

# Results workshop

## Strengthening Tree Seed Supply System for Forest and Landscape Restoration: Good Practices, Lessons Learned, and Collaboration Opportunities



Bandung, Indonesia, 27 February to 1 March 2024



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## **ABBREVIATIONS**

Alliance	Alliance of Bioversity International and the International Center for Tropical Agriculture
APFORGEN	Asia-Pacific Forest Genetic Resources Programme
BRIN	National Research and Innovation Agency, Indonesia
D4R	Diversity for Restoration
DFTS	Directorate of Forest Tree Seed, Indonesia
FGR	Forest Genetic Resources
GCBC	Global Center on Biodiversity for Climate
GEF	Global Environment Facility
FLR	Forest and Landscape Restoration
UN FAO	United Nations Food and Agriculture Organization

*Cover photo: Workshop participants at the nursery of the Giri Jaya Farmer Group, West Java. Credit: Alliance / Ysabel Lee & Alie Peter Galeon*

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## Introduction

Countries across South and Southeast Asia have set targets to restore tens of millions of hectares of degraded landscapes by 2030, contributing fundamentally to global biodiversity and climate goals. Nevertheless, tree seed supply chains especially for native species remain inadequate in many of the countries, which constrains the delivery of diverse restoration objectives. Restoration targets are unprecedented in scale and ambition, and sharing good practices, experiences and lessons learned is imperative to accelerate learning.

The regional workshop “Strengthening tree seed supply systems for forest and landscape restoration: Good practices, lessons learned and collaboration opportunities” was organised in Bandung, Indonesia, from 27 February to 1 March 2024. The workshop had the following objectives:

- Gather and share experiences about emerging approaches, methods and tools to strengthen demand and supply for native tree seeds and seedlings, from addressing barriers to adoption to the identification and management of seed sources, production and delivery models.
- Assess technical and institutional capacities and capacity needs to scale up tree seed delivery, in ways that foster seed quality and diversity, and local community participation in restoration value chains
- Identify priorities for regional collaboration on seed systems development for native tree species

The workshop was organised as part of the regional project “Strengthening collaborative tree seed supply systems for restoration in Asia” (2022-2025), led by the Alliance and funded by the UK Darwin Initiative. The project seeks to strengthen institutional and technical capacities to develop seed supply chains for native tree species in Bangladesh, India, Indonesia and the Philippines, so that forest and landscape restoration projects are linked with quality seed sources and local seed producers are linked with customers to support local livelihoods and sustainable forest management. The project will analyse gaps in the current availability of seed sources for pilot tree species in each country and support the identification of new seed sources and seed supply chains to fill the gaps.

The project is implemented as a collaboration of the following organisations:

- Alliance of Bioversity International and CIAT (lead)
- Bangladesh Forest Department
- Institute of Forest Genetics and Tree Breeding, India
- National Research and Innovation Agency (BRIN), Indonesia
- College of Forestry & Natural Resources, University of the Philippines Los Baños
- Royal Botanic Garden Edinburgh
- OECD Forest Seed and Plant Scheme

In addition to the project partners, the workshop had participants from Malaysia and Vietnam to extend sharing of experiences and lessons learned.

Workshop programme is given in Annex 1 and list of participants in Annex 2.

Workshop presentations are available from: <https://t.ly/lx7DT>

## Day 1 – Sharing country experiences

### Session 1: Opening

The workshop was opened by **Anang Setiawan Achmadi**, Director of the Forest Center for Ecology and Ethnobiology at BRIN. He pointed out how the workshop represented the coming together of minds and dedication in advancing knowledge in tree seed supply systems among partners across Asia. The collaborative efforts of different research teams and partners bring diverse perspectives to the deliberations and drive innovations that transcend borders. He also stressed that learnings from this workshop can contribute to meeting the forest rehabilitation objectives of the Ministry for Environment and Forestry of Indonesia.

A round of introductions from participants were facilitated by **Riina Jalonen**, of the Alliance of Bioversity International and CIAT. Afterwards, she shared the workshop objectives and agenda of the workshop (Annex 1). She then provided an overview of the regional initiative “Strengthening collaborative tree seed supply systems for restoration in Asia” including key outcomes, activities, and outputs. She emphasised the contextual needs for forest restoration; the barriers in achieving national, regional and global restoration goals; and the need for strengthening local capacities and best practices in tree seed collection, seed quality considerations, and the participation of local communities in seed supply chains.

