Training on

Roads for Water and Resilience

WATER HARVESTING FROM ROADS: EXPERIENCES IN TIGRAY, NORTHERN ETHIOPIA

Outline of the Presentation

1. Introduction
2. Hydrological effects of road development
3. Approaches and Techniques of Water Harvesting from roads in Tigray
4. Effects of WH from roads
5. Opportunities for up-scaling

1. Introduction

- Water scarcity is a major problem in many parts of Ethiopia.
- Road building constitutes one of the largest and most widespread public investments.
- Estimated spending in road sector in Sub-Saharan Africa: 7 billion USD per year (World Bank, 2010).
- Roads alter the surface and sub-surface hydrology.

2. Hydrological effects of road development

- Increase in erosion of local streams causing gullying.
- Sedimentation/siltation of reservoirs, farm lands, etc.
- Alter sub-surface shallow groundwater flows.
- Water logging in the upstream areas.

Water from culverts damaging farmlands in Negash area, Tigray, Ethiopia

Farmers pointing out flood level due to road development.

Water logging due to new road construction, Tigray, Ethiopia:

- *A hand-dug well which is recharged from ponding of water along road.*

Roads retarding surface runoff and sub-surface water flow.

Upstream side of the road is a potential area for shallow groundwater development.

(An example from Shire area, Tigray, Northern Ethiopia)

Rainfall triggered landslides causing road failures along Bonga-Mizan-Wach road, western Ethiopia.

Examples of major gully development in Nigeria

3. Approaches and Techniques of water harvesting from roads in Tigray

To convert the negative effects of water from roads, different efforts have been done in Tigray in the year 2013/2014 alone.

- The implementation of water harvesting from roads in Tigray has gone beyond piloting programs.
- The technologies applied are variable, depending on site condition.
- The technologies are implemented in 30 woredas of the region.

3.1 Roles of different partners in implementation

- Catalyst Research Grant holders (MU, MM, IDS): Technical input and performance evaluation.
- TBoARD: overall leader of the implementation.
- Woreda Offices: coordinating the implementation activities.
- Communities: Implementing the interventions.
- Road contractors and consultants: support the overall activity and in some cases machinery for excavations.

3.2 Implemented techniques of water harvesting from roads

- This was part of the moisture conservation program of the Tigray region.
- Over 30 woredas of the region have implemented different innovative techniques suitable to their local conditions.
- Most of the techniques were implemented by local communities with support from the local and regional experts.

Techniques implemented include:

(a) Construction of Deep trenches at downstream side of roads to recharge the groundwater and improve moisture conditions of soils.

(b) Road side ponds to recharge groundwater and enhance in-situ moisture in soils.

(c) Road side runoff diverted into ponds for surface water storage and groundwater recharge.

(d) Water from a culvert is channeled into farmlands (used for groundwater recharge and improving soil moisture).

