



FORRU-CMU's Contributions to the Seed to Tree Project

31/03/2026

We summarize the contributions of FORRU-CMU towards the above project, including development of forest-ecosystem restoration tools and technical support for TRCRC in Malaysia. FORRU contributed towards development of a Thai version of D4R (Diversity for Restoration – species-matching matching) by providing: i) a list of species of proven restoration value, ii) 9,961 GPS tree locations, to refine species-distribution models and iii) a large matrix of trait data, culminating in testing of a D4R Thai-language prototype (6/3/26) to match tree species with sites in Northern Thailand. FORRU staff were trained in the MFT app (MyFarmTrees – tracking seeds and trees) and provided local species lists and Thai language menus, enabling testing of a Thai prototype. FORRU ran two workshops (communities and nursery officers) to assess reactions to the tools and validate seed-zones and species choices. A survey of northern Thai nurseries revealed average production costs of 4.5 THB per sapling and value-chain gaps, specifically lack of seed-collection budgets and technical training. FORRU provided three workshops for TRCRC in Chiang Mai (funded separately), followed by on-site training at centre's nurseries and field sites in Malaysia (November 2025). We also provided tree-species information to support restoration in Malaysia. However, few northern Thailand species matched TRCRC's lists.

Restoration and conservation planning toolkit designed and promoted in 3 Malaysian states

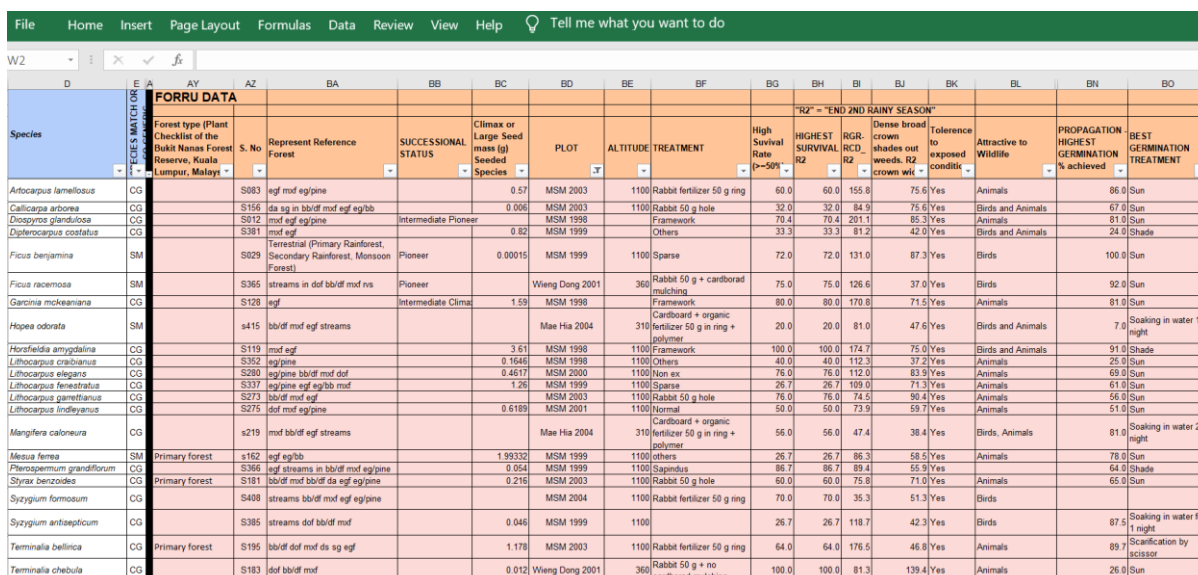
1.1 Contribute to selecting ≥60 priority tree species for restoration in Malaysia and other ASEAN member states, based on existing species datasets, expert information, and the principles of the Framework species method (Y1, Q3).

Data from the Forest Restoration Research Unit database were used for data mining to select appropriate tree species for Malaysia, including data on habitat, forest type, field performance, uses and seed-dispersal mechanisms. We searched for species that matched those, listed by TRCRC, as locally available and currently in the TRCRC nurseries. We also expanded the list to include closely related species (as very few were a perfect species match). Data were collated from FORRU-CMU's archives for northern Thailand and sent to TRCRC officials on 8th February 2025.

The full data set can be downloaded from here:

<https://www.dropbox.com/scl/fi/901j1z07ze0vn7ee393d/TRCRC-Promising-Species-Lists-FILTERED-DO-NOT-EDIT.xlsx?rlkey=tv1tixkuxodihzzuxaq7mxgk5&dl=0>

Please note that this spreadsheet has hidden columns to make the data more readable and has already been filtered for the 22 species mentioned in the below summary:



Species	Forest type (Plant Checklist of the Bukit Manas Forest Reserve, Kuala Lumpur, Malays)	S. No	Represent Reference Forest	SUCCESSIONAL STATUS	Climax or Large Seed mass (g) Seeded Species	PLOT	ALTITUDE	TREATMENT	High Survival Rate	HIGHEST SURVIVAL R2	RGR	RCD	R2	Dense broad crown shades cut weeds, R2 crown wlt	Tolerance to exposed condition	Attractive to Wildlife	PROPAGATION HIGHEST GERMINATION % achieved	BEST GERMINATION TREATMENT
Artocarpus lamellosus	CG	S083	egf mof eg/pine		0.57	MSM 2003	1100	Rabbit fertilizer 50 g ring	60.0	60.0	155.8		75.6	Yes	Animals		86.0	Sun
Callicarpa arborea	CG	S156	da sg in bb/df mof egf eg/bb		0.006	MSM 2003	1100	Rabbit 50 g hole	32.0	32.0	84.9		75.6	Yes	Birds and Animals		67.0	Sun
Diospyros glandulosa	CG	S012	mof egf eg/pine	Intermediate Pioneer		MSM 1998		Framework	70.4	70.4	201.1		85.3	Yes	Animals		81.0	Sun
Dipterocarpus cootatua	CG	S381	mof egf		0.82	MSM 1999		Others	33.3	33.3	81.2		42.0	Yes	Birds and Animals		24.0	Shade
Ficus benjamina	SM	S029	Terrestrial (Primary Rainforest, Secondary Rainforest, Monsoon Forest)	Pioneer	0.00015	MSM 1999	1100	Sparse	72.0	72.0	131.0		87.3	Yes	Birds		100.0	Sun
Ficus racemosa	SM	S365	streams in dof bb/df mof ns	Pioneer		Wiang Dong 2001	360	Rabbit 50 g + cardboard mulching	75.0	75.0	126.6		37.0	Yes	Birds		92.0	Sun
Garcinia mckeaniana	CG	S128	egf	Intermediate Clima	1.59	MSM 1998		Framework	80.0	80.0	170.8		71.5	Yes	Animals		81.0	Sun
Hopea odorata	SM	s415	bb/df mof egf streams			Mae Hia 2004		Cardboard + organic fertilizer 50 g in ring + polymer	20.0	20.0	81.0		47.6	Yes	Birds and Animals		7.0	Soaking in water 1 night
Horsfieldia amygdalina	CG	S119	mof egf		3.61	MSM 1998	1100	Framework	100.0	100.0	174.7		75.0	Yes	Birds and Animals		91.0	Shade
Lithocarpus cradleanus	CG	S352	eg/pine		0.1648	MSM 1998	1100	Others	40.0	40.0	112.3		37.2	Yes	Animals		25.0	Sun
Lithocarpus elegans	CG	S286	eg/pine bb/df mof dof		0.4817	MSM 2000	1100	Con ex	76.0	76.0	112.0		83.9	Yes	Animals		68.0	Sun
Lithocarpus fenestratus	CG	S337	eg/pine egf eg/bb mof		1.26	MSM 1999	1100	Sparse	26.7	26.7	109.0		71.3	Yes	Animals		61.0	Sun
Lithocarpus pameffianus	CG	S273	bb/df mof egf			MSM 2003	1100	Rabbit 50 g hole	76.0	76.0	74.5		90.4	Yes	Animals		56.0	Sun
Lithocarpus lindleyanus	CG	S275	dof mof eg/pine		0.6189	MSM 2001	1100	Normal	50.0	50.0	73.9		59.7	Yes	Animals		51.0	Sun
Mangifera caloneura	CG	s219	mof bb/df egf streams			Mae Hia 2004		Cardboard + organic fertilizer 50 g in ring + polymer	56.0	56.0	47.4		38.4	Yes	Birds, Animals		81.0	Soaking in water 2 night
Mesua ferrea	SM	Primary forest	4162 egf eg/bb		1.9832	MSM 1999	1100	Others	26.7	26.7	86.3		58.5	Yes	Animals		78.0	Sun
Plenospermum grandiflorum	CG	S366	egf streams in bb/df mof eg/pine		0.054	MSM 1999	1100	Sapodius	86.7	86.7	89.4		55.9	Yes	Animals		64.0	Shade
Styax benzoides	CG	S181	bb/df mof bb/df da egf eg/pine		0.216	MSM 2003	1100	Rabbit 50 g hole	60.0	60.0	75.8		71.0	Yes	Animals		66.0	Sun
Syzygium formosum	CG	S408	streams bb/df mof egf eg/pine			MSM 2004	1100	Rabbit fertilizer 50 g ring	70.0	70.0	35.3		51.3	Yes	Birds			
Syzygium antisepticum	CG	S385	streams dof bb/df mof		0.046	MSM 1999	1100		26.7	26.7	110.7		42.3	Yes	Birds		87.0	Soaking in water for 1 night
Terminalia bellicosa	CG	S195	bb/df dof mof ds sg egf		1.178	MSM 2003	1100	Rabbit fertilizer 50 g ring	64.0	64.0	176.5		46.8	Yes	Animals		89.0	Scarification by scissor
Terminalia chebula	CG	S183	dof bb/df mof		0.012	Wiang Dong 2001	360	Rabbit 50 g + no cardboard mulching	100.0	100.0	81.3		139.4	Yes	Animals		26.0	Sun

Only 4 exact species-name matches were found in the FORRU data archives: two fig species (*Ficus benjamina* and *F. racemosa*), *Hopea odorata* and *Mesua ferrea*. The two *Ficus* species are highly recommended framework species in Thailand. Although their overall field performance is moderate, their figs (produced after about 6 year's growth) are extremely attractive to seed-dispersing wildlife and their dense root systems bolster against soil erosion and landslides. They can be planted to strengthen stream banks and thus help prevent land disputes. Both are good weed suppressors. *F. racemosa* has a fairly good grow-back rate after fire. *Hopea* and *Mesua* have **low field performance**, in N. Thailand, mainly due to low field survival on exposed sites. Survival rates may be higher under some shade. Furthermore, *Hopea* seeds are difficult to germinate. However, it is a highly valued timber tree (for boats), so if local people want an investment for their grandchildren, it might be worth including a few in the planting mix if the site already has some shade. *Mesua* has medicinal properties and is a favourite of traditional healers. It is being actively researched for treating diabetes in modern medicine. It is easy to germinate in the nursery and has a reasonable growth rate in the field, but survival rates in the field are low. So, similarly it should probably be planted only in partially shaded sites.

In addition, we compiled data on 18 species in the same genera as those of interest to TRCRC, so the advice based on the northern Thailand dataset for these species may be less reliable in the Malaysian context.

Horsfieldia, *Garcinia* and *Diospyros* all score high in terms of field performance and they all produce fleshy fruits that are highly attractive to seed-dispersing animals. All have recalcitrant seeds - so they cannot be stored in a seed bank. They must be germinated immediately after seed collection. *Terminalia* and *Artocarpus* also both exhibit high field performance and both have fruits attractive to seed-dispersers. More marginally acceptable genera, based on field performance of N. Thai species, were *Lithocarpus* and *Pterospermum*. *Lithocarpus* produces "acorns" which are a favourite of squirrels, some of which are scatter hoarders, so they could encourage a common group of seed dispersers into restoration plots. Congeneric species of some of the other TRCRC listed species had poorer recorded field performance in northern Thailand: *Syzygium*, *Styrax*, *Callicarpa*, *Dipterocarpus*, *Mangifera* etc.

Dipterocarpus spp – FORRU has never had great success with germinating Dipterocarp seeds in the nursery and survival of planted out seedlings has always been low for us. Furthermore, the seeds are wind dispersed, so they should arrive at restoration sites naturally, provided mature trees still remain within dispersal distance of the restoration plots. Dipterocarps are particularly attractive to animals in terms of food. So, provided the restoration sites are fairly close to native forest which retain fruiting dipterocarps, there seems little reason to plant them.

Mangifera spp - wild mango – are highly attractive to seed-dispersing animals, but field survival rates in exposed sites is low and growth rates are fairly slow.

Syzygium – produce fleshy fruits, which are attractive to seed dispersers. Field survival and growth is highly variable. They have robust almost leathery leaves, which they tend to retain through the dry season. They are quite hardy on exposed degraded sites.

Our advice is based on field trials on exposed sites in northern Thailand, so we recommend that TRCRC tests these and other congeneric species under typical conditions in Malaysia. The data are intended to help focus attention on field testing species and genera that may have a higher probability of success (based on field data from northern Thailand), compared to a random selection.

Furthermore, we compiled a **list of top-performing tree species from our southern Thailand plots in Krabi** (Krabi) and made the list available to TRCRC via our website, for checking against local tree floras at Elmina and Perak.

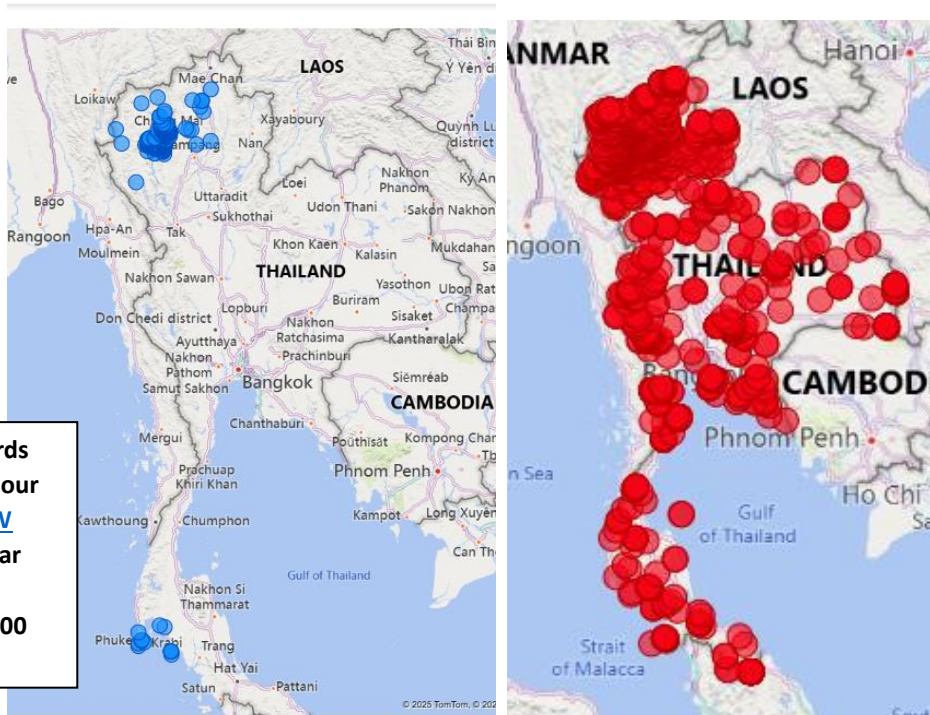
<https://www.forru.org/lowland-tropical-forest-of-southern-thailand-below-1-000-m-above-sea-level>

1.2 Compile and share spatially-explicit occurrence data for native Asian tree species across their distribution range (Y1, Q4), to help develop and refine restoration planning tools for Malaysia and other ASEAN member states

We collated tree-location data from 2,700 seed-collection records from FORRU's database, CMU research student projects, and seed-collection data, amassed during FORRU's work with the [Global Tree Seed Bank project with the Royal Botanic Gardens, Kew](#). Since FORRU has worked mostly in northern Thailand and in Krabi Province (S. Thailand) most of the localities were concentrated in those areas.

In addition, we scoured the labels of >10,000 herbarium specimens (CMU-B herbarium), which had been scanned into a library of images. Most of the specimens had been collected by J.F. Maxwell from 1992-2015. Images were examined for location information in the herbarium label. Although most did not have GPS coordinates, we were able to deduce a fairly precise location from the detailed descriptions provided by Maxwell and our own local knowledge from collecting trips with him. These GPS locations were widespread across the country.

From these two sources, we were able to extract 9,961 GPS locations which were submitted to Tobias on 10 March 2025 as an [excel file](#), to contribute towards verifying the ranges of species to be included in the D4R model.



Right: seed-collection records from FORRU database and our projects with the MSB, KEW (searched 2,500 records). Far right: CMU's herbarium specimens (searched >10,000 records).

1.4 Contribute to developing a comprehensive dataset on the uses and functional traits of native Asian tree species, by providing inputs to trait selection and compiling and sharing existing data on templates provided by the Alliance (Y1, Q4; Y2, Q1 (reporting of indicative results), and Y2, Q2 (final results)). The data will be used to jointly expand the Diversity4Restoration species selection tool to Northern Thailand, targeting at least 70 tree species and 40 functional traits and uses.

Since submission of the first report, we continued to work closely with Tobias via many emails and Zoom meetings, resulting in the successful launch of a test-version of the D4R app for northern Thailand at a workshop for RFD nursery officials on March 6th.

We provided a preliminary list of 122 tree species in October 2024, for which we have confirmed data from old field trials (early survival and growth), including most of those subsequently selected as framework tree species. We censused the FORRU Team for their opinions about criteria, that apply to northern Thailand, to include in drop-down menus of options in the model on: i) site conditions and ii) restoration objectives and engaged with Tobias to evaluate the criteria (see summary discussion in **Appendix A**). During online meetings with the D4R team in early May 2025, the criteria and data-entry protocol for traits and uses were finalized. Our FORRU team and interns extracted data on species uses and functional traits from FORRU's database and published resources over subsequent several months, using a small R application, which Tobias had written. The selected data were then sorted and checked, removing repetitions, and compiled into the final spreadsheet, used by the app to generate species lists for each location. That process revealed several gaps in the data and Tobias requested us to search through additional data sources in late 2025. Since the additional worked had not been budgeted under the original grant, we requested supplementary funding in the extension agreement, to further employ Dr. Greuk to perform those additional analyses. We also worked on development of a Thai translation of the app's interface.

Consequently, we were able to test a Thailand prototype of the app, using a thoroughly researched background list of tree species, indigenous to northern Thailand (of proven value for forest restoration), with locally relevant uses and an interface in the Thai language in March 2026. Dr. Greuk demonstrated the app for the first time to a Thai audience of RFD officers on March 6th <https://d4r.treeplanner.org/tool/> - go here and then zoom into Thailand on the map



Dr. Greuk explaining the D4R concept and demonstrating the Thai prototype version to workshop participants from the Royal Forest Department (6/3/25)

The D4R tool was evaluated by a total of 40 participants, including community representatives, researchers and forestry officials. The feedback was overwhelmingly positive. Only 2 of the community respondents said they would not use it and all forest officers said they would. Stakeholders praised the tools' technical utility for species selection. However, significant barriers to adoption were identified, particularly regarding the complexity of the user interface, which some found "too complicated", particularly farmers and elderly villagers. Future success depends on prioritizing system simplification, improving Thai localization—including the addition of local common names.