**Rekha Warriar** of the Institute of Forest Genetics and Tree Breeding (IFGTB) in India outlined the new regional strategy of the **Asia-Pacific Forest Genetic Resources Programme (APFORGEN)** for 2023-2030. The strategy was prepared collaboratively by the network members from 12 countries, and first presented for endorsement to the Asia-Pacific Forestry Commission at the Commission’s 30<sup>th</sup> Session in Sydney, Australia, October 2023. The strategy has for strategic objectives on capacity development and policy support, information on forest genetic resources, conservation of native regionally important species, and strengthening tree seed systems, and its targets are explicitly linked to the Global Plan of Action on Forest Genetic Resources of FAO and the Kunming-Montreal Global Biodiversity Framework. The strategy is available at: [www.apforgen.org/about/strategy-2023-2030](http://www.apforgen.org/about/strategy-2023-2030)

### *Discussion*

- How can local government units connect with APFORGEN and partners for collaboration? Do we have to go through the central government?
  - *Certainly. National coordinators of APFORGEN are officially appointed by central government, but local governments play a key role in the conservation, restoration and sustainable use of forest genetic resources. Involving different levels of governance and linking together through national networks or platforms is important for both aligning outcomes with local needs and contributing to national plans and policy goals.*
- Many countries lack strong formal tree seed systems, although for example in India, there are a few organisations who are developing capacities to improve forest tree species. In such

situations, what opportunities are there to improve the skills of other than public sector supply chain actors in seed collection?

- *In India, one of the main issues is that forest departments have hesitations about identifying new seed sources. Therefore, APFORGEN needs to advocate and sensitize the departments that local communities and their local seed sources can also be trusted sources that contribute importantly to seed availability. Through capacity building, we could help facilitate the provision of certificates for seed sources. Currently, the government is also starting to accredit local nurseries, but this mechanism still does not exist for tree seeds.*

## Session 2: Forest Restoration Targets and tree seed systems in Indonesia

The second session saw a series of presentations from Indonesian partners discussing the wide scope of national and provincial government efforts on tree seed supply systems in the country.

### Forest Plant Seed Policies and Programs in Indonesia in Indonesia

**Ambar Dwi Suseno** of the Ministry of Environment and Forestry's Directorate of Forest Tree Seed (DFTS) presented two forest plant seed policies and programs: seedling provisions and seed improvement. For seedling provisions, DFTS conducts seedling production and procurement mainly on 11 tree species for which seed is required to be obtained from certified sources. He emphasized that all rehabilitation efforts down to the local scale need to use seeds from registered sources; otherwise, corresponding penalties and sanctions will be put in place. Meanwhile, seed improvement includes the following activities: tree breeding, seed sources and genetic resource improvement, seed procurement, seed distribution control, and nursery building.

While the DFTS' role is to ensure the availability of quality seeds and seedlings for forest rehabilitation, Pak Ambar underscored the need to select species (timber or non-timber) that could also provide economic benefits for local communities. Seedling production in community nurseries is also among the priorities of Indonesian President Joko Widodo, who has set targets for opening 30 new large-scale nurseries by 2025 to help meet demand for tree planting. Present challenges in delivering restoration targets include sustaining seed sources, implementing seed zone maps, improving the availability of high-quality seed, and controlling the quality in seed distribution. Numbers of community nurseries vary widely from year to year, demonstrating current challenges with sustainability of small nursery operations.

### From forestry to forest generation rehabilitation: Changing roles of West Java Forestry Service

**Dodit Ardian Pancapana** of the West Java Provincial Forest Service presented about the importance of simultaneously protecting the environment and supporting livelihoods in forest rehabilitation efforts, in order to bring local communities on board. West Java is facing looming challenges by the climate crisis which affect important crops like coffee, and so most of the tree planting interventions focus on high-value commodity trees as opposed to forest tree species. The Forest Service in West Java offers

upstream to downstream industrial opportunities for coffee production because a strong market already exists. While promoting coffee in the market also encourages farmers to plant more coffee, this could also pave ways in planting wider diversity of tree species because coffee needs shade trees. Pak Dodit shared examples of agroforestry models based on intercropping of coffee and woody plants between parcels of plots. As a step forward, the Forestry Service is working with other ministries, national research organisations, and international research organisations like the Alliance to shift current land use to include nurseries and seed sources for native tree species.

