

Comparison of Forest Disturbance Datasets in Fiji [DRAFT].

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Background

This document provides preliminary results for analysis conducted in support of Fiji's National Forest Monitoring System in conjunction with the Forest Carbon Partnership Facility (FCPF). The objective of this analysis is to develop and test a methodology for monitoring forest degradation using remote sensing data. To do so, we created a preliminary dataset using the Continuous Degradation Detection (CODED) methodology. This dataset was compared to the results of analysis performed by Fiji for developing their forest reference emission level (FREL) from 2005 to 2017.

The prior dataset (hereby referred to as the "Fiji Dataset") was created using a time series of yearly cloud-free Landsat composites. Since CODED operates on the pixel level and requires all available data (as opposed to yearly composites), it was not possible to run CODED on the yearly composites. However, a simple version of the algorithm based on a simple decision tree approach (hereby referred to as "CODED-Light" or in figures "CODED-L") was run on yearly composite data. This analysis was done to simulate using the locally created composites for estimating degradation, as opposed to CODED which requires all available observations.

The Fiji dataset was created for 2005-2017 for the islands of Vanua Levu and Viti Levu, while CODED was run for 2006-2016 for Vanua Levu and Viti Levu and CODED-Light for 2006-2016 and only for Viti Levu. The Fiji dataset contains pixels that undergo forest clearings, while CODED and CODED-Light provide pixels that contain deforestation and/or degradation. Deforestation was defined as a conversion from forest to non-forest, while degradation was defined as a disturbance in a forest without a land cover conversion.

Preliminary Results

Preliminary assessment of the datasets show a relatively strong spatial correlation (Figure 3) with variation in the years and types of disturbance (Figures 1, 2). CODED-Light found the largest area of total disturbance (Table 1), but exhibited stronger temporal relation to the Fiji dataset than did CODED (Figure 2). Both CODED and CODED-Light found more disturbances than the Fiji dataset when including degradation.

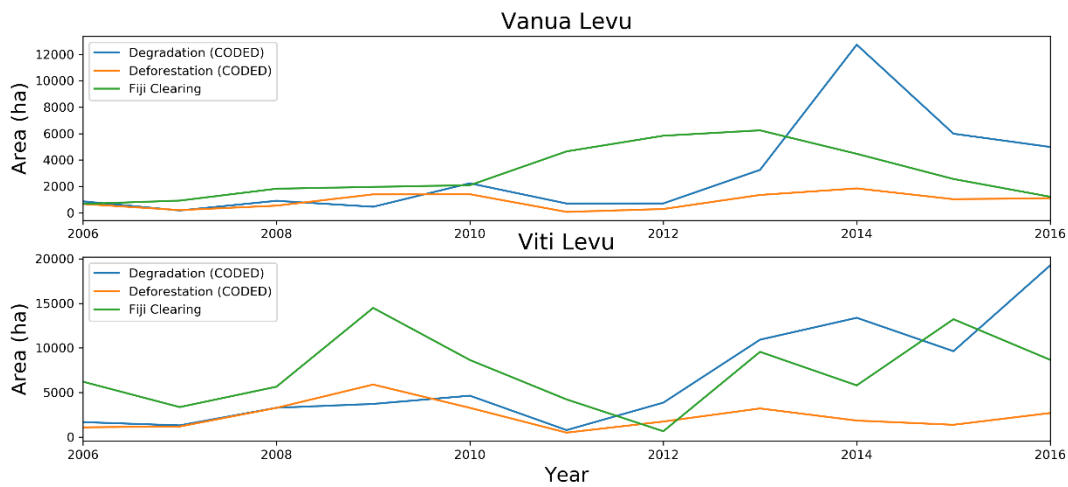


Figure 1. Yearly mapped areas of forest disturbance for Vanua Levu and Viti Levu from 2006 to 2016 according to the Fiji dataset and results creating using the CODED methodology.

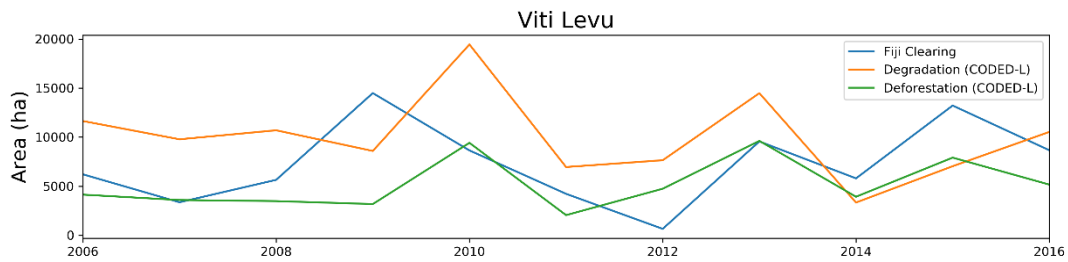


Figure 2 Yearly mapped areas of forest disturbance for Viti Levu from 2006 to 2016 according to the Fiji dataset and results creating using the CODED-Light methodology.