Table 1 - Summary survey of reaction to D4R

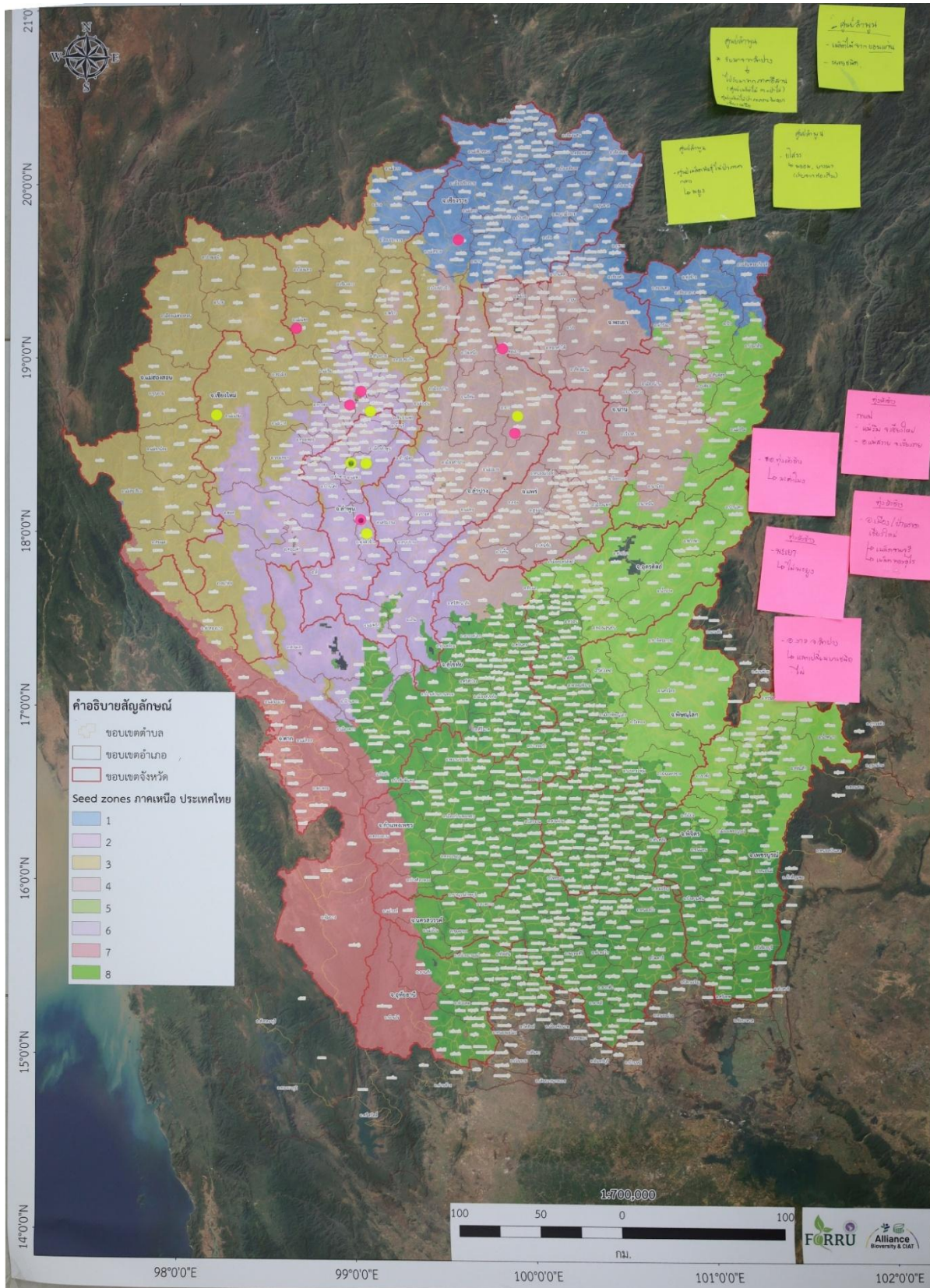
Feedback and Utility

Topic	Feedback Count	Summary of Stakeholder Input
Species Selection	6	Highly valued for its ability to filter and suggest tree species that match specific planting areas and forest restoration goals.
Impact & Value	4	Viewed as a useful guideline for community conservation and providing incentives for restoration work.
Scientific Utility	3	Described as a "good concept" and a modern, convenient tool for aligning species with geography and climate.
Planning & Research	7	Aids in organizational decision-making, work planning and data validation against actual site conditions.
Functionality	2	Praised for acknowledging site conditions

Improvements and Future Suggestions

Topic	Feedback Count	Summary of Stakeholder Input
Localization	11	There is a strong demand for a comprehensive Thai version of the tool. This includes the integration of Thai common and local tree names to improve community understanding.
System Simplification	13	Users urgently requested that the tool be made " simpler " and "accessible" to local farmers. This involves streamlining the user interface and reducing the number of forms and functions.
Database Expansion	4	Adding more native species from Northern Thailand. Suggestions also highlight the need for data on plant habits, survival rates and specific seed collection times.
Technical Features	3	Key technical updates involve improving map usability for more precise location selection. Additionally, participants suggested adding GPS coordinates for seed collection areas and a site assessment instruction prior to data entry.

Detailed feedback responses are summarized in **Appendix B**.



One of these seed-zone maps (province and district boundaries), overlaid with seed supply chains, was completed by each of the five working groups of nursery officers during the workshop. This example shows 2 Lamphun nurseries (circle with black dots: yellow= Lamphun Provincial Forest Nursery Station and pink= Thung Hua Chang Forest Nursery Station). Yellow nursery has three seed origins within the home seed zone (purple) one outside to the west and one to the east. Pink nursery also has two seed origin points within their seed zone and four outside.

1.5 Contribute to validating the results on species distributions, traits, and seed zones of the spatial analysis

Validation of seed zones took place during the 2nd Chiang Mai workshop with RFD officers. In general participants felt they did not have enough local knowledge to validate the seed zone boundaries, in terms of natural isolating factors or morphological differences in target tree species among the suggested seed zones. Therefore, we ran an exercise by which the officers mapped their seed source supply chains directly on to A0 size seed-zone maps, overlaid with provincial and district boundaries. This activity revealed that Chiang Mai and Lampang Provinces are the primary seed sources, providing essential support to nearly all nurseries across all Upper Northern provinces (Table 2). Whilst most seed collection locations were within the idealized seed zones, there were notable exceptions, e.g. *Dalbergia cochinchinensis* and *Pterocarpus macrocarpus*, were predominantly imported from Khon Kaen and Udon Thani (in Eastern Thailand).

Nan Province was particularly noted for seed supply of economic fruit and timber species across seed zones, most notably Tamarind and *Azelia xylocarpa*. Meanwhile, Phrae Province exhibited a remarkably high diversity of indigenous species including *Dolichandrone spathacea*, *Senna siamea*, *Lagerstroemia loudonii* and *Bauhinia saccocalyx*. They aimed to maintain a self-reliant strategy by prioritizing seed collection within its own provincial boundaries. However, seed mapping revealed they actually collect several species from much further afield. Discussions, during the session, revealed that, whilst most officers understood the purpose and need for seed zoning, orders from higher up the management hierarchy, and the need to meet targets, often superseded genetic considerations.

We did not attempt to validate all the D4R functional traits within workshops, since many were not understood by the participants. The economic traits were the major exception. There was clear support for economic species, mostly timber trees from the RFD and trees yielding various NTFPs including bamboos from the villagers.

In terms of validating species choices and distribution, please see the bar charts below (nursery survey section) for species preferred by RFD in their nurseries and the species and family lists in the workshop reports appended.

Output 3. Identified partnership opportunities and leverage points within restoration value chains, fostering species diversity, ensuring seed availability and quality, and empowering IPLCs

3.5 Provide expert guidance to the development of business plans with and for IPLC practitioners at 5 native tree nurseries or seed collector groups (at least 3 community groups and 20 participants, including at least 30% women)

Information to support this output was generated by a structured **survey of tree nurseries** in northern Thailand and through information exchange and dialogues with the Project's Malaysian Partner (TRCRC) during **workshops with TRCRC** including site visits to their nurseries and field plots in November 2025, by FORRU staff (Steve and Dia)

Nursery Surveys in Northern Thailand

Sorayuth conducted a survey of 27 nurseries across eight provinces in northern Thailand from 3 November 2025 to 20 January 2026. Of these, 24 were government nurseries, two were private nurseries, and one was a state enterprise nursery. A total of 27 respondents participated, comprising 19 men (70.37%) and 8 women (29.63%). The study used questionnaire surveys and in-person interviews with local nursery heads and staff, involving travel across northern Thailand (no online interviews were conducted). A copy of the questionnaire is provided in Appendix C.

His results revealed considerable room for improvement in value chains related to seed collection and planting stock production across northern Thailand. Average number of staff at each nursery was only 5.8 (SD=4.7) with average budgets of just over 1 million baht per nursery (mean 1.15 million, SD= 0.84). The number of saplings produced per nursery per year averaged 254,213 (SD=131,567) of an average of 19 species per nursery (SD=11).

Therefore, a rough estimate for average overall production costs was 4.5 THB/sapling and of production efficiency of 40,000-50,000 trees per person per year.

Most seeds were obtained from natural forest, trees on farms and government seed orchards, and were collected by either nursery staff or bought from external suppliers (ranked roughly equally overall). However, most nursery staff interviewed did not know where seeds had originated from nor how many seed trees had been collected from.

Economic value was the dominant species-selection factor. However, data on the perceived popularity or importance of species and species actually collected as seed and/or growing as saplings in the nurseries did not align—see bar charts below, indicating that species production was driven by opportunistic seed availability rather than idealized species preferences.

Species information, technical knowledge (training), equipment, staffing levels and budget were all ranked more or less equally by the interviewees as needing improvement. Several nurseries reported exceeding their budgets and ranked limited budgets as a major constraint. Combining the quantitative survey results with additional free-style comments, the following emerged as priorities to address in improving the seed/sapling the value chain:

Resource & Budget Allocation

- **Funding Gaps:** dedicated budgets specifically for seed collection, mother tree surveys, and the maintenance of mother trees.
- **Equipment Modernization:** lack of modern tools and specialized equipment (particularly for collecting seeds from tall trees) is a major hurdle.
- **Infrastructure:** establishment of high-quality seed-production areas and better extraction facilities.

Technical Development & Training

- **Knowledge & Skills:** specialized training programs for staff to improve technical knowledge in seed extraction and germination.
- **Efficiency Improvements:** better grading processes (to reduce loss) and stricter selection of high-quality seeds, to address current low germination rates.
- **Data Integration:** better use of data and new technologies to improve overall operations—these ties in with the MFT and D4R apps developed under the project.

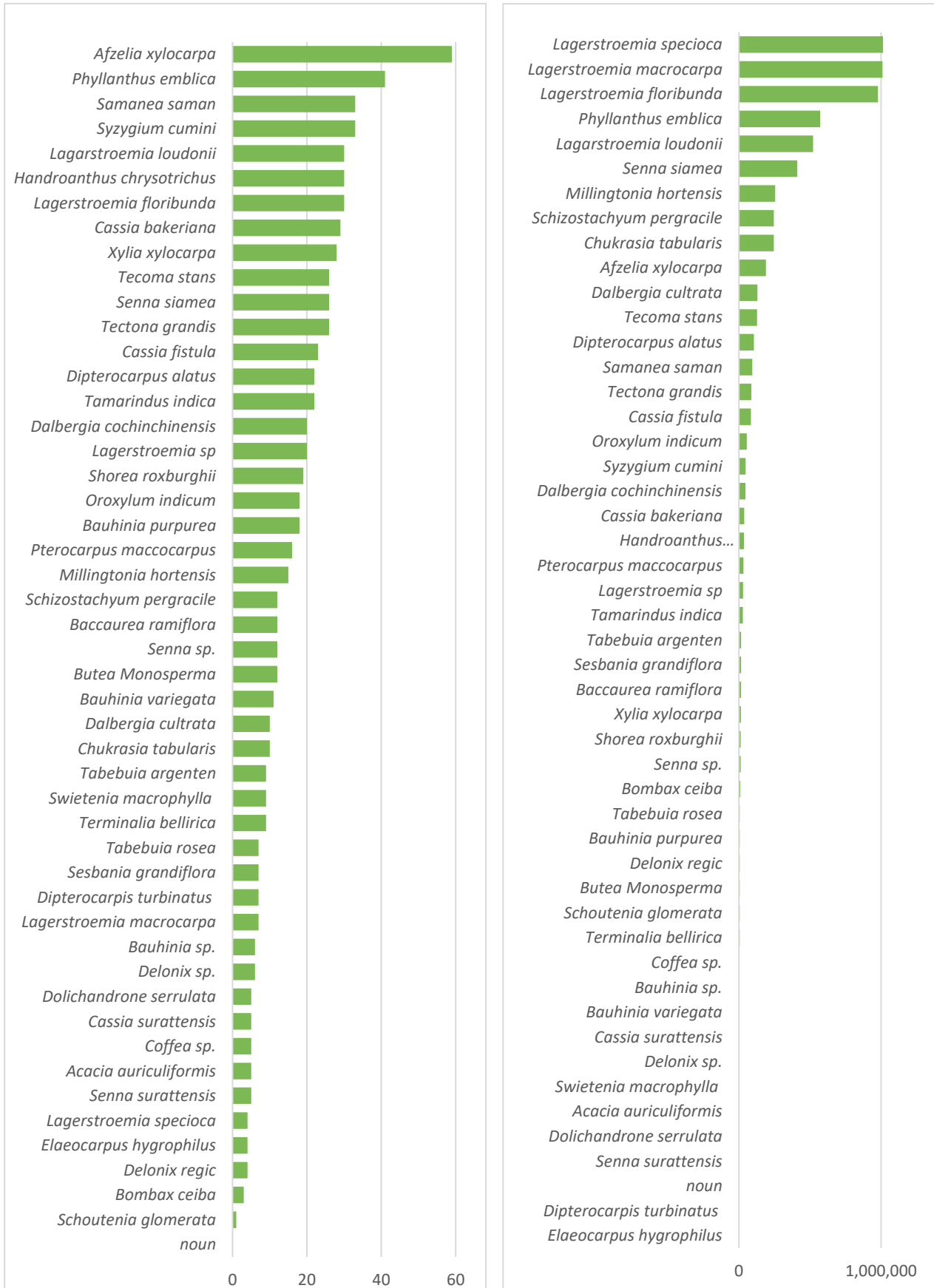
Logistics & Structural Reform

- **Centralization:** a central hub for seed distribution, so that nurseries can focus exclusively on raising saplings rather than sourcing their own seeds—*however* this perceived need of the nursery staff goes *against* the principle of local seed collection, to maintain local gene pools and genetically match locally produced planting stock with local site conditions.
- **Staffing:** currently insufficient to handle the workload of managing and producing plating stock to meet local demand.
- **Legal & Social Barriers:** Legislative amendments were suggested, to allow for sapling production from mother trees located within restricted National Reserved Forests. There is a need to address public misconceptions, where seed collectors are sometimes accused of stealing seeds for commercial sale.

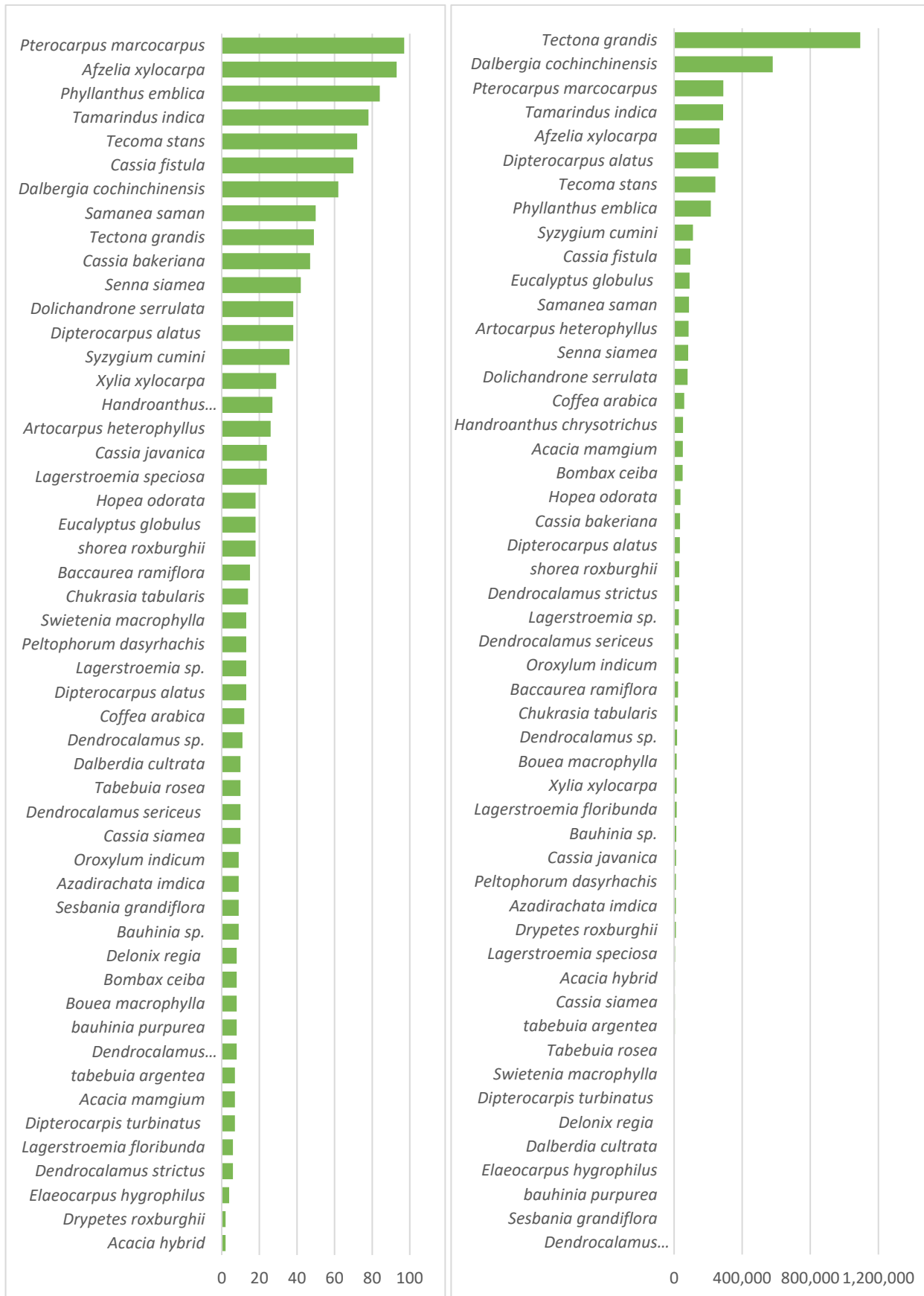
Community & Market Alignment

- **Species Diversity:** Local communities are requesting more edible fruit tree species, as current inventories are too focused on non-edible timber trees.
- **Meeting Demand:** Production should be better aligned with actual public demand and annual needs, especially for species that are currently difficult to find.

