



Scaling up restoration in the Wet Tropics

Kylie Freebody¹, Ellen Weber²

(1) Program Coordinator, Wet Tropics Restoration Alliance, Cairns (2) Senior Scientific Officer, Wet Tropics Management Authority PO Box 2050, Cairns.



We acknowledge the spirit of Country and recognise Rainforest Aboriginal Peoples as the Traditional Owners and custodians of Wet Tropics Country. We pay our respects to their ancestors and traditions.



Restoration
potential



Wet Tropics Restoration Alliance

A coordinated and supported network including landholders, community groups, Rainforest Aboriginal Peoples, industry, government and researchers.

Purpose

Scale up restoration to increase the resilience of Wet Tropics fauna, flora and ecosystems in the face of ongoing climate impacts.



Wet Tropics Restoration Alliance members



Native Conifer Carbon Sink



Scaling up restoration

- More large-scale projects – tens of hectares v several hectares
- Many more, smaller projects



Dirrans End Nature Refuge, 2018

Barriers to address

- Attracting investment at scale
- Making natural capital markets work
- Reducing high restoration costs
- Reducing barriers to participation
- Increasing access to best practice restoration science



Rainforest restoration pathways - 3 main types



Ecological revegetation plantings

- planted for environmental reasons
- many tree species; mostly local natives
- can develop rapidly into "native" forest



Timber plantations

- planted for wood harvest;
- one to few tree species; many may be exotics
- could develop slowly into "native" forest if unharvested



Regeneration

- autogenic regrowth - establishes without assistance
- tree diversity and density variable; many may be exotics
- slow development, usually towards "native" forest

Which restoration method to use

Project objectives will influence;

- Restoration methodology and design
- Methods used to implement & maintain (species selection, spacings, maintenance methods)

This helps determine the resources required (time, labour, materials & costs)



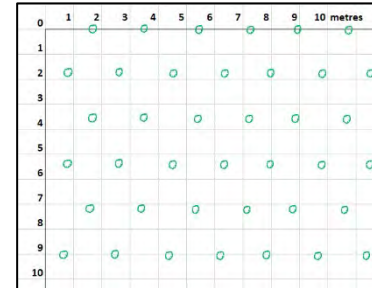
Revegetation

Ecological revegetation (medium – high density)

- 3,000 – 6,500 trees per hectare
- Canopy cover within 2-4 yrs
- Fauna is becoming similar to rainforest at ~ 6 yrs
- structure has high similarity to remnant rainforest at ~ 10 yrs

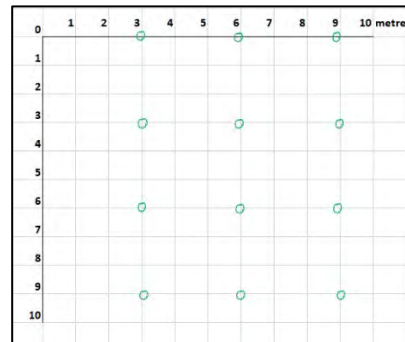
3,000 trees/hectare, 1.8m spacing

🌱 Indicates one tree



Timber plantations (low density)

- 900 – 1,200 trees per hectare
- Canopy cover within 6-10 yrs



1,200 trees/hectare, 3.0 m spacing

🌱 Indicates one tree



Direct seeding

- No planting of established seedlings - reduces the upfront project cost
- Seeds of some species can germinate and grow readily
- Growth rate of weeds and grasses – limiting factor

