Tropical peat swamp forest restoration: natural, assisted, or direct re-vegetation?

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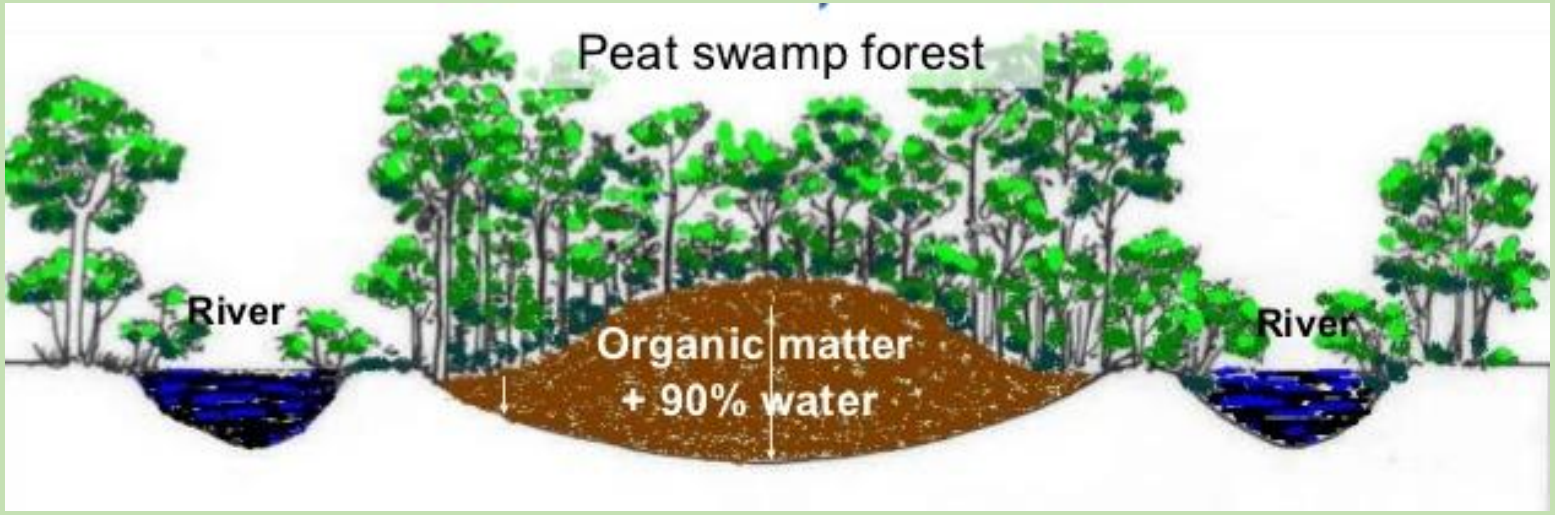
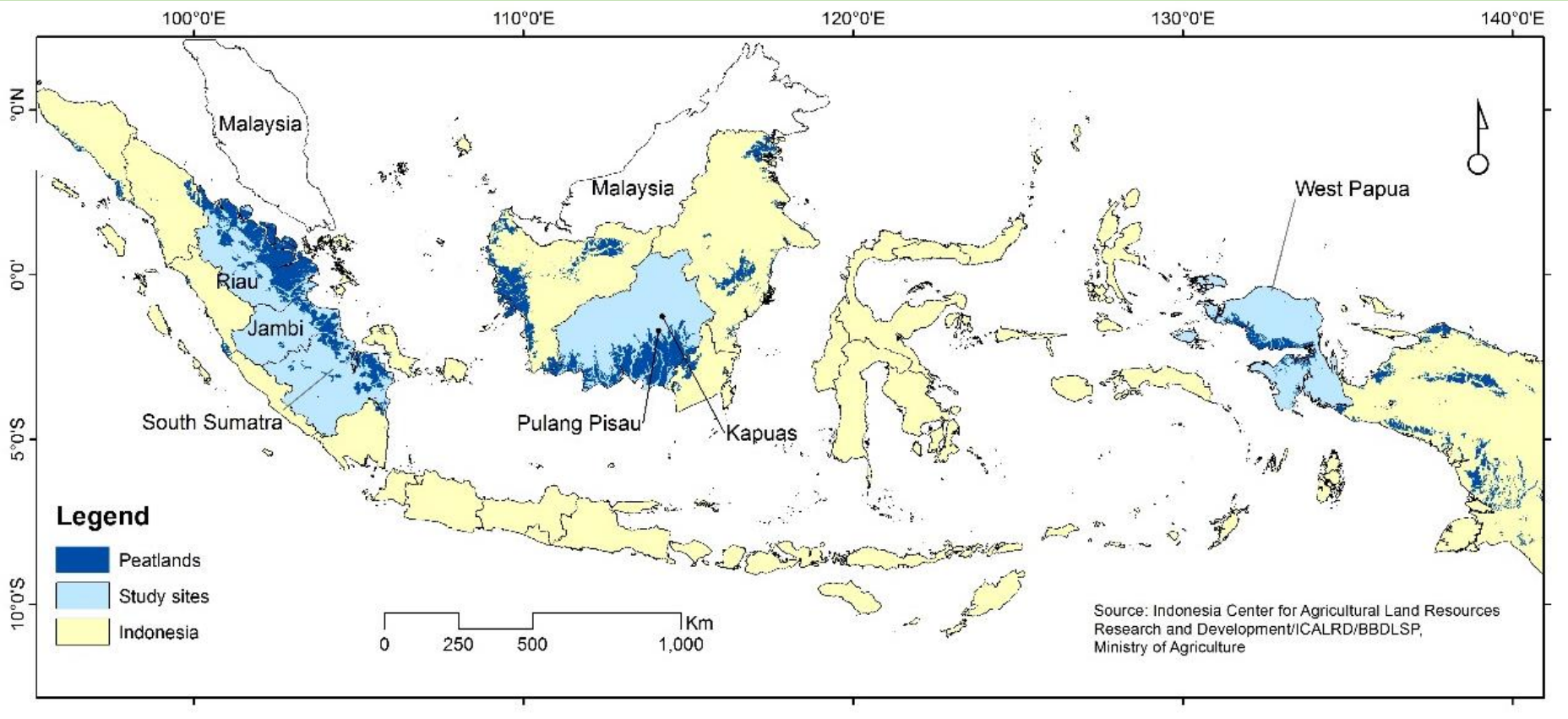
Tropical peatland's natural state