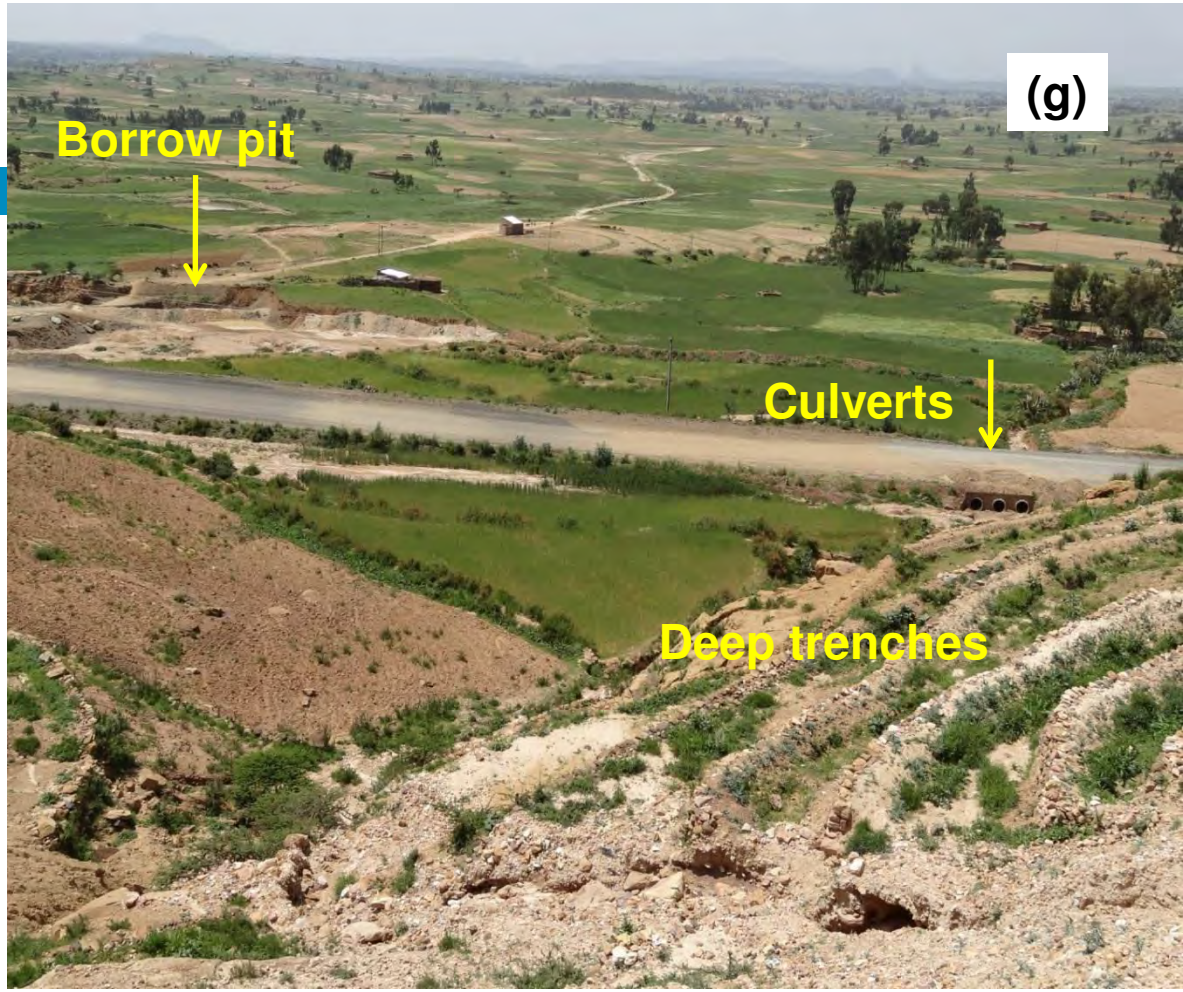
Channeling water culverts and road side drainage into farmlands

(e) Road side runoff is channeled into farmlands (used to improve soil moisture and reduce runoff to downstream areas).

(f) Water from a culvert and road side drainage channeled into a pond (for surface water storage and groundwater recharge).

(g) Runoff from a town (Freweign) is managed through a number of options:

- Construction of deep trenches to reduce runoff and enhance groundwater recharge.
- Diverting water from culverts into a borrow pit for surface water storage and groundwater recharge.



