Project *brief*

Thünen Institute of Forestry 2024/30a

Lessons learned from thirty years of reforestation in Madagascar: The 'How' triumphs over the 'Where'

Ferdinand Peters[1], Daniel Kübler[1], Andreas Kempe[1], Sven Günter[1]

- **Reforestation for wood fuel resulted in a gradual increase in tree cover at the plot level, although the final canopy density remained low.**
- **Reforestation success is largely attributed to plot-specific dynamics with limited impact from the broader environmental and socio-economic spatial context.**

Background and aims

Since 1953, Madagascar has lost half of its forests, largely due to heavy reliance on woodfuel. In response, German cooperation agencies have supported smallholders and rural communities in establishing woodfuel plantations in the Boeny and DIANA regions. We assessed the development of 10,000 reforestation plots in these regions using satellite imagery to estimate crown cover over time. Then, we employed linear mixed-effects models to identify which environmental and socioeconomic factors contributed to high crown cover. These models included (1) fixed effects, such as socio-economic and environmental conditions, plot size and age, and whether reforestation was supported by GIZ or KfW programs, and (2) random effects, which represented the unique growth rates for each plot.

Key findings

Reforestation increased crown cover over time; however, over half of the areas did not exceed 20% crown cover within one rotation. Reforestation success was only weakly influenced by environmental and plot characteristics. Smaller plots with favorable soil conditions and less water stress performed slightly better. Also, the reforestation program (GIZ or KfW supported) did not affect growth rates. Socioeconomic factors had minimal overall influence. Crown cover development was mainly affected by random effects, meaning that even plots close to each other with similar environmental conditions often showed different results.

Advice for policy-makers

The strong plot-specific dynamics underscore the importance of flexible, adapted management approaches ('how') compared to the spatial context ('where') since regional differences had only minor influences. This includes investment in capacity building, institutional support, secure land tenure, appropriate silvicultural practices, and fostering demand for sustainably produced forest products.

To scale up reforestation effectively, we recommend comprehensive cross-program monitoring between agencies like GIZ and KfW, including better data harmonization, joint documentation, and open-access publishing.

Figure: Non-successful, moderately successful and successful tree cover development in wood fuel plantations in Boeny and DIANA (Source: Ferdinand Peters).

Further Information

Contact

[1] Thünen Institute of Forestry
ferdinand.peters@thuenen.de
www.thuenen.de/de/wf

Run time

05.2023–07.2024

Project-ID

2604

DOI:10.3220/PB1733131943000

Publication

Peters F, Kempe A, Kübler D, Günter S (2024) Evaluating Forest Degradation, Deforestation, and Reforestation in Boeny and DIANA: Current Efforts and Future Opportunities. Braunschweig: Johann Heinrich von Thünen-Institut, 116 p, Thünen Working Paper 248, DOI:10.3220/WP1728377983000

Funding

by the Federal Ministry for Economic Cooperation and Development (BMZ) and the European Union (EU), in partnership with the Ministry of the Environment and Sustainable Development (MEDD), through the Program on Natural Resources Management in Madagascar (PAGE II), which is implemented by GIZ.