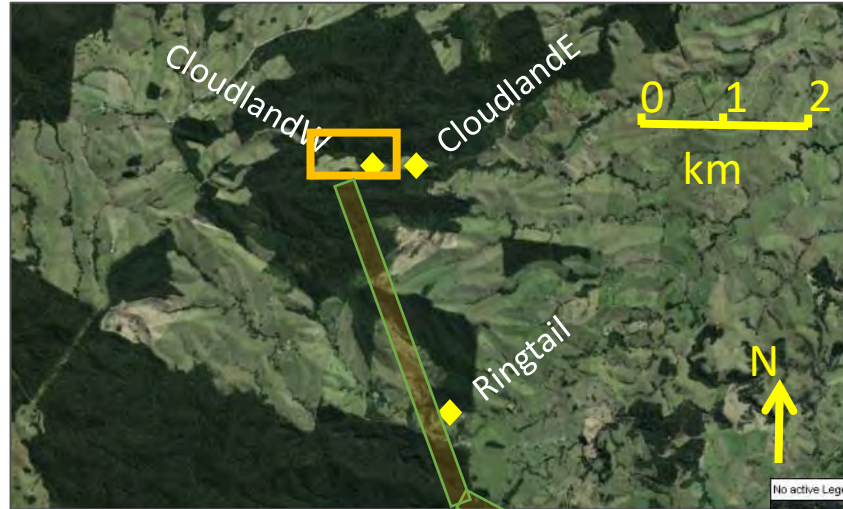


Innovative projects

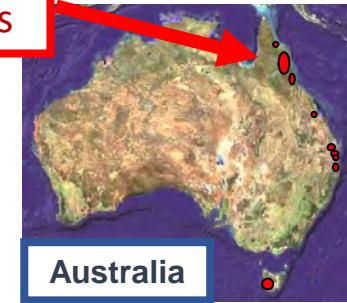
- Cloudland Kickstart trials
- Miyawaki and modified Miyawaki plantings
- ClimateForce – Tropical Regen Project

Management experiment: 'Kickstart trials'

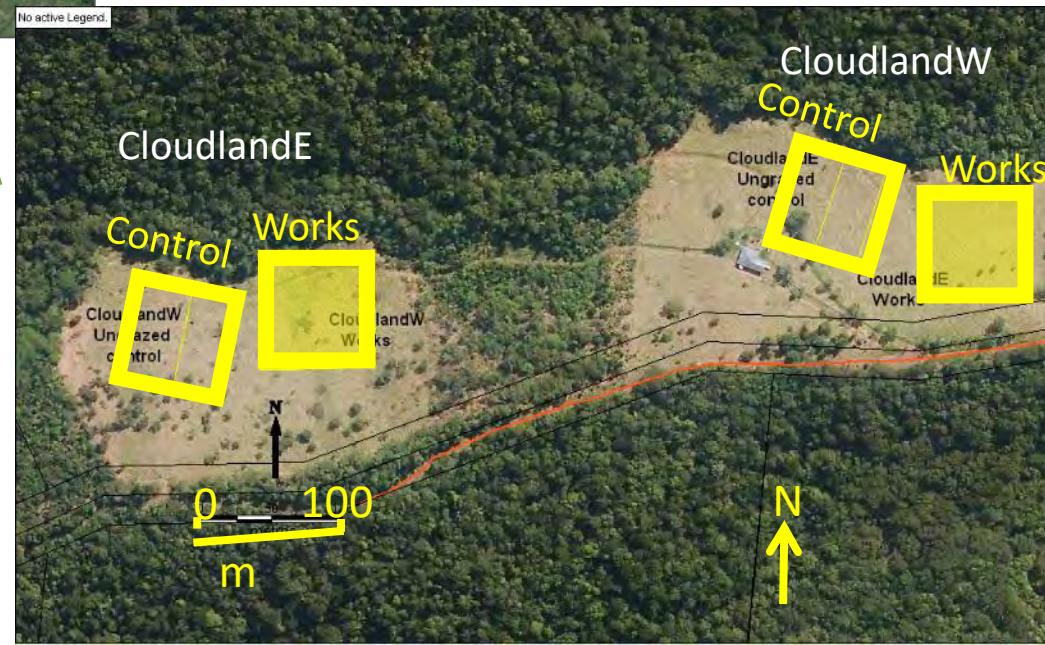
Use of interventions to catalyse reforestation in retired pasture