Sum of rank importance values for seed collection from designated by staff from all nurseries (left) estimated actual number seeds collected (all nurseries) (right).



Sum of rank importance values for planting stock production designated by staff from all nurseries (left) and estimated actual number seedling sin nurseries (all nurseries) (right).



Working with TRCRC

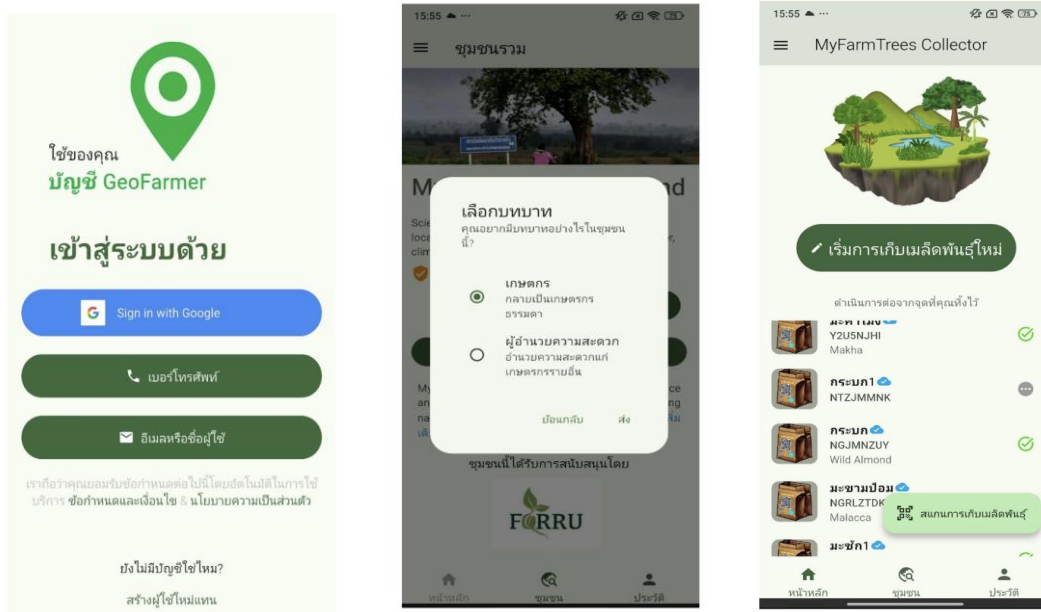
The topic of value chains was also covered (along with many other topics) during workshops with TRCRC. In 2024 and 2025, FORRU provided a total of 3 workshops in Chiang Mai (each lasting 5 days) to TRCRC staff and their partner communities from Sarawak State. These workshops were funded by other parts (non-FORRU) of the StT budget and with external contributions (i.e. Bruno Manser Fonds or BMF). Presentations and dialogues on restoration costs/benefits were always included in these workshops, alongside many technical aspects of forest-ecosystem restoration, including step by step guides through the planting-stock supply chain from species selection through seed collection/storage/treatment and nursery procedures.

Furthermore, Steve and Dia provided onsite training at TRCRC’s Elmina and Perak sites in Malaysia over 5 working days in November 2025. That trip included visits to community tree nurseries where the dialogue on value chains was continued. A full report on the trip was supplied to Bioversity and TRCRC on 24/11/25 and is also appended to this report (**Appendix D**)

[Annotated photo gallery of the trip can be viewed here.](#)

MyFarmTrees

The FORRU team also worked on bringing to fruition a Thai version of the MyFarmTrees app that would allow registration of seeds collected and trees planted. Dr. Dia Shannon and Pornpawee Laohasom attended a 3-day training workshop at TRCRC’s Elmina Centre in June 2025 followed up with some online training in October (for full account see **Appendix E**). Subsequently, FORRU created a MFT account and provided species lists to the app developers and proofed Thai translations for the interface. Furthermore, Som created a “how to use” video. The video provides a comprehensive guide to the various features and functions of My Farm Tree Seed Collection, My Farm Tree Nursery, and My Geo Farm. Furthermore, the FORRU team uploaded the video to their YouTube channel, to facilitate easy learning for the Thai community https://youtu.be/z9xgFOX4zI0?si=v_CRZV2pQIiBtMiw .



Interface Thai translation of MFT application

The app was tested during the two Chiang Mai workshops with 42 representatives from national parks, provincial administration, tree nurseries and local community networks 27/2/26 and 6/3/26. The application suite achieved a very high interest rate, with 96% of participants in the first workshop and 86% in the second workshop expressing intent to adopt the tools for their restoration and tracking work

Table 2 – Overview summary of reactions to the MyFarmTrees application.

Feedback and utility

Topic	Feedback Count	Summary of Stakeholder Input
Database & Tracking	12	Highly valued as a reliable source for tracking seed origins, managing "Red List" (endangered) species, and maintaining historical data for restoration evaluation.
Niche Utility	5	Viewed as a strong concept specifically suitable for small-scale restoration projects or CSR initiatives.
Implementation Success	3	Recognition that successful adoption depends on ongoing support and administrative layers for data verification.

Concerns

Topic	Feedback Count	Summary of Stakeholder Input
Complexity & Practicality	19	Frequently cited as "too complicated" for villagers or elderly workers. Concerns include too many steps for data entry and being too slow for high-volume field operations.
Data Security & Sovereignty	9	Significant anxiety regarding the safety of sensitive "Red List" location data on the cloud. Users also raised concerns about national data sovereignty and foreign developer access.
Platform Compatibility	2	Specific requests for an iOS version, as current demonstrations were focused on Android.
QR Code Reliability	2	Concerns regarding the physical durability of QR codes in the field and the ability to export data (CSV) if codes are lost.

Improvements and Future Suggestions

Topic	Feedback Count	Summary of Stakeholder Input
UX & Accessibility	12	Urgent need to simplify the interface for local farmers and villagers, including reducing the number of forms and potentially allowing the app to generate its own QR codes.
Botanical Data & AI	7	Suggestions to add germination details (dormancy/treatment), species photographs for identification, and AI-based photo identification in the field.
Operational Efficiency	7	Requests to "decrease steps" to make it more practical for monitoring large numbers of trees simultaneously. Suggestions included adding automated reminders for seed collection schedules.
Data Quality Control	2	Recommendation to involve specialists to verify and correct species data and common names.

Individual responses are tabulated in **Appendix F**.



Hands-on testing of MFT at the Chiang Mai workshops

Household Community Surveys – Species Selection

The purpose of the household surveys was to integrate traditional ecological knowledge of Indigenous Peoples and Local Communities (IPLCs) into restoration planning.

The primary goal was to document useful tree species and their agro-ecological characteristics to enhance decision-support tools for restoration across northern Thailand. Structured interviews were conducted at 10 villages, covering elevations from 234 to 1,050 meters above sea level, to compile lists of preferred tree species. The findings were then verified in a validation workshop amongst 30 community representatives and botanical experts in Chiang Mai on February 27th.

Totally, 204 useful plant species from 58 families were listed. Whilst timber trees featured heavily in the lists produced (40 species), broader subsistence species were also identified of high importance, particularly food (34 species) and medicinal plants (31 species). Respondents stated that most such species were for local use; not for commercial sale. Respondents demonstrated deep knowledge of functional traits, identifying species suitable for drought tolerance, soil improvement and wildlife support. Species like *Phyllanthus emblica* (Indian gooseberry) and *Ficus* spp. were noted as keystone food sources for wild birds and mammals including barking deer and wild boar. Several species exhibited multifunctional use e.g. villagers allocated *Turpinia pomifera* to five different use categories.

The study concluded that local knowledge extends far beyond simple utility, to include complex ecological insights. Integrating these locally preferred multifunctional species into restoration efforts would ensure that restoration projects support both ecosystem recovery and community livelihood resilience, thus building local “buy-in” to such projects.

The full report on this part of the project is rather long and is submitted separately. [It can also be downloaded from this link.](#)

Chiang Mai Workshops

FORRU ran two workshops at the Doi Suthep Nature Education Centre, serving many functions most of which have already been mentioned above, including follow up on outputs from the village meetings and the nursery survey: 27/2/26 – for community groups and 6/3/26 - for Royal Forest Department nursery staff. Thirty participants attended the community workshop and 24 attended to nursery staff workshop. Both workshops tested hands-on use of the MFT app and a hands-on assessment of tree-species preferences. D4R was presented as a PowerPoint in the first workshop and as a working prototype in the 2nd workshop. The second workshop also included the hands-on exercise, to validate seed zone maps (prepared by Tobias) with RFD officers.

A detailed report on the workshops is **appended (Appendix G)**.

Photo galleries and videos from the workshops are available via FORRU's FB pages as follows:

1. **Community workshop** – [annotated photo-gallery](#), video clips: i) [D4R and tree-species selection](#), ii) [MFT](#), iii) [seed collection and banking](#)
2. **Nursery staff workshop** – [annotated photo-gallery](#) and [video](#)

The technical outputs of these workshops (review of apps and seed zones) are covered elsewhere in this report.

Project Management

We worked on finalizing the original project agreement and signing in November 2024 and prepared a plan for additional work and an amendment agreement in November 2025.

We contributed to online project meetings on 4th December 2024, 12th & 13th March, 10th April, 2nd July, 8th December 2025,

We promoted the project with a page on the four.org website <https://www.forru.org/projects/seed-to-tree>

Additional Activities

We invited Bioversity to promote the project and the D4R tool at our workshop, entitled "Technologies for Assisting Forest Ecosystem Restoration" <https://www.forru.org/stories/tech-meets-trees>. Riina accepted the invitation to present, thus providing a further opportunity to promote the project to prospective users of the tools.

Dr. Pimonrat from FORRU contributed to Bioversity's side event at the Asia Pacific Forestry Commission meeting (Seeds of Resilience: Innovations for restoring biodiverse and productive forests) with a talk on species distribution modelling.

APPENDIX A – Evolution of D4R (Thai version)

Site conditions and objectives D4R N-Thailand

The Diversity for Restoration tool (<https://www.diversityforrestoration.org/tool/> and <https://besjournals.onlinelibrary.wiley.com/doi/full/10.1111/1365-2664.14079>) is a tool to support the selection of tree species and seed sources for forest landscape restoration, depending on the site conditions and restoration objectives selected by the user of the tool. This document is meant to collect feedback on which conditions and objectives to include.

A. Site conditions

Note: the site conditions in D4R are currently only used to score species compatibility with these conditions. Two other types of site conditions were proposed by Steve from FORRU for D4R Thailand: (1) site conditions that can guide the restoration approach/method (for ex. distance to forest), and (2) site conditions to filter out species (regenerating species, forest type). I suggest we try to implement the last two not only in Thailand but also in Borneo.

1. Site conditions to score species compatibility with site conditions

Site conditions included (proposal):

Site condition	Comment Tobias	Comment FORRU
acid soils		We can list species that grow well with pines (Mon Long and BPK23-24 plots) , which as usually associated with acidic soils
alkaline soils		We can list species that grow on limestone mountains, such as Doi Chiang Dhao
compacted soils		No specific data
drought		May have a few species recommendations – waiting to hear back from colleagues
erosion		Recommend any <i>Ficus</i> spp and <i>Streblus asper</i> (the latter especially river-bank erosion stabilization)
fire prone		Seven species had excellent post fire survival >70%: <i>Bischofia javanica</i> , <i>Ficus auriculata</i> , <i>Heynea trijuga</i> , <i>Manglietia garrettii</i> , <i>Protium serratum</i> , <i>Prunus cerasoides</i> and <i>Spondias axillaris</i> . re-sprout after burning, we found 8 species with high fire resilience: <i>B. javanica</i> , <i>Castanopsis calathiformis</i> , <i>Diospyros glandulosa</i> , <i>F. auriculata</i> , <i>M. garrettii</i> , <i>Phoebe lanceolata</i> , <i>P. cerasoides</i> and <i>Sarcosperma arboreum</i> . https://www.forru.org/library/0000219
flooding risk		We could scour Max's study of trees in flood zones along the Mekong River to pull out matched FWS for those areas
grazing pressure		No specific data
next to a perennial river or waterbody		Same as flood tolerant spp?
open cast mining	Added	Yes ... we have data of species that grow well on mines
poorly drained/heavy clay soils		No data
sandy soils		No data
shallow or rocky soils		No data
soils with low nutrient contents		No data
steep slope		I don't think slope much affects growth and survival of planted trees – they are much more sensitive to elevation and rainfall.

Remarks/questions Tobias:

- Drought and flooding risk were suggested as unnecessary by FORRU but I'd prefer to keep them (should make clearer though in the user interface that drought refers to drought as consequence of topographic position, climatic drought is accounted for by the species distribution models)
- The site conditions suggested by FORRU also included 'recently burnt', can this be merged with fire-prone? – YES
- The site conditions suggested by FORRU also included 'aspect', why? I'm not sure if it's possible to categorize species in species that can be grown on a north-facing slope and species that can't (for example)? - AGREE
- The site conditions suggested by FORRU simplified soil conditions to poor soil (red compacted)/good soil (brown-black easily cultivated), but this is an oversimplification in my opinion, I propose to keep soil texture, soil pH, soil compaction and soil nutrient contents separated (I even got the feedback before from others that this is still too simplistic, so trying to find a compromise...). Also, because info sheets often have info on some of these separately, and not very often info on 'good/bad soils' – **we do not have species-soil association correlations in our data. What we could probably do is to recommend species that perform well and are also found on Doi Chang Dhao (limestone, high ph), acidic soils (from out pine plots), upper elevation brown soils in evergreen zone and compacted lateritic soils in lowland deciduous forest zone.**

Site conditions not included:

Site condition	Comment Tobias	Comment FORRU
saline soils		Agree to exclude
irrigated		Agree to exclude
soils degraded by gold mining		Agree to exclude

2. Site conditions that influence the restoration approach

Site condition	Comment Tobias	Comment FORRU
Nearest reference forest remnant <1 km 1-5 km >5 km	Use higher proportion animal-dispersed species if forest is far away	Yes – if the forest is far away, we would recommend planting those species is large seed sizes (animal dispersed) ... we have very good data on seed sizes.
Tree cover: entirely deforested, open forest, closed forest	Use more heliophytes and less shade tolerant species with less tree cover	We have data on performance of planted seedlings and associated shade using a very rough scale of 0-3. We could analyze the data sets to identify species with high performance under low, moderate or dense shade at time of planting.
Regeneration density (<1,000; 1000-2000; 2000-3000; >3000 per hectare?)	For determining planting density	YES – subtract the starting regenerant density from 3100 stems/ha (for northern Thailand) (from the rapid site assessment) to arrive at the number of trees to plant per ha. So, we would need to post the link on how to perform a Rapid Site Assessment (RSA) in order for the users to enter their data for this question. https://www.forru.org/advice/rapid-site-assessment

3. Site conditions to filter out species

Site condition	Comment Tobias	Comment FORRU
Forest type: (dof, bb/df, mx, egf (with without pine/bamboo).	To use this, we would need to know for all species in which forest types they occur	We have forest type data for every species from when Max did the species lists for Doi Suthep. The book is here: https://www.forru.org/library/0000027 . But we also have it all in an excel spreadsheet
Regenerating species	To filter out the species that are naturally regenerating	This would also come from the RSA ... we ask participant to write down the species of regenerants present in each circular sample as they perform the survey. Usually, local names ... but then we translate them into scientific names. It can also be done semi quantitatively by counting the number of circles in which each species is found. I think it would be use to allow the users to “list the most common species of natural regenerants in the restoration site from the RSA”. Obviously, those species are well-matched with the site ... but would be low priority for planting, since they are already there and fairly common.

B. Objectives

Objectives included (proposal)

Category	Objective	Comment Tobias	Comment FORRU
wood uses	charcoal		We should make it clear that these options are not available in protected areas. Can we get the user to state if the restoration sit is in a national park or wildlife sanctuary ... or get the system to determine that from the GPS Of the site location? If the site is in a PA these options should not appear in the drop-down menu of objectives
	firewood		
	timber for construction - intermediate cycle (15 - 25 years)		
	timber for construction - long cycle (25 - 50 years)		
	timber for construction - short cycle (8 - 15 years)		
	wood for tools		
	wood for posts		
	canes/bamboo	Added. We need to add species that provide this to the species list if we want to include this	Bamboo severely impedes growth and survival of planted trees within a 10-m radius at least.

regulating ecosystem services	carbon sequestration and storage		We have some species-specific data on carbon storage
	erosion control		<i>Ficus</i> all species and <i>Streblus</i>
	riverine protection		“
	soil fertility improvement		Legumes
other non-wood uses	fodder		Legumes
	honey		No data
	medicinal plants		Can look up secondary data sources for each tree species
	ornamental species		“
	spices		Only Cinnamomum springs to mind
food production	fruits for local use*		We have access to indigenous knowledge for species info for this one.
	fruits for sale*		Cut from drop down menu if the site is in a PA
	nuts and seeds for local use*		We have access to indigenous knowledge for species info for this one.
	nuts and seeds for sale*		Cut from drop down menu if the site is in a PA
	oils and fats for local use*		We have access to indigenous knowledge for species info for this one.
	oils and fats for sale*		Cut from drop down menu if the site is in a PA
	roots and tubers for local *use		We have access to indigenous knowledge for species info for this one.
	roots and tubers for sale*		Cut from drop down menu if the site is in a PA
	vegetables for local use*		We have access to indigenous knowledge for species info for this one.
	vegetables for sale*		Cut from drop down menu if the site is in a PA
biodiversity conservation	bats		
	birds		
	pollinating insects		
	terrestrial mammals		
	threatened woody species		Have a lot of info on threatened endemic tree species
	hornbills?		None left

* These objectives are currently grouped into a single ‘food’ objective in the user interface, these objectives are ‘behind the scenes’, to make it possible to implement two objectives at a later point (if we would want to): optimize nutritional diversity (see <https://nph.onlinelibrary.wiley.com/doi/full/10.1002/ppp3.10304>) and optimize the diversity of food products for sale

Remarks/questions Tobias:

- Are we sure no commercial timber production should be included? So even logging of planted trees is not allowed in Thailand?
- **SE - There is an argument that planting timber tree species (*Dalbergia* spp, *Azelia*, Teak, *Xylia* etc.) as a very long-term investment in agroforestry plots is preferable to planting fruit trees. As the latter attract animals out of safety in protected forests and into conflict with humans. The problem is getting permission to harvest timber trees even outside protected areas. No one know what the regulations will be 50 years into the future.**
- I kept 'wood for posts' for now as relevant objective in most of the tropics, or not relevant in Thailand?
- Could add hornbill conservation as objective (we are planning to include this for D4R Malaysia), would this make sense or not needed? (means planting trees consumed by hornbills)
- **SE - I don't think there are many hornbills left in N. Thailand (they are long extinct on Doi Suthep) ... and why single out hornbills? What about primates?**
- Steve provided feedback that the food products are divided in too many categories, but see comment above (indicated with *)
- Dividing biodiversity conservation in bats, birds, mammals was suggested by FORRU to be unnecessary, but this is based on traits we compile anyway: pollination and dispersal type (in fact the tool simply recommends species that are pollinated/dispersed by bats/birds/mammals, so that should maybe be made clearer in the name of the objective), so I propose to keep them
- Planting trees for ecotourism was suggested by FORRU as objective, but is a bit vague in my opinion: I propose that this is covered by the objective 'ornamental species' and the biodiversity objectives – **SE - YES**

Objectives not included:

Category	Objective	Comment Tobias	Comment FORRU
wood uses	commercial timber - intermediate cycle (15 - 25 years)		Species matching these criteria can be found in the PROSEA Handbooks
	commercial timber - long cycle (25 - 50 years)		
	commercial timber - short cycle (8 - 15 years)		
	pulp for paper production		
	wood for handicrafts		
other non-wood uses	biopesticide		There may be secondary sources with this info
	cosmetics		
	cultural uses		
	dye		
	fibre		
	gum, resin, latex or oil for industrial use		
	handicrafts		
	live fence		
	pig feed		
	shade tree for crops		
	shade trees for livestock		
	support for climbing crops		
windbreak			
food production	optimize nutritional diversity		Few communities rely on the forest for food these days.
	optimize the diversity of food products for sale		

Remarks/questions Tobias:

- Are we sure we don't want to include objectives related to agroforestry (shade trees, windbreak, live fence etc.). Or is the idea to focus the tool on ecological restoration rather than restoration in broader sense?

