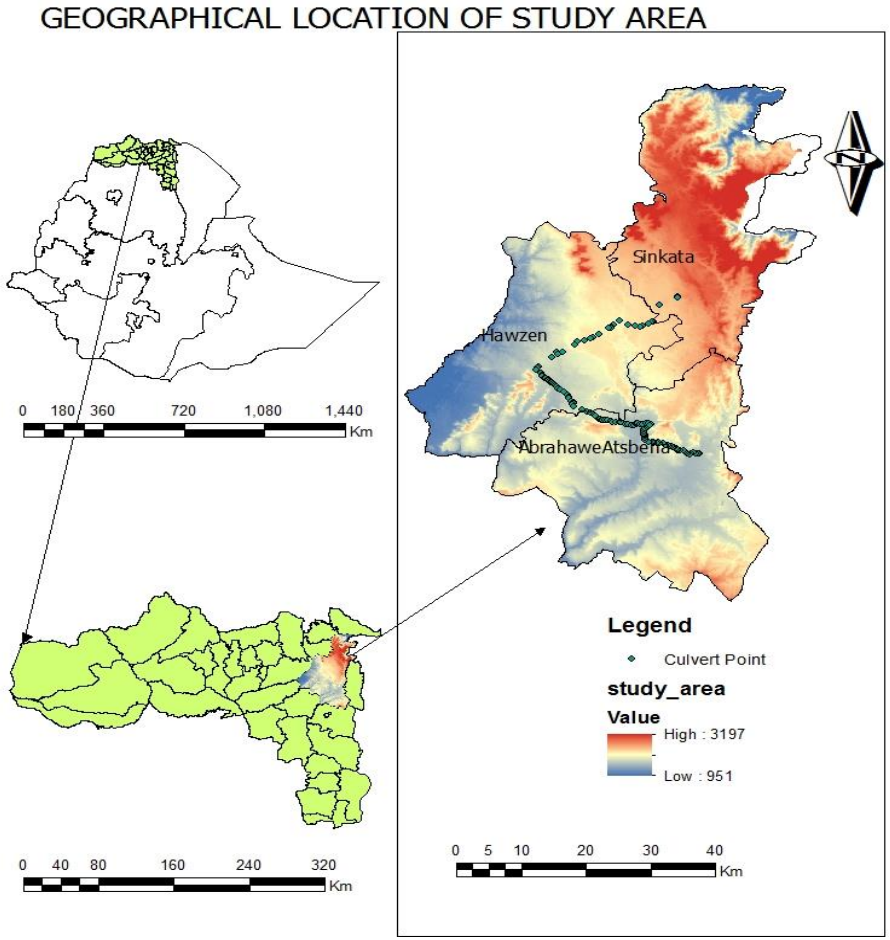


Fig: Slope and drainage map

Result & disc.