- Forested peat dome (non-coastal)
- Consistently high water table
- Forest and peat are highly inter-dependent:
  - Leaves, branches and roots create the peat
  - Canopy creates a humid and cool microclimate
  - Tree roots hold the peat in place and keep it aerated



Distribution of tropical peatlands

- Over 200,000 km^2 located in Indonesia (largest in the world? Approx. 45%)
- Contain a globally critical reservoir of carbon, approximately 57 Gt C



Benefits from tropical peatlands

Environmental services:

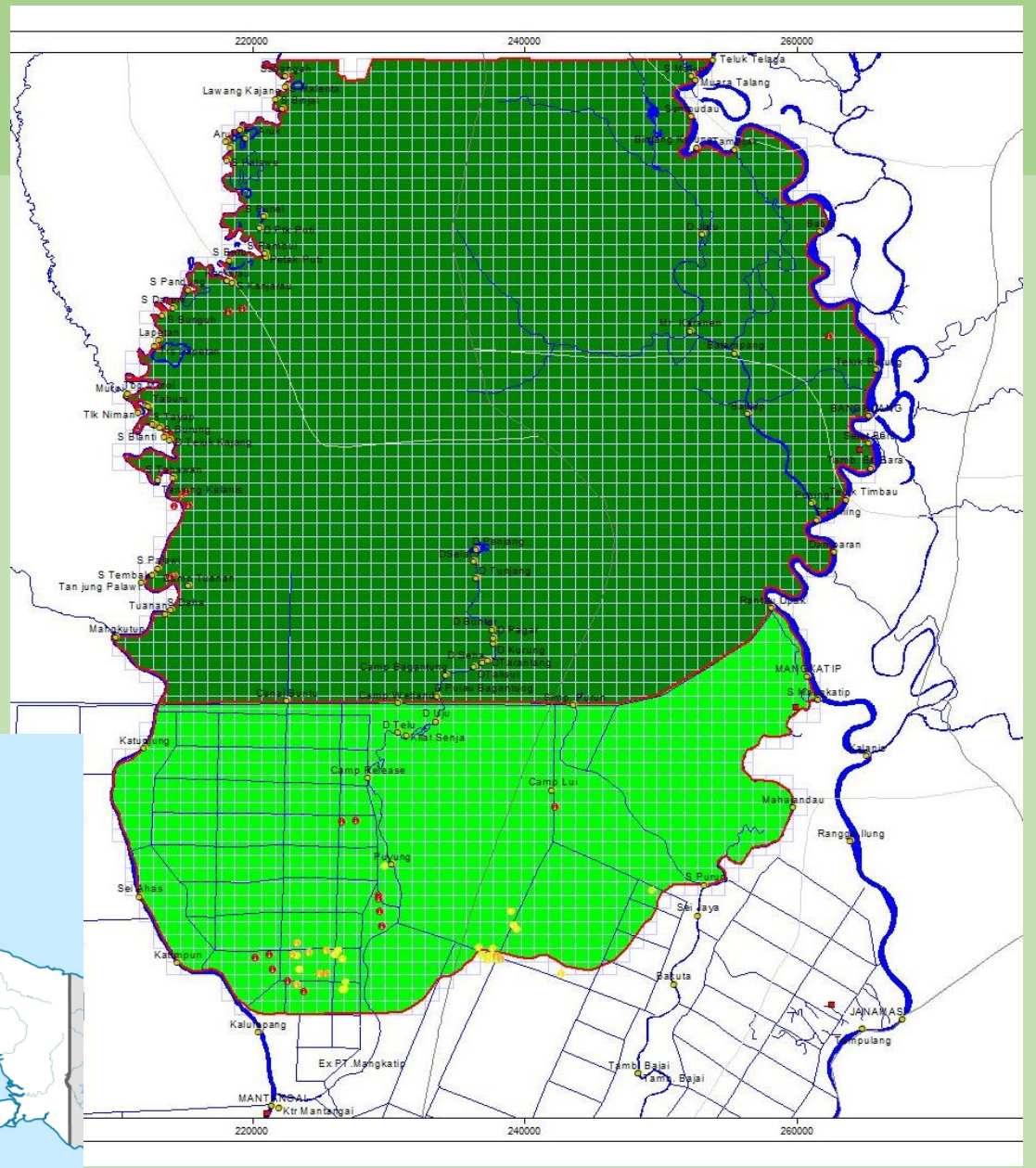
- High floral and faunal biodiversity
- Natural regional hydrological management
- Supports nutrient cycling
- Large carbon storage

Important for local communities:

- Multiple alternative livelihood options: Fishing, hunting, NTFP collection
- Important culturally, tied to religious, spiritual and personal identities

BOS-Mawas (2003 - …)

- Protecting 309,000 hectares of natural habitat for wild orangutans
- Area sustains one of the largest remaining orangutan populations with an estimated 2,500 orangutans inhabiting the area
- There are 59 villages along the rivers

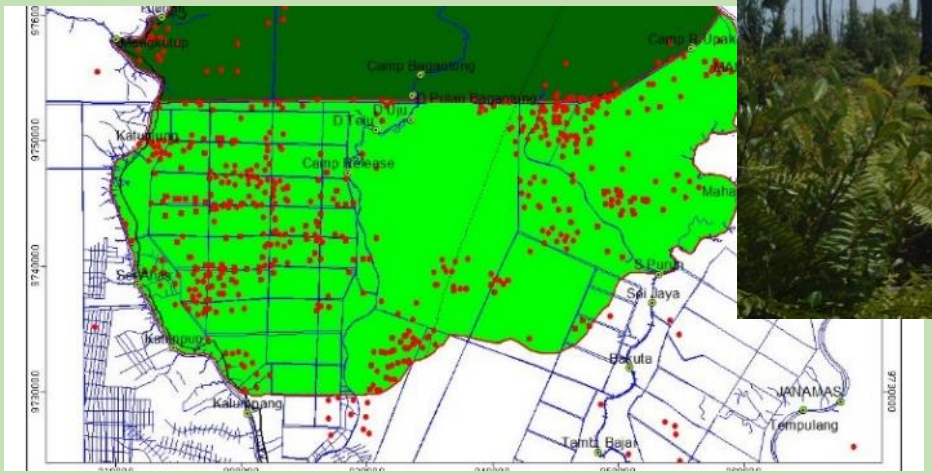


Degradation of Mawas: Mega Rice Project (1995-1998)

- One million hectares - intended to allow Indonesia to become self-sufficient in rice production
- More than 4600 km of canals
- Access routes for logging
- Dried peat, human presence, logged forest >> fires
- 50% loss of forest cover across Mawas area

