Ecological Restoration of Common Pastures through a Community Led Multi-Stakeholder Partnership

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Ecological restoration of common pastures through a community led multi-stakeholder partnership

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Introduction

Kalyanpura watershed, spread over 5,175 ha area with 16 villages, is situated in the drought prone district of Bhilwara in Rajasthan. Prior to project initiation, only 27% of the area in Kalyanpura was under agriculture and the balance was mainly accounted for by village commons used for livestock grazing and fuel wood collection. Although the area receives an average annual rainfall of 700 mm, the undulating landscape, shallow soil cover and the absence of any soil moisture conservation resulted in high runoff and degraded commons. Recurring droughts and absence of irrigation facilities made farm based livelihood vulnerable to seasonality, especially so to extreme weather episodes. In this context, a collective initiative to revive degraded commons and conserve water was critical to sustain livelihoods and protect the native biodiversity of area.

ITC Limited responded to these challenges by launching a unique multi-stakeholder partnership in 2007. It brought together the Government of Rajasthan, ITC Limited, and the Foundation for Ecological Security (FES - an NGO) with the objective of restoring the common pastures in order to increase availability of and access to natural resources, especially for the poor. This initiative gave special focus to strengthen village community based governance of commons through rules, regulation and systems evolved by grassroots institutions. In the project period, 1.55 lakh CMT of *in-situ* soil moisture conservation work was undertaken, 77 water harvesting structures were constructed, and 1.85 lakh saplings were planted on 1,141 ha in 17 pastures, in addition to the formation of pasture protection committees.

This paper presents the impact of these initiatives on biodiversity, soil properties and governance of the common pasture lands in the watershed.

Materials and Methods

Base line biodiversity study of the watershed was carried out in 2007. After undertaking ecological restoration under watershed management, a follow-up study was carried out in 2010 to assess the impact of these interventions. The following methodology was used for conducting these studies:

- With the help of GIS software, satellite image of the area was classified into different land uses. The land-use map of the watershed was divided into 86 grids of 30”x 30” dimension each. More than 5% of the total grids in each micro-watershed were sampled (Fig 1)
- The assessment of biodiversity was carried out through grid based sampling, within which plots and transects were used for quantification of the floral and faunal species, besides using opportunistic search. A minimum of 5% of the area was sampled in each land use.
- The higher plants were sampled at every 200 m interval all along the transect with varying sizes of plots such as; 10 m radius plots for trees, and 8 m radius for shrubs and climbers. For herbs and grass, five quadrats of 1 x 1 m were nested within the larger plots, with one in the centre and one each of the four corners. Biomass was estimated by cutting and weighing.
- Listing of birds was done by using area search method (Dieni and jones 2002) and quantified using point count method (Bibby *et al.*, 1992), where species and their abundance was recorded at a distance of 40m (for agriculture and grasslands) and 30 m (forest) from a point, at every 100 meters.
- From all land uses within each grids, up to 1 kg soil samples were collected for testing physical and chemical properties

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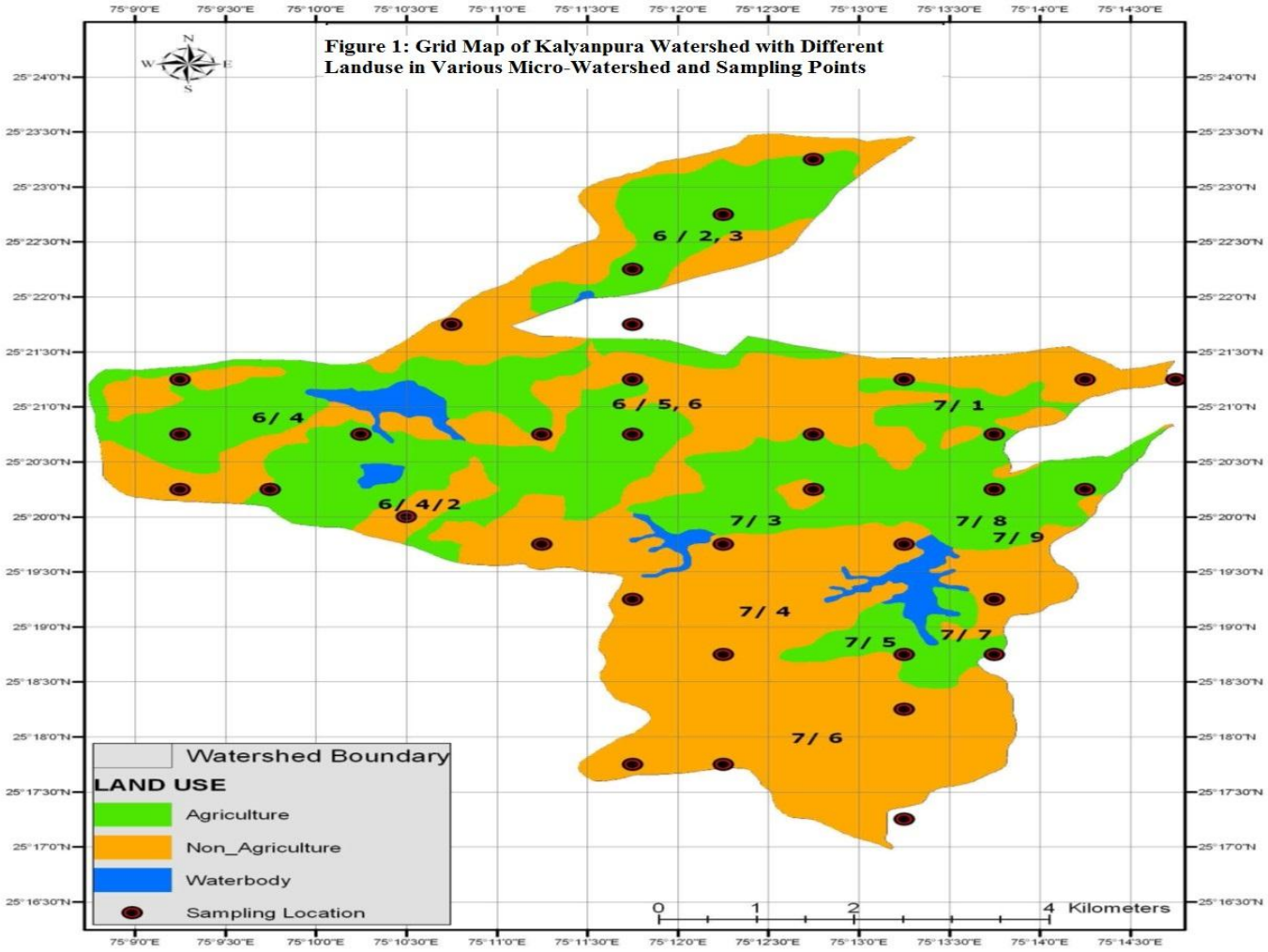

