

Landscape natural resources management with soil and water conservation practices

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Key messages

- ✓ Modelling and field work provide valuable insights on scaling potential of promising technologies for smallholder farmers;
- ✓ Smallholder farmers are able to reap the benefits associated with sustainable intensification through improved yields with a lower environmental footprint.
- ✓ Cumulative and combined effects of field conservation practices are scalable and were noted to reduce runoff and sediment load while increasing soil moisture storage and crop yield;
- ✓ Low soil moisture supply for crop production in semi-arid zones is further aggravated by in-appropriate tillage practices which accelerate rain water loss through increased runoff;
- ✓ Introduction of in-situ rainwater harvesting techniques notably ox-tied ridging and ox-ripping techniques were superior over ox-plough tillage and therefore is envisioned to bridge crop water deficits during dry spells;

Objectives and approach

Objective: Improve smallholder agricultural productivity by managing natural resources through a sustainable intensification lens.

Approach: (i) modelling impact of soil and water conservation at farm level and watershed level in Babati, (ii) establishing runoff plots in Kongwa and Kiteto, (iii) Establishing an ICT platform for empowering farmers with information on land resources, market prices and climate services.

Key results

- Cumulative and combined effects of field conservation practices are scalable and were noted to reduce runoff and sediment load while increasing soil moisture storage and crop yield (**Figure 1**).
- The engagement of farming communities in the research processes to a large extent can improve decisions made by small-scale farmers on the selection of technologies as well as scaling options.
- The use of in-situ rainwater harvesting with animal powered implements notably ox-ridging and ox-ripping techniques can result in increased maize grain yield remarkably despite low and erratic rainfall experienced in semi-arid regions (**Figure 2**).

Significance and scaling potential

- Central regions of Tanzania is endowed with high number of livestock particularly cattle implying that deliberate efforts are required to fully exploit available resource through engagement of farming communities on the use of animal oxen drawn tillage implements that can improve soil moisture.
- Farmers spend most of the time on their farms and phones help them in linking up the digital divide by communicating with agro-vet shops, seeking information about types of seeds and fertilizers to be used given the nature of the season as well as market prices. Africa RISING in collaboration with NAFKA are exploiting this option to scale up viable and promising technologies.
 - To maximize the benefits from research outputs, a strategy to scale-up and scale-out the results is essential in order to disseminate and transform project findings from outputs into beneficial outcomes with impact for stakeholder communities including input dealers, millers, seed suppliers and smallholder farming communities. The use of the mobile phone through ICT platforms is one of the most game-changing avenues (**Figure 3**).

