

Assessing the impact of wind-fallen tree areas on plant structure diversity in Costa Rica

Justin Lee
Utah State University

Jessica Murray
Utah State University

Introduction

Windfall tree gaps are openings in the canopy caused by disturbances or loss of trees

Gaps play a large role in plant diversity in forest ecosystems (1)

The disturbances lead to changes in light and nutrient availability creating new niche areas

These new areas can lead to lots of opportunities for new and different kinds of plants (2)

Understanding this relationship of treefall gaps and plant structural diversity is important for predicting how the forests with respond to disturbance and climate change

By studying how gaps influence the types of plants in the area we can better predict effects of disturbances from natural and human disasters

How does the structural diversity of plants vary between gaps and contiguous forest areas in the tropics?

Table 1- Comparison of each paired plot

	Gap 1	Forest 1	Gap 2	Forest 2	Gap 3	Forest 3
Area (sq ft)	263.6	248	240	160	160	176
Canopy Coverage	81%	89%	80%	88%	84%	86%
Diversity index (standardized)	.553	.536	.755	.67	.623	.881

Methods

3 paired plots were established in windfall areas and adjacent intact forest

I established 2 transects that spanned the length of the plot

Walking down each transect I counted all the plants within 2 feet on either side of the transect

All the plants were classified into different structural categories; middle story, understory, woody debris, vines, and trees > 10 cm diameter

Densiometer was used to find the percentage of canopy cover in the middle of the gap

I then standardized because not all transects covered same area. This was done by taking observed individuals of each category and dividing by transect area

Simpsons diversity index equation was used to compare each category to the total number of individuals surveyed

After calculating the diversity index I used those values in a simple t-test comparing the diversity of all the gaps to all the intact forest

Results

My p-value from the t-test came out to .339 meaning there was no significant difference

Table 1 shows the area of each transect as well as the standardized structural diversity of each plot

Figure 2 shows how the structural diversity of the forested areas compared to the gap areas

Location 3 showed higher structural diversity in the intact forest. Location 2 showed higher diversity in the gap. Location 1 was about equal



This image shows a wind fall gap from the survey

Figure 2 – Diversity of Wind-fall vs Parallel

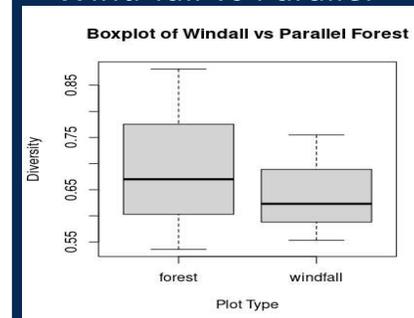


Figure 2 is a chart that is comparing plant diversity. The blue bars are the windfall areas and red is the parallel control area.

Conclusions

The results rejected my hypothesis. There was not a significant difference between the areas, this can be seen with the p-value of .339

Although the data shows no significant difference in structural diversity, there was definitely a visual difference

The understory category dominated all 3 plots. This makes sense because plants have lots of seedlings but not all make it to maturity

Transect lines may have not covered enough area

We must also remember that this research was done in a 2-day period using a very small sample size. I think there was more data that results would vary

References

- Schumann et al., 2003, *ScienceDirect*
- Seidl et al., 2017, *nature climate change*

Acknowledgments

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