

Strengthening village economies through Agroforestry innovation with biochar for increased biodiversity and livelihood options in middle hills of Nepal

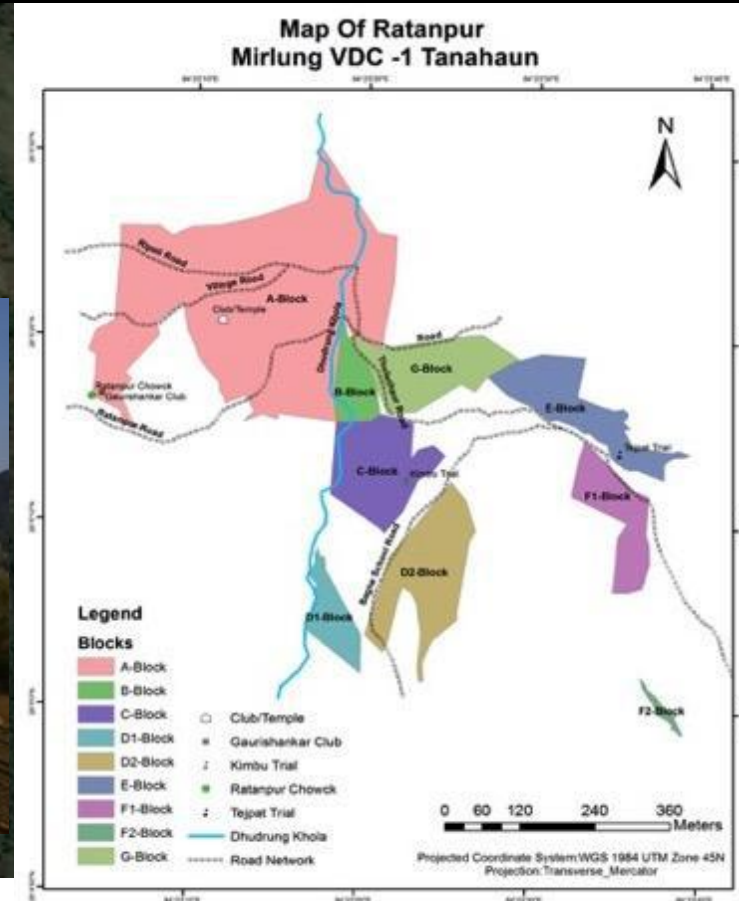
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Ratanpur region

Land slides swept away traditional irrigation cannel and many of the ancient terraces lay barren due low water availability, and exposed to erosion, low productivity and food insecurity as a result rural youth migrated, so started planning for private reforestation blocks



Eight pillars of interventions for strengthening village economies associated to Forest gardening

1. Private reforestation on barren lands
2. Restore ecosystem services (water, biodiversity and soil organic matter) and control erosion)
3. Develop new organic product lines from forest gardens like essential oils, dried fruits and silk.
4. Create new income opportunities in the village and thereby motivate migrated youths to return home.
5. Production of biochar for organic biochar based fertilizer, nutrient cycling, soil fertility and carbon sequestration.
6. Establishment and operation of community-owned essential oil distillation unit to augment households income.
7. Link to an international carbon credit scheme selling
8. Organize international agro tourism and workshops