#### Ecosystem restoration and biodiversity assessment to support enhanced Nationally Determined Contributions: research and innovations

Anang Setiawan Achmadi presented BRIN's extensive body of work that bridges environmental research and policy in Indonesia. The research and innovation institution takes the lead in biodiversity assessment, biodiversity conservation, land rehabilitation and climate change research, all of which yield policy recommendations to the Ministry of Environment and Forestry.

#### *Discussion:*

- Which tools does BRIN use for carbon estimates? Bangladesh Forestry Department uses IPCC tools.
  - *BRIN has its own software for carbon estimates, but it's difficult to adapt methods and tools for the extremely large diversity found in the country, with 23 distinct ecosystem types. BRIN is collaborating with the Indonesian Chamber of Commerce to support adoption of new regulations, but the approaches are still being finalized.*
- How is climate change affecting the forest restoration planning in Indonesia?
  - *Researchers need to find varieties of important commodities such as coffee that can adapt to climate change but also have high productivity. The challenge is that profiles do not exist for all important species and varieties in terms of their productivity, phenology and genetics. More characterisation efforts are needed to address data gaps.*

### Session 3: Emerging results and lessons of seed system development in other Asian countries

#### Evaluating Native Tree Seed and Seedling Supply Systems in India

**Rekha Warriar** explained India's practices surrounding tree seed systems. Current policies dictate priority species and pose limitations in introducing native tree species for restoration. The problems in seed collection typically involve knowledge and capacity gaps as annual seed production does not meet annual demand, and government needs to engage private nurseries to supply additional seedlings. However, private nurseries are usually run under a family business and only produce few species, with few mother plants per species and lacking monitoring of collection practices and seed quality. Through defining the process for seed quality assessment involving collection, production, distribution, and seed testing in laboratories, the country can move towards establishing a unified registration process that is able to monitor and evaluate seed sources, enforce the use of quality seeds for raising plantations, and document seed zones and knowledge on the extent on which seeds can be grown.

### Information System and Community-Based Nurseries to Support Forest Landscape Restoration in Indonesia

The Indonesian government has a commitment to rehabilitate 12 million hectares of critical lands and accelerate the rehabilitation efforts of degraded mangrove lands. **Vivi Yuskianti** shared how BRIN's efforts and collaboration with APFORGEN under the UK Darwin Initiative project have contributed to the government's restoration targets. One of the project's main achievements is producing an information system on tree seed. Owned by DFTS, the system is deemed complete and ready for use, and can replace the current paper-based system that is difficult to maintain and coordinate. Vivi Yuskianti emphasized the usefulness of information systems and seed zones map for decision-making related to forest and landscape restoration as these tools would enable decision makers and restoration implementers to identify areas without adequate seed sources. She also underscored collaboration with local communities as a key ingredient to increasing the number of certified seed sources for native species. Community-based nurseries are among the highlights of the work in Indonesia, yet nursery owners still need capacity building to improve seed quality and seed handling.

### Emerging results and lessons of seed system development in the Philippines

**Enrique Tolentino Jr.** from the University of the Philippines Los Baños shared key lessons of seeds system development in the country. The university partners with the Mindanao Forest Tree Seed Center and has conducted capacity needs assessments and capacity building programs in the region. Important insights from this work include that few quality seed sources exist for native tree species as most respondents believe exotic tree species are far more productive (i.e. fast growth) and provide better market opportunities (i.e. higher demand and prices). Access to and availability of information on native tree seeds for restoration to support restoration planning and implementation remain a challenge for restoration practitioners in the country.

*The productive, biodiverse, and climate resilient forests of tomorrow are in the genetically diverse and climate-change adapted seeds of today*

*- Enrique Tolentino Jr.*

### Strengthening Forest Tree Seed Supply Systems for Restoration in Bangladesh

**Md Zahidur Rahman Miah** and Md Tauhidur Rahaman of the Bangladesh Forestry Department explained about the history of tree planting efforts in Bangladesh. Previously, exotic tree species were given priority over native tree species, but since then, the government is taking concrete steps to include more native trees in restoration efforts. select an initial list of five native tree species using an existing database. They demonstrated the use of a Data Viewer of the Bangladesh National Forestry Inventory and described activities to improve seed availability such as establishing and monitoring seed orchards, and assessing species suitability using digital elevation models. Currently, the Forestry Department is



planning to document distributions of 10 endangered species, identify potential seed suppliers, assess and strengthen capacities in seed collection and management, and developing information systems such as a mobile application that links seed collectors, nurseries, and restoration managers.