SE- I think the best way to deal with this is to scour the literature and list as many uses of the tree species as we can find + ask villager we work with ... and then look to see what we have. Our strength is of course restoration of forest ecosystems to pre-disturbance conditions, but we are being asked more and more to get involved in agroforestry projects, so we might as well get an accurate catalogue of the uses of the species we work with.

APPENDIX B

Individual Feedback on Prototype of Thailand D4R

Date 2026	Gender	Unit/Organization/Village	Interested	Improvement and suggestion	Help/Question	Feedback
27/2	Female	Highland Research and Development Institute (HRDI)	Yes	Have more information about plant, seed collection time, planting time. Adjust map easier to use.		Useful for unit and community
"	Male	-	Yes		Need to have training how to use D4R to make more understanding	Useful and make incentive for unit in restoration work
"	Male	The Botanical Garden Organization	Yes			Good concept
"	Female	CMU	Yes	Data that can select should be more extensive for southeast Asia and population like elevation, biome, resource use		Good application and beneficial for conservation work
"	Female	Highland Research and Development Institute (HRDI)	Yes			Good app, but complicated for using.
"	Female	Doi Suthep-Pui national park	Yes			Convenient and modern for species selection suitable for geography and climate.
"	Female	Doi Suthep-Pui national park				Convenient application
"	Male	Chiang Mai University "Hariphunchai" Centre, Lamphun Province	Yes	Can calculated the area that we need to plant		
"	Male	Phuping village	Yes			Hard to reach and understand for villager
"	Male	Phuping village	No			Not understand
"	Male	Northern Association for Sustainable Development (NASD)	Yes	Make easier and simpler for small stakeholder		Good application in restoration work for single land use agriculture.
"	Female	Northern Association for Sustainable Development (NASD)	Yes	Thai version and Thailand area		Can use to be guideline for work, increase time
"	Male	Village	Yes			
"	Male	Doi Suthep-Pui national park	Yes			
"	Male	Doi Suthep-Pui national park	Yes	Some plant species the habit up to elevation slope light in each geography of country		
"	Male	Provincial Administration	Yes	Make more simple for villager using		

Date 2026	Gender	Unit/Organization/Village	Interested	Improvement and suggestion	Help/Question	Feedback
		Office Chiang Mai, Mae Hia				
"	Male	Provincial Administration Office Chiang Mai, Mae Hia	Yes	Make more simple for villager using		
"	Male	-	No			Feel very specific tool and very hard to use and understandings
"	Female	Chiang Mai University "Hariphunchai" Centre, Lamphun Province	Yes			
"	Female	Ban Pha Pang Luang Community Network, Mae Phrik, Lampang.	Yes			
"	Male	Ban Pha Pang Luang Community Network, Mae Phrik, Lampang.	Yes			Very good
"	Female	Voluntary community development	Yes			For community/ villager feel hard to use, too much function but idea for app is good that can select the species to planting.
"	Male	The Botanical Garden Organization	Yes	Add site appropriate related survival rate, important information about tree like fruiting time, size of tree		Too much form to fill in
6/3	Male	Royal Forest Department	Yes	Reduce data entry and location step, have site assessment before fill data		Too much detail in data entry, useful for organization for site assessment and risk
"	Male	Chiang Mai tree nursery Centre	Yes			Complicated for working and not related to mission of centre
"	Male	Forest Management Office 1 (Chiang Mai)	Yes			
"	Female	Forest Management Office 1 (Chiang Mai)	Yes			
"	Female	Chiang Mai tree nursery centre	Yes	Add Thai name for recommend species		Interested tool, use for filter tree species for planting in specific area
"	Female	Mae Tang tree nursery station	Yes	Make more convenient and reachable		Good for species selection
"	Female	Mae Thi tree nursery centre	Yes			
"	Female	Phare tree nursery centre	Yes			
"	Female	Phare tree nursery centre	Yes			Useful for seed collection

Date 2026	Gender	Unit/Organization/Village	Interested	Improvement and suggestion	Help/Question	Feedback
"	Female	Chiang Mai tree nursery centre (Royal Forestry Department)	Yes			Useful at species selection for restoration
"	Female	Forest Resource Management Office No.2 Chiang Rai	Yes	Improve Thai translation and data analysis, add more species in Northern Thailand	Has the analysis data been compared with the actual site yet?	Complicated for villager, more useful for researcher or organization
"	Female	Lamphun tree nursery station	Yes	Need simpler, too much detail		Assist for work planning and decision making
"	Male	Forest Resource Management Office No.2 Chiang Rai	Yes	Add Thai common/local name, make more simple for local agriculture		Useful for researcher and organization
"	Female	Chiang Mai tree nursery centre	Yes	Add Thai common/local name, make more simple for local agriculture, specific location for seed source.		Good tool for person who take sapling from nursery and need suggestion for species selection
"	Male	Forest Resource Management Office No.3 Lampang	Yes	Have GPS coordinate location for seed collection		Easy for using and searching for seed collection area.
"	Female	Forest Resource Management Office No.2 Chiang Rai	Yes	Use of language can be simpler and understanding, add source for take sapling for nursery, cooperate with forestry department in project of restoration		Useful in restoration term but can make more simple for local villager
"	Female	Chiang Rai tree nursery centre	Yes			Good tool for species selection in specific area
"	Male	Forest Resource Management Office No.2 Chiang Rai	Yes			Good tool

APPENDIX C

NURSERY SURVEY QUESTIONNAIRE

Seed sources and seedling production for forest restoration การจัดหาแหล่งเมล็ดพันธุ์ไม้ป่า และผลิตกล้าไม้เพื่อการฟื้นฟูป่า



วัตถุประสงค์ของแบบสอบถาม / Purpose of the Survey

1. แหล่งที่มาที่หน่วยงานงานที่เกี่ยวข้องกับการฟื้นฟูป่าได้มาซึ่งเมล็ดพันธุ์ไม้ป่า
The locations where forest restoration organization obtain forest tree seeds.
2. ปัญหาและอุปสรรคที่เผชิญ
Problems and challenges encountered.

ผลลัพธ์จากแบบสอบถามนี้จะถูกนำไปใช้เพื่อเป็นแนวทางในการปรับปรุงและพัฒนาการจัดการ การจัดการ และการกระจายเมล็ดพันธุ์ให้มีประสิทธิภาพมากยิ่งขึ้น เพื่อสนับสนุนการฟื้นฟูป่าในพื้นที่ภาคเหนือของประเทศไทย

The results of this questionnaire will be used to guide improvements in the sourcing, management, and distribution of seeds, to enhance the effectiveness of forest restoration efforts in Northern Thailand.

แบบสอบถามฉบับนี้จัดทำโดยนักศึกษาระดับปริญญาโทจากมหาวิทยาลัยเชียงใหม่ ซึ่งเป็นส่วนหนึ่งของโครงการ Weston Global Seed Bank Project Phase 4: ‘The Global Seed Bank—Unlocked’ (KW4) โดยมีหัวข้องานวิจัยคือ “Native Seed Supply and Seedling Production of Data-Deficient Species for Forest Restoration in Northern Thailand.”

This questionnaire was developed by a master’s student at Chiang Mai University as part of the Weston Global Seed Bank Project Phase 4: ‘The Global Seed Bank—Unlocked’ (KW4). The research project is titled “Native Seed Supply and Seedling Production of Data-Deficient Species for Forest Restoration in Northern Thailand.”

ข้อมูลที่ท่านให้จะถูกเก็บรักษาเป็นความลับและใช้เพื่อวัตถุประสงค์ทางการวิจัยเท่านั้น ผลการศึกษาบางส่วนอาจถูกนำไป ตีพิมพ์และเผยแพร่ในวารสารทางวิชาการในอนาคต โดยจะไม่เปิดเผยชื่อหรือข้อมูลส่วนบุคคลของท่าน เว้นแต่ท่านจะยินยอมให้เปิดเผยตัวตน

All information provided will be kept confidential and used solely for research purposes. Some findings may be published and disseminated in future academic journals, but your name and personal information will remain anonymous unless you consent to be identified.

ท่านสามารถระบุได้ว่าท่าน **ยินดีหรือไม่ยินดี** ให้เปิดเผยชื่อหรือสังกัดของท่านในรายงานการวิจัย

You may indicate whether you **agree or do not agree** to have your name or organization mentioned in the research report.

ข้าพเจ้ายินดีให้เปิดเผยชื่อหรือสังกัด / I agree to be identified (name or organization may be mentioned).

ข้าพเจ้าไม่ประสงค์ให้เปิดเผยชื่อหรือสังกัด / I do not agree to be identified.

วันที่ตอบแบบสอบถาม / Date of survey response

พิกัดที่ตั้ง (GPS) / Location

(GPS) _____

ส่วนที่ 1: ข้อมูลทั่วไปของผู้ตอบ / Section 1: General Information

1. ประเภทของหน่วยงานหรือองค์กรของท่านคืออะไร

What type of organization or institution is yours

- Government agencies – หน่วยงานของรัฐบาล
- Government enterprises – รัฐวิสาหกิจ
- Public organizations – องค์กรมหาชน
- Local administrative organizations – องค์กรปกครองส่วนท้องถิ่น
- Private sector – ภาคเอกชน
- Non-Governmental Organizations (NGOs) – องค์กรพัฒนาเอกชน
- Local communities – ชุมชนท้องถิ่น

2. โปรดระบุชื่อเต็ม ของสถานีเพาะกล้าไม้ที่ท่านสังกัดอยู่

Please specify the full name of the tree nursery you are affiliated with.

3. ชื่อ-นามสกุล / Full Name

4. เบอร์โทรศัพท์ / phone number

5. อีเมลล์ / email

6. ตำแหน่ง / บทบาท / Position / Role

- เจ้าหน้าที่รัฐ / Government official
- นักวิจัย / Researcher
- ชุมชน / Community
- หัวหน้าเรือนเพาะชำ / Nursery head
- เจ้าหน้าที่ประจำเรือนเพาะชำ / **Nursery staff**
- พนักงานหรือลูกจ้างชั่วคราว / **Temporary worker or laborer**
- อื่น ๆ / Others:

ส่วนที่ 2: ข้อมูลทั่วไปของเรือนเพาะชำกล้าไม้ / Section 2: General

Information of the nursery

7. เจ้าหน้าที่ประจำเรือนเพาะชำกล้าไม้ / staff members in the tree nursery

ตำแหน่ง (Position)	จำนวน (คน) Number of persons	ทำงานเต็มเวลา Full time	ทำงานบางเวลา Part time

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จำนวนเจ้าหน้าที่รวมทั้งหมด the total number of staff members _____ คน / persons

8. งบประมาณรวมในแต่ละปี / The annual financial turnover

9. จำนวนงบประมาณที่ใช้จ่ายในแต่ละปี / Estimated budget spent each year

10. โปรดจัดลำดับความสำคัญว่าใช้งบประมาณใช้จ่ายไปกับอะไรมากที่สุด (1 = สำคัญที่สุด)

Please indicate which activities the budget is mostly spent on (1 = most important etc.)

	ปริมาณค่าใช้จ่ายในการบำรุงรักษาแปลงเพาะชำ (วัสดุ, อุปกรณ์, ค่าดูแล ฯลฯ) <i>Expenditure on nursery maintenance (materials, tools, and upkeep)</i>
	ปริมาณค่าใช้จ่ายที่ใช้ไปกับการจัดหาเมล็ดพันธุ์ไม้ป่าเพื่อผลิตกล้าไม้ <i>The annual expenditure on procuring forest tree seeds</i>
	ปริมาณค่าใช้จ่ายที่ใช้ไปกับเจ้าหน้าที่ในแต่ละปี / The annual expenditure on staff
	ปริมาณค่าใช้จ่ายในการฝึกอบรมและพัฒนาศักยภาพเจ้าหน้าที่ <i>Expenditure on training and staff capacity building</i>
	ปริมาณค่าใช้จ่ายในการสำรวจภาคสนามหรือแหล่งเก็บเมล็ดพันธุ์ <i>Expenditure on field surveys or seed source exploration</i>
	ปริมาณค่าใช้จ่ายในการวิจัยและพัฒนาการเพาะกล้าไม้ <i>Expenditure on research and development related to seedling production</i>
	อื่น ๆ (โปรดระบุ) _____ <i>Other (please specify)</i>

ส่วนที่ 3: ข้อมูลการผลิตกล้าไม้ / Section 3: Seedling Production Data

11. จำนวนต้นไม้ที่เรือนเพาะชำผลิตโดยประมาณต่อปี / Estimated total number of trees produced by the nursery each year

โปรดระบุ (หากไม่ทราบ กรุณาระบุปริมาณคร่าว ๆ) Please specify (if unknown, please estimate approximately)

12. โปรดระบุค่าใช้จ่ายต่อกล้าไม้หนึ่งต้น (Please specify the unit cost per seedling):

_____ บาท / Baht

13. จำนวนชนิดไม้ที่ปลูกในเรือนเพาะชำ / Total number of tree species grown in the nursery

_____ ชนิด / species

14. ขอชื่อ 10 ชนิดไม้ที่มีจำนวนมากที่สุดในปัจจุบันในเรือนเพาะชำ / Top Ten most abundant species currently in the nursery:

ลำดับ No.	ชื่อสามัญ (Common name)	ชื่อวิทยาศาสตร์ (Scientific name)	แหล่งที่มาเมล็ดพันธุ์ (Seed source)	จำนวนที่เพาะต่อปี (ต้น/ปี) (Quantity/year)
1				
2				
3				
4				
5				
6				
7				

8				
9				
10				
11				

ส่วนที่ 4: การจัดหาเมล็ดพันธุ์ไม้ป่า / Section 4: Seed Sourcing of Forest Tree Species

15. แหล่งที่มาหลักของเมล็ดพันธุ์ไม้ป่าได้มาด้วยวิธีการใดบ้าง (1 = สำคัญที่สุด)

Please indicate the seed material suppliers. (1 = most Important etc.)

	เจ้าหน้าที่หน่วยตัวเอง / Own staff nursery
	ตลาดเชิงพาณิชย์ / Commercial market
	องค์กรวิชาการหรือองค์กรวิจัย / Academic or research organization
	หน่วยงานรัฐ / Government supply
	องค์กรพัฒนาเอกชน/ Non-government organization
	รวบรวมเมล็ดพันธุ์อิสระ / Independent seed collectors

16. ปัจจัยต่อไปนี้มีมีความสำคัญมากน้อยเพียงใดในการเลือกชนิดพันธุ์ของเมล็ดพันธุ์ไม้ป่า (1 = สำคัญที่สุด)

How important are the following factors in choosing the species of seed material? (1 = most Important)

	ความต้องการของโครงการฟื้นฟูป่า / Project restoration demand
	ความสำคัญทางเศรษฐกิจ / Economic value
	ความสำคัญทางนิเวศวิทยา / Ecological importance
	ความนิยมของชุมชน / Community preference
	แหล่งเมล็ดพันธุ์ที่มีเข้าถึงง่าย / Availability of seeds

17. เรือนเพาะกล้าไม้ของท่านใช้เมล็ดพันธุ์จากแหล่งใดบ้าง (1 = สำคัญที่สุด)

What seed sources does nursery use, if known (1 = most Important)

	ป่าธรรมชาติ / Natural forest
	ป่าฟื้นฟูหรือป่าที่ถูกปลูก / Restored or planted forests
	พื้นที่ผลิตเมล็ดพันธุ์ในป่าธรรมชาติ / Seed production areas in natural forests
	สวนเพาะเมล็ด / Seed orchards
	ต้นไม้ในฟาร์ม/ Tree on farm

18. เรือนเพาะชำของท่านมีเกณฑ์อย่างไรในการคัดเลือกต้นแม่พันธุ์ของชนิดพันธุ์เป้าหมาย?

What criteria does the nursery have for selecting the parent trees for target species?

(เลือกได้มากกว่าหนึ่งข้อ / Select more than one option)

- ต้นแม่พันธุ์ต้องปราศจากโรคและแมลงศัตรูพืช / Tree should be free from pests and diseases
- ต้นแม่พันธุ์ควรมีลำต้นตรงและรูปทรงดี / Tree should have good stem form
- ต้นแม่พันธุ์ควรให้ผลผลิตเมล็ดมากกว่าต้นอื่น ๆ / Tree should produce a lot of seed compared to another tree
- เก็บเมล็ดจากต้นแม่พันธุ์อย่างน้อยตามจำนวนขั้นต่ำที่กำหนด
Collect seed from at least a minimum number of trees
- เมื่อเจ้าหน้าที่ของหน่วยงานของท่านเก็บเมล็ดพันธุ์ไม้ป่าด้วยตนเอง ท่านได้จดบันทึกตำแหน่งของต้นแม่ที่เก็บเมล็ด
When your staff collect forest tree seeds themselves, you record the mother tree locations
- เก็บเมล็ดจากพื้นที่ทั้งหมดที่มีการกระจายของต้นไม้ชนิดนั้น
Collect over the whole area where trees occur
- ต้นแม่พันธุ์ไม่ควรถูกแยกโดดเดี่ยวจากต้นอื่นของชนิดเดียวกัน
Parent trees should not be isolated from other tree of same species
- ต้นแม่พันธุ์ควรมีจำนวนไม่น้อยกว่าขั้นต่ำที่กำหนด
Parent trees should at least a minimum number of trees
- เก็บเมล็ดหรือกล้าไม้ในจำนวนเท่ากันจากแต่ละต้นแม่พันธุ์

Collect same number of seed or seedling from each parent tree

ไม่มีเกณฑ์ในการคัดเลือก / No criteria

ไม่ทราบ / ไม่มีข้อมูล I don't know

19. โดยเฉลี่ยแล้ว ในการเก็บเมล็ดพันธุ์แต่ละครั้ง ท่านทราบหรือไม่ว่าเก็บจากต้นแม่ไม้กี่ต้น?

