Rehabilitation of Degraded Lands through Agroforestry Systems in Rajasthan and Odisha, India

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Introduction

Land degradation is a global threat and leads to loss of soil volume, nutrients and biodiversity; decreased reservoir capacity, increased maintenance cost of irrigation systems, declined/lost crop productivity, and ultimately affects livelihoods. This poster presents lessons learnt on the extent to which the degraded lands can be rehabilitated through agroforestry interventions.

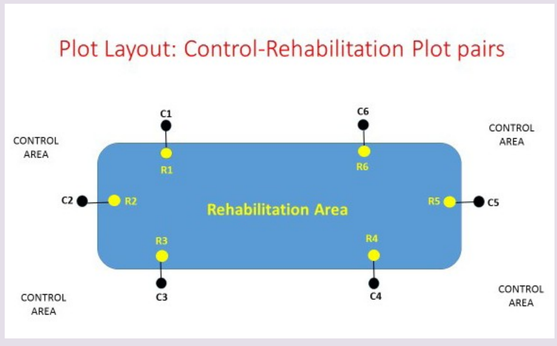
Intervention

The rehabilitation interventions were carried out in Odisha (Angul and Dhenkanal) and in Rajasthan (Udaipur, Bhilwara and Jaipur), India from 2005 to 2007. The impact assessment was done in 2014 and 2015.

Interventions included:
Biological - assisted regeneration of natural vegetation in degraded areas and seeding with local tree and fodder species
Social - fencing to protect vegetation from grazing, and limiting bio-mass harvesting
Physical - making small check dams and anicuts

The control and rehabilitated fields were compared using the Before and After in Control and Impacted (rehabilitated) Plot (BACIP) model with actual measurements on soil physical, chemical and hydrological properties, and vegetation.

Most of the lands in the study areas were severely degraded and had very low biodiversity, vegetation cover, soil fertility and productivity. They had coarse texture, shallow soil depth, variable infiltration rates and very poor nutrient status.

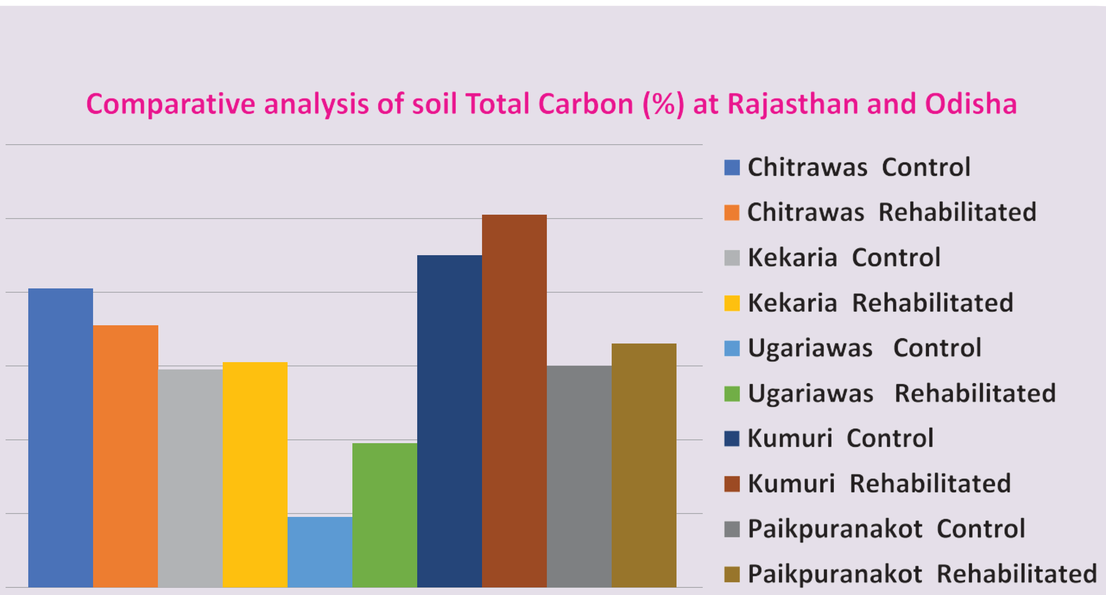


Impact of Rehabilitation After 7 years

Soil properties showed only a small change, confined to slightly to moderately degraded areas. There was a slight increase in C, N, P, EC, Al, and Ca.

A noticeable improvement in vegetation cover was seen, both in species diversity and biomass, and in hydrological parameters. Biomass (type and amount) and vegetation index were significantly higher in rehabilitated fields with mixed vegetation (trees, shrubs and grasses), whereas control fields had scrubby vegetation/grasses.

Communities living downstream have also benefitted from improved water availability. For example, Udaipur has adopted sugarcane cultivation, while Bhilwara is now intercropping orange trees with wheat.



Control (foreground) and Rehabilitated area at rear (hill) of Ugariawas (a) and across the stone fence of Kekaria (b), sites Rajasthan

Conclusion

Rehabilitation efforts using only physical means have lesser impact in improving degraded lands as compared to social and biological means, such as planting trees.
Improvement in soil quality, especially in chemical properties, was very low and insignificant, at least for the duration of the effort.

Use of rehabilitated land for agricultural purposes would however, require adequate input application.

Results indicate the high potential of agroforestry systems to restore the productivity of degraded lands through assisted regeneration of native vegetation and planting of trees, especially fodder, fuel and multi-purpose species.

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