#### Decision-support tools for species selection for restoration and agroforestry

**Tobias Fremout** of Alliance gave an overview of the [Diversity for Restoration](#) (D4R) tool, which guides restoration implementers and practitioners to select the most appropriate tree species and seed sources for forest and landscape restoration. Based on dynamic seed zone maps, the tool helps identify where to source suitably adapted seeds for target species for climate-resilient restoration. D4R is originally developed for the tropical dry forests of Colombia but have since outscaled throughout the regions of Latin America, Africa, and Asia—with Laos being the pilot country for the latter. This year, the team is also looking at scaling the tool in Vietnam.

#### Monitoring and reward mechanisms for seed value chains in restoration

**Chris Kettle** of the Alliance shared the results of the MyFarmTrees mobile app that helps track seed quality and origin through supply chains from seed collection to nurseries and to farmers' fields. The tool also enables monitoring of planted trees over time and provision of rewards to farmers based on tree survival, using blockchain technology and enabling crowdfunded climate solutions. The purpose of consolidating information through MyFarmTrees is to support and mobilize investment in smallholder and community-led restoration of critical landscapes across the world while addressing issues on inadequate delivery of seeds, sustaining capacity and knowledge building activities for native tree species. The tool is currently piloted in Kenya and Cameroon. The application can be used offline while in the field and so works also in conditions with limited internet access. Extension offices can access the information on tree planting and integrate inputs to national restoration and conservation strategies.

#### Session 4: Group discussion on mainstreaming seed supply considerations in FLR programmes

The last activity for Day 1 of the workshop involved breakout groups to discuss considerations for seed source management, seed collection and seedling production, and the delivery to end-users based on the learnings from the presentations made throughout the day. Notes from the discussions are provided in Annex 2.

#### Day 2 – Field visits

The second day of the workshop was dedicated to field visits to partners who work in seed source certifications, orchards, and nurseries to explore best practices and share ideas among experts and practitioners.

Technical Implementing Unit for Forest Tree Seed and Certification, Forestry Service of West Java

The participants were welcomed to the Technical Implementing Unit for Forest Tree Seed and Certification (SPTH) in West Java, the workshop participants were welcomed by **Dede Mahmiludin**, Head of the Unit. He presented the tasks of the unit under the Ministry of Environment and Forestry: seed certification, seedling quality certification, seed source certification, and seed inspection. The unit also provides technical recommendation and guidance for certification of seed, information on forest plant and seedling, and provision of seedlings for restoration and environmental services. The process in seed and seedling quality certification was explained. In the region, there are only five certified seed orchards and 25 certified seed sources all species, illustrating the gaps in seed availability. Seventy-five registered seed providers operate in the region. SPTH partners with other Indonesian research centers to share methodologies and testing responsibilities. Individual land owners can register their seed sources with SPTH for up to 5 years. The challenge is lack of continuity as seed source owners may decide to change the land use at the expiry of the certificate.



**Figure 1.** Visit to the Seed testing lab of the Technical Implementation Unit. Head of the Unit Pak Ded Mahmiludin standing on the right.

Certified Seed Source of *Pinus merkusii* in Cijambu, Sumedang

The second stop of the field trip was at Perhutani's Pine Seed Orchard in Cijambu, Sumedang, West Java, where participants were welcomed by **Chorirotun Nur Ulifah**. Perhutani is a state-owned enterprise committed to sustainably managing forest resources while contributing to community empowerment through product sharing of teak and other species such as pine and mahogany. Established in 1976, the

*Pinus merkusii* Seedling Seed Orchard in Cijambu produces approximately 262 kilograms of seed per year. Pine seeds undergo a long production process that involves cone observation, cone collection, cone transportation, cone ripening, cone drying, cone opening, seed selection, seed windowing, seed packing, and seed storage.