On average, how many mother trees are used for seed collection each time

(เลือกเพียงหนึ่งข้อ / Select one only)

1

2

3

4-5

6-10

11-20

More than 20

ส่วนที่ 5: ปัญหาที่พบเจอ / Section 7: Challenges encountered

20. เคยพบเจอข้อจำกัดในการจัดหาเมล็ดพันธุ์ไม้ป่าชนิดพันธุ์ที่ใช้หรือไม่

Have you experienced any constraints in obtaining seeds of the forest tree species you use?

	ไม่เคย Never	แทบไม่เคย Very rarely	บางครั้ง Sometimes	ค่อนข้างบ่อย Fairly often	บ่อยมาก Very often	เป็นประจำ Consistently
ขาดทรัพยากรเมล็ด (Lack of seed)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
ขาดแหล่งเมล็ดต้นแม่ / (No mother tree seed sources)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
ขาดเมล็ดพันธุ์ไม้บาง ชนิด / (Some seed species not available)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

แหล่งที่มาของเมล็ดพันธุ์ไม่เป็นที่ทราบแน่ชัด / (Origin of seed material is unknown)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
บุคลากรไม่เพียงพอ (Insufficient staff)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
งบประมาณจำกัด (Limited budget)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
ข้อจำกัดทางกฎหมาย / (Legal restrictions)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
เมล็ดพันธุ์ที่มีขายในท้องตลาดมีคุณภาพต่ำ / (Low quality of seed material available)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
อื่น ๆ โปรดระบุด้านล่าง (Others, please specify below)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

ส่วนที่ 6: การกระจายกล้า / Section 6: Seedling distribution

21. โปรดระบุสัดส่วนที่หน่วยงานต่างๆ ที่เดินทางมารับกล้าไม้ไปในปีล่าสุด พร้อมระบุวัตถุประสงค์?

Please specify the proportion of seedlings received by each organization last year, along with the purposes for which they were used.

ให้ติ๊กถูกลงในช่องว่างที่ตรงตามข้อมูล / Please tick the box that corresponds to the information.

(สามารถระบุชื่อหน่วยงานที่ช่องแรกได้ / Please indicate the name of the organization in the first column.)

หน่วยงานที่รับต้นกล้าไป Organizations receiving seedlings	ไม่มี None	<100	101-1,000	1,001- 10,000	10,001- 100,000	จุดประสงค์ที่รับกล้าไป Intended purpose of seedling use
กรมป่าไม้ Royal Forest Department						
กรมอุทยานแห่งชาติ สัตว์ป่า และพันธุ์พืช Department of National Parks, Wildlife and Plant Conservation						
องค์กรรัฐวิสาหกิจ State Enterprise						
องค์กรพัฒนาเอกชน Non-Governmental Organizations						
ภาคเอกชน Private Sector						
องค์กรปกครองส่วนท้องถิ่น Local Administrative Organizations (LAOs)						
ประชาชน Citizens						
อื่นๆ / Others						

พอทราบหรือไม่ว่าหน่วยงานต่างๆมีเกณฑ์อะไรในการคัดเลือกชนิดพันธุ์ที่ใช้?

criteria do the Organizations have for selecting target species?

22. ท่านมีการเก็บค่าใช้จ่ายจากต้นกล้าที่ผลิตหรือไม่?

Do you charge any fees for the seedlings produced?

คำตอบ / Answer options:

- มีการเก็บค่าใช้จ่าย / Yes, fees are charged
 - ขอทราบรายละเอียด / Please specify the details
- ไม่มีการเก็บค่าใช้จ่าย / No, no fees charged

ส่วนที่ 8: แนวทางและข้อเสนอเพื่อพัฒนาการจัดหาเมล็ดพันธุ์ / Section 8: Approaches and Recommendations for Improving Propagation Material Supply

24. สิ่งใดที่ท่านคิดว่ายังขาดหรือจำเป็น เพื่อช่วยพัฒนาการผลิตเมล็ดพันธุ์หรือกล้าไม้ให้ดีขึ้น? (สามารถเลือกได้มากกว่าหนึ่งข้อ)

What do you think is still needed to improve seed or seedling production? (You may select more than one)

- ข้อมูลชนิดพันธุ์ / Species information
- ความรู้ทางเทคนิค / Technical knowledge
- เครื่องมือและอุปกรณ์ / Tools and equipment
- งบประมาณสนับสนุน / Financial support
- บุคลากร / Human resources
- อื่น ๆ / Others:

25. โปรดแสดงความคิดเห็นหรือข้อเสนอแนะเพิ่มเติมเกี่ยวกับการจัดหาเมล็ดพันธุ์ไม้พื้นถิ่น การผลิตกล้าไม้ หรือการฟื้นฟูป่า

Please share any additional comments or suggestions related to native seed supply, seedling production, or forest restoration.

ขอขอบพระคุณเป็นอย่างสูงสำหรับความร่วมมือและเวลาที่ท่านได้สละให้ในการตอบแบบสอบถามนี้ คำตอบของท่านมีคุณค่าต่อการศึกษาวิจัยและจะช่วยสนับสนุนการพัฒนางานด้านการฟื้นฟูป่าในอนาคต

We are sincerely grateful for your time and cooperation in completing this survey. Your responses are highly valuable to our research and will contribute significantly to advancing forest restoration efforts in the future.

APPENDIX D

REPORT ON TRAINING PROVIDED TO TRCRC IN MALAYSIA

17 November - 21 November 2025

1. Activities and tasks

Activities and tasks were performed following the itinerary below, slightly modified from the original plan.

2. Objectives

Approximately 85% of the topics conceived in the original list of objectives were completed within the time available.

Original Objective	Achievements
Improve restoration best practices & carbon/biodiversity impact monitoring (STT Output 1, 4)	Current TRCRC practices were reviewed in the nursery and field plots at both ELMINA and Banun and subsequently discussed in several “class-room” sessions. Recommendations arising are listed below. Biodiversity monitoring was addressed by a structured bird-watching exercise, followed by an in-class data-analysis session. Carbon monitoring was not specifically addressed.
Learn how to use drone technology effectively for restoration, e.g. to identify seed sources (STT Output 2)	Drone calibration was performed and flight planning using Litchi demonstrated. Construction of 3D forest models was shown, using Pix4D. The TRCRC team would need further training and practice to be able to perform 3D forest modelling and tree-height measurements within the models. Steve offered further online training, to complete flight planning and image-analysis steps. FORRU-CMU could also provide additional in-field training in Chiang Mai, to complete the process. Identification of seed-tree species is not yet possible with TRCRC’s current drone technology.
Identify ways to improve communication and collaboration with IPLCs on seed collection and seedling production (STT Output 3)	This was covered in discussion sessions. Most pressing need is for phenology data to plan monthly seed-collection calendars.
Improve knowledge products for IPLC and other local stakeholders (STT Output 4).	Covered in a discussion session devoted to the topic on Day 2, with examples from FORRU’s outreach program.
Engagement with ASEAN restoration actors, planning for knowledge sharing and exchange session in Year 3 (STT Output 4)	Most pressing need, in this regard, was improving TRCRC’s website, identified in the discussion sessions https://www.trcrc.org/cqi-sys/suspendedpage.cqi

3. Itinerary

Date	Time	Activity	Venue
16/11 Sunday	9:00 am- 1:00 pm	AirAsia flight from CNX-KLIA2	KLIA2
	1:00 pm- 3:00 pm	Grab from KLIA2 to Elmina	
	3:00 pm	Check in to hotel	Elmina
	7:00 pm	Dinner (FORRU & TRCRC)	Elmina area
17/11 Monday	9:00 am- 10:00 am	Presentation about TRCRC, Seed to Tree, Elmina Urban Biodiversity Corridor	ERKC Elmina
	10:00 am- 11:00 am	ERKC Nursery Tour	ERKC Elmina
	11:00 am- 12:30 pm	EUBC restoration plot tour & review of restoration & monitoring practices.	EUBC plots
	12:30 pm- 2:00 pm	Lunch	
	2:00 pm- 4:00 pm	Discussion about best practices at ERKC Nursery & EUBC restoration plots, including: <ul style="list-style-type: none"> • Production scheduling and data management (topic selected by participants out of 4 options). 	ERKC Elmina
	4:00 pm- 7:00 pm	Evening bird survey – finished early due to rain	EUBC plots
	7:00 pm- 7:30 pm	Back to hotel	
	7:30 pm- 8:30 pm	Dinner	Free and easy

18/11 Tuesday	8:00 am	Check out from hotel	
	8:30 am- 10:30 am	Bird Survey: Results Discussion	ERKC Elmina
	10:30 am- 12:00 pm	Review knowledge products and communications materials.	ERKC Elmina
	12:00 pm- 6:00 pm	Drive from Elmina to Banding / Lunch on the way	Travel
	6:00 pm- 7:00 pm	Check into Hotel at Banding	
	7:00- 9:00 pm	Dinner at Banding Jetty	Banding Jetty
19/11 Wednesday	7:30 am- 8:00 am	Drive from Banding to TRLC Banun	TRLC Banun
	8:00 am- 9:00 am	Nursery tour	“
	9:00 am- 10:00 am	Field plots (enrichment planting)- tour	“
	10:00 am- 11:00 am	The viaduct field plot – planting into grass with elephant damage.	“
	12:00 am- 1:00 pm	Lunch at R&R Titiwangsa	
	1:00 pm- 5:00 pm	Visit to RPS Air Banun and Community Nurseries	Kg. Raba
20/11 Thursday	9 am – 11.00 am	Drone set up – flight planning	TRLC Banun
	11.00 am – 12.00 am	Review recommendations	TRLC Banun
	1.00 pm – 2.00 pm	Lunch	Gerik
	2- 7 pm	Drive from Gerik to KL; check into hotel	Tune Hotel

4. Recommendations

Recommendations arose out of discussions in the nursery, field and classroom throughout the visit. Draft recommendations were presented to the TRCRC group on the last day for review, acceptance/rejection and/or modification. The list below presents the resultant refined recommendations that arose out of that review.

4.1 Reference forest – setting restoration targets

1. Use the same survey methodology and intensity (circular sample plots) in reference forest as in restoration plots to construct species-area curves and assess carbon. Repeat in non-planted control plots.
2. Make sample circles for rapid site assessments (RSA) in restoration plots **permanent** (labelled metal pole and GPS location) – to use for future comparison with reference forest.

4.2 Seed collection

1. Use published phenology data, local knowledge and TRCRC seed buyback/collection data to develop monthly seed collection charts
2. Meet with key village seed collectors, to target which species to collect each month
 - Reason – to ensure tree diversity levels in nurseries are maintained or increased.
3. Offer bonus payments for collection of tree seeds of new species – not already collected by the project and for rare/threatened tree species.
 - Reason – to ensure tree diversity levels in nurseries are maintained or increased.
4. Consider the “Treasure Tree” concept to encourage local school children to join in seed collection. Label targeted wayside trees with treasure tree logo (large size) and month of fruiting. School children collect seeds on their way to school and receive a reward when they deliver seeds to the nursery:
 - Reason - engages younger generation in forest restoration and fosters a sense of local stewardship of the restored forests.
5. Use online sources to look up which species produce orthodox seeds. <https://ser-sid.org/>
 - Reason – to plan/manage seedling production schedule more efficiently.
6. Use PROSEA handbooks for numbers of seeds per kg.
 - Make seed payments more in line with numbers of seeds rather than weight.
 - Seed prices based on seed sizes (small, medium, and large) and rarity.
7. Send seeds of rare species to the MSB for conservation (re-establishment after species goes extinct in the wild).

4.3 Nursery

1. Include some forest soil in the germination medium
 - For early infection with mycorrhizal fungi
2. Experiment with planting out smaller trees (i.e. less than the current 100-150 cm tall size), grown in smaller polybags bags (9 x 2.5”), but with more frequent maintenance & fertilizer to determine optimum tree size at planting time.
 - Reason - To avoid transplantation shock
 - Reason - To reduce consumption of nursery resources – medium, container, labour
 - Reason - To ease transportation and planting operations

- *Reason - To dispatch seedlings earlier – reduce nursery time*
- 3. Perform simple, but more quantitative, measurements in the nursery, e.g. 100-seeds germination test – include cut test before germination/after germination test, at least one block of seedling growth measures
 - *Reason - to fill gaps in data required to develop most efficient production schedules*
- 4. Centralize data recording for all steps into a “master” database – with one data manager – combine for all site – use MS ACCESS(?)
 - *Reason - to enable formal species-specific production schedule development*
- 5. Consider “volunteerships” (traineeships) – to take on the additional data collection/processing.
- 6. Give away/sell excess, overgrown, saplings to potential arboreta, the private sectors or restoration practitioners in other regions.
- 7. Otherwise dispose of them by burning
 - *Reason – free up nursery space and resources for new healthy planting stock, ready for planting at a reasonable size and eliminate a potential disease reservoir in the nurseries.*

4.4 Plots

1. Consider using a non-residual herbicide e.g. glyphosate to prep plots.
2. Rigorously perform weeding + fertilizer application, matched with local weed-growth rates.
3. Plant more pioneers (local *Macaranga* spp, *Duabanga*, *Trema*(?)) particularly in grassy sites.
 - *Reason – to bring about rapid canopy closure, shade out weeds – site recapture.*
4. Try to complete all planting within a narrower time period (a few consecutive days). If necessary, draft in more IPLC folk (including school kids?) to help out.
 - *Reason – to synchronize maintenance and monitoring operations (all saplings have same start date).*
5. Aim to plant an even number of all species over most plots (e.g. 25 individuals of 20 species in 500-tree blocks?).
 - *Use number-stamped aluminium tags instead of plastic strips and ink.*
 - *Don't have to monitor all trees (as long as you have a minimum of 20 trees per species).*
 - *Reason - enables monitoring beyond 2 years if desirable.*
6. Rapidly establish an accessible “showcase” demo plot.
 - *Reason – maintain interest of local people and attract more funding.*
7. Inaccessible sites? – try direct seeding or drone seeding?

4.5 Social and seed collection with communities

1. Use the protocols and activities in the IUCN ROAM handbook to build comprehensive restoration plans
 - *Reason – to dovetail TRCRC activities with community objective and aspirations – addresses TRCRC’s concerns over problems with communication with IPLC*
2. Riina suggested performing FORRU-style “**collaborative costing**” when planning tree planting of future plots. Cost out more day-employment of local people for tree planting, maintenance and monitoring (when large number of people are needed).

- *Reasons – manages expectations of donors, local communities and facilitating NGO’s (TRCRC) and demonstrates transparency and inclusiveness of planting operations.*
- 3. Consider “volunteerships” (traineeships) – to develop localized communication materials (e.g. illustrated storybooks for children).
 - *Reason – to strengthen community and stakeholder understanding of forest restoration processes through culturally relevant and accessible materials.*

5. Suggested follow-up activities

5.1 Review and implement recommendations

Have an online meeting to discuss acceptance/rejection/modification of the recommendations and to present how the accepted recommendations would be implemented: who would be involved, what actions will be taken and over what time scale.

5.2 Online learning

The discussion pinpointed 3 areas where additional technical training might be useful

- The Treasure Tree concept – and how it worked at Doi Mae Salong and in Krabi for FORRU.
- The collaborative costing procedure.
- Drone flight planning (Litchi), 3D models and tree measuring.

5.3 Website Development

FORRU-CMU could share our experience with dual-language website development. The TRCRC website is currently “suspended”. We could arrange a joint online session with our website designer and help with planning a suitable plan and budget, to maintain and develop the TRCRC website, as a vehicle for data dissemination, publications, outreach activities and to support project management.

6. Thanks

Steve and Dia heartily thank the TRCRC team for hosting our visit and for sharing experiences. We both learned a great deal from the trip, especially the local constraints that are specific to the region. The enthusiasm and energy of the TRCRC team should serve as an inspiration to other tree-planting groups, both within Malaysia and beyond. Special thanks to Maria and Nabilah for taking on the bulk of the organizational tasks and to Riina and Bioversity, for funding the trip, as part of the Seed to Tree project.

Steve Elliott and Dia Shannon, 24/11/25

APPENDIX E

REPORT ON MFT TRAINING RECEIVED

Dr Dia Shannon and Som (Pornpawee Laahasom) joined the MyFarmTrees training workshop at the Tropical Rainforest Conservation & Research Centre (TRCRC) Elmina from June 3–5, 2025. The first two days the technical framework and operational mechanics behind three core applications: My Farm Tree Collector, Nursery and GeoFarm. To mirror the complexity of real-world conservation, participants were organized into specialized groups, representing various organizational roles—field researchers, nursery managers, site supervisors and government units. Through simulated project scenarios, these teams learnt to align digital tools with specific organizational objectives. By actively using the applications, Dia and Som practiced planning and implementing workflows for seed species collection, sourcing, nursery propagation, and field planting monitoring.



Figure 1 Divided participants in group and learn to use MFT application

On the final day, the workshop transitioned into the field for a hands-on simulation. Groups navigated specific environmental and logistical challenges, ranging from managing data entry in remote, low-connectivity conditions to coordinating complex logistics across different organizational tiers. Thus, Dia and Som gained experience of the technical functionality of the apps and how they can be scaled and adapted, to meet the unique demands of their respective conservation landscapes. The training concluded with a comprehensive feedback session, allowing participants to share insights from the field and refine their strategies for future implementation.



Figure 2 Field test of 3 applications in reference forest

On October 14, 2025, the application developers conducted a Moderator Training session, focused on advanced user management and the specific responsibilities of the moderator role. Although the FORRU team was unable to attend the live session, they participated by reviewing the event materials, ensuring competence in the latest administrative protocols, and enabling them to effectively manage user permissions and oversee data integrity across the platform’s digital ecosystem.