Wet
Tropics
uplands



- 3 sites
- cattle excluded 7yrs prior
- 80m x 80m works & control plots



Kickstart activities and monitoring



Interventions

- Herbicide applications
- Bird perches
- Logs and water points



Monitoring

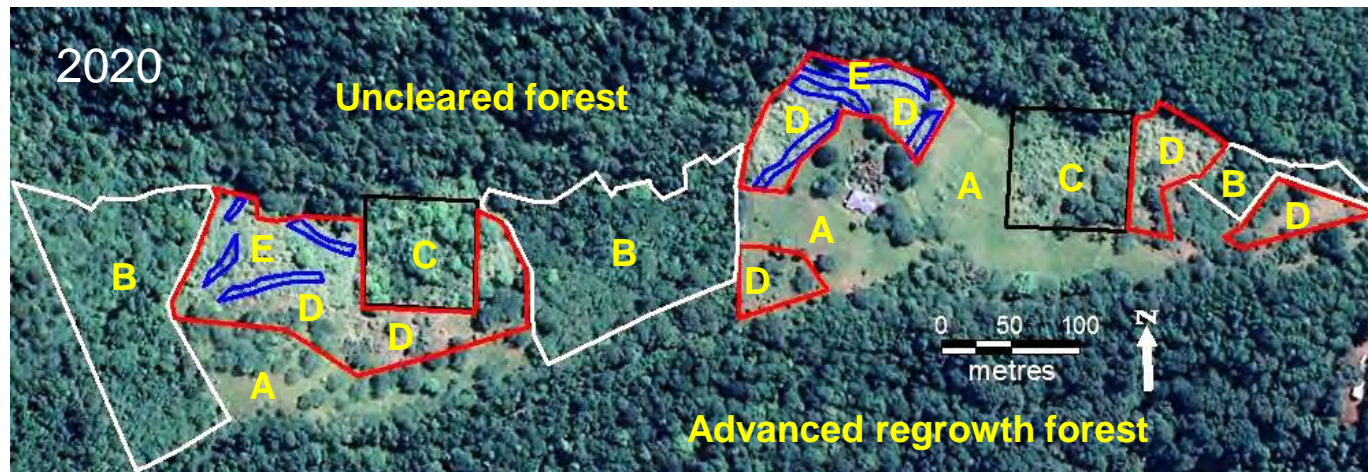
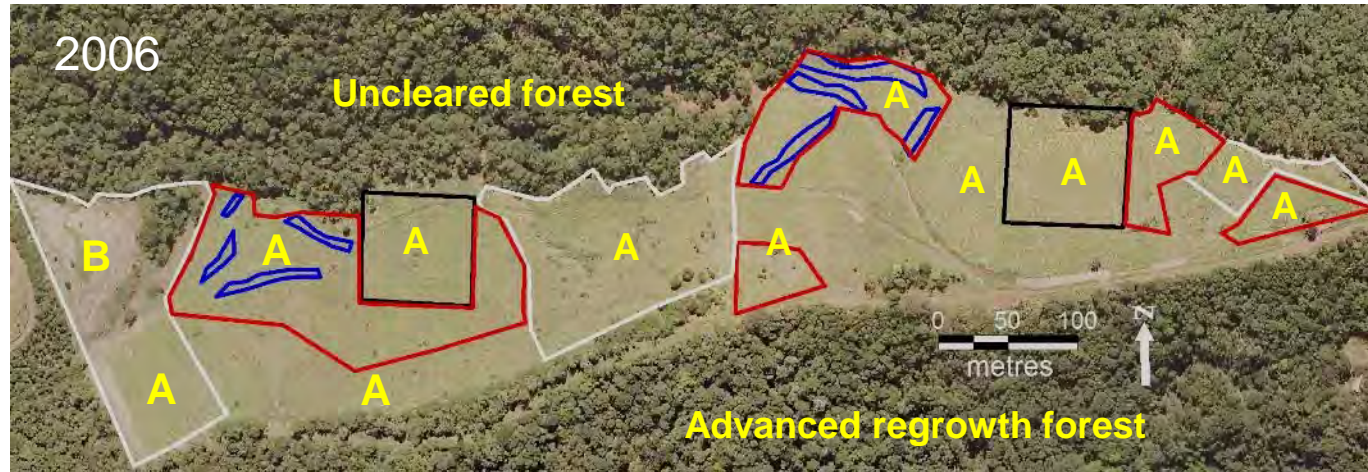
- All activities and costs
- Vegetation structure annually
- Seedling searches (native recruits), 0,8, 2, 4.5 yrs
- Bird surveys