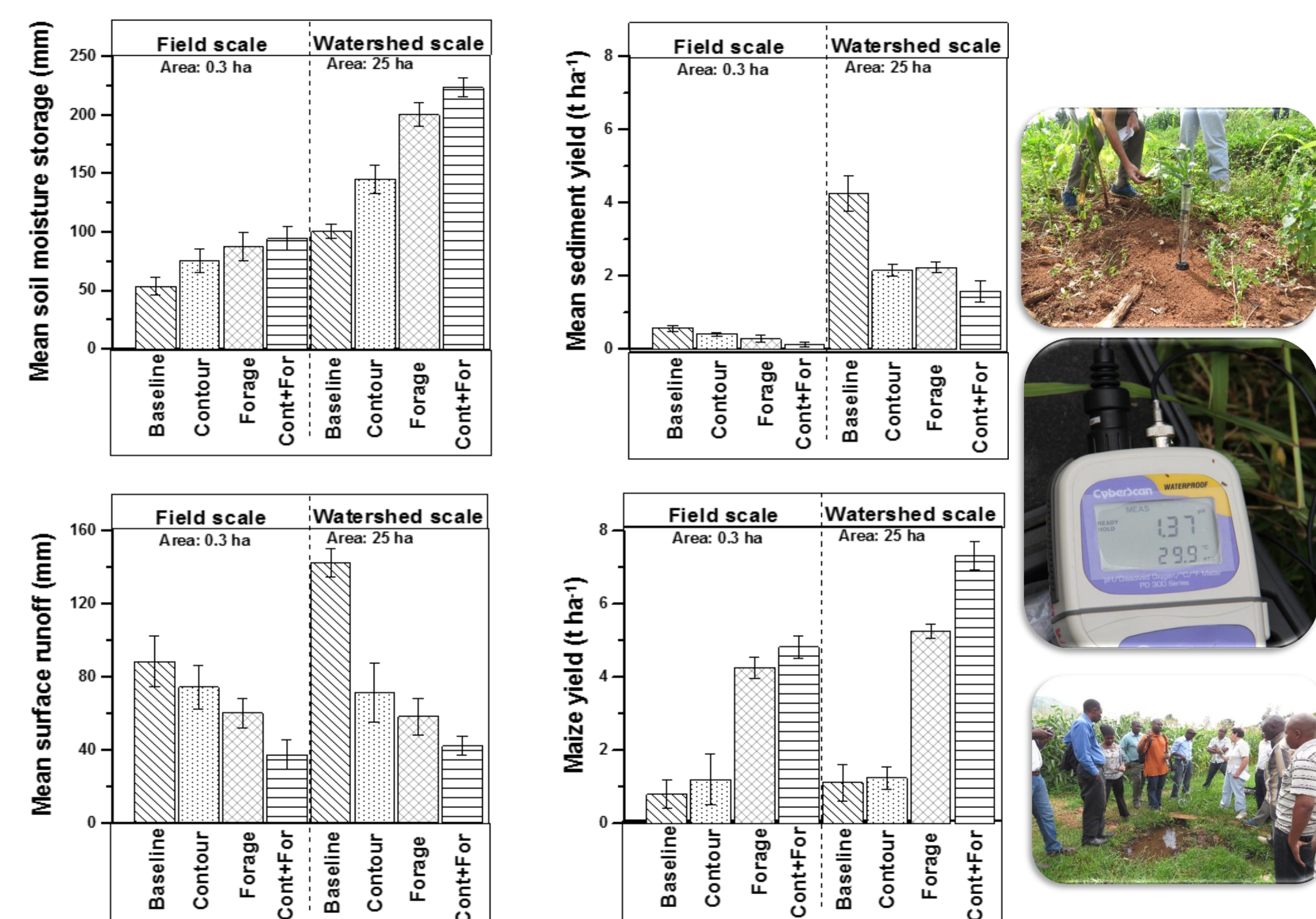
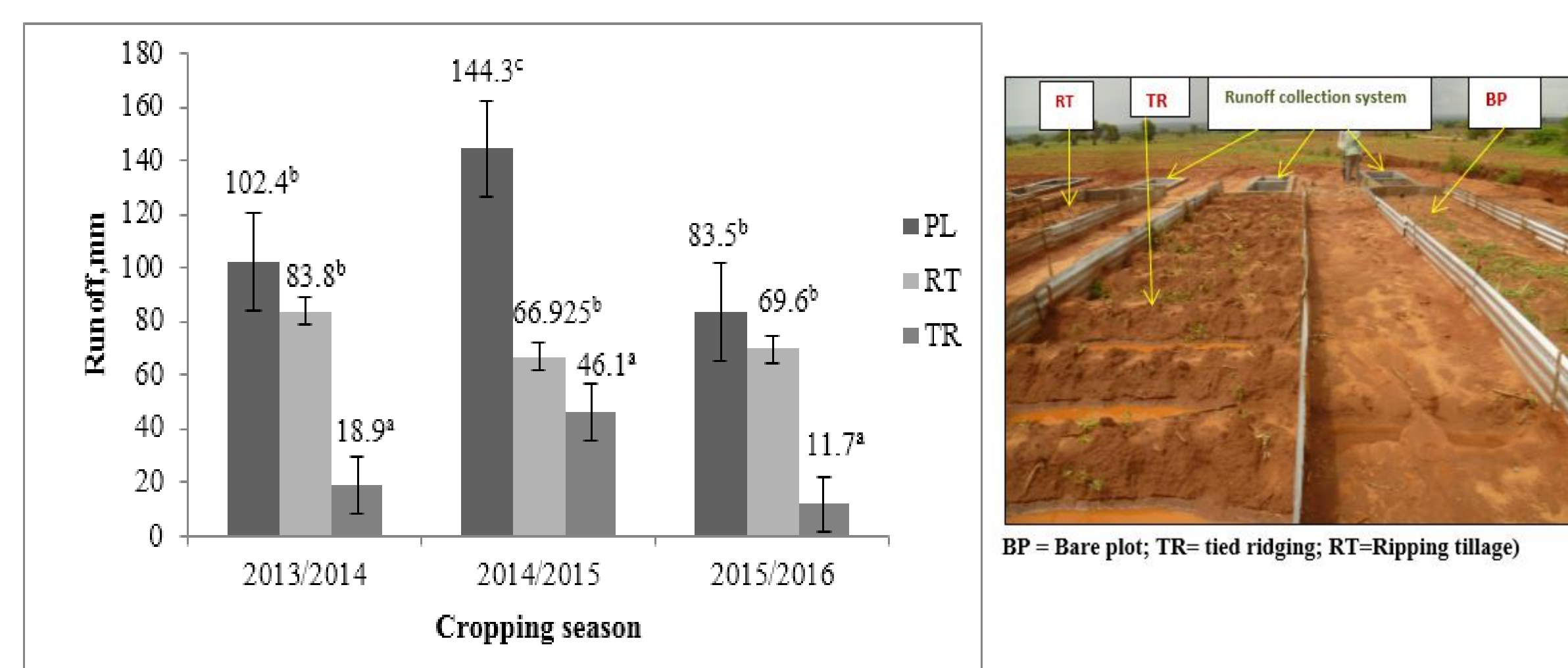


Fig.1: Farm scale and watershed scale fluxes interactions under varying management options.



PL = Conventional ox-ploughing; RT = Ox-ripping; TR = Ox-ridging. Means with different superscripts letters in the same cropping season are significantly different at $P < 0.05$ using DMRT.

Fig. 2: Variation of runoff under varying tillage options. Picture: Runoff collection system immediately after planting .

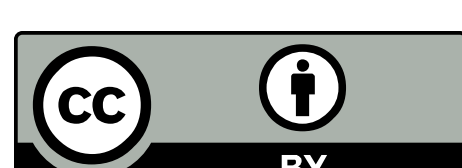


Fig. 3: Empowering farmers with actionable information on the state of their land, market prices and climate services.

Partners:



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