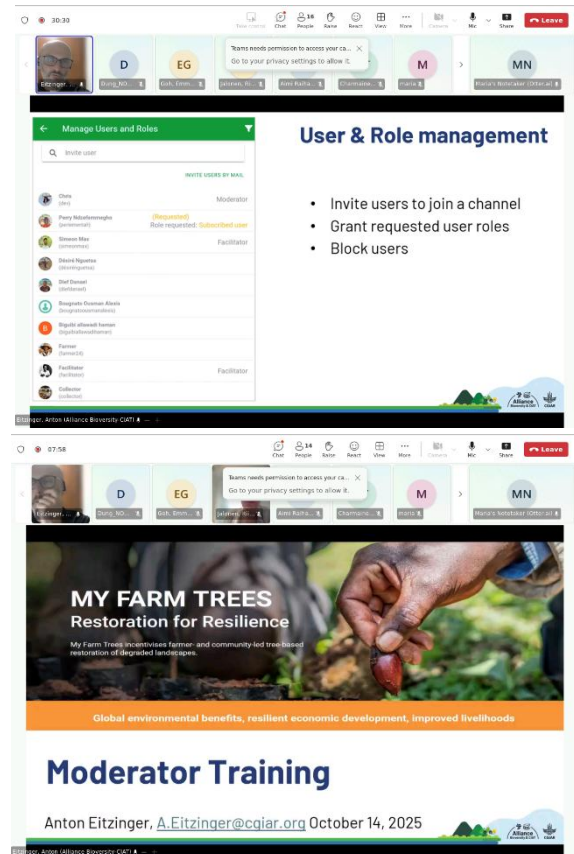


Figure 3 Moderator training on online

Pornpawee Laahasom and Dia Shannon, 24/02/26

APPENDIX F

INDIVIDUAL RESPONSES TO MFT

27/2/26 - communities

Gender	Organization/Village	Interested	Improvement and suggestion	Help/Question?	Feedback
Male	The Botanical Garden Organization	Yes	Type of collection - adding fruit part	If QR code lost, can export in CSV/others?	
Male	Northern Sustainable Development Association	Yes	Make more easier for farmer, too complicated for villager		Useful in term of database for farmer and community
Male	Doi Suthep-Pui national park	Yes	Add date to remind for collecting next year	Who can access the data of location in term of Endanger of red list species?	Useful in term of database for source of seed
Male	The Botanical Garden Organization	Yes	-add suggestion detail of seed germination detail such as treatment, dormancy time and waiting time to get seedlings. Estimate size of tree in field.		Good for tracking
Male	Phuping village	Yes	It should be user-friendly and accessible (hard to use), not practical in field.		Beneficial in restoration work
Male	Doi Suthep-Pui national park	Yes			
Male	Doi Suthep-Pui national park	Yes	Controlling of reaching data of red list tree, suggest optimal time for seed collection		
Male	Provincial Administration Office Chiang Mai, Mae Hia	Yes	Make more easier for user, almost user/worker is age		Concept good, hard to use
Male	Provincial Administration Office Chiang Mai, Mae Hia	Yes	Make more easier for user, almost user/worker is age		
Male	-	Yes		If don't know species, who will identify	Easy to use
Male	Ban Pha Pang Luang Community Network, Mae Phrik, Lampang.	Yes			Good
Male	Phuping village	Yes		Need teaching workshop	
Male	Ban Pha Pang Luang Community Network, Mae Phrik, Lampang.	Yes	Can get beneficial from 3 apps not just only Geofarm		
-	Chiang Mai University "Hariphunchai"	Yes	Can be use in IOS		

Gender	Organization/Village	Interested	Improvement and suggestion	Help/Question?	Feedback
	Centre, Lamphun Province				
Female	Doi Suthep-Pui national park	-			Not practical in field use
Female	Ban Pha Pang Luang Community Network, Mae Phrik, Lampang.	Yes			
Female	Chiang Mai University "Hariphunchai" Centre, Lamphun Province	Yes			
Female	Chiang Mai University "Hariphunchai" Centre, Lamphun Province	Yes			
Female	Phuping village	Yes			Good for tracking, can evaluate restoration work
Female	CMU	Yes	Should have photo of species in specie selection for identify		Have effort to use can implement in household or small unit
Female	Highland Research and Development Institute (HRDI)	Yes	Add picture for tree identify, maybe have short key for use in field		Complicated to use for villager, cannot use in high volume, remoted and isolated area.
Female	Doi Suthep-Pui national park	Yes	Can be use in IOS		
Female	Highland Research and Development Institute (HRDI)	Yes	Need to have admin to recheck specie in some area have many common name	How can QR use in field for long term,	
Female	Northern Association for Sustainable Development (NASD)	Yes			Not practical to use for old people, useful for tracking
Female	The Botanical Garden Organization	Yes	Should have unit for seed collection sometime collected fruit not seed		Help to organize database and tracking species

27/2/26 - RFD

Gender	Unit/Organization/village	Interested	Improvement and suggestion	Help/Question	Feedback
Female	Chiang Mai tree nursery centre	Yes	Add more species, make more function for organization that have big data		Not practical in field, waste time, cannot use in big scale or organization that have a lot of data
Female	Chiang Mai tree nursery centre	No	Make easier and more practical for monitor a lot of trees in field		Hard to use and too many step, good for track rare species.
Male	Forest Resource Management Office No.2 Chiang Rai	Yes	Have specialist make correction of the species	Concern data security and developer foreigner. How can make sure the developer will not bring data in Thailand to other country,	Risk of data security, not for track a lot of saplings for organization that focus on restoration but good for small scale or CSR
-	Forest Management Office 1 (Chiang Mai)	Yes			
Female	Phare tree nursery centre	Yes	Can adjust for local villager using		Too many step
Male	Chiang Mai tree nursery centre	Yes	Can adjust for local villager using, decrease complicated step		Not easy to understand
Female	Chiang Mai tree nursery centre	No	Can adjust for local villager using, decrease complicated step, low data input but can coverage many tree		Not practical in field, seed collection app is okay.
Male	Forest Resource Management Office No.3 Lampang	Yes	Decrease step for input data and make more easier for farmer, if can generate QR code in application is better		Too many step
Female	Forest Resource Management Office No.2 Chiang Rai	Yes	Better if can develop in own country for data security		Good for tracking, can evaluate restoration work, but not insecure in government data or project
Female	Mae Tang tree nursery station	Yes	Link to seedbank, or place that people can take seed		Good application
Male	Forest Resource Management Office No.2 Chiang Rai	Yes	Thread/rare/endanger species should not sync on cloud		Good application, developed specifically to align with current conditions and simplify decision-making.
Male	Chiang Rai tree nursery centre	Yes	Or take a photo may be can roughly identify by photo	Can edit or not if fill wrong data	To many step and app for register data for one tree, it's easy to make mistake.

Gender	Unit/Organization/village	Interested	Improvement and suggestion	Help/Question	Feedback
Female	Lamphun tree nursery station	Yes			Good application in forestry field
Female	Forest Resource Management Office No.2 Chiang Rai	Yes	Make more easier and decrease step, concern about rare species, cooperate with organization in part of developing for more practical using in field		Good for tracking, can evaluate restoration work
Female	Chiang Rai tree nursery centre	Yes	Improvement for using in big scale		
Female	Phare tree nursery centre	Yes			
-	Phare tree nursery centre	Yes	Combine D4R and MFT in one app		Good for tracking mother tree and seed source.
-	Phare tree nursery station	Yes			Too much for QR code, good to know location of mother tree
-	Phare tree nursery station (Long)	Yes			Good for tracking from origin

APPENDIX G

REPORT ON IMPLEMENTATION – TWO WORKSHOPS

Seed to Tree Project Validation Workshops for Species Choices, Seed Supply D4R and MFT Apps

Introduction

Following community meetings and a survey of local tree nurseries, two validation workshops were conducted to verify and complement the collected information. These participatory sessions were designed to ensure the accuracy of the dataset by incorporating multiple knowledge sources, ultimately strengthening the reliability of the information used for subsequent restoration planning.

The first workshop focused on the integration of academic and local community knowledge on 27th February 2026. The second workshop, held on 6th March 2026, focused on institutional nursery management and technical forestry data. This two-tiered participatory process integrated diverse knowledge sources, ranging from community-based indigenous knowledge to state-level forestry operations, thereby strengthening the reliability of the information used for subsequent restoration planning.

Objectives:

1. Confirm preferred species identification and demand.
2. Clarify local names and seed sources.
3. Discuss seed zones and provide ecological knowledge to refine the final restoration dataset.
4. Obtain feedback from demonstration of the D4R and MFT apps.

Communities and Indigenous knowledge workshop

This workshop brought together community representatives from the study villages, researchers from the Biology Department, and botanical experts from the Queen Sirikit Botanic Garden (QSBG). Additionally, representatives from Doi Suthep-Pui National Park and non-governmental organizations, working with local communities, joined the Forest Restoration Research Unit (FORRU) team to review species identification and local ecological traits.



Figure 1 Photos of validation workshop on 27th February 2026.

Species Selection

Community groups identified a high taxonomic diversity of preferred species from 47 plant families (Figure 2). The most significant contributor to this diversity is the Fabaceae (Legume family), which dominates the landscape with 16 recorded species. This is followed by Euphorbiaceae (6 species) and several other prominent tropical families, including Moraceae, Fagaceae, Dipterocarpaceae, and Arecaceae, each contributing 5 species. The presence of these families—specifically the Dipterocarps and Fagaceae—indicates a forest structure typical of Thai ecological zones, ranging from lowland deciduous to upland evergreen forests. Structurally, the composition is heavily weighted toward native trees, providing a robust foundation for ecological restoration and community-managed nurseries. Only two species—*Barnebydendron riedelii* and *Tamarindus indica*—are introduced or commercial. This indicates a high reliance on indigenous flora for ecosystem services and local use.

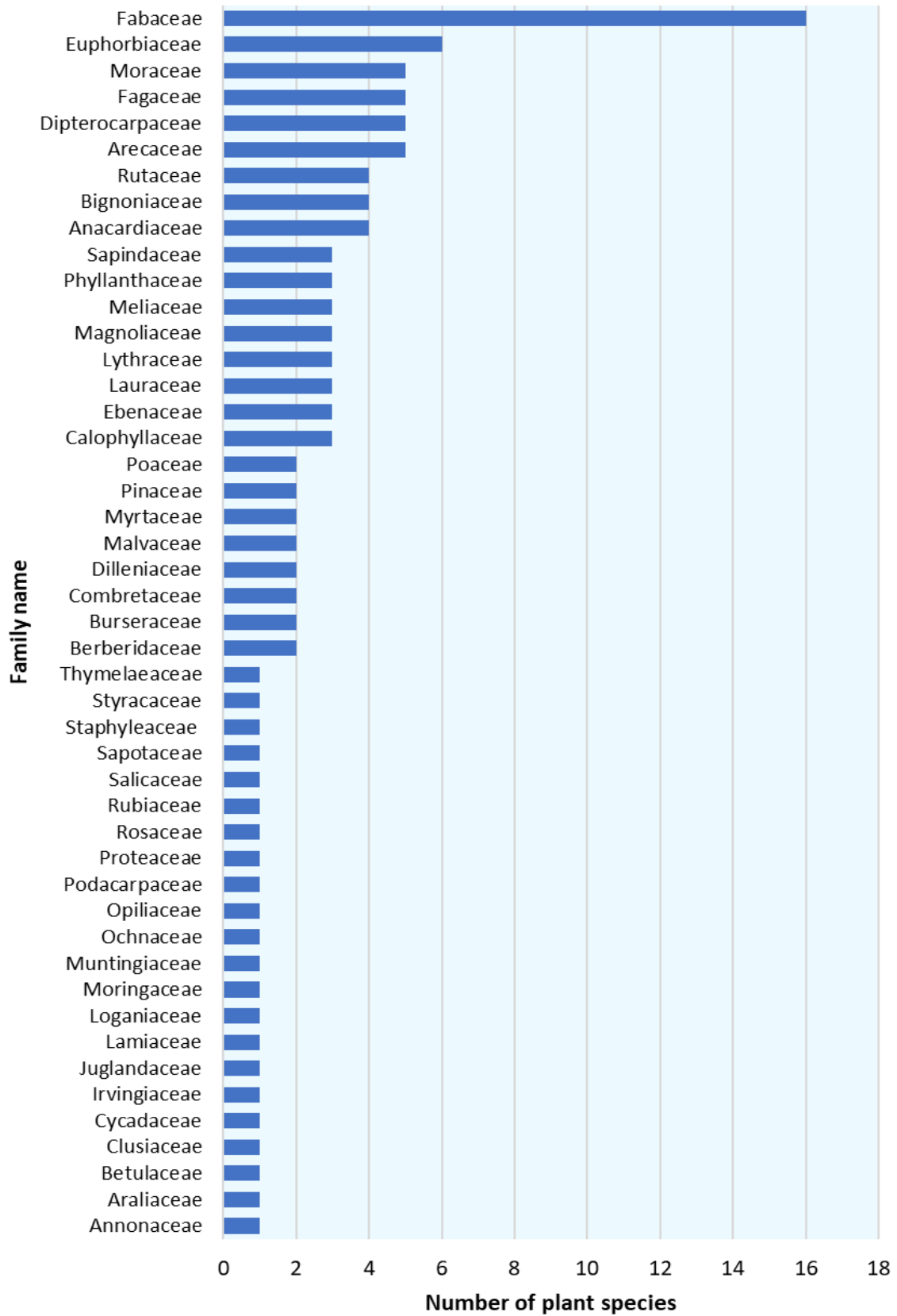


Figure 2 - Number of plant species selected in each plant family – community workshop

Usefulness, Species utilization

A total of 116 species from 47 families were identified at the workshop. The preference scores highlight a subset of trees that the local community rank the most valuable for livelihoods and for ecosystem services. The utilization profile of these species demonstrates a clear community preference for multi-purpose trees and shrubs (including bamboos) that provide immediate tangible benefits (Table 1). Food and Fodder are the primary drivers of species valuation, as evidenced by the high "Preference Scores" for *Ficus lacor* (15) and *Irvingia malayana* (12). Medicinal utility also a selection criterion in the local economy, with species like *Clausena excavata* and *Tamarindus indica* being highly regarded for their therapeutic properties. While timber and fuelwood uses are recorded for high-value species like *Aquilaria crassna* (Agarwood) and *Chukrasia tabularis*, these often receive lower overall preference scores than edible species. This suggests that the local utilization strategy prioritizes "non-timber forest products" (NTFPs) and food security over long-term timber extraction, favoring a sustainable, multi-use approach to forest management.

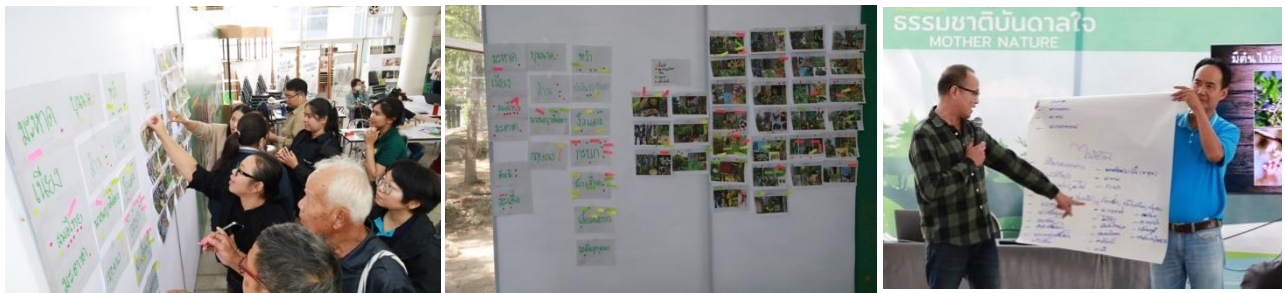


Figure 3 Participants selected preferred useful tree species in their areas

The activity will be organized by provincial groups, who will list useful tree species used within their local communities. Photos of species lists from the household surveys that overlap with the species they list will be posted on the board. Any additional species mentioned during the workshop that were not included in the survey should be written on slips of paper and also attached to the board.

After that, participants will provide scores in two main topics:

1. Utilization: * Timber, fuel, food, fodder, medicinal, and other uses; participants voted for one preferred species per category.
2. Preference score: ** A weighted scoring system was applied to the top 3 rankings: 3, 2, and 1 point(s) respectively.

Table 1 - Utilization categories and preference rankings for key recorded species

Scientific name	Habit	Origin	Utilization* (no. single votes)						Preference score** (sum of rank scores)
			Timber	Fuelwood	Foods	Fodder	Medicinal	Other uses	
<i>Ficus lacor</i>	Tree	Native			2	2			15
<i>Iringia malayana</i>	Tree	Native		2	5		2		12
<i>Barnebydendron riedelii</i>	Tree	Introduced			1		1		12
<i>Bambusa spp.</i>	Bamboo			3	2	3			11
<i>Terminalia bellirica</i>	Tree	Native	3			1			11
<i>Cinnamomum spp.</i>	Tree	Native	2						9
<i>Bauhinia acuminata</i>	Tree	Native			1				8
<i>Clausena excavata</i>	Shrub	Native		1			6		6
<i>Tamarindus indica</i>	Tree	Introduced/commercial					5		6
<i>Spondias pinnata</i>	Tree	Native			2	3			5
<i>Xantolis cambodiana</i>	Tree	Native		2					5
<i>Mahonia duclouxiana</i>	Tree	Native					4		5
<i>Oroxylum indicum</i>	Tree	Native							5
<i>Castanopsis diversifolia</i>	Tree	Native	1	1					3
<i>Mammea siamensis</i>	Tree	Native		1	4				3
<i>Hopea odorata</i>	Tree	Native		2					3
<i>Choerospondias axillaris</i>	Tree	Native					1		3
<i>Lagerstroemia floribunda</i>	Tree	Native					2		3
<i>Artocarpus lacucha</i>	Tree	Native	1						3
<i>Melodorum fruticosum</i>	Shrub	Native				1			3
<i>Engelhardia spicata</i>	Tree	Native			3				3
<i>Styrax benzoides</i>	Tree	Native							3
<i>Castanopsis acuminatissima</i>	Tree	Native		1	1	3			2
<i>Protium serratum</i>	Tree	Native			2	2			2
<i>Syzygium sp.</i>	Tree	Native					1		2
<i>Aquilaria crassna</i>	Tree	Native	4						2
<i>Arenga westerhoutii</i>	Palm	Native			2				2
<i>Xylia xylocarpa</i>	Tree	Native	1				1		1
<i>Betula alnoides</i>	Tree	Native					2		1
<i>Fernandoa adenophylla</i>	Tree	Native			3				1
<i>Chukrasia tabularis</i>	Tree	Native	3						1
<i>Diospyros ehretioides</i>	Tree	Native			1				1

Nursery survey data validation workshop

This workshop was attended by staff from the Forestry Department representing nurseries in Chiang Mai, Chiang Rai, Phrae, Lamphun, and Lampang. As before, a preliminary list of preferred species was generated and the MFT app was tested. In addition, a hands-on exercise in seed supply, relative to seed zones was run, as well as a demo of the Thai version of D4R, to gain feedback. Participants were invited to confirm species demand, clarify seed sources and volunteer additional ecological knowledge.



Figure 4 Validation workshop on 6th March 2026.

Species Selected for Seed Collection

In the species-preference exercise (Figure 5), a weighted scoring system was applied to the top 3 rankings: 3, 2, and 1 point(s) respectively. A total of 52 plant species was initially identified. Again the family Fabaceae (Legume family), dominated with 16 species (approximately 31% of the total). Other notable families include Dipterocarpaceae and Bignoniaceae, which represent critical timber and ornamental categories, respectively.