Learnings



Expanded Kickstart Trials

Cloudland restoration treatments 2006-2020



Types of treatment

- A.** Unsprayed grass (ungrazed since 2005).
- B.** Medium density planting (3,000 trees/ha), 2006-07 & 2009 (white outlines).
- C.** Kickstart pasture conversion, with 6 sprays in 2011-17; 2 sprays in 2018-19; 1st spray nonselective glyphosate, others grass-selective (mainly Verdict). (black outlines).
- D.** Expanded kickstart, 5 sprays 2018-19, 1 spray 2022 (red outlines).
- E.** Tree island plantings, 2018-19 6 sprays + planting (blue outlines).



Learnings from kickstart trials

- After 5yrs grasses replaced with more diverse woody vegetation
- Increasing cover of native tree recruits
- Pasture conversion costs $\frac{1}{4}$ cost of biodiverse plantings but takes longer and cover is patchier
- long term outcomes are less clear
- Need more trials with costing and monitoring



Catterall et al.(2018) http://www.treat.net.au/publications/WnsJan2018.html#catalysing_rainforest

Wet Tropics Management Authority (2020). <http://www.treat.net.au/resources/index.html>

Catterall, C.P. (2020). DOI:[10.1007/s40823-020-00058-5](https://doi.org/10.1007/s40823-020-00058-5)

Miyawaki forests

- Miyawaki method developed in early 1970's
- Intensive site preparation
- High density planting – 4 plants/metre
- Maintenance free within 2 yrs



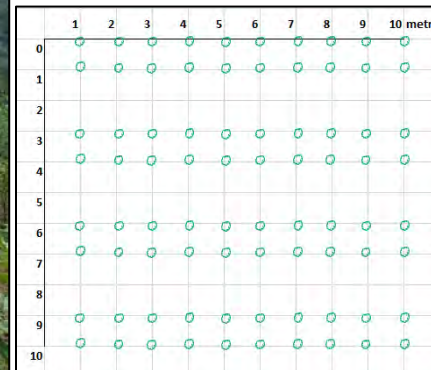
Miyawaki planting, 2,800 trees, 700m²

<https://www.brettacorp.org.au/miyawaki-forests/>

Modified Miyawaki

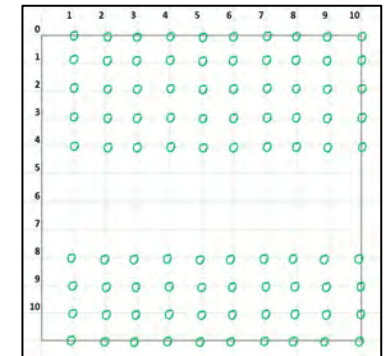
Ecological revegetation (high density plantings).

- planted beds with grassy inter-rows
- Trees planted at 1.0m spacings
- Includes canopy, mid-canopy and understorey species in each 1m²
- Approximately 6,500 trees per hectare
- Canopy cover within 1-3 yrs (lowlands)



6,800 trees/hectare

● Indicates one tree



6,500 trees/hectare

ClimateForce – Tropical Regen

- Work focuses on research and organic management
- Planting trials - species combinations and maintenance techniques- all organically
- Geo-tagged trees
- Monitoring
- Drone technology



ClimateForce Public Impact Dashboard



Outcomes, costs and risks

ANR has much reduced upfront costs relative to tree planting projects *

But....

the treatment of pasture grasses and other undesirable exotics may require many more years

and

the risks of not achieving project objectives may be higher

Ecological tree planting can achieve expected outcomes in shorter time but at a greater cost