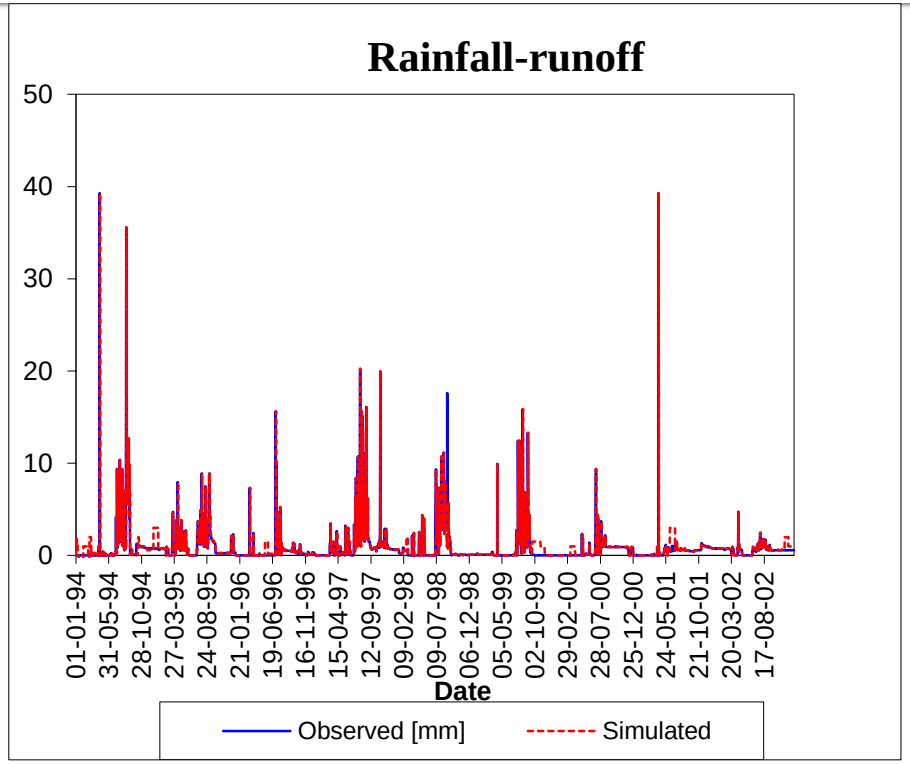


Fig. Calibration result of Genfel Catchment

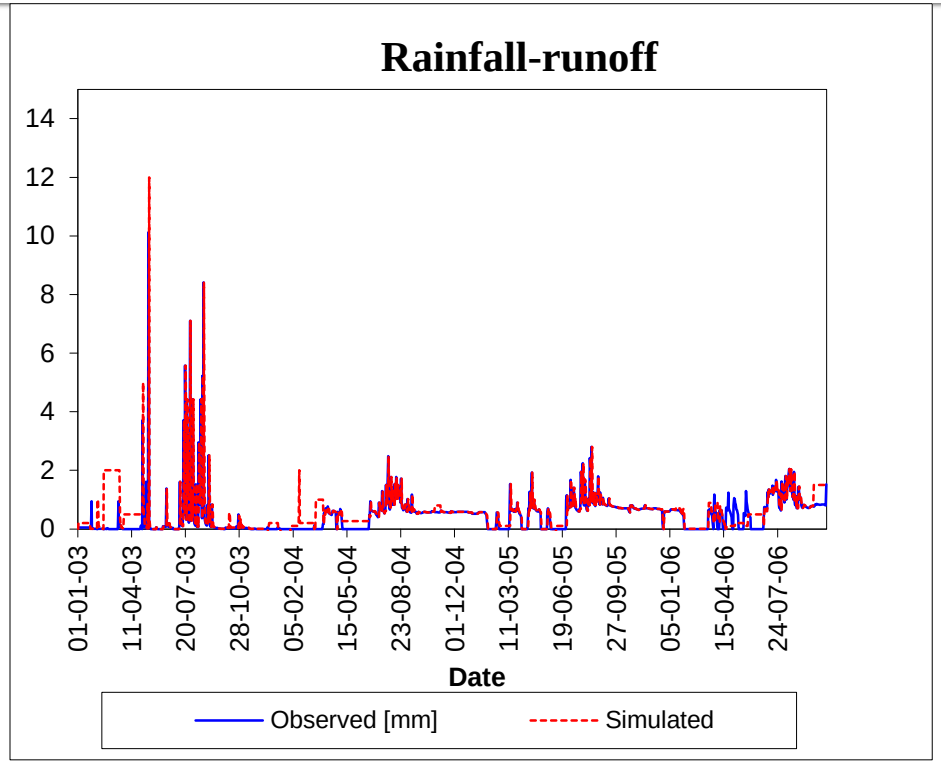


Fig. Validation result of Sulluh catchment

- model performance shows that for all catchments,
  - NS is greater than 0.7 and RV_E less than – 5% and + 5%
- Pick discharge from road by using
  - RM is 35.31m3/sec from 10km and SCSUHM is 99.62m3/sec from 42km.

...Cont.

- The probabilities that a dry-spell of duration longer than 25 and 32 days does occur at least once in a crop season are 86% and 46% respectively.
- from result it can be depicted that due to lack of sufficient amount of water there could not be good germination and emergence which is very crucial part of yield or production.
- the CWR at (Sept 21-30) was found to be 2.54mm while the RF was 0.05mm which shows that the CWR is about 50 times more than the RF