Most of Indonesia's tropical peatlands are degraded:

- only 6.4 % is classified as 'non-degraded'
- Between 1985-2006 47% of tropical peatlands were degraded



Local communities' perceptions of restoration




Local Dayak communities have a close relationship with the forest

- Appreciate uses and environmental services
- Deep and wide knowledge regarding its restoration

Limited health and education options
Limited livelihood options
Issues over land ownership

- Land degradation largely through external drivers
- Local communities often not involved in land management decisions - feel like observers of their landscape
- They continue to extract the remaining resources even though they are aware of the unsustainability of their actions

Re-vegetation activities
(part of the Aus-Indo KFCP REDD+ demonstration project)

Developed and trained in tree ID, planting and nursery methods and resources

Implemented large-scale reforestation programs including:
- autonomous community-based seedling programs
- silviculture research projects
- selection of appropriate tree species

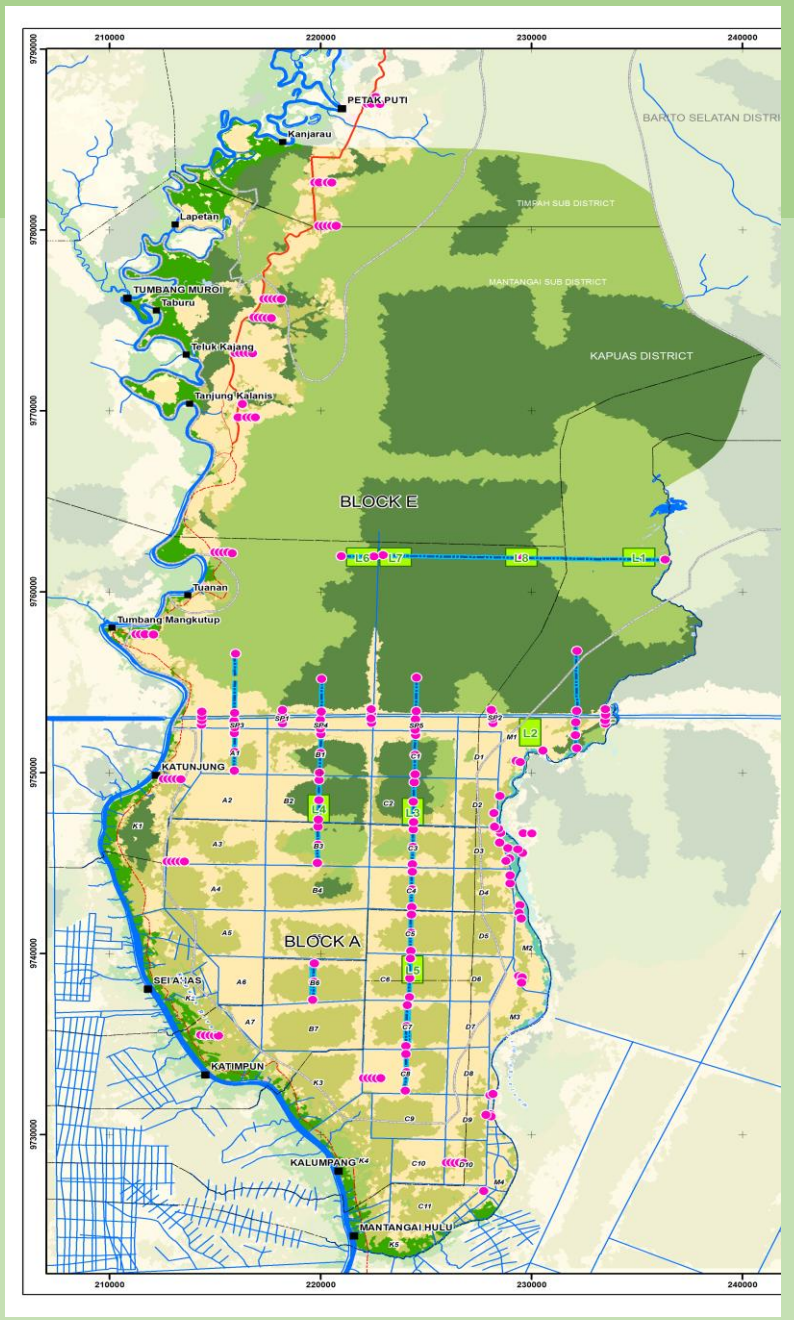
Landscape-scale environmental monitoring

Data collected seasonally from 2010 to present:

Vegetation: 96 permanent monitoring plots across 8 locations

Hydrology and Peat monitoring

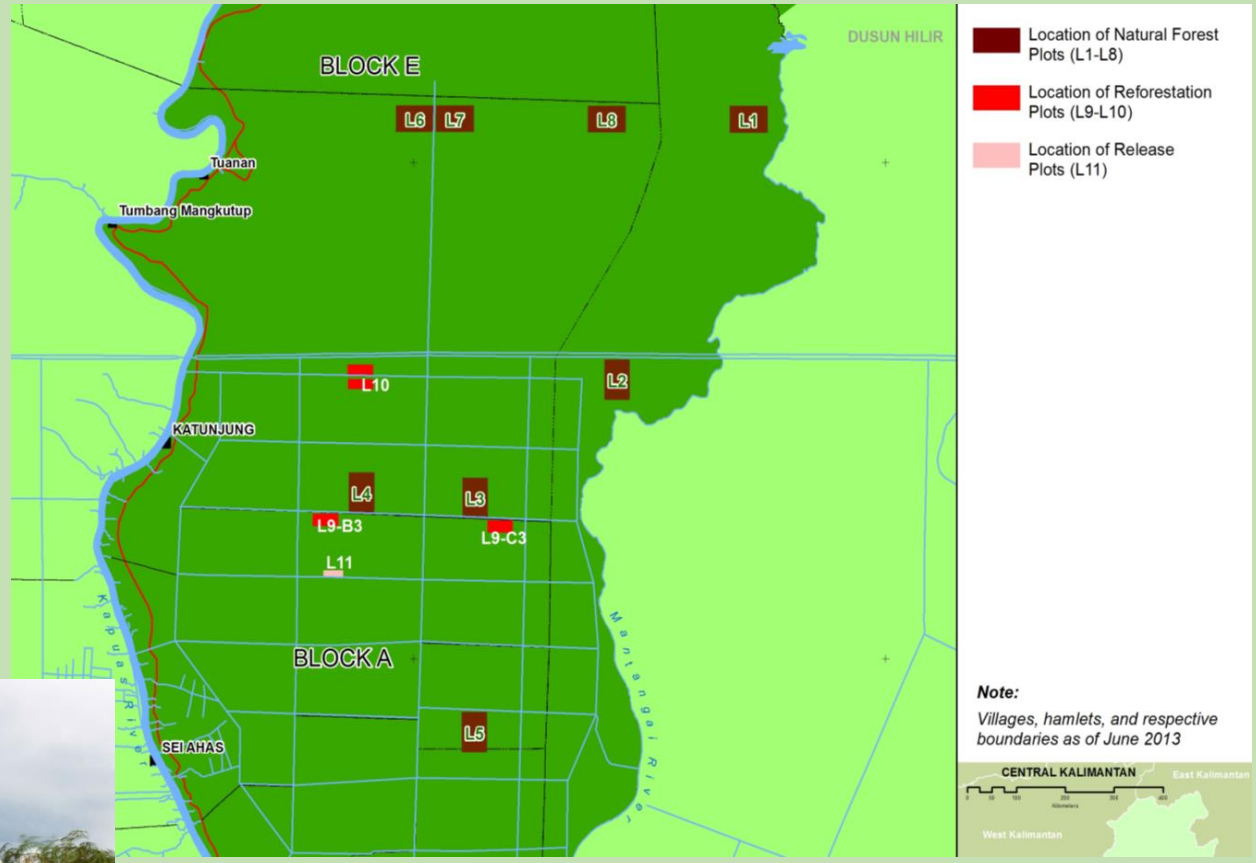
Fire and fuel monitoring



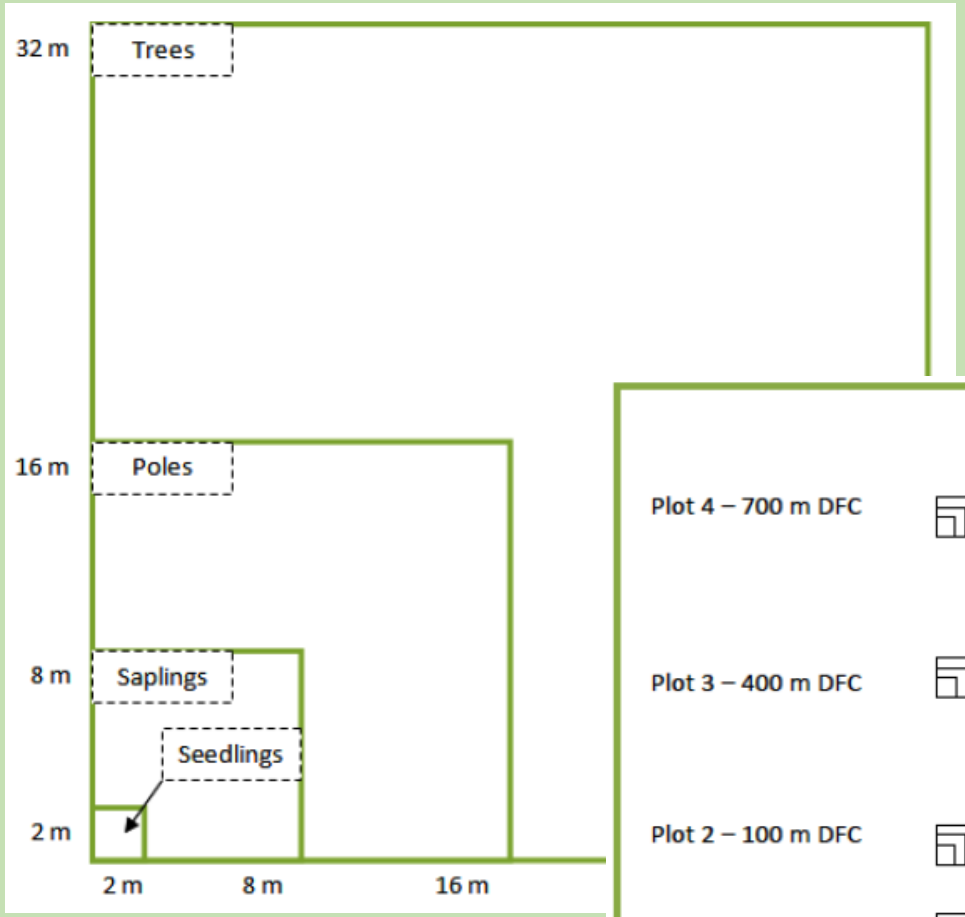
Re-vegetation: Natural, Assisted or Direct?

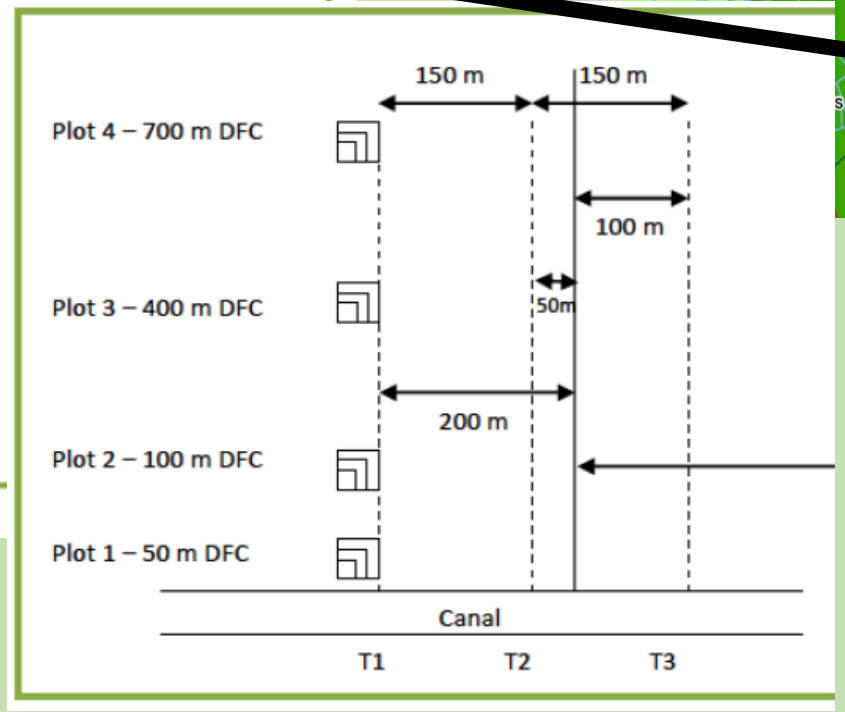
- A study was carried out to compare the success of three re-vegetation techniques:
  - Natural regeneration
  - Removal of ferns surrounding natural seedlings / ANR / Release
  - Replanting / Reforestation