**Figure 2.** *Pinus merkusii* seedling seed orchard in Cijambu.

## Nursery of the Giri Jaya Forest Farmer Group, Nagrog Village, Sumedang

From one success story to another, the Giri Jaya Forest Farmer Group proved that while real and positive impacts may take time in the restoration work, the only thing that matters is you started today --- or in their case, 10 years ago. In 2010, the group put up the nursery to manage hectares of private forests. They had received assistance from both the Forest Office of West Java and the private sector. In 2015, they were tapped to produce 250,000 seedlings of timber species for the Forestry Service which were distributed across the province for free. At present, the group was trusted to establish a seed source and produce around 300,000 seedlings per year. Moving forward, the Giri Jaya group aims to make their self-sustaining nursery a platform for the youth (e.g. high school graduates or dropouts) to earn a living. **Pak Tatang Sutardi** wants to help those who did not attend college to be financially independent, and in turn, accelerate efforts to restore forest and degraded landscapes in the province through nurseries.



**Figure 3.** *Left:* Signboard of the Nursery of the Giri Jaya Farmer Group, with details on species produced and production capacity. *Right:* Members of the group filling polybags for planting seedlings.

## Day 3 – APFORGEN day

The third day of the workshop was dedicated for developing project collaborations and to collate ideas for scaling. It was also an opportunity to exchange ideas and outline how APFORGEN's strategy could be operationalized in the different countries to support the conservation, restoration, and sustainable use of native tree diversity within and between countries.

To kick-off the discussions on day 3 of the workshop, **Enrique Tolentino Jr.** from the University of the Philippines Los Banos shared highlights of the capacity needs assessment and training workshop organized among community members and local government stakeholders in Mindanao, Philippines, in February 2024. The workshop objectives were to share methods in identifying trees, conserving priority tree species, the habitat suitability modeling results on potential distributions, importance of seed quality in a changing environment, tree seed processing and storage, and finally practical application surrounding the practice of seed collection, and seed and nursery planning. Organisers paid special attention to gender balance and participatory approaches throughout the workshop. It was agreed that the approaches and training materials should be shared and made widely available to share experiences and good practices and develop a resource bank of capacity building materials on seed production and quality for native species.

**Smitha Krishnan** presented activities of the OneCGIAR Initiatives on [Nature positive solutions](#) and [Mixed Farming Systems](#) that tackle restoration and conservation in various locations around the world, including in India, Lao PDR and Vietnam.

### *Discussion:*

- How could the OneCGIAR Initiatives be replicated in other countries beyond the current areas of implementation?
- How is carbon sequestration potential of forests measured in the Initiatives?
  - Carbon sequestration is not currently measured in the two Initiatives, although it would be important alongside biodiversity considerations. However, several other CGIAR Initiatives research carbon sequestration and adaptation potential in food systems.
- Do the Initiatives focus on food trees?
  - The Nature+ Initiative focuses on food security but have an interest to explore how forests can also help with strengthening ecosystem services, particularly on food provision and that research activities on this have started in Vietnam.

### Group discussions: Project development

Workshop participants were split into three groups to discuss specific calls for proposals and solicit ideas from different country perspectives on concrete objectivities, targets and activities to overcome existing barriers in tree seed systems and restoration. **Riina Jalonen** identified UK's Global Center on Biodiversity for Climate (GCBC), and Global Environment Facility's (GEF) funding as two funding opportunities that

the APFORGEN partners could consider taking forward. Both funding options have strong biodiversity components, giving priorities to the implementation of global conventions like the Convention of Biological Diversity of the UN.

#### GCBC Proposal: Malaysia and Indonesia

The group spoke about the potential scope of a GCBC proposal for Malaysia and Indonesia that are focused on addressing both economic and restoration values of forests. In pinning down an area that would be suitable for local restoration needs and have similar characteristics for both Malaysia and Indonesia, the group talked about (a) degraded lowland forests, and (b) degraded lands around agricultural areas that also have high commercial interest, which would be relevant for including an economic analysis on restoration costs and benefits.

#### GEF: Indonesia

Participants from the Directorate of Forest Tree Seed, BRIN, West Java Forestry Service and Perhutani discussed the potential to develop a GEF proposal for Indonesia to improve biodiversity and livelihood outcomes from restoration goals. The group identified the following barriers to using native tree species in restoration and local community participation in restoration supply chains:

- Centralization of seedling production in large-scale government nurseries which use limited tree species, especially native species, and compete with community based nurseries. Over 50 smaller permanent nurseries established and strategically located in different parts of Indonesia have become dysfunctional in recent years due to supply-demand gaps.
- Limited number of seed sources for native tree species and their concentration on Java island, which much fewer sources available on other islands.
- Shift in tree species composition from forest species to commodity and horticultural species such as fruit trees. There is limited market for products of native forest trees.
- Lack of knowledge for matching species and germplasm to site conditions, especially under a changing climate
- Gaps between human resources and facilities between Java and other islands

Project activities to address the identified gaps should include cost and benefit analyses of different ways of organizing seed production and distribution, quota systems for nursery production by different actors to level the playing field, establishing new seed sources for native tree species and improving seed and seedling quality, and developing agroforestry models and market linkages to motivate planting of native species.