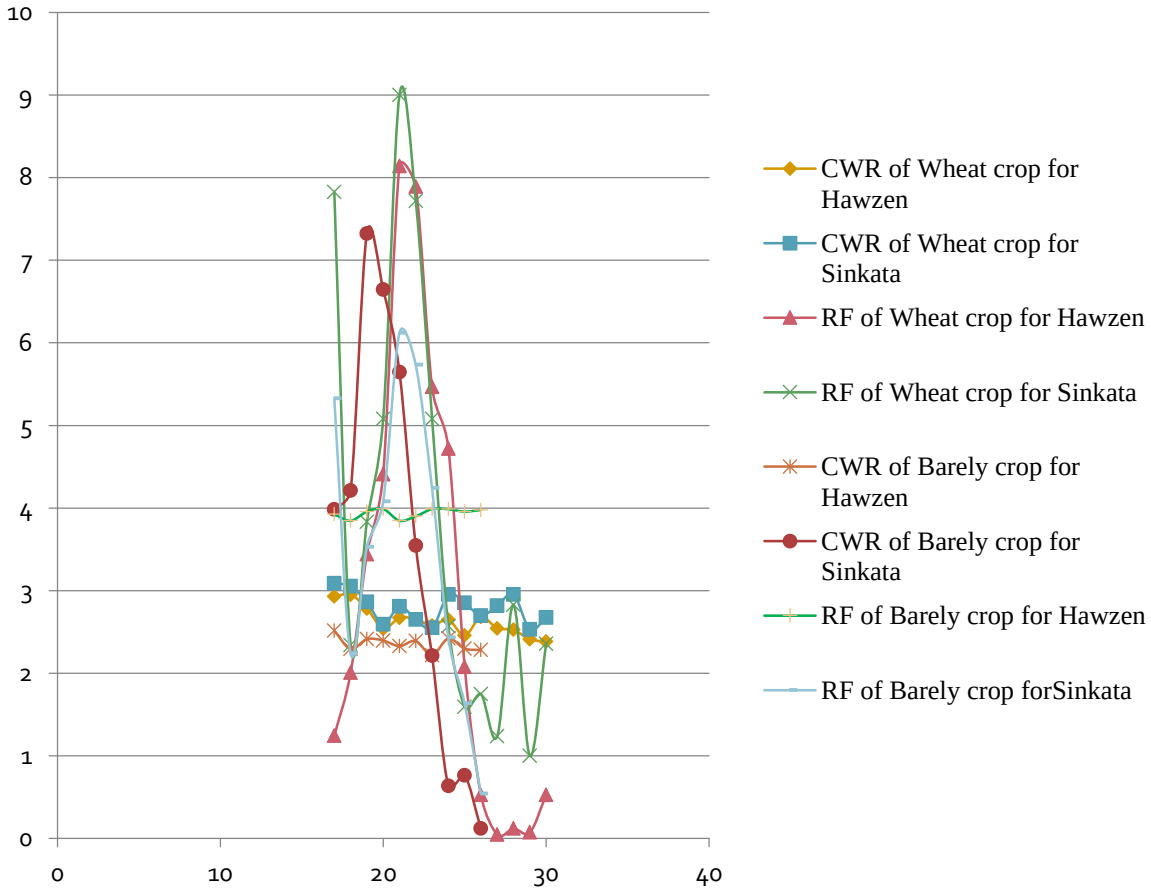


Fig: 4.13. Crop water requirement vs Rainfall for Wheat and Barely

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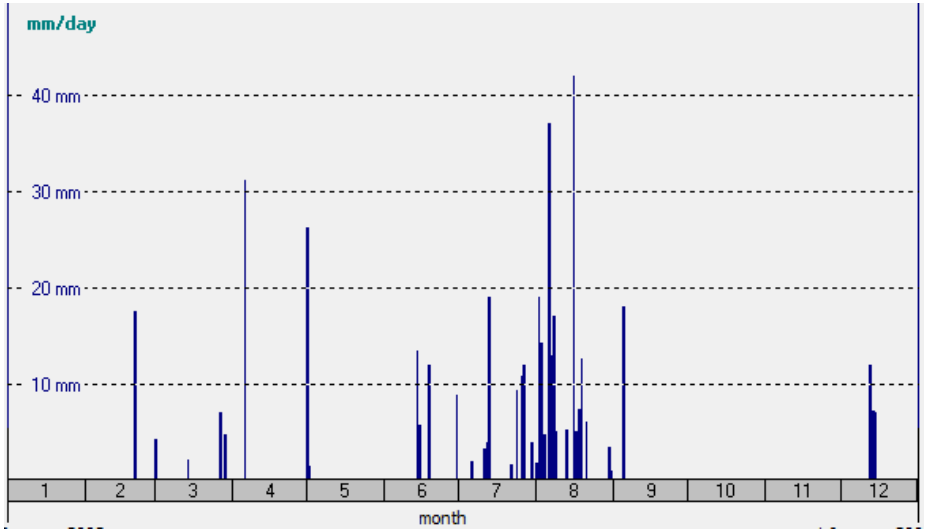
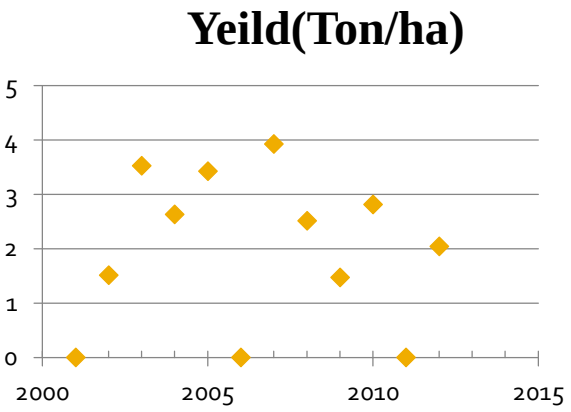


Fig: Daily rainfall distribution for minimum yield



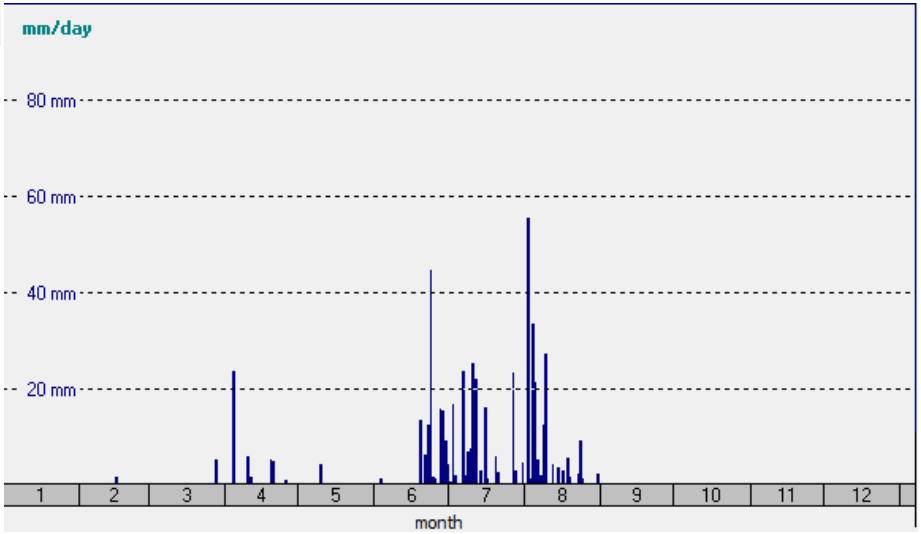


Fig: Daily rainfall distribution for maximum yield

Cont…

❖Gully formation by runoff from roads

❖Land become out of use due to erosion caused by road runoff

Cont…

❖Temporary water logging

❖Crop failure due to uneven distribution of rainfall

Cont…

- 70% of households and 65 % of the farm lands are affected by the road side runoff.
- 95 % of the farmers are willing to utilize road side runoff

Fig: Crop failure due to road runoff and uneven distribution of rainfall

Conclusion

- There are various factors affecting agricultural productivity and sustainability of farmers income as well as their consumptions.

  - Crops can be rescued from failures caused due to the uneven distribution of rainfall, resulting in a better income
  - Harvesting road runoff can minimize the damage caused by flood on farms along the road side
  - The harvested runoff can be used as a supplemental water source for alternative uses

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Recommendation

- Mainstreaming in educational system: Roads for water harvesting and multiple use
  - Filling the knowledge gap

- There should be integration between relevant institutions and authorities (ERA , MoA as well as regional and zonal line offices) in making future road development plans.
  - Operationalizing the knowledge acquired

- Awareness generation should be done to encourage farmers utilize the runoff from roads for productive purposes. Moreover, technical assistance and trainings needs to be delivered at grass-root level.