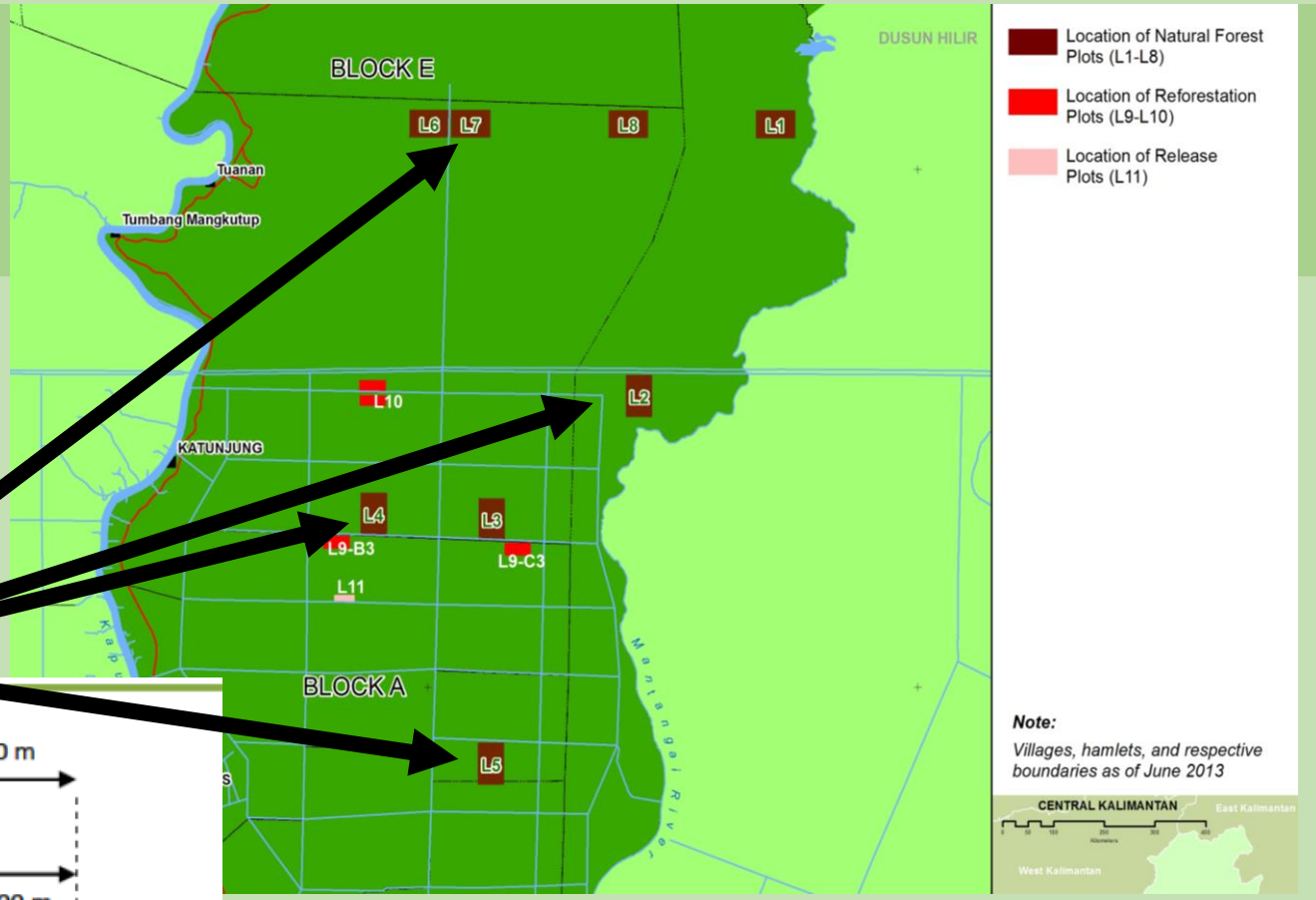
- Success:
  - Seedling density
  - Seedling growth
  - Species number
  - Ease of practice
  - Cost