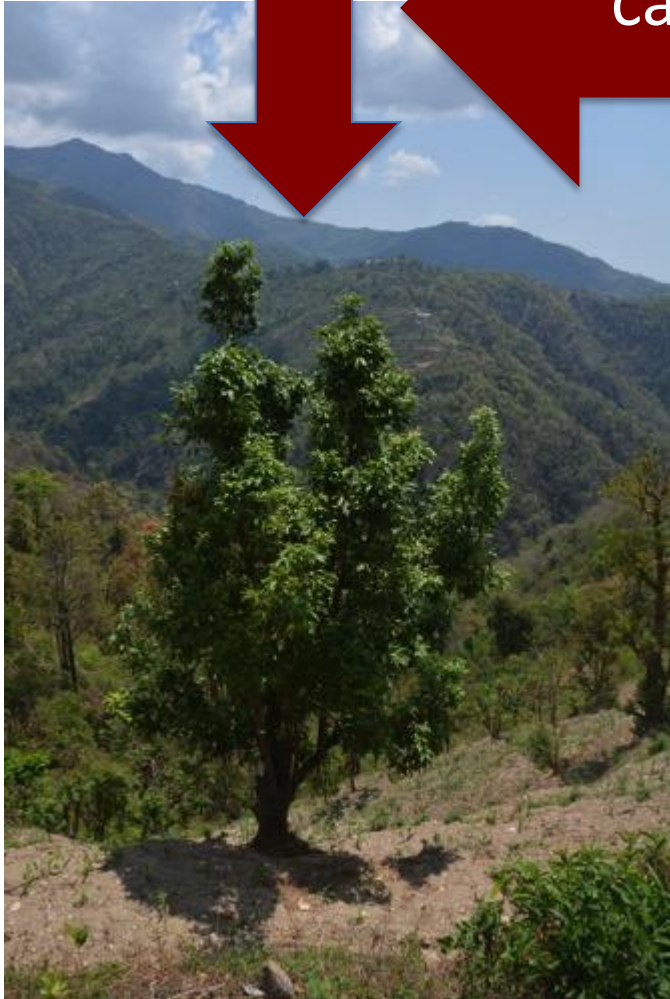


90 kg CO₂ per year

90 kg CO₂ per 700 km

carbon credits

at 130 g CO₂ per km



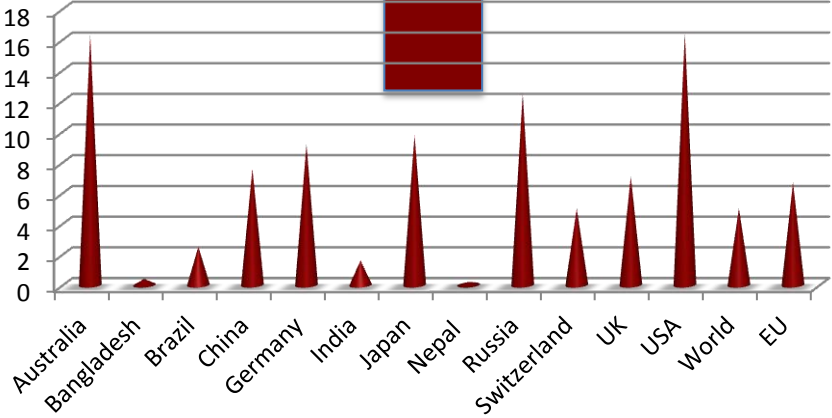
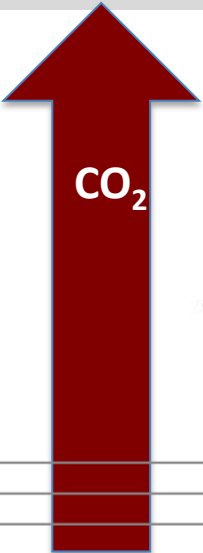
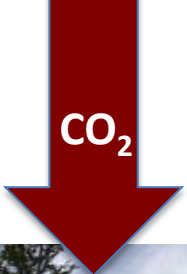
10 year average of a cinnamom tree in Nepal