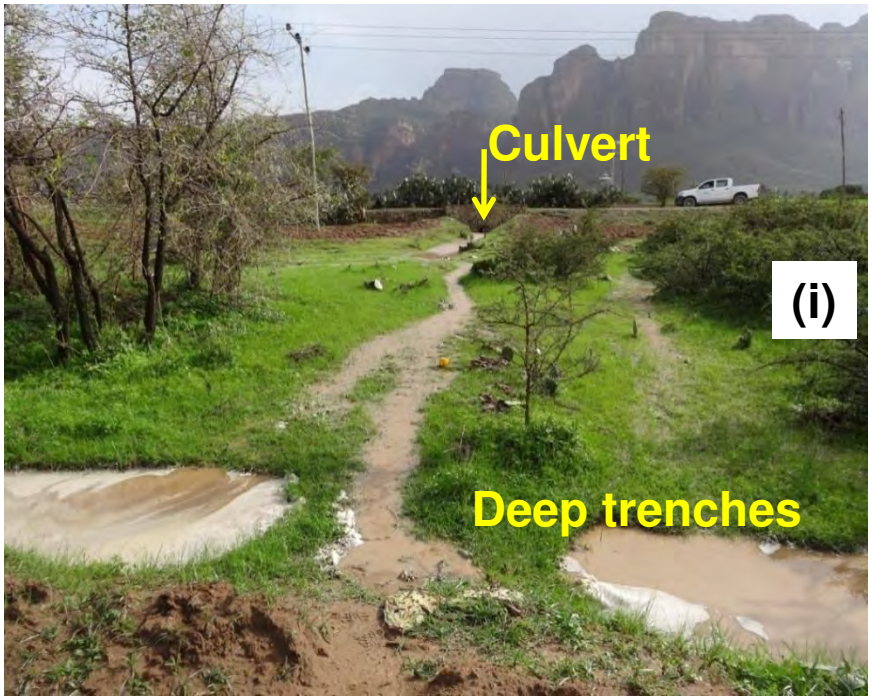
Communities which used to have been affected by flooding are saved from flooding.


Borrow pit shown in (g)

Panoramic view of channels to divert water from culverts into a borrow pit shown in (g).

(h) Water from culvert is channeled into check-dams (for surface water storage and groundwater recharge.

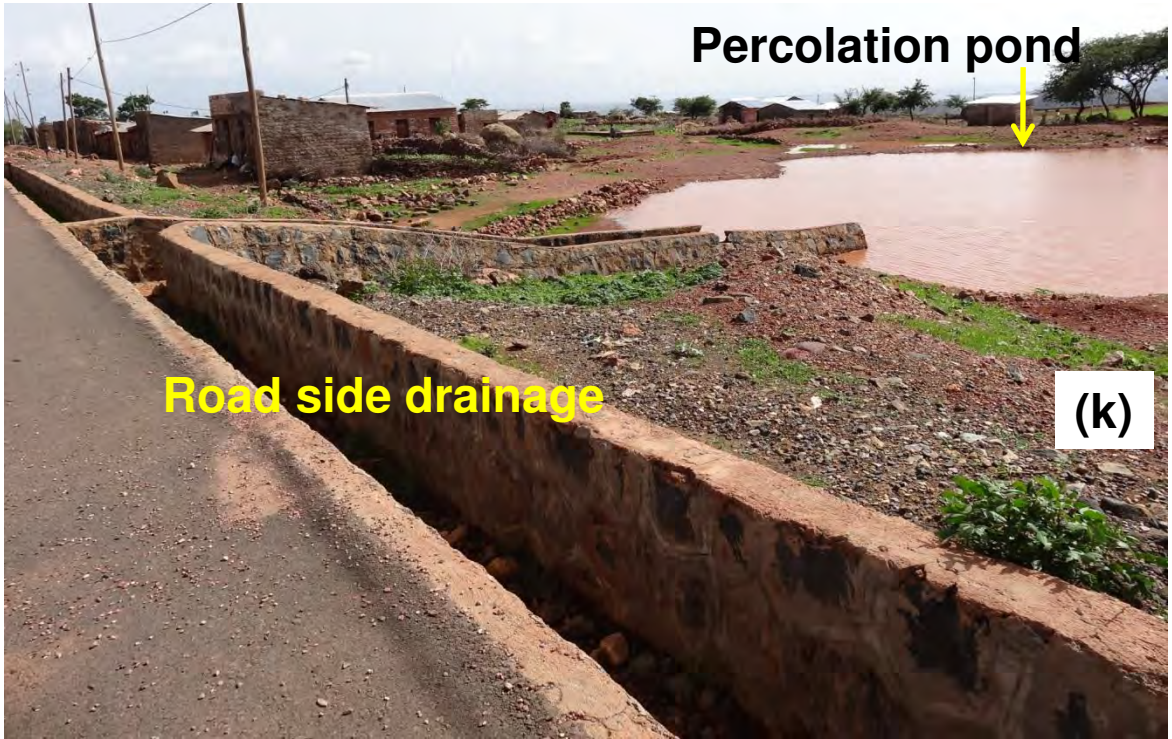
(i) Water from a culvert is spread into series of deep trenches to enhance groundwater recharge.



