Progress Report

Title: Assessing recovery of large rainforest trees and carbon storage in ecologically restored degraded rainforest fragments
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Duration: 14 Feb 2017 to 13 Feb 2018
Report date: 31 Aug 2017

Goal

This project aims to: (1) assess tree community and carbon recovery in ecologically restored rainforest fragments, (2) compare the effectiveness of ecological restoration and monoculture plantations in overcoming barriers to recovery of large-statured tree species and carbon storage in degraded rainforest fragments and (3) engage with scientists and managers to increase awareness and training for ecological restoration as a conservation and carbon sequestration strategy in human-dominated rainforest landscapes.

Activities

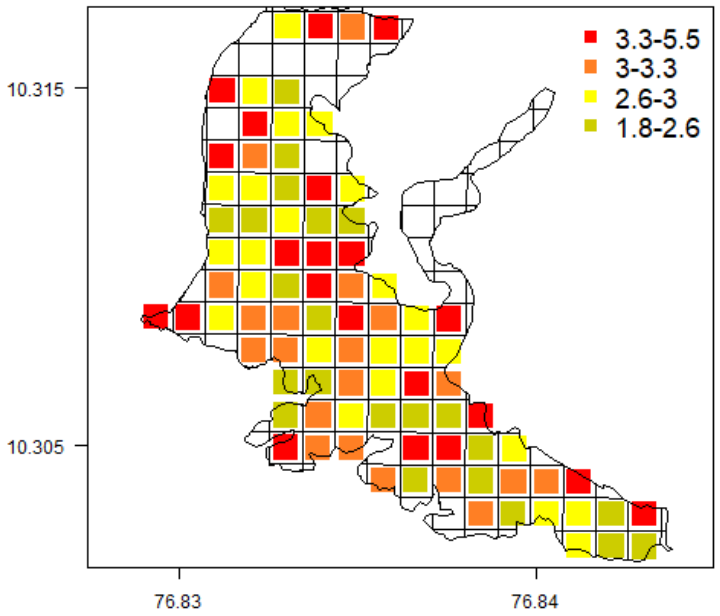
1. Assessing tree community and carbon recovery in ecologically restored rainforest fragments (Feb 2017- Aug 2017)

A total of 87 plots (20 x 20 m) were sampled for vegetation and soil in formerly degraded forests that have been restored, adjacent degraded sites that were not restored, and near-natural protected forest sites (29 sites each). All trees (≥ 3 cm diameter at breast height – dhb) were identified and measured (dbh and height). Three soil cores were collected from each plot for elemental and microbial analyses. All field- and lab-work for this component has been completed, and data analysis is currently underway. A scientific article examining recovery of forest structure, tree diversity, carbon storage and soil fertility in ecologically restored rainforest fragments is in preparation and expected to be ready for submission to a peer-reviewed journal by December 2017. An abstract based on this work, prepared by project assistant K Srinivasan, has been selected for an oral presentation at the September 2017 edition of Student's Conferences in Conservation Science, Bangalore.

Data collection for vegetation and aboveground carbon (left) and collection of soil cores for carbon, nutrient and microbial analyses (right) in degraded and restored rainforest fragments of the Valparai Plateau, Western Ghats, India.

2. Pre-restoration soil and vegetation baselines for ongoing/future restoration site (Apr 2017 – Nov 2017)

NCF has recently formalised a partnership with the Parry-Agro company for systematically restoring a 100 ha remnant of degraded rainforest in Shekalmudi, in the western Valparai plateau. Vegetation and soil assessments of the degraded site were initiated in April 2017, focusing on tree diversity, vegetation and soil carbon, soil nutrients and microbial activity. 100 soil samples (one per hectare) have been collected and analysed, and 30 out of 100 vegetation plots have so far been sampled. The data are not only beginning to tell an interesting story in terms of how vegetation and soil responses vary across different levels of forest degradation, but these data also constitute pre-restoration baselines which will be valuable for evaluating and monitoring post-restoration ecological recovery.



Map of pre-restoration soil carbon % at the 100 ha degraded rainforest remnant at Shekalmudi, Valparai.

3. Restoration effects on seed germination and seedling survival (June 2017- Jan 2018)

We have initiated an experiment at a shade house in Valparai to examine how restoration, through modifications to soil and shade conditions, affects seed germination and seedling survival and growth. The experiment employs a factorial design combining three soil treatments (restored, unrestored, Eucalyptus plantation) and two shade treatments (50%, 75%). Two hundred and forty seeds each of three old-growth species (*Artocarpus heterophyllus*, *Knema attenuata* and *Elaeocarpus tuberculatus*) and one secondary forest species (*Actinodaphne malabarica*) were collected and sown in June 2017. Rates of seed germination, seedling survival and growth are being monitored over a six-month period.

Specimens of seeds of four species included in the experiment, namely (clockwise from top left) *Actinodaphne malabarica*, *Knema attenuata*, *Elaeocarpus tuberculatus* and *Artocarpus heterophyllus* (left). At right, a partial view of the experimental set up with a mesh fence installed to prevent vertebrate seed predation and herbivory.

4. Ecological restoration workshop (1-5 May 2017)

A week-long workshop titled "*Ecological restoration: Principles, practice and monitoring*" was organized in Valparai and surrounding areas during 1-5 May 2017. The ten workshop participants, who were selected from a competitive group of 60 applicants, came from a background of research and/or practice of ecological restoration in different parts of India. The workshop comprised classroom sessions focusing on principles and theory of ecological restoration, combined with field visits for sharing experiences in nursery techniques, restoration planting, stakeholder engagement and scientific monitoring. A detailed account of the workshop is uploaded separately under the name "Restoration workshop report".

Ecological restoration workshop group, Valparai

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