link the local to the global community

forest garden
600 mixed fruit trees
8.1 tons CO₂ per year

40 persons in Nepal
8 persons in India
1 person in Germany



app. 300 mixed forest garden trees per ha, in Nepal

CO₂ emissions per capita in tons per year

world bank 2013, <http://data.worldbank.org/indicator/EN.ATM.CO2>

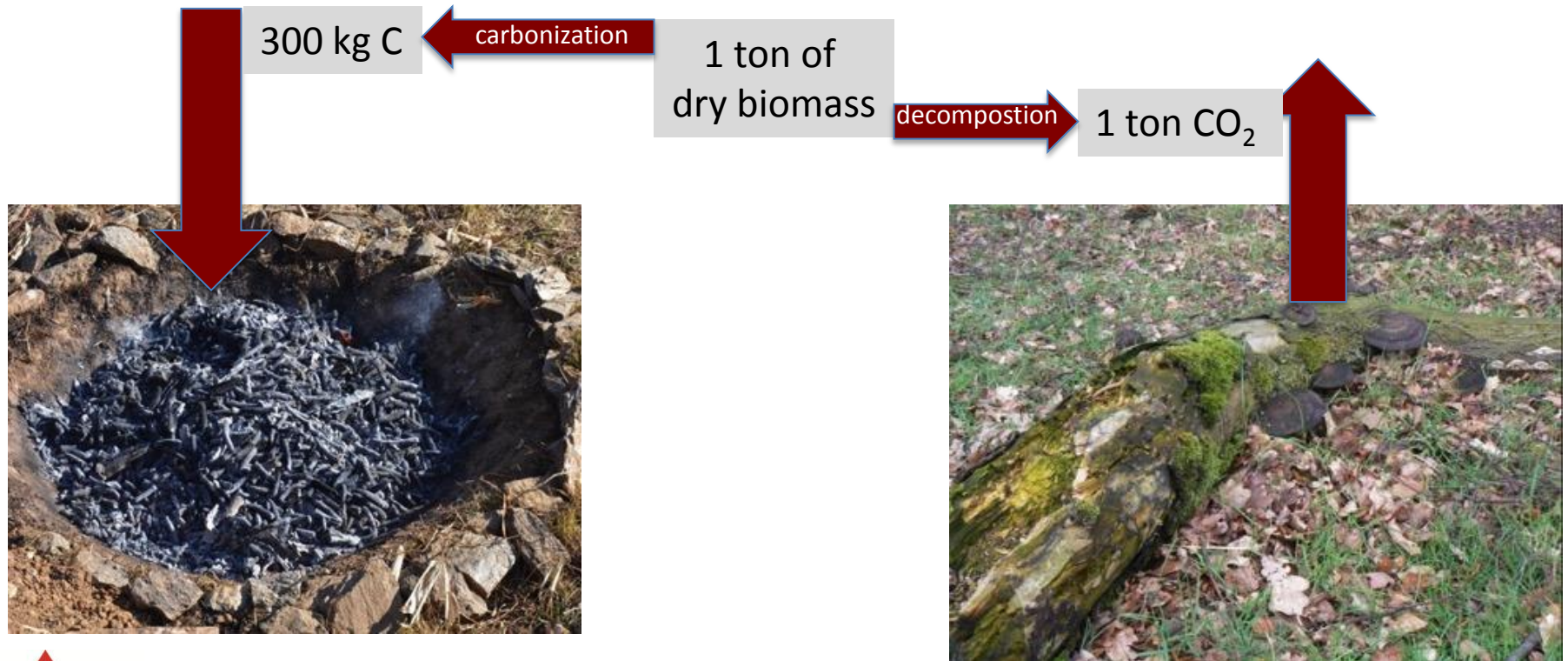


make the carbon visible

demonstrating the carbon content of a tree or waste material transforming biomass into biochar



1 ton of biomass into 300 kg of pure carbon instead of 1 ton CO₂ explaining the local carbon cycle



charging biochar with cow urine to make an organic fertilizer



Planting of the trees involves the whole village including marginalized and disadvantaged communities



11 black smith families at the lower watershed are allocated CF land for income generation

40 % are dalit and indigenous households supported

Women from *gharti*, *dalit* and indigenous magar are taking lead in management of afforestation and nursery



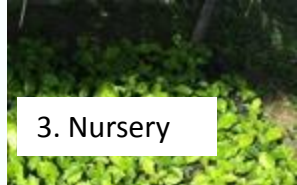
Elements to promote community ownership

1. Re-cultivation of barren land that turned into generating income - **ginger** (1 kg seed produced 8.2 kg in 10 month) in one year
2. **Water** pond in dry season
3. Income from women group run **nursery** of high value commercial tree species (Paulownia, budda chitta mala, moringa, cinnamon)
4. Plantation activity linked to **essential oil distillation**- increase of economic productivity.
5. Creation of well paid **jobs** in the village- pitting, planting and management and oil distillation
6. **Carbon payment**- DFO distributed carbon money to tree planting farmers of first year

1. Ginger in between tree line



3. Nursery



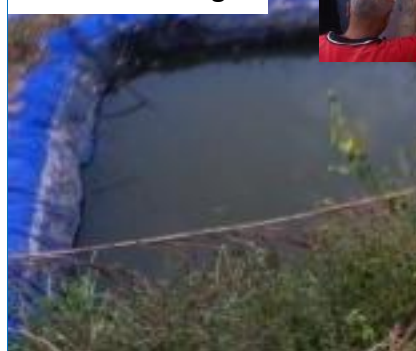
4. Distillation unit



5. Job opportunity



2. Water storage



6. Carbon payment



Challenges for mainstreaming and their potential solution

Challenges

1. Increasingly unpredictable monsoon rains are making annual cropping more prone to crop failure.
2. Excessive use of chemical fertilizer has exhausted soil fertility level
3. Dependency on buying fossil fuel for processing of forest products
4. There could be a chance of dying planted seedlings because of drought and irregular rainfall
5. Because of declined productivity, rural youth, basically from poor and marginalized families have migrated for jobs in urban cities and abroad and women suffered.

Potential solution for scaling up

1. Diversified legume mixed high value Agroforestry cropping
2. Urine biochar organic fertilization that replaces chemical fertilizer
3. Utilizing waste energy from biochar making kon-tiki during oil processing
4. Replenishment or construction of soil water pits/ pond
5. Creating job locally with increased economic activities- agro-tourism, carbon trading and new forest products development

Recommendations

- Working through local Community Forest User Groups
- Mobilization of women sub-groups
- Joint adaptation planning
- A triad system (a group of three households)
- Implementation in collaboration with local partners
- Create incentive mechanism (such as carbon payment, ecotourism etc) for local motivation
- Remove legal barriers for forest gardening in private lands.
- Learning and sharing with other communities for scale up
- Link to business enterprise



Combining biochar production with essential oil distillation



Pilot test results:

- 8 kg of cinnamon leaves:
- 50 ml of essential cinnamon oil
- 300 liter hot water




forest garden after one year

banana, paulownia, cinnamon, michaelia, black lentil, ginger



Success is the most convincing argument for up-scale



A landscape photograph showing a grassy hill with several trees. The foreground is dominated by tall, dry, golden-brown grasses. In the middle ground, there is a large, spreading tree with a light-colored trunk and dense green foliage. Other smaller trees and shrubs are scattered across the hillside. The background shows a hazy, overcast sky with soft, diffused light. A semi-transparent white rectangular box is overlaid on the lower half of the image, containing the text.

Thank you and please share your comments!