Landscape features

Impact: Crop yield

Reference 4

Abera, W; Tamene, L; Tibebe, D; Adimassu, Z; Kassa, H; Hailu, H; Mekonnen, K; Desta, G; Sommer, R; Verchot, L 2020 Characterizing and evaluating the impacts of national land restoration initiatives on ecosystem services in Ethiopia LAND DEGRADATION AND DEVELOPMENT, 31(1), 37-52. 10.1002/ldr.3424

Background and objective

Ethiopia is one of the countries with huge investments in land restoration. Tremendous land management practices have been implemented across the country since the 1970s. However, the spatial distribution of the interventions has not been documented, and there is no systematic, quantitative evidence on whether land restoration efforts have achieved the restoration of desired ecosystem services The specific objectives of the study include 1) collate and map the major landscape restoration interventions in Ethiopia; 2) review, synthesize, and map literature related to the impacts of land restoration practices across the country that are published in peer-reviewed journals; and 3) investigate the impacts of landscape restoration efforts on landscape ecosystem services in the country. Here, results on crop productivity are reported.

Search strategy and selection criteria

The authors collected peer-reviewed papers that have investigated the impacts of land restoration in Ethiopia until August 2018. They used the Web search function involving keywords ‘landscape restoration in Ethiopia’, ‘impacts of landscape restoration in Ethiopia’, ‘soil and water conservation practices in Ethiopia’, ‘impacts of soil and water conservation practices in Ethiopia’, ‘sustainable land management in Ethiopia’ and ‘impacts of sustainable land management in Ethiopia’. Authors collated peer-reviewed publications until August 2018. The authors collected peer-reviewed papers that have investigated the impacts of land restoration in Ethiopia until 2018.

Data and analysis

For comparing the effect size of land restoration intervention types, authors used the nonparametric weighting function of case-studies calculated as an inverse of the pooled variance. The weighted response ratios were then used to obtain the mean effect size for each intervention and ecosystem service. The bias-corrected 95% confidence intervals (CIs) of the mean were generated by a bootstrapping procedure. For convenience, the effect size was converted from the natural logarithm to percentage using the equation (eRR − 1) * 100. This provides the actual response of the intervention in percentage.

Number of papers	Population	Intervention	Comparator	Outcome	Quality score
103	Degradated landscape across several agroecology zones	1. Contour bunds; 2) Terraces; 3) Vegetated contour bunds	No treatment, before treatment	Metric: Crop production; Effect size: Ratio of the considered metrics in the intervention to the considered metrics in the control	62%

Results

- The impact of fanya juu on productivity was not significant.
- Bunds reduced productivity slightly (effect size of −9.4%).
- A significant positive effect was found of combined bunds and biological interventions on productivity (mean effect size = 170%, with a range of 97–318%).
- NA
- NA

Factors influencing effect sizes

- NA : NA
- NA : NA
- NA : NA

Conclusion

For productivity, the highest effect was observed from bunds + biological intervention followed by conservation agriculture practices, with 170% and 18% increase, respectively. The other interventions (bunds, fanya juu, and biological) reveal negligible effect on productivity. This indicates the need for developing integrated land management practices that enhance multiple ecosystem functions and/or identifying appropriate practices and targeting where they can generate maximum benefit.