Re-vegetation: Natural regeneration

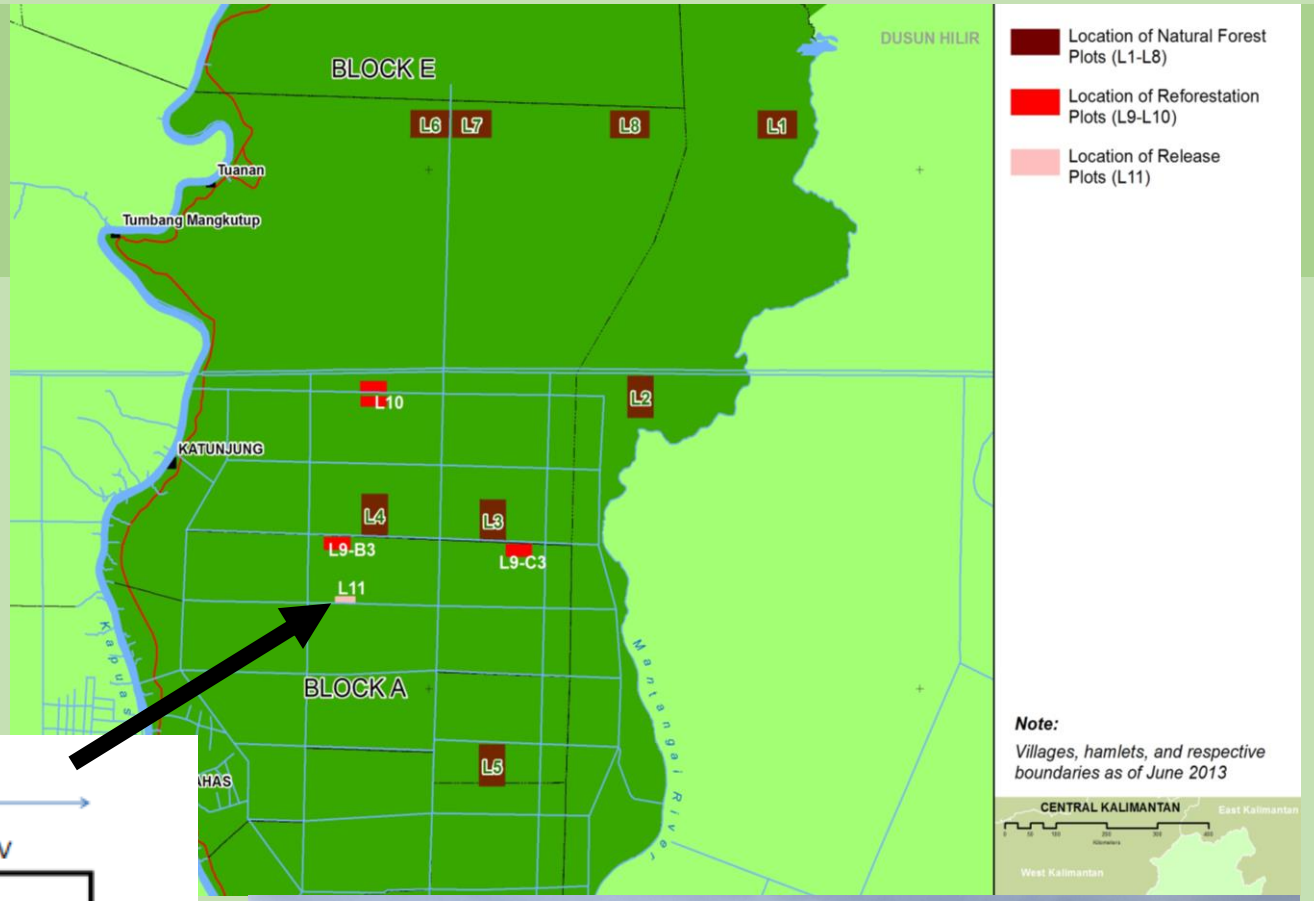


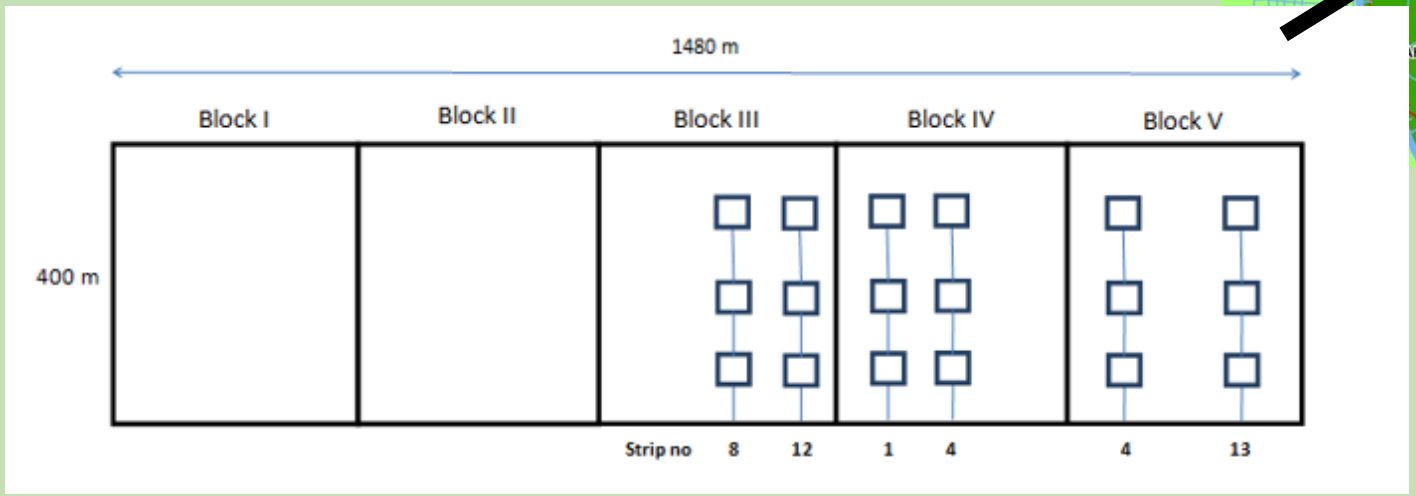




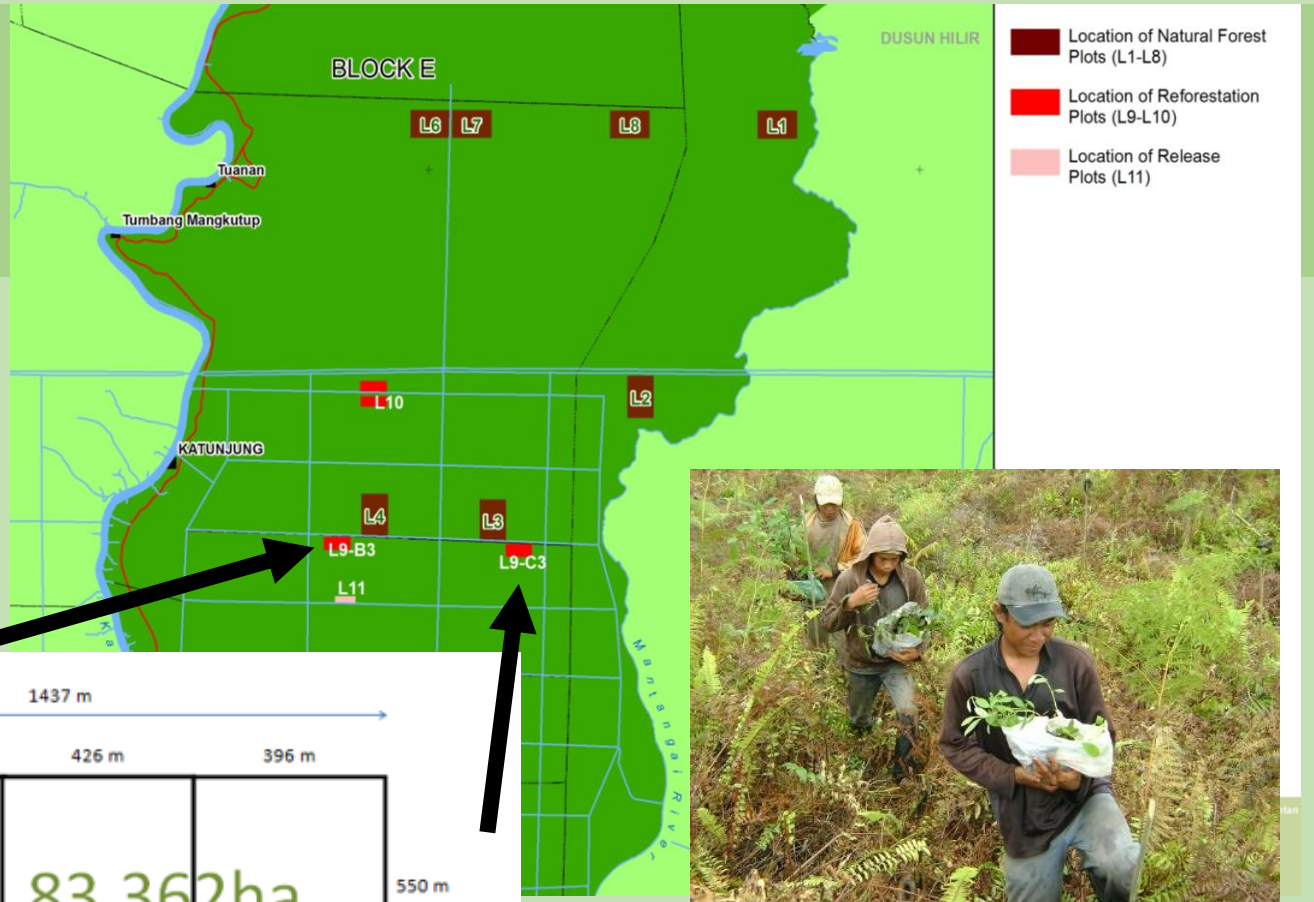
Re-vegetation: Assisted / ANR

- Remove high fern density around marked seedlings in targeted natural high seedling density
  - the ‘Release’ activities