Results and Discussion

Changes in biodiversity status: In just three years, substantial changes in species richness, density, diversity and regeneration were observed (Table 1). On the whole, post-intervention quantification inventories showed that among higher plants, 74 species belonging to 60 genera and 27 families were recorded, of which 24 were herbs, followed by grasses (21), shrubs (9), trees (17), and climbers (3).

Pasture lands recorded the maximum richness of 54 species compared to other land use like agriculture or forests. Similarly, regeneration was found higher in pasture lands than that of the forest lands. In the pasture lands, among the 10 tree species recorded, mature trees comprised three species, while regeneration was represented by six species. In contrast, no mature trees were recorded in the forestland, while regeneration was represented by only two species of the eight tree species documented in this land use.

Among fauna; birds, which are very good pollinators, seed dispersers, and biological pest controllers, had shown a doubling in their species, from 40 to 86, including migratory birds. Post intervention survey also recorded 13 butterfly species (being one of the main pollinators) and 2 species of spiders (which are excellent biological controllers of insect pests)

Improvement in soil properties: In a span of 3 years, the area witnessed noteworthy improvement in soil property. The soil organic carbon increased from an average of 0.37 to 0.49 per cent. The consequent increase in organic matter prompted increase of microbial activity from an average of 5.33 pkat/g to 7.12 pkat/g in the area. Electric conductivity declined by about 0.056 ds/m, further contributing to improvement in soil quality. The availability of major nutrients like nitrogen (332.4 to 477.5 ppm), phosphate (22.49 to 23.87 ppm) and potassium (351.07 to 366.28 ppm) has also increased in the region.

Table 1: Change in the floral diversity of the area

Parameters	Unit	2007	2010	Per cent Change
Canopy Cover	Per cent	10.00%	25.00%	150%
Tree Density	Trees / Ha.	105.00	480.00	357%
Dominance (Trees)		24.80	99.00	299%
Dominance (Shrub)		32.44	100.00	208%
Frequency (Trees)		14.40	99.00	588%
Frequency (Shrubs)		17.60	101.00	474%
Species Diversity (Trees)	Simpson's Index	0.28	1.91	582%
Species Diversity (Shrub)	Simpson's Index	0.53	0.76	43%
Species Diversity (Herb/ Grass)	Simpson's Index	0.19	1.69	789%
Regeneration	Sapling / Ha.	320.00	508.00	59%

As per the 2010 survey, it was observed that the organic matter stood at 4.57 tons/ha and the CO_2 sequestration in the soil was found to be 6.86 tons/ha. Therefore all the pasture lands together have sequestered carbon to the tune of 1454.2 tons in this watershed. Restoring vegetative cover on degraded common lands has thus proven to be a promising solution to mitigate the adverse impact of climate change through sequestering of atmospheric carbon.

Governance of commons: This partnership initiative began with reviving the institutions of collective actions. The pastures of the project area too would have faced the same tragedy of the commons but for a unique initiative of the project implementing agency (FES) - social fencing through 17 Pastureland Committees' formed for the purpose. The general body of these committees had a representation from all the adult members of the village. For the purpose of addressing governance at a larger level, these committees were federated at watershed level.

These people's institutions formulated rules and regulations for the protection of pasture lands, including removal of encroachments, protection against grazing, illicit felling, lopping, pollarding of trees, fire, and diseases. To ensure that villagers adhered to these governance practices, the committees imposed fines on offenders found guilty of harming the pastures in any manner. They were also charged with the responsibility of life-saving watering during dry spells. The buy-in of the villagers was largely ensured through equitable benefit sharing arrangements for the fodder produced in the plots that permitted them to cut and carry head-loads.

Conclusion

Though eco-restoration is a long-term process, the encouraging results of this intervention prove what is possible even in a short span of time, if a combination of field-specific approaches is implemented in a rigorous manner. Community participation and strong institutional backup is critical for success as it involves a lot of negotiations within the community over the critical choices depending on the core (ecological) characteristics of the resources and challenges posed by the changing economic-socio-cultural context within a region.

Given this, the success of this unique multi stakeholder partnership highlights an important point: the choice of a management strategy that involves identifying appropriate mix of technologies, institutional arrangements, and preferences over use and users of the commons can not only nurture and revive biodiversity but can also develop a very strong a climate resilient village ecosystem.

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