Thank You!

Rain water harvesting Experience from Tanzania

By Harold Msanya
Innovation Coordinator
ECHO East Africa Impact Center

9th August 2018

1. Using haffir to harvest water for small scale irrigation

Haffir cont…

2.Harvesting runoff from the road to water the farms

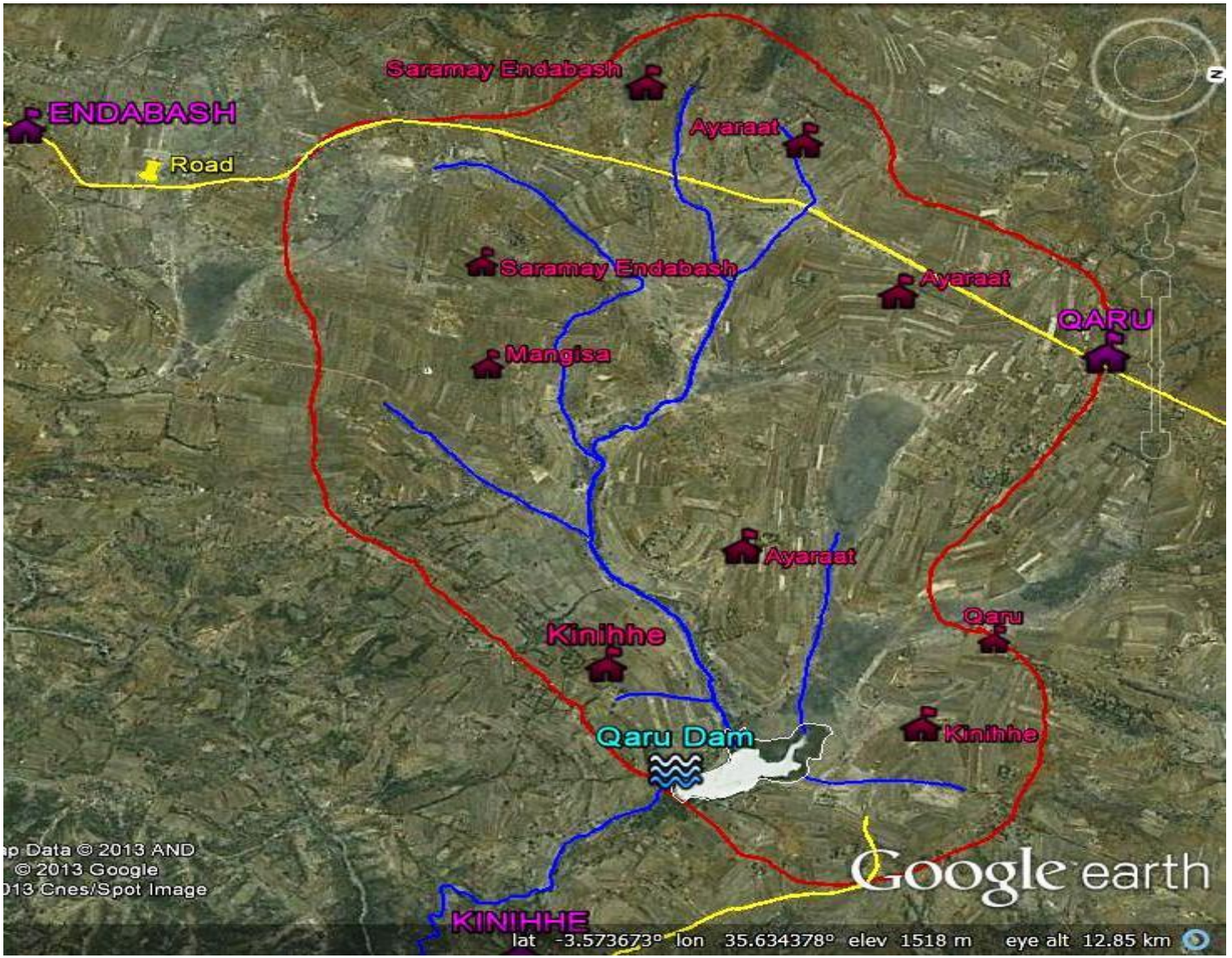
3. Soil and Water Conservation

Saramay Hill – July'11

Saramay Hill – February'13

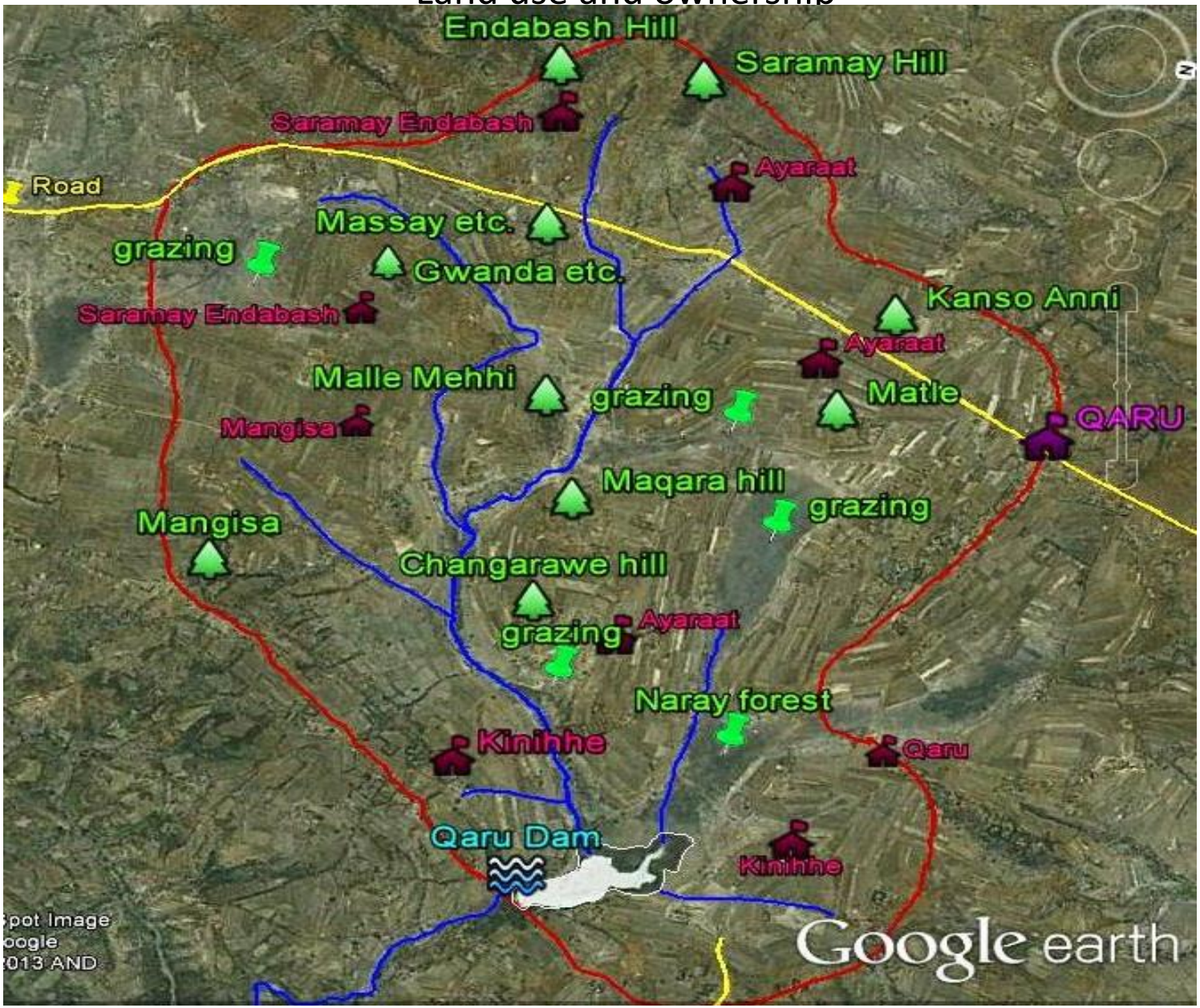
Saramay Hill Karatu district: Prior to initiation of the pilot interventions, Saramay hill was extensively used by the community for grazing their livestock and cutting of bushes for fuel and trees for housing material. Over a period of time this had resulted in extensive soil loss exposing the rocks and impervious strata. The hill was brought under protection by the Village Council since September 2011 and SWC measures implemented in the upper slopes. As a result at the time of the assessment in Feb'13, a good vegetative cover was observed.

