Dalbergia cochinchinensis seed supply system in Lao PDR

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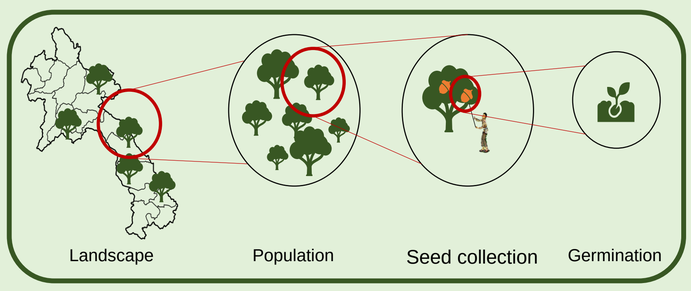
Overview

To reverse the effect of human disturbances, habitat degradation, overexploitation and climate change on tropical forests, many ambitious global and national targets have been set to restore degraded habitats. In early 2021, Lao People's Democratic Republic started its 9th Five-year Plan to restore its forest cover to 70% by 2025. Forest restoration projects need good quality and large quantity of tree seeds. We analysed genetic bottlenecks at different stages of seed collection of Laos' threatened and economically important native species *Dalbergia cochinchinensis* or Siamese Rosewood to better understand and improve seed supply of the species for restoration purposes, enhance its conservation status and develop an income stream for rural communities.

Methods

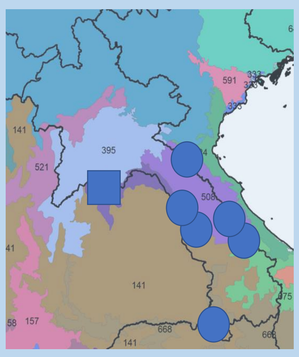
Genetic bottlenecks in tree seeds supply can be found at different levels. At the landscape level; number of seed sources and where they are in the landscape. At the population level; number of reproducing trees. At the stage of seed collection; where and how seeds are collected. And at the viability of the seeds collected.

1. Literature research on seed supply system in Lao PDR and their location in the landscape.
2. Population survey of *D. cochinchinensis* from 13 populations in 4 provinces in October – November 2020 (individuals >10cm dbh or <10 cm dbh but fruiting)
3. Germination testing of seed from surveyed populations (100 seeds per population tested)
4. District and provincial forestry officers from four provinces were involved and interviewed on implementation of seed collection strategies



Preliminary findings

- Established designated seed production areas are insufficient and are disappearing in the landscape; to this day only one remains.
- Existing information on informal seed sources are scarce. The one population identified for seed collection are mostly located in the central parts of Lao PDR.

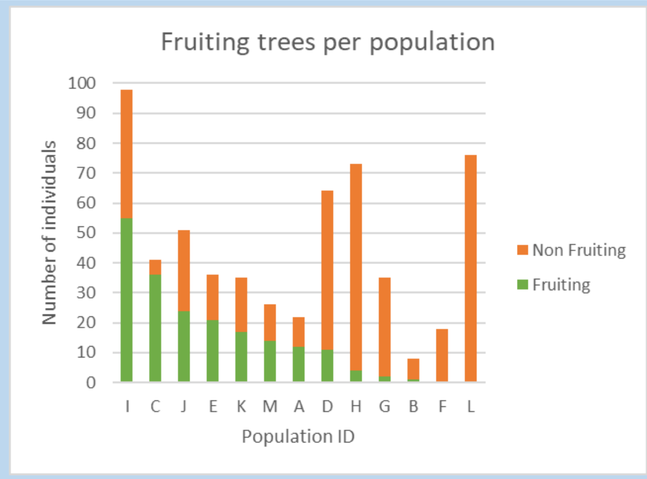


Global ecoregions in Lao PDR (based on Dienerstein et al., 2017)