(j) Water from a bridge is spread into series of deep trenches and percolation ponds to recharge groundwater.

- *Hand-dug well which used to be dry became productive after the intervention.*

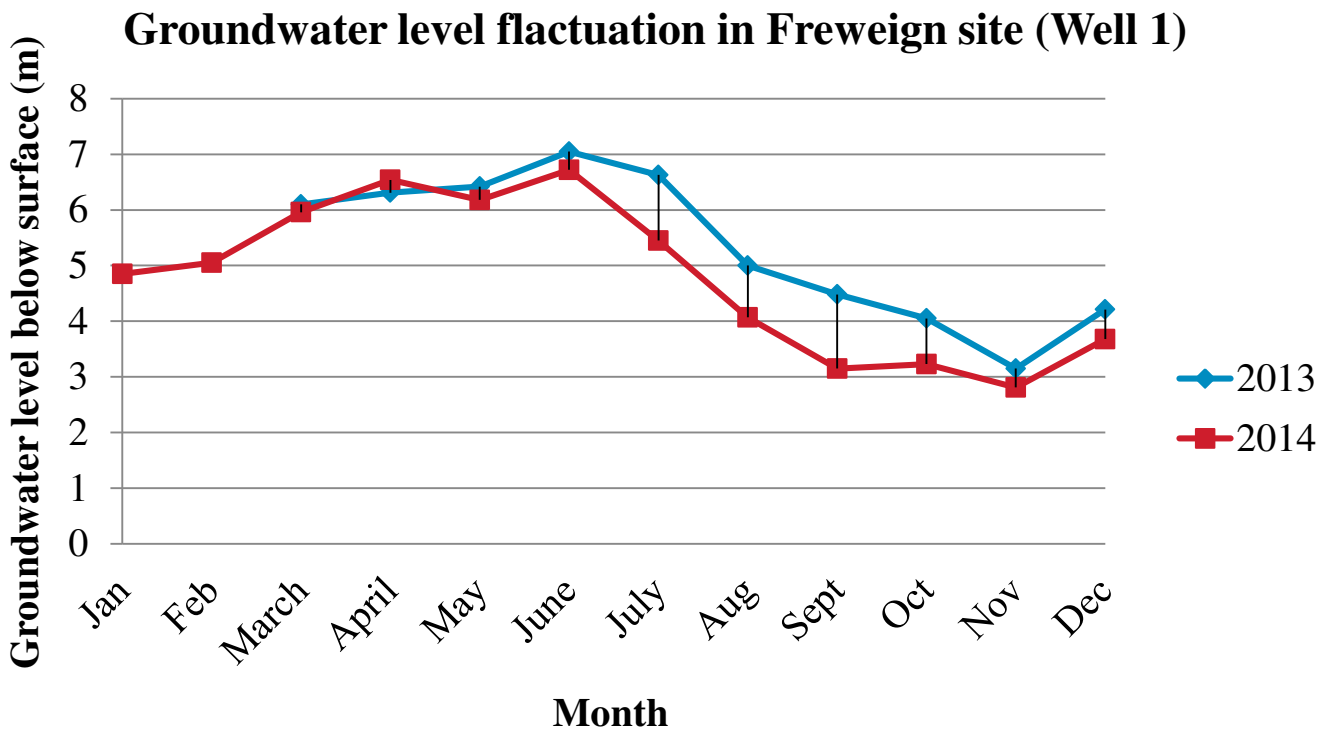
(k) Road side drainage connected to percolation pond for groundwater recharge.



Example: Effects on Groundwater Levels

Water from a culvert and road side drainage channeled into a pond:

- Enhanced the shallow groundwater.



Note: Borrow pit was used as water storage in the month of July 2014.

4. The Way Forward

- There is a strong need for the different sectors to work together for addressing the issues of roads and water.

➢ *Through establishing a strong regional and national platforms that include different actors involved in road development, NRM, and water resources development.*

- Options of water harvesting from road need to be integrated as part of road design and construction procedures.

➢ *Hence there is a need to have standard design guidelines.*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