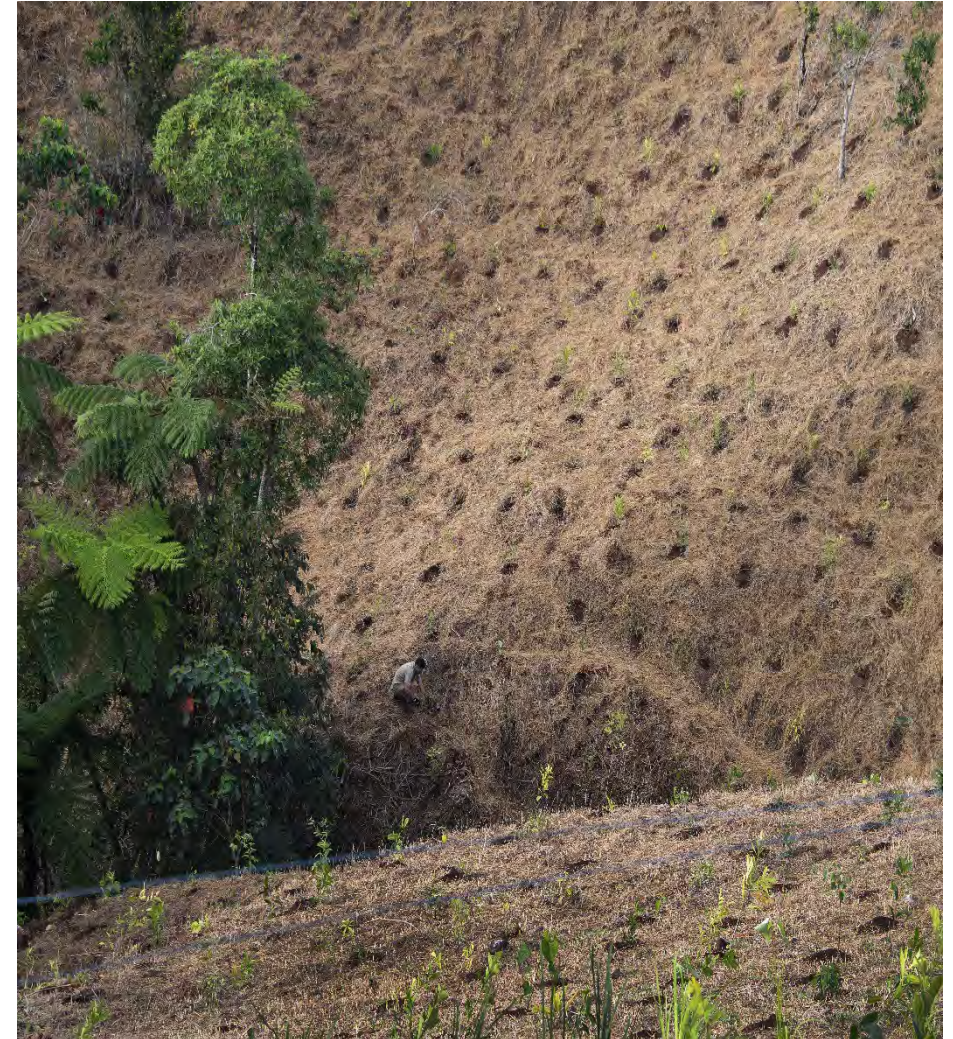
* <http://www.treat.net.au/resources/index.html>



Which restoration method to use

Be clear about;

- Primary project objective
- The timeframe and resources available



Expected Outcomes

Restoration method	Tree planting density	Estimated years to canopy closure	Establishment cost	Maintenance cost
Ecological revegetation	Medium-high	2-4	High	Medium
Modified Miyawaki revegetation* (4m grassy beds)	High	2-3 plantings 5-10 inter-rows	High	Low-medium
Modified Miyawaki revegetation * (1m grassy beds)	High	2-3 plantings 3-5 inter-rows	High	Low-medium
Timber plantation	Low	7-10	Medium	Medium
Direct seeding *	None	>15	Low-medium	Medium-high
Kickstart pasture conversion * (ANR)	None	>15	Low	Medium

* Estimates

Conclusion

The implementation of more large-scale restoration requires rigorous evidence of the outcomes, associated costs and risks

Development of a suite of different restoration methods to engage more landholders

Thank you