Using Google earth map as community planning tool for SWC

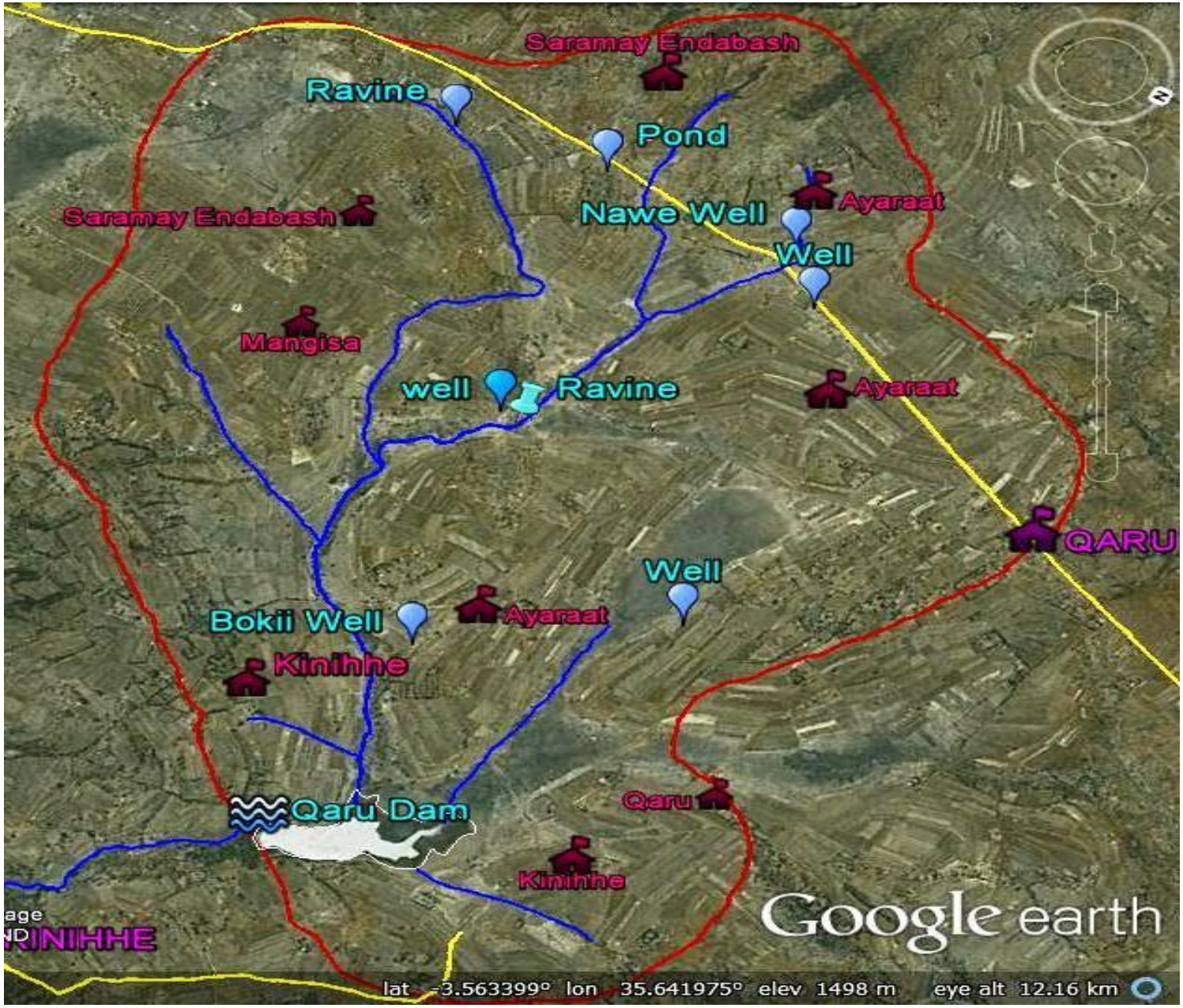


GE map of Qaru dam and catchment area (demarcated with a red line). Drainage lines are in blue. Icons represent area under different villages and sub-villages

Land use and ownership



Water sources



A-Frame