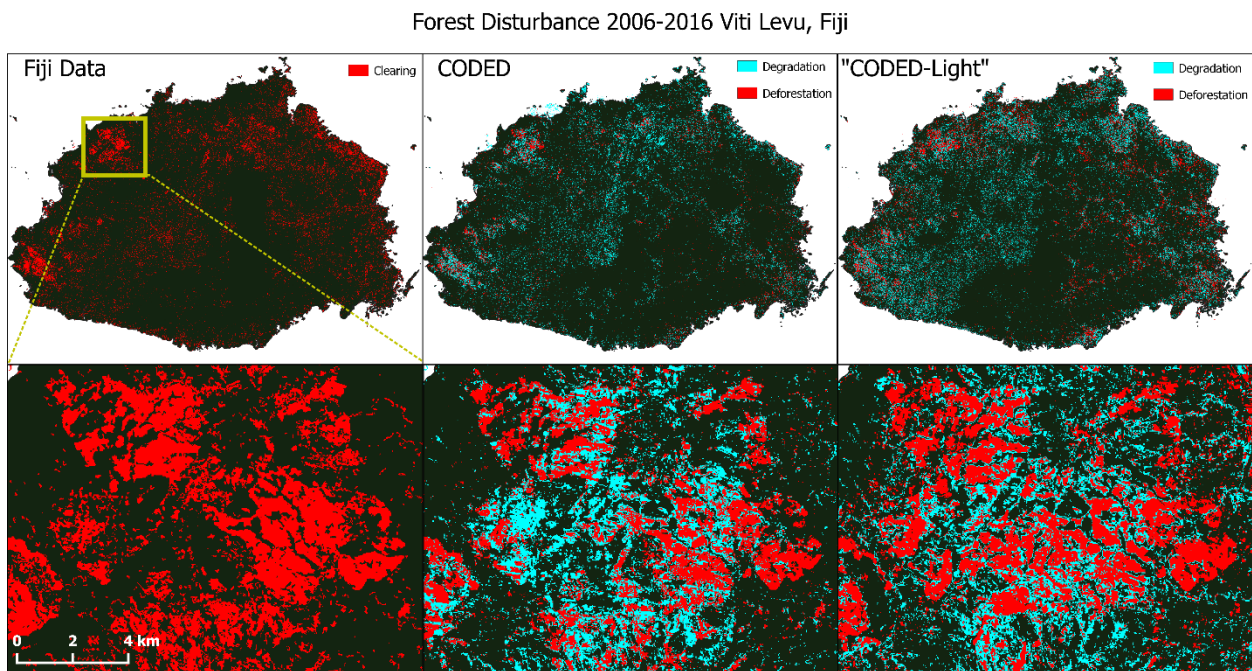


Table 1. Total disturbance area (ha) from 2006-2016 according to the three different datasets.

	Fiji	CODED		CODED-Light	
	Clearing	Deforestation	Degradation	Deforestation	Degradation
Viti Lenu	80000	22000	72000	57000	110000
Vanua Levu	32000	10000	33000	N/A	N/A

Incomplete Analysis

In addition to mapping disturbance, an objective of this analysis is to compare field data on forest type and logging to determine whether they can be classified using the CODED methodology. This analysis, as of January 27th, 2020, is in its early stages and thus was not included in this report.

Next steps

This preliminary assessment found that both CODED and CODED-Light may *potentially* be affective for monitoring forest degradation and/or deforestation in Fiji. However, the following analysis is required for completion during this project:

- Incorporate feedback from local experts.
- Collection of Fiji-specific training data using field inventory data on forest types.
- Pixel-level comparison of the different datasets to evaluate biases.
- Extension of both the CODED and CODED-Light methodologies to other islands.
- Completion of an accuracy assessment that can be used to assess each of the datasets.
- Collection of reference data on disturbance types and occurrence.
- Estimation of activity data of forest degradation and deforestation.