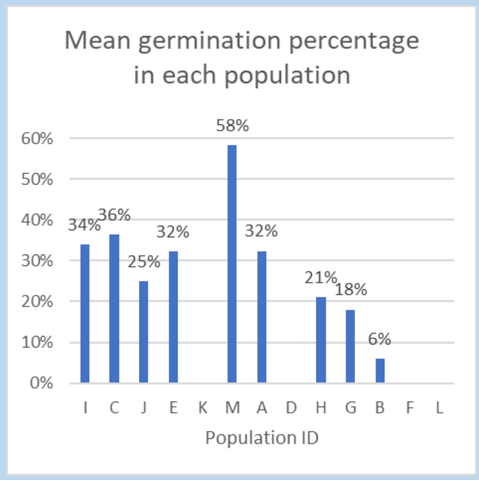
designated seed production areas

Informal seed sources

- Population survey revealed that there are only a fragments of adults trees in surveyed landscape (an average of 37 individuals per population), and not all were fruiting during the time of the survey.
- It was possible to collect seeds from 42 mother trees from 9 populations.
  - The absence of fruiting can be explained in different ways:
    - Siamese Rosewood does not fruit every year.
    - The survey was done in 2020, a particularly windy and rainy year, the seeds could have fallen earlier.
    - Reduced population size and population density could have influenced the pollen flow, thus affecting the reproductive success of the species
    - It was possible to collect seeds from 42 mother trees from 9 populations.
- Results from germination tests shows that the percentage of germination is generally very low, other than population M, with 58% germination, all other populations would have a percentage lower than 40%



- There are only a few known Rosewood seed collectors in Lao PDR. Only 6 seed collectors were interviewed in this study. Four seed collectors would occasionally outsource seed collection.
  - Four seed collectors would collect seeds only from 1 to 5 trees, only one seed collector would collect from about 11 to 15 mother trees
  - All of the seed collectors collect seeds from less than 5 different sites, and all of them collect from trees in the farmland (only 3 from natural forests).
  - When outsourcing the collection, guidelines on seeds collection are not always provided
- Identified challenges in seed collection:
  - Trees are often too far from one another, making the collection more challenging.
  - Collectors need to pay tree owners a fee to collect seeds.
  - Lack of information on the demand for this species.



Siamese Rosewood (*Dalbergia cochinchinensis*)

Dalbergia cochinchinensis is native to lowland forests of Cambodia, Lao PDR, Thailand and Vietnam. Siamese Rosewood is a commercially highly valuable species, as it is considered one of the Hongmu species, a group of tropical timbers sought after because of their characteristic fine texture and dark red, durable hardwood. The wood is mostly used to produce premium grade furniture, musical instruments and handicraft.

Because of the increased demand for this wood, the species has been subjected to illegal logging and overexploitation. The entire genus *Dalbergia* was given CITES Appendix II protection in 2017, restricting its international trade. As a result of overexploitation and illegal logging, coupled with forest degradation and fragmentation, the natural range of Siamese Rosewoods has decreased over the years and many populations are composed of only few mature individuals.

Conclusion

Our research suggest that there are severe bottlenecks in different stages of the seed supply of *D. cochinchinensis.* Seed sources and individuals are scarce, making seed collection difficult and possibility limiting the quantity and genetic diversity of seeds collected. In the long run, scarce, fragmented and smaller population sizes, could lead to inbreeding depression and genetic drift, ultimately putting the surival of the species as risk if actions are not taken soon.

Including Siamese Rosewood in restoration and afforestation planning supports conservation of the species and creates opportunities for rural communities to earn from seed collection. To provide enough quantity and quality tree seeds, there is a need to identify and increase the number of seed sources, *in situ* and *ex situ* conservation areas across the landscape. Futhermore, guidelines on seed collection should be implemented and more seed collectors should be trained and informed about seed collection practices, market opportunities and legal frame of seed collection. With an improved seed supply information system (e.g. on the market opportunities) as well as the creation of further designated seed sources, it would be possible to increase the changes to reach restoration goals, improve conservation and management of the species as weel as improve livelihoods condition of rural communities.Further research are needed to better understand the trend of Rosewoods populations in Laos.

Reference

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