The species selected were mostly native, highlighting a strong foundation of indigenous flora that supports local biodiversity and ecosystem resilience. However, the distribution also reflects a deliberate integration of introduced species, primarily driven by ornamental interests (e.g., *Bignoniaceae*) and commercial agricultural requirements (e.g., *Rubiaceae*). This balance between native and non-native suggests a managed landscape, where indigenous ecological value is supplemented by introduced species selected for their aesthetic appeal and economic utility. The distribution of the scores indicated a strong preference for a few dominant species particularly *Tectona grandis* with a score of 28—the highest in this dataset, followed by *Dipterocarpus alatus* at 14 and *Dendrocalamus strictus* at 11 (Table 2). Demand was high for high-value hardwoods, bamboos and other versatile fast-growing species.

Table 2 – List of species propagate in the nurseries with preference score.

No.	Local Name	Scientific Name	Family	Origin	Preference Score (sum)
1	สัก	<i>Tectona grandis</i>	Lamiaceae	Native	28
2	ยางนา	<i>Dipterocarpus alatus</i>	Dipterocarpaceae	Native	14
3	ไผ่ชาง	<i>Dendrocalamus strictus</i>	Poaceae	Native	11
4	มะขามป้อม	<i>Phyllanthus emblica</i>	Phyllanthaceae	Native	9
5	ทองอุไร	<i>Tecoma stans</i>	Bignoniaceae	Non-Native	8
6	จามจุรี	<i>Samanea saman</i>	Fabaceae	Non-Native	6
7	กาแฟ	<i>Coffea arabica</i>	Rubiaceae	Non-Native	5
8	ยางแดง	<i>Dipterocarpus turbinatus</i>	Dipterocarpaceae	Native	4
9	ประดู่ป่า	<i>Pterocarpus macrocarpus</i>	Fabaceae	Native	4
10	ขนุน	<i>Artocarpus heterophyllus</i>	Moraceae	Non-Native	3
11	ชมพู่พันธุ์ทิพย์	<i>Tabebuia rosea</i>	Bignoniaceae	Non-Native	3
12	พะยูน	<i>Dalbergia cochinchinensis</i>	Fabaceae	Native	3
13	มะกอกน้ำ	<i>Elaeocarpus hygrophilus</i>	Elaeocarpaceae	Native	3
14	มะไฟ	<i>Baccaurea ramiflora</i>	Phyllanthaceae	Native	3
15	กระถินเทพา	<i>Acacia mangium</i>	Fabaceae	Non-Native	3
16	อินทนิลบก	<i>Lagerstroemia macrocarpa</i>	Lythraceae	Native	2
17	เพกา	<i>Oroxylum indicum</i>	Bignoniaceae	Native	2
18	กาแฟอาราบิก้า	<i>Coffea arabica</i>	Rubiaceae	Non-Native	2
19	ยูคาลิปตัส	<i>Eucalyptus spp.</i>	Myrtaceae	Non-Native	2
20	ยมหิน	<i>Chukrasia tabularis</i>	Meliaceae	Native	2
21	กัลปพฤกษ์	<i>Cassia javanica</i>	Fabaceae	Native	2
22	ซีเหล็ก	<i>Senna siamea</i>	Fabaceae	Native	1
23	อินทนิลน้ำ	<i>Lagerstroemia speciosa</i>	Lythraceae	Native	1
24	มะค่าโมง	<i>Azadirachta indica</i>	Fabaceae	Native	1
25	แดง	<i>Xylia xylocarpa</i>	Fabaceae	Native	1
26	กะพี้เขาควาง	<i>Dalbergia cultrata</i>	Fabaceae	Native	1
27	ราชพฤกษ์/ตูม	<i>Cassia fistula</i>	Fabaceae	Non-Native*	1
28	เหลืองปรีดียาธร	<i>Tabebuia aurea</i>	Bignoniaceae	Non-Native	1
29	เหลืองเขียงราย	<i>Handroanthus chrysotrichus</i>	Bignoniaceae	Non-Native	1
30	ไผ่ไร่	<i>Gigantochloa albociliata</i>	Poaceae	Native	0
31	มะฮอกกานี	<i>Swietenia macrophylla</i>	Meliaceae	Non-Native	0
32	ตะแบก	<i>Lagerstroemia floribunda</i>	Lythraceae	Native	0
33	พะยอม	<i>Shorea roxburghii</i>	Dipterocarpaceae	Native	0
34	มะปราง	<i>Bouea macrophylla</i>	Anacardiaceae	Native	0
35	มะขาม	<i>Tamarindus indica</i>	Fabaceae	Non-Native*	0
36	เสี้ยวบ้าน	<i>Bauhinia saccocalyx</i>	Fabaceae	Native	0
37	หว้าป่า	<i>Syzygium cumini</i>	Myrtaceae	Native	0
38	อะราง	<i>Peltophorum dasyrhachis</i>	Fabaceae	Native	0
39	ตะเคียนทอง	<i>Hopea odorata</i>	Dipterocarpaceae	Native	0
40	กระพี้	<i>Cassia grandis</i>	Fabaceae	Non-Native	0
41	กระถินลูกผสม	<i>Acacia hybrid</i>	Fabaceae	Non-Native	0
42	ไผ่บงกิง	<i>Dendrocalamus sp.</i>	Poaceae	Native	0
43	สะเดา	<i>Azadirachta indica</i>	Meliaceae	Native	0
44	จิว	<i>Bombax ceiba</i>	Malvaceae	Native	0
45	ไผ่รวก	<i>Thyrsostachys siamensis</i>	Poaceae	Native	0
46	ต้นแค	<i>Sesbania grandiflora</i>	Fabaceae	Native	0

No.	Local Name	Scientific Name	Family	Origin	Preference Score (sum)
47	ต้นชงโค	<i>Bauhinia purpurea</i>	Fabaceae	Native	0
48	ทางนกยูงฝรั่ง	<i>Delonix regia</i>	Fabaceae	Non-Native	0
49	ไผ่ชางหวล	<i>Dendrocalamus membranaceus</i>	Poaceae	Native	0
50	แคนนา	<i>Dolichandrone serrulata</i>	Bignoniaceae	Native	0
51	มะค่าไก่	<i>Drypetes roxburghii</i>	Putranjivaceae	Native	0
52	ประดู่ม่วง	<i>Pterocarpus macrocarpus*</i>	Fabaceae	Native	0

*POWO lists *Cassia fistula* and *Tamarindus indica* as originally native to the Indian Subcontinent and Africa, respectively.



Figure 5 Participants mapping supply chains on seed zone maps and ranking species preferences.

The selection of species for nursery production appeared to be governed by a hierarchy of factors, aimed at ensuring both community adoption and ecological success. The primary factor was meeting the specific needs of local stakeholders, so the nurseries could ensure that their output is relevant and immediately utilized. Supporting this demand-driven approach was the critical assessment of local environmental suitability. This involves selecting species with high survival rates and ease of cultivation, specifically choosing plants that are compatible with the original forest type and soil conditions of each area. Finally, certain species were selected for their potential to incentivize local farmers to engage in planting and long-term land

stewardship. Teak owes its high popularity to its inclusion in government-sponsored initiatives. While local villagers may not favor these as much as other indigenous species, they are often compelled to accept them, to secure the associated state incentives and policy benefits.

Seed Source Mapping

The seed source mapping exercise revealed that Chiang Mai and Lampang provinces are the primary seed sources providing essential support to nearly all nurseries across the Upper Northern region of Thailand (Table 3). In contrast, species typically associated with the Northeastern (Isan) region, such as *Dalbergia cochinchinensis* and *Pterocarpus macrocarpus*, are predominantly distributed from Khon Kaen and Udon Thani. Furthermore, Nan Province is particularly noted for economic fruit and timber species, most notably Tamarind and *Azelia xylocarpa*. Meanwhile, Phrae Province exhibits a remarkably high diversity of seed sources of for various indigenous species including *Dolichandrone spathacea*, *Senna siamea*, *Lagerstroemia loudonii* and *Bauhinia saccocalyx*.

Table 3 Seed sources between nurseries and provinces.

Nursery	Seed source									
	Northern						Northeast		Central	
	Chiang mai	Lampang	Phayao	Nan	Phare	Chiang rai	Lamphun	Koen Kaen	Udon Thani	Saraburi
Mae Taeng (Chiang Mai)	/	/	/							
Hot (Chiang Mai)	/	/	/							
Lamphun							/	/	/	/
Tung Hua Chang (Lamphun)		/	/							
Phrae		/	/	/	/			/	/	
Chiang Rai	/					/		/	/	
Wieng Pa Pao (Chiang Rai)	/					/				
Sop Prap (Lampang)	/									

Nursery Challenges and Problems

In discussion sessions participants identified pests and diseases, threatening the health and viability of the sapling stock as major problems. Water scarcity and quality, ranging from insufficient supply to chemical imbalances that affect plant growth was also considered serious. Furthermore, structural gaps in infrastructure and personnel, specifically the lack of reliable electricity and a shortage maintenance staff were identified as significant constraints. These internal struggles are often exacerbated by environmental and weather extremes, such as flooding and inclement weather, which disrupt seed collection and damage existing inventory.

Development Goals

The top priority is the enhancement of technical infrastructure, with a focus on stabilizing water delivery and utility systems. Parallel to physical upgrades, there was a significant emphasis on capacity building, aiming to improve the practical knowledge and professional skills of the workforce. To modernize operations, the nurseries seek to expand digital and resource access through the development of distribution applications and detailed information channels for plant care. Finally, equipment upgrades and increased budgetary support for seed collection tools were viewed as essential steps toward ensuring long-term sustainability and production scaling.

Discussions

The discussion sessions revealed a high level of diversity in preferred species, which was not met in actual production levels. A critical point of discussion was the divergence between community priorities and institutional demands. Local villagers strongly favor "non-timber forest products" (NTFPs) that provide immediate food and medicinal benefits, such as *Ficus lacor* and *Irvingia malayana*. In contrast, regional nurseries are driven by high-value hardwoods like Teak (*Tectona grandis*), which dominates production due to government-sponsored incentives rather than local livelihood preference. The workshops also mapped an intricate seed supply network, identifying Chiang Mai and Lampang as primary hubs for the region.

Conclusion

In conclusion, the validation workshops both verified much of the data that were collected by the nursery and community survey and also exposed some mismatches and conflicts between what demand and production of tree species for tree planting across northern Thailand. Opinions were fluid and often divergent, depending on the groups and individuals involved. However, an encouraging emergent conclusion was the overall high diversity of tree species being requested by communities and grown in local nurseries. This is an important point as diversity is one of the key components and objectives of forest ecosystem restoration. The workshops also helped to raise awareness amongst the participating groups and contributed towards bridging gaps between local ecological knowledge and state-level forestry operations. Whilst restoration demands native trees that support biodiversity recovery, integration of some introduced species, to satisfy specific commercial and ornamental requirements maybe unavoidable. The identification of persistent challenges—including pests, water scarcity, and infrastructure gaps—underscores the necessity for the achievement of development goals. Ultimately, the success of long-term forest restoration in the region depends on balancing community needs with institutional goals, modernizing nursery infrastructure, and expanding the use of digital tools like the D4R and MFT applications to enhance capacity building and resource management.

Appendix

Table A1 – All tree species workshop participants identified as useful (27/2/26) Number of single votes for uses and sum of ranking scores for overall preference. Blank cells indicate those species initially listed but which subsequently received no use votes or preference rank scores.

ชื่อสามัญ	Scientific name	Family	Habit	Origin	Number of single votes						Preference score (sum of rank scores)
					Timber	Fuelwood	Foods	Fodder	Medicinal	Other uses	
มะกอกพราวน	<i>Turpinia pomifera</i>	Staphyleaceae	Tree	Native	1	5	1	2	1		
ก่อเดือย	<i>Castanopsis acuminatissima</i>	Fagaceae	Tree	Native		1	1	3			2
ไผ่	<i>Bambusa spp.</i>	Poaceae	Bamboo			3	2	3			11
กระบก	<i>Irvingia malayana</i>	Irvingiaceae	Tree	Native		2	5		2		12
แดง	<i>Xylia xylocarpa</i>	Fabaceae	Tree	Native	1				1		1
มะแฟน	<i>Protium serratum</i>	Burseraceae	Tree	Native			2	2			2
ก่อแป้น	<i>Castanopsis diversifolia</i>	Fagaceae	Tree	Native	1	1					3
สารภี	<i>Mammea siamensis</i>	Calophyllaceae	Tree	Native		1	4				3
มะกอกป่า	<i>Spondias pinnata</i>	Anacardiaceae	Tree	Native			2	3			5
ส้มป่อง	<i>Clausena excavata</i>	Rutaceae	Shrub	Native		1			6		6
สมอพิเภก	<i>Terminalia bellirica</i>	Combretaceae	Tree	Native	3			1			11
ประดู่แดง	<i>Barnebydendron riedelii</i>	Fabaceae	Tree	Introduced			1		1		12
ผักเอือด	<i>Ficus lacor</i>	Moraceae	Tree	Native			2	2			15
มะตูม	<i>Aegle marmelos</i>	Clusiaceae	Tree	Native			1	2			
มะเกลือ	<i>Diospyros mollis</i>	Ebenaceae	Tree	Native			1	4			
มะคำติควาย	<i>Sapindus rarak</i>	Sapindaceae	Tree	Native				1	1		
เต็ง (แงะ)	<i>Shorea obtusa</i>	Dipterocarpaceae	Tree	Native	1	1					
สลีนก	<i>Balakata baccata</i>	Euphorbiaceae	Tree	Native			1	3			
นางพญาเสือโคร่ง	<i>Prunus cerasoides</i>	Rosaceae	Tree	Native	2	1					
กำลังเสือโคร่ง	<i>Betula alnoides</i>	Betulaceae	Tree	Native					2		1
แคหางค่าง	<i>Fernandoa adenophylla</i>	Bignoniaceae	Tree	Native			3				1
ยมหิน	<i>Chukrasia tabularis</i>	Meliaceae	Tree	Native	3						1
ต้นเต้าหลวง	<i>Diospyros ehretoides</i>	Ebenaceae	Tree	Native			1				1
หว่า	<i>Syzygium sp.</i>	Myrtaceae	Tree	Native					1		2
กฤษณา	<i>Aquilaria crassna</i>	Thymelaeaceae	Tree	Native	4						2
ปาล์มลิบสองบันนา	<i>Arenga westerhoutii</i>	Arecaceae	Palm	Native			2				2
ตะเคียน	<i>Hopea odorata</i>	Dipterocarpaceae	Tree	Native		2					3
มะกัก	<i>Choerospondias axillaris</i>	Anacardiaceae	Tree	Native					1		3
ตะแบก	<i>Lagerstroemia floribunda</i>	Lythraceae	Tree	Native					2		3
มะหาด	<i>Artocarpus lacucha</i>	Moraceae	Tree	Native	1						3
นมแมว	<i>Melodorum fruticosum</i>	Annonaceae	Shrub	Native				1			3
คำหัด	<i>Engelhardia spicata</i>	Juglandaceae	Tree	Native			3				3

ชื่อสามัญ	Scientific name	Family	Habit	Origin	Number of single votes						Preference score (sum of rank scores)
					Timber	Fuelwood	Foods	Fodder	Medicinal	Other uses	
นมนาง/นมวัว	<i>Xantolis cambodiana</i>	Sapotaceae	Tree	Native		2					5
ขมิ้นต้น	<i>Mahonia duclouxiana</i>	Berberidaceae	Tree	Native					4		5
มะขาม	<i>Tamarindus indica</i>	Fabaceae	Tree	Introduced/commercial					5		6
เสี้ยวดอกขาว	<i>Bauhinia acuminata</i>	Fabaceae	Tree	Native			1				8
อบเชย	<i>Cinnamomum spp.</i>	Lauraceae	Tree	Native	2						9
คันทมิ	<i>Cleidion javanicum</i>	Euphorbiaceae	Tree	Native	4						
ยาแก้	<i>Monosis volkameriifolia</i>	Arecaceae	Tree	Native	3						
เนียง	<i>Archidendron pauciflorum</i>	Fabaceae	Tree	Native		1					
มะเดื่อหัว	<i>Ficus auriculata</i>	Moraceae	Tree	Native			1				
ช้างน้ำ	<i>Ochna integerrima</i>	Ochnaceae	Tree	Native					2		
ส้มปี	<i>Toddalia asiatica</i>	Rutaceae	Climber	Native					2		
กำยาน	<i>Styrax benzoides</i>	Styracaceae	Tree	Native							3
เพกา	<i>Oroxylum indicum</i>	Bignoniaceae	Tree	Native							5
มะขามป้อม	<i>Phyllanthus emblica</i>	Phyllanthaceae	Tree	Native							
มะม่วงป่า	<i>Mangifera caloneura</i>	Anacardiaceae	Tree	Native							
สมอไทย (มะปៃ)	<i>Terminalia chebula</i>	Combretaceae	Tree	Native							
มะไฟ	<i>Baccaurea ramiflora</i>	Phyllanthaceae	Tree	Native							
ค้อ	<i>Livistona speciosa</i>	Arecaceae	Palm	Native							
มะเขว่น	<i>Zanthoxylum limonella</i>	Rutaceae	Tree	Native							
มะคิงป่า แผลงป่า	<i>Strychnos nux-vomica</i>	Loganiaceae	Tree	Native							
สัก	<i>Tectona grandis</i>	Lamiaceae	Tree	Native							
รัง	<i>Shorea siamensis</i>	Dipterocarpaceae	Tree	Native							
ประดู่ป่า	<i>Pterocarpus macrocarpus</i>	Fabaceae	Tree	Native							
ยางนา	<i>Dipterocarpus alatus</i>	Dipterocarpaceae	Tree	Native							
เป็ล้าหลวง	<i>Croton roxburghii</i>	Euphorbiaceae	Tree	Native							
ยมหอม	<i>Toona ciliata</i>	Meliaceae	Tree	Native							
เสียน	<i>Melia azedarach</i>	Meliaceae	Tree	Native							
จำปี	<i>Magnolia alba</i>	Magnoliaceae	Tree	Native							
มะเดื่อ	<i>Ficus ssp</i>	Moraceae	Tree	Native							
ค้างป่า/ค้างหลวง	<i>Trevesia palmata</i>	Araliaceae	Tree	Native							
จำปา	<i>Magnolia champaca</i>	Magnoliaceae	Tree	Native							
ขี้เหล็กป่า	<i>Senna timoriensis</i>	Fabaceae	Tree	Native							
ตะไคร้ต้น	<i>Cymbopogon citratus</i>	Poaceae	Tree	Native							
ผักหวานป่า	<i>Melientha suavis</i>	Opiliaceae	Tree	Native							
ฝาง	<i>Caesalpinia sappan</i>	Fabaceae	Small tree	Native							
จวงหอม	<i>Cinnamomum caudatum</i>	Lauraceae	Tree	Native							
ทองหลวงป่า	<i>Erythrina subumbrans</i>	Fabaceae	Tree	Native							
กระพุ่มเนิน	<i>Neolamarckia cadamba</i>	Rubiaceae	Tree	Native							

