



Genetic considerations in ecosystem restoration

Michele Bozzano PhD

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Experience in ecosystem restoration

Brazil



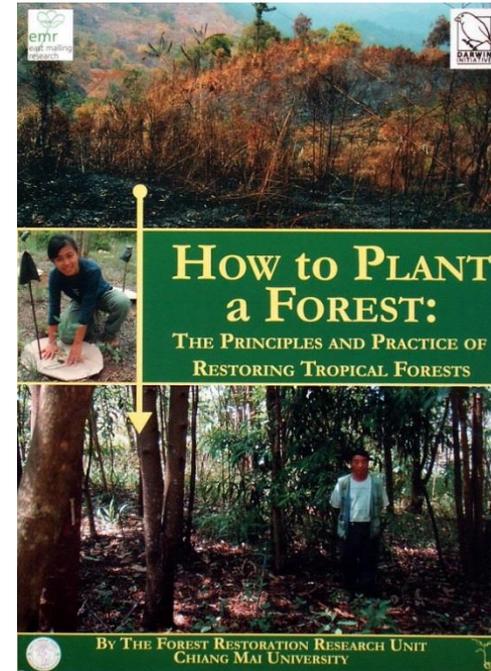
Colombia



Malaysia



Thailand



Why are genetic considerations important?



- Increase **long-term** success of restoration
- Restoring **resilience**
- **Conserve local populations** and species
- **Provide ecosystem services**

Why are genetic considerations important?