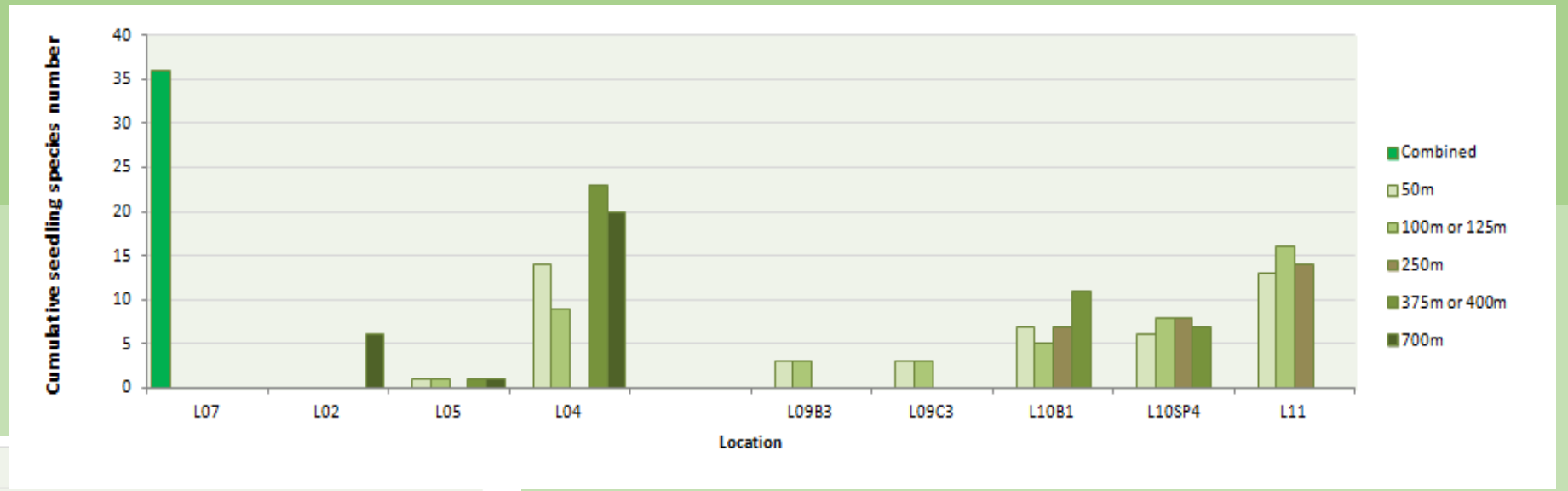


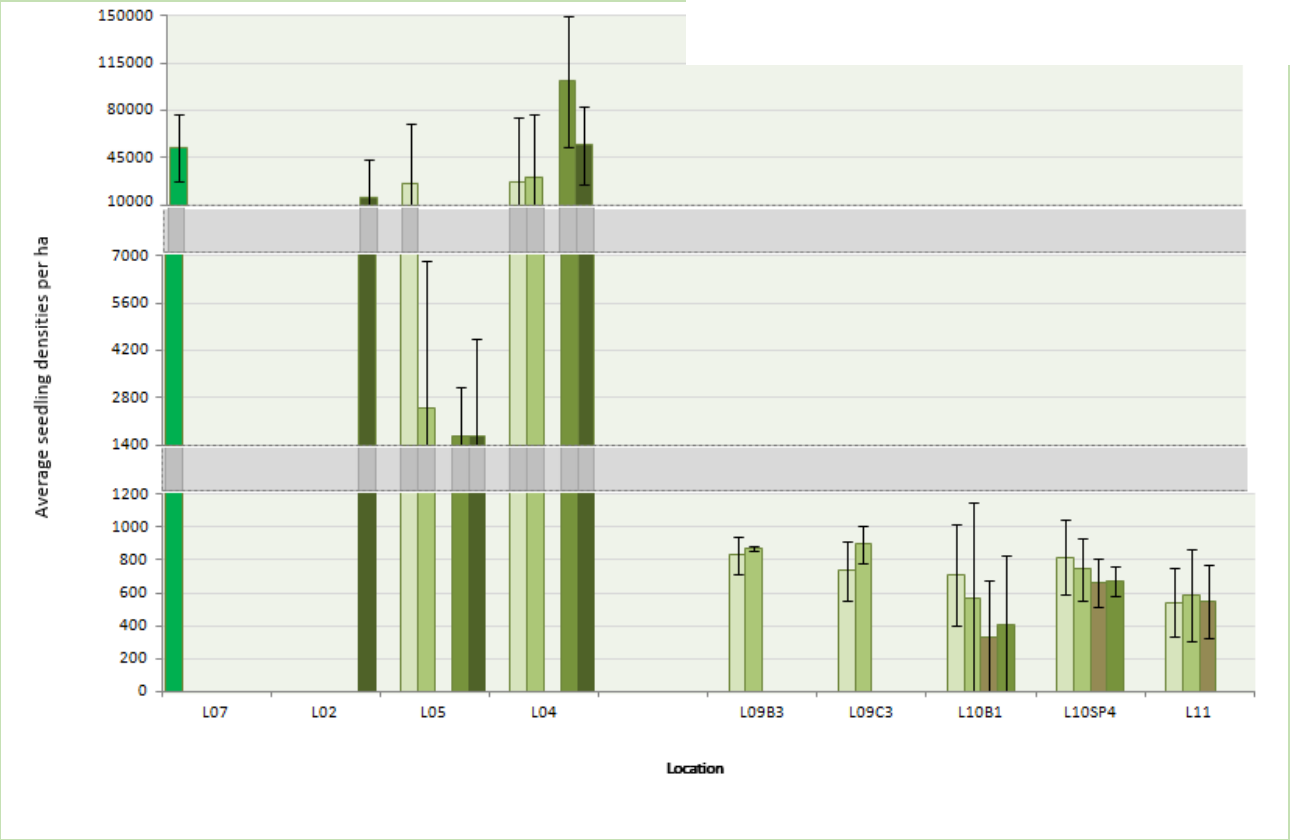


Re-vegetation: Direct planting



Results

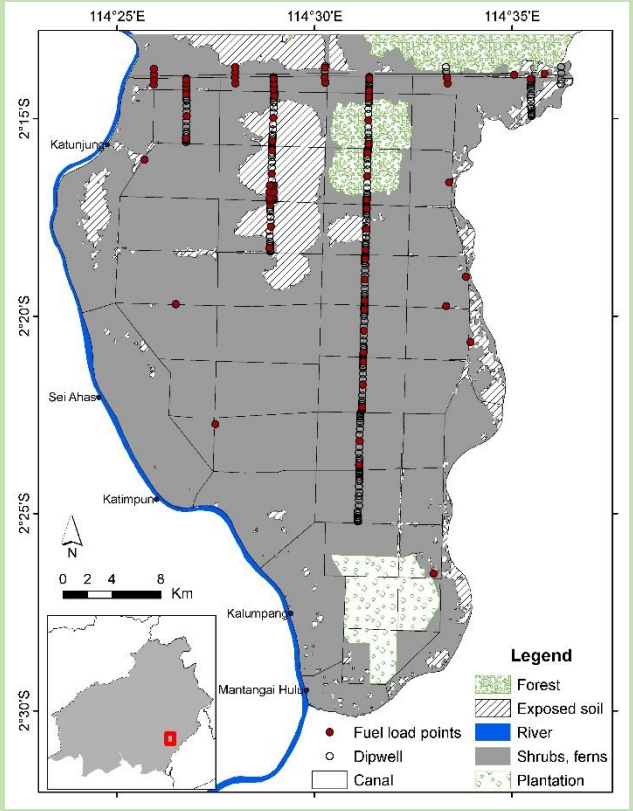


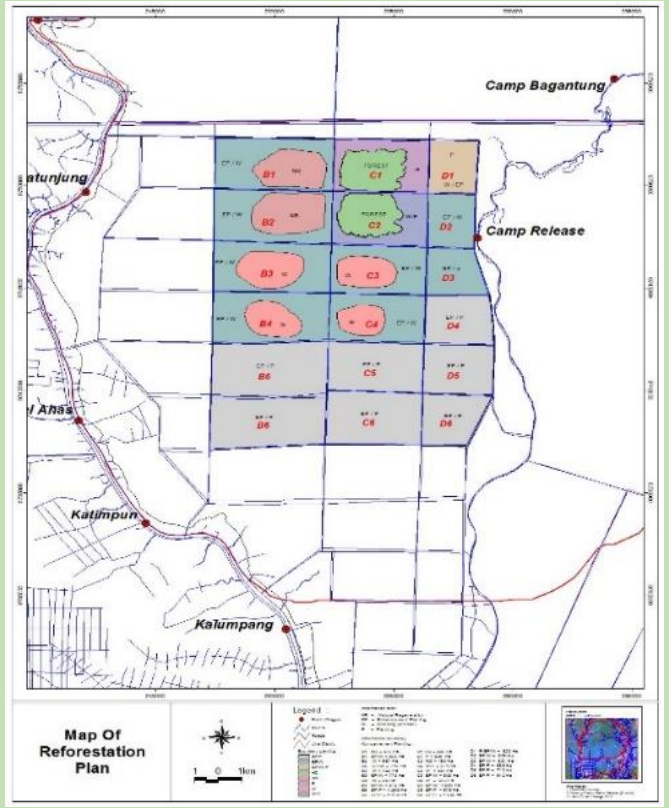


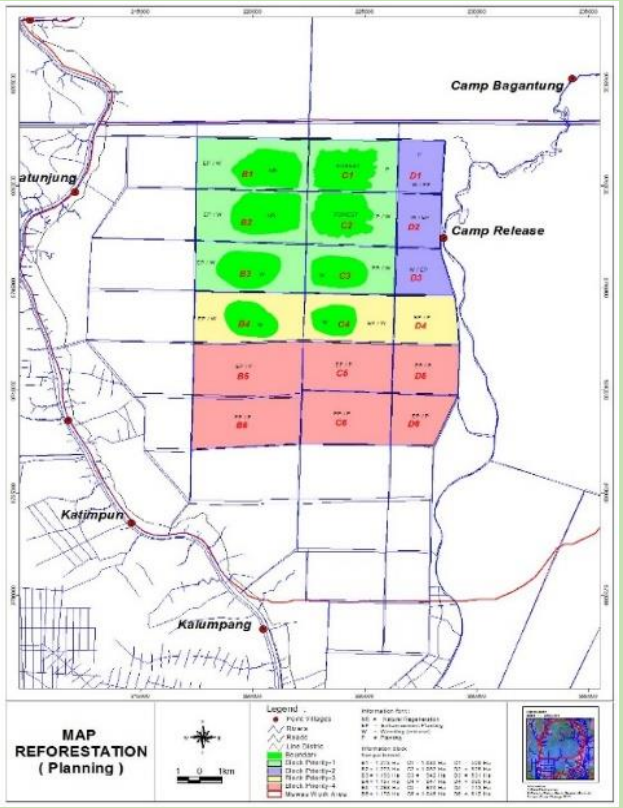
- Seedling densities similar in ANR and replanted sites, but ANR showed continued recruitment
- Species diversity was higher for ANR than the replanted sites, and continued to increase
- Growth rates were good at both ANR and replanted. Seedling response in the ANR sites showed they had been halted by ferns, and seedlings were indeed ‘released’
- ANR was much less costly and easier than reforestation – the community preferred it too

Landscape-scale planning of NR, ANR and Direct re-vegetation

- Areas which will regenerate by themselves
- Areas requiring low intervention methods
- Areas requiring high intervention methods
- Areas requiring full re-vegetation
- Zone prioritisation







Thank you