ชื่อสามัญ	Scientific name	Family	Habit	Origin	Number of single votes						Preference score (sum of rank scores)
					Timber	Fuelwood	Foods	Fodder	Medicinal	Other uses	
กระเจาะ	<i>Helicia nilagirica</i>	Proteaceae	Tree	Native							
พะยอม	<i>Shorea roxburghii</i>	Dipterocarpaceae	Tree	Native							
ตะขบป่า(มะเกี๋ยน)	<i>Flacourtia indica</i>	Salicaceae	Tree	Native							
ตะคร้อ	<i>Schleichera oleosa</i>	Sapindaceae	Tree	Native							
ตะขบ	<i>Muntingia calabura</i>	Muntingiaceae	Tree	Introduced							
เดียม	<i>Bischofia javanica</i>	Euphorbiaceae	Tree	Native							
กาสะลอง/ปีบ	<i>Millingtonia hortensis</i>	Bignoniaceae	Tree	Native							
มะกล่ำตื้น	<i>Adenantha pavonina</i>	Fabaceae	Tree	Native							
สนสามใบ	<i>Pinus kesiya</i>	Pinaceae	Tree	Native							
ก้อหรั่ง	<i>Castanopsis armata</i>	Fagaceae	Tree	Native							
แคนา (ดอกขาว)	<i>Dolichandrone serrulata</i>	Bignoniaceae	Tree	Native							
แค	<i>Sesbania grandiflora</i>	Fabaceae	Tree	Native							
มะตาด	<i>Dillenia indica</i>	Dilleniaceae	Tree	Native							
กล้วยฤาษี	<i>Diospyros glandulosa</i>	Ebenaceae	Tree	Native							
กระแจะ	<i>Naringi crenulata</i>	Rutaceae	Tree	Native							
ก้อแดง	<i>Castanopsis tribuloides</i>	Fagaceae	Tree	Native							
ก้อใบเลื่อม	<i>Castanopsis tribuloides</i>	Fagaceae	Tree	Native							
กะทิง	<i>Calophyllum polyanthum</i>	Calophyllaceae	Tree	Native							
ทางหลวง	<i>Albizia chinensis</i>	Fabaceae	Tree	Native							
กูก	<i>Lansea coromandelica</i>	Anacardiaceae	Tree	Native							
เก็ด	<i>Dalbergia sp</i>	Fabaceae	Tree	Native							
ครามป่า	<i>Indigofera tinctoria</i>	Fabaceae	Shrub	Native							
คอแลน	<i>Nephelium hypoleucum</i>	Sapindaceae	Tree	Native							
จิวแดง	<i>Bombax ceiba</i>	Malvaceae	Tree	Native							
ตะคร้ำ	<i>Garuga pinnata</i>	Burseraceae	Tree	Native							
ต้าว	<i>Arenga pinnata</i>	Arecaceae	Palm								
เต่าร้าง	<i>Caryota mitis</i>	Arecaceae	Palm								
ทองเหลือง	<i>Erythrina stricta</i>	Fabaceae	Tree	Native							
บุหนาค	<i>Mesua ferrea</i>	Calophyllaceae	Tree	Native							
ปรง	<i>Cycas siamensis</i>	Cycadaceae	Cycad	Native							
พญาไม้	<i>Podocarpus neriifolius</i>	Podocarpaceae	Tree	Native							
พลับพลา	<i>Microcos tomentosa</i>	Malvaceae	Tree	Native							
มณฑา	<i>Magnolia sp</i>	Magnoliaceae	Tree	Native							
มะเดื่ออุทุมพร	<i>Ficus racemosa</i>	Moraceae	Tree	Native							
มะเฒ่า	<i>Antidesma sp</i>	Phyllanthaceae	Tree	Native							
มะรุม	<i>Moringa oleifera</i>	Moringaceae	Small tree	Native							
ยมแดง	<i>Syzygium nervosum</i>	Myrtaceae	Tree	Native							
ละหุ่งเครือ	<i>Euphorbiaceae sp.</i>	Euphorbiaceae	Climber								

ชื่อสามัญ	Scientific name	Family	Habit	Origin	Number of single votes						Preference score (sum of rank scores)
					Timber	Fuelwood	Foods	Fodder	Medicinal	Other uses	
สนสองใบ	<i>Pinus merkusii</i>	Pinaceae	Tree	Native							
ลำต้น	<i>Dillenia obovata</i>	Dilleniaceae	Tree	Native							
สีเสียด	<i>Senegalia catechu</i>	Fabaceae	Tree	Native							
เสลา	<i>Lagerstroemia loudonii</i>	Lythraceae	Tree	Native							
หมีเหม็น	<i>Litsea glutinosa</i>	Lauraceae	Tree	Native							
เหมือดโสด	<i>Aporosa villosa</i>	Euphorbiaceae	Tree	Native							
อินทนิล	<i>Lagerstroemia speciosa</i>	Lythraceae	Tree	Native							

Table A2 Focus species and source of seed in nursery on 6th March 2026.

Local name	Scientific Name	Seed Source	Nursery Location
ยางนา	<i>Dipterocarpus alatus</i>	Chiang Mai, Lampang, Udon Thani, Khon Kaen, Den Chai (Phrae)	Lamphun, Phrae, Chiang Rai, Wiang Pa Pao
พะยุง	<i>Dalbergia cochinchinensis</i>	Saraburi, Udon Thani, Phayao (Online), Seed Centers	Lamphun, Thung Hua Chang, Phrae
สัก	<i>Tectona grandis</i>	Lampang (Ngao), Northeastern Region	Phrae, Chiang Rai
ประดู่	<i>Pterocarpus macrocarpus</i>	Udon Thani, Khon Kaen	Phrae, Chiang Rai, Wiang Pa Pao
มะค่าโมง	<i>Afzelia xylocarpa</i>	Nan, Khon Kaen, Udon Thani	Phrae, Chiang Rai
นางพญาเสือโคร่ง	<i>Prunus cerasoides</i>	Chiang Mai (Mae Fah Luang), Huai Nam Khun	Chiang Rai, Wiang Pa Pao
พะยอม	<i>Shorea roxburghii</i>	Chiang Mai, Chiang Rai (Wiang Chai)	Chiang Rai
แดง	<i>Xylocarpus xylocarpa</i>	Khon Kaen, Udon Thani	Chiang Rai, Wiang Pa Pao
มะขาม	<i>Tamarindus indica</i>	Chiang Mai, Mae Chaem, Nan	Lamphun, Phrae
มะขามป้อม	<i>Phyllanthus emblica</i>	Nan	Phrae, Chiang Rai
ขนุน	<i>Artocarpus heterophyllus</i>	Fruit processing factories	Lamphun
ชนิดอื่นๆ เช่น แค ขี้เหล็ก เสลา	<i>Multiple Species</i>	Phrae (Local collection)	Phrae

Schedule on Validation Workshop 27th February 2026

Biodiversity and local Knowledge

Day/Date/Time	Topic	Facilitator
Friday	Conceptual Basis	
February 27, 2025		
9.00 - 9.30	Registration	
9:30 - 9.45	Welcome speeches and group photo	Dia
9:45 - 10.00	Introduction to "Seed to Tree" Program	Dia
	Demonstration of Diversity for restoration (D4R) and survey	Greuk
10.00 - 10.30	Presentation of the results from questionnaire (result after analysis)	Dia
	Q&A Discussion	
10.30 - 10.45	Break	
10.45 - 12.00	Brainstorming with the community (focus group) The useful plant species/most favorite species/target species for restoration	Dia/Som
	Recheck the species, usefulness, habit	
	Q&A Discussion + Presentation	Som
12.00 - 13.00	Lunch	
13.00 - 14.30	Demonstrate My Farm Tree application and survey	Som
14.30 - 14.45	Break	
14.45 - 15.15	Introduction to seed collection and seed collection (Hand on activity)	Nattanit/Yoi/Thonglaw
15.15 - 15.45	Seed cutting test, floating Seed viability test	Nattanit
	Seed banking (Exhibition)	Nattanit
16.00	Certificate - CLOSE	

Participants list



กิจกรรมการประชุมเชิงปฏิบัติการ “ความหลากหลายทางชีวภาพและความรู้ท้องถิ่น”
ณ ศูนย์ธรรมชาติวิทยาคอดุสิตเทพเฉลิมพระเกียรติฯ มหาวิทยาลัยเชียงใหม่
วันที่ 27 กุมภาพันธ์ 2569 เวลา 09.00 น. – 16.00 น.

ชื่อ - สกุล	หน่วยงาน/จังหวัด	ยินยอมให้ใช้ ถ่ายภาพ	ไม่ยินยอมให้ ถ่ายภาพ	ลงชื่อ
นายมี เทพหลวง	เชียงใหม่		✓	<i>[Signature]</i>
นายพิภช เพ็งเอี่ยม	บ้านทุ่งไปล้ง	✓		<i>[Signature]</i>
ดร. อังคณา อินตา	มหาวิทยาลัยเชียงใหม่	✓		อ.อังคณา อินตา
ดร. ประทีป ปัญญาดี	องค์การบริหารส่วนตำบล...	✓		<i>[Signature]</i>
ดร.พีรณ ชันชะสีลา	...	✓		พีรณ
นายวิทยา ปองอมรกุล	...	✓		<i>[Signature]</i>
นายภาณุพงศ์ รัตนวิจิตร	มูลนิธิเพื่อคนพิการที่เชียงใหม่	✓		ทพ.
น.ส. กวณทิศา ศิริสุข	สถาบันวิจัยและพัฒนาพื้นที่สูง (องค์การมหาชน)	✓		กมลทิศา
น.ส. อังสร วัฒนวงษาวัฒน์	สถาบันวิจัยและพัฒนาพื้นที่สูง (องค์การมหาชน)	✓		อ.อังสร
นางสาว พิศาล	หน่วยวิจัยพืชไร่	✓		นางสาว พิศาล
นางสาว อธิชา รัตนวิจิตร	มูลนิธิเพื่อคนพิการที่เชียงใหม่	✓		นางสาว อธิชา
น.ส. อธิชา รัตนวิจิตร	มูลนิธิเพื่อคนพิการที่เชียงใหม่	✓		อธิชา
น.ส. อธิชา รัตนวิจิตร	SDF	✓		อธิชา
น.ส. อธิชา รัตนวิจิตร	อุทยานแห่งชาติดอยสุเทพ-ปุย	✓		<i>[Signature]</i>



กิจกรรมการประชุมเชิงปฏิบัติการ “ความหลากหลายทางชีวภาพและความรู้ท้องถิ่น”

ณ ศูนย์ธรรมชาติวิทยาอสุเทพเฉลิมพระเกียรติฯ มหาวิทยาลัยเชียงใหม่

วันที่ 27 กุมภาพันธ์ 2569 เวลา 09.00 น. - 16.00 น.

	ชื่อ - สกุล	หน่วยงาน/จังหวัด	ยินยอมให้ใช้ ถ่ายภาพ	ไม่ยินยอมให้ ถ่ายภาพ	ลงชื่อ	
1/4	นายโชติกุล ปกรสิทธิ์	แม่ฮ่องสอน	✓			✓
1/4	นายจื้อ รัตนติลกุล					Absent
1/4	นายบุญธรรม มณีวรรณ	ม.ร. ๗-11 เชียงใหม่	✓			✓
1/4	นายดาวรุ่ง ไสพส	พ.ร. ๓ เชียงใหม่	✓			✓
1/4	นายนิวัฒน์ อินทวิน	ส. 12 เชียงใหม่	✓			✓
1/4	นายสนไพโร สมเพชร	อุทวิงค์ เชียงใหม่	✓			✓
1/4	น.ส. ศรีนวล ตุ่นใจ	ภูเก็ต ๑	✓			✓
1/x	นายธงชัย เยตดา	ศูนย์การศึกษานานาชาติ เชียงใหม่	✓			
1/x	พีเจริญ นันทะศักดิ์	ศูนย์การศึกษานานาชาติ เชียงใหม่	✓			
1/x	พุทธมนต์ สนธิคุณ	ศูนย์การศึกษานานาชาติ เชียงใหม่	✓			
1/4	นายธวัชชัย เทวะธำ	เชียงใหม่ เชียงใหม่	✓			✓
1/4	น.ส.กชนิภา วงศ์เศรษฐี					Absent
1/4	นางสุรางค์ นามเมือง	เชียงใหม่ เชียงใหม่	✓			✓



กิจกรรมการประชุมเชิงปฏิบัติการ “ความหลากหลายทางชีวภาพและความรู้ท้องถิ่น”

ณ ศูนย์ธรรมชาติวิทยาคยสุเทพเฉลิมพระเกียรติฯ มหาวิทยาลัยเชียงใหม่

วันที่ 27 กุมภาพันธ์ 2569 เวลา 09.00 น. - 16.00 น.

ชื่อ - สกุล	หน่วยงาน/จังหวัด	ยินยอมให้ใช้ ถ่ายภาพ	ไม่ยินยอมให้ ถ่ายภาพ	ลงชื่อ
1/ กิ่งก้าน ป่าจันท.	กรมส่งเสริมการค้าระหว่างประเทศ-ปจ	✓		กิ่งก้าน ✓
1/ เดชม อธิราช อธิราชบุรี	— " —	✓		อธิราช ✓
1/ นาย อภิสิทธิ์ อภิสิทธิ์	— " —	✓		อภิสิทธิ์
1/ พ.ศ. ๒๕๖๙ พ.ศ. ๒๕๖๙	มูลนิธิไทยรักษ์ป่า	✓		นาย อภิสิทธิ์
1/ น.ส. สุวิมล นางสม	มูลนิธิไทยรักษ์ป่า	✓		สุวิมล

**Schedule of Nursery survey Validation workshop
On 6th March 2026**

Day/Date/Time	Topic	Responsible
Friday	Conceptual Basis	
March 6, 2026		
08.45 - 09.00	Registration	
09.00 - 09.10	Welcome remarks by Asst. Prof. Dr. Pimonrat Tiansawat	Som-O
09.10 - 9.30	Seed supply system challenges for growing native tree species for forest by Ms. Benjarat Prompen, Special Forestry Technical Officer, Head of Forest Tree Improvement and Seed Management Research Division restoration	RFD
9.30 - 10.00	Demonstration of the D4R (Diversity for Restoration) tool and introduction to the Seed Zone Concept	Greuk
10.00 - 10.05	Feedback and discussion on the D4R	Som
10.05 - 10.15	Coffee break	
10.15 - 10.50	Practical session – Mapping the forest tree seed supply system in Northern Thailand	Christmas
10.50 - 11.35	Practical session – In-depth discussion on the supply of native forest tree seeds for forest restoration	Christmas
11.35 - 11.55	Presentation of the nursery survey results in Northern Thailand: Seedling production and sources of forest tree seeds	Sorayuth
11.55 -12.00	Q&A and discussion	Som
12.00 - 13.00	Lunch break	
13.00 - 13.30	Using the MFT mobile application, including its concept and application methods	Som
13.30 - 13.35	Feedback and discussion on the application	Som
13.35 - 14.00	Seed collection demonstration by staff from the Forest Restoration Research Unit, Chiang Mai University (FORRU-CMU)	Nattanit/Yoi/Thonglaw
14.00 -14.15	Coffee break	
14.15 - 14.45	Welcome remarks and introduction to the Seed Bank	Nattanit
14.45 - 14.55	Seed handling and storage management techniques within the Seed Bank	Nattanit
14.55 - 15.15	Closing and certificate	



แบบฟอร์มลงทะเบียน

การขอความยินยอมเพื่อจัดเก็บและใช้ภาพลักษณ์: ท่านยินยอมให้บันทึกภาพและวิดีโอเพื่อเผยแพร่ประชาสัมพันธ์ผ่านสื่อสังคมออนไลน์หรือไม่

กิจกรรม:	"ร่วมพัฒนาระบบเมล็ดพันธุ์เพื่อการฟื้นฟูป่าภาคเหนือ"			
วันที่	6 มีนาคม พ.ศ.2569			
ลำดับ	ชื่อ นามสกุล	ยินยอม <input checked="" type="checkbox"/>	ไม่ยินยอม <input checked="" type="checkbox"/>	ลงชื่อ
1 /	นางวนิดา ทองนุช	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<i>[Signature]</i>
2 /	นางสาวนาฎฤดี เมืองลา	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<i>[Signature]</i>
3 /	นายฉกรรจ์ หมุดแก้ว	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<i>[Signature]</i>
4 /	นางสาวเยาวลักษณ์ กาละดี	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<i>[Signature]</i>
5 /	นายปุดนวยรี หาทสำ	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<i>[Signature]</i>
6 /	นางสาวศิริลักษณ์ ธรรมนุ	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<i>[Signature]</i>
7 /	นายพูนศักดิ์ ไชยดวงแก้ว	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<i>[Signature]</i>
8 /	นางสาวสาวิตรี มังคลาด	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<i>[Signature]</i>
9 /	นางสาวอำพร จีมะลี	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<i>[Signature]</i>
10 /	นายทรงพล ชัยมงคล	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<i>[Signature]</i>
11 /	นายกรกฎ สุขฤกษ์	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<i>[Signature]</i>
12	นายเชษฐา กาวิล	<input type="checkbox"/>	<input type="checkbox"/>	<i>[Signature]</i>
13	นายสยาม อินถาโท	<input type="checkbox"/>	<input type="checkbox"/>	
14 /	นางสาวศิวพร อินทร	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<i>[Signature]</i>
15 /	นางสาวประวีณา ลวงสวาส	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<i>[Signature]</i>
16 /	นางจรรยา โปร่งใจ	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<i>[Signature]</i>
17 /	นางสาวนุชรี จอมแก้ว	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<i>[Signature]</i>
18	นายอนุสรณ์ ปูเคเรือ	<input type="checkbox"/>	<input type="checkbox"/>	
19	นายพูนนันท สบายสุข	<input type="checkbox"/>	<input type="checkbox"/>	
20	ดร.เกริก ผักกาด	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
21 /	นางลา สุวิทย์ แก้วอนันต์	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<i>[Signature]</i>
22 /	นาง ทวีชาติทิพย์ กิ่งแก้ว	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<i>[Signature]</i>
23 /	นางสาวประไพจิตร ไชยสิทธิ์	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<i>[Signature]</i>
24 /	นาง เชษฐา ทวี	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<i>[Signature]</i>
25 /	นายพฤษกร งาม	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<i>[Signature]</i>
26 /	นายสุวิทย์ จันทารวม	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<i>[Signature]</i>
27 /	นาง อุกฤษ ธีระชัย	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<i>[Signature]</i>
28 /	นายฉัตรชัย กอแก้ว	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<i>[Signature]</i>



The ASEAN-UK Green Transition Fund (GTF) is the UK's flagship programme to accelerate ASEAN's transition to a clean and climate resilient economy. ASEAN UK GTF works with ASEAN institutions and supports ASEAN Member States and Timor Leste. This programme is delivered through the UK Partnering for Accelerated Climate Transition (UK PACT) mechanism.

For any enquiries, please get in touch via email at aseangtf@ukpact.co.uk