- Seed source forests must be large to avoid inbreeding



- Origin of germplasm must match site conditions to ensure adaptation



- Changing environment

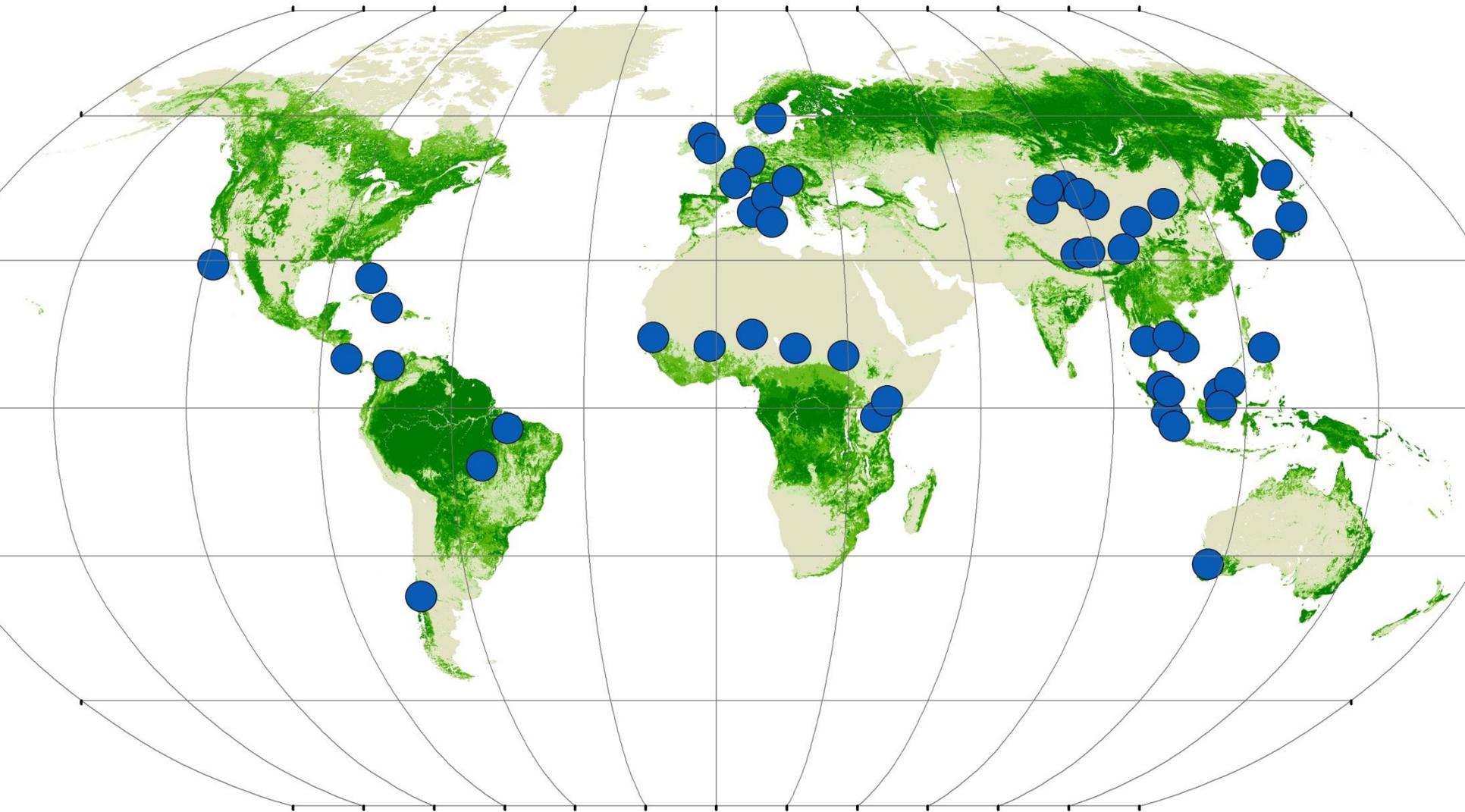


Thematic Study on genetic considerations in ecosystem restoration using native tree species

Thematic study

- Commissioned by FAO for the first global report on the State of the World's Forest Genetic Resources
- Reviews on overarching issues:
 - Seed provenance, Propagation methods, Fragmentation, Gene flow, Hybridization, Collection of propagation material in the absence of genetic knowledge, Seed availability for restoration, Designing landscape mosaics
- Description and case studies of restoration methods
- Survey among restoration researchers and practitioners about common approaches
- Analysis of genetic considerations in restoration practice
- Recommendations for policy, practice and research

Case study locations



Limited attention to genetic considerations in restoration

Few experimental studies on genetic considerations in restoration projects but most of those reveal:

- Questionable matching of germplasm and site, e.g. mixing of seed from clearly distinct sources
- Poor genetic quality of seed sources
- Poor collection practices which had resulted in genetic bottlenecks, reflected as light seed and poor germination

Experiences among restoration practitioners

A survey among 23 practitioners who have developed or advanced forest restoration methods

- Only half of the restoration methods incorporated **guidelines** or **recommendations** for germplasm collection
- *“it is very difficult to get people to collect seed from more than one tree”*
- **Lack of knowledge** about and germplasm for native tree species was considered a main constraint to the wider application of the various restoration methods
- More than half of the respondents indicated that the restoration methods do not consider **effects of climate change**.



**Recommendations
originated from the
thematic study**

Recommendations for research

- **Evaluate** the impact of different restoration **methods** on the genetic diversity of restored tree populations.
- **Expand knowledge** on native species, and identify ways to overcome constraints that limit their use in restoration.
- Develop, make available and support the adoption of **decision-support tools** for: (i) collecting and propagating germplasm (ii) matching of species and provenances to restoration sites based on (current and future) site conditions, (iii) landscape-level planning in restoration projects.
- Develop **protocols to monitor and evaluate** the genetic diversity of tree populations in restoration efforts as

Recommendations for restoration practice

- Give priority to the use of **native tree species**
- use **FRM** that is well **matched** to **environmental** conditions of the restoration site and represents a **broad genetic base**
- aim to promote resilience by **maximizing species** and **genetic diversity** from sources that are similar to the site conditions
- **Plan** for the sourcing of propagation material of desired species and associated information well before the intended planting
- Consistently plan restoration efforts in the **landscape context** and seek to integrate them into the surrounding landscape matrix.

Recommendations for policy

- Create an enabling **national policy environment** that fosters **long-term**, ecologically based forest management that explicitly favours the use of native species in ecosystem restoration and genetic conservation and provides adequate financial support.
- Put in place **supportive** regulatory frameworks that guide the **production** and **supply** of **FRM** of native tree species and the use of adequately diverse material of appropriate origin in restoration efforts.
- Broaden **education** and training curricula to promote understanding of the **importance** of using native species and genetically diverse and appropriate FRM



Thank you

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