#### Digital tools for restoration

The group involved participants from Bangladesh, India and Vietnam and discussed common capacity needs and opportunities for developing and adopting digital planning tools for restoration. The group started with a recap demonstration of the features of the D4R tool, before delving deeper into the potential improvements necessary to boost D4R's overall usability and performance. The group covered the following topics:

- Additional information that could be included in the tool to suit local needs and contexts:
  - Information on propagation and specific seed sources. This should also contain contact details of sources within the zones
  - Need for tools for prioritization of areas for restoration
  - Option to upload .kml/gpx files to define delineating restoration site
  - Information on recommended spatial arrangements/planting densities
  - Information on non-tree species
  - Restoration methods beyond tree planting (e.g. natural regeneration and succession for post-mining sites)
  - Possibility to exclude some species directly from the tool
  - Estimation of possible income from timber and non-timber forest products
  - Information on possible buyers/marketing channels/processing possibilities
  - Estimation of carbon sequestration over time
- Piloting and adoption of the tools by stakeholders
  - Involve as many stakeholders as possible from the beginning to make information more country- and context-specific
  - Provide capacity building such as consultation workshops to decide on which species, site conditions, and restoration objectives should be present in the tool
  - Target restoration project managers and local governments for awareness raising on the tool's existence
  - Translate user interface into local languages
  - Develop a mobile app (especially for agroforestry) to popularize D4R
  - Have a simplified version of the D4R tool for farmers
  - Include piloting of tools in project proposals and budgets to ensure testing would materialize; lack of funding and resources for field-testing is currently a challenge.
  - Provide seed funding for local NGOs to test the tool in practice
  - Set up demonstration plots for faster adoption of the tools
- Building capacity for tool adaptation within APFORGEN countries
  - Identify existing local capacity and similar resources that have been developed locally and evaluate how this capacity can be used
  - Link/dovetail with existing projects to try to channel some of their project money for training
  - Seek funding for capacity building and training
- Synergies
  - Identify what has been done already in terms of species characterization
  - Evaluate possibility of a more centralized/efficient database instead of separate excel files (instead of sharing these Excel databases)
  - Use digital tools for more efficient field data collection
  - Learn and adapt experience from other countries (e.g. site-specific plans of Bangladesh with 32 restoration interventions which could be adapted to other countries)
  - D4R could give recommendations on restoration methods/interventions

## World (Asian) Café: topics

In the afternoon, participants were once again divided into three groups to take on three rounds of short, dynamic group discussions. Within 20 minutes per round, each group had to discuss and contribute to (1) regional collaboration ideas for an existing proposal for the UK Pact, (2) International Provenance Trials, and (3) Other network activities for APFORGEN. The topics were identified building on earlier discussions and identified opportunities during the week.



**Figure 4.** Participants in group discussions



## Day 4 – UK Darwin Initiative day

The final day of the regional workshop was dedicated to the four member countries (Indonesia, India, Bangladesh, and the Philippines) involved in the UK Darwin -funded project *Strengthening collaborative tree seed supply systems for restoration in Asia*. Project leader Riina Jalonen and Alliance’s Monitoring and Evaluation Associate Officer **Ronaldo Estera** led the staking stock of progress reports among each of the countries. Country representatives provided specific updates to the annual report and monitoring and evaluation templates against key activities and performance indicators.

Although the work will not be able to formally continue in Bangladesh, **Md. Zahidur Rahman Miah** from the country’s Forest Department offered to keep the work going using their own resources. Alliance expressed commitment to continue supporting Bangladesh’s efforts in tree seed supply systems and restoration targets. In the Philippines, meanwhile, the project officially ends this year while both India and Indonesia get one more year of extension.

### Expected short-term changes

Representatives from the four countries participated in a short exercise to identify achievements, challenges, and areas that need to be kept track moving forward in the country-level perspective. Their responses are measured against specific short-term changes specified below:

- At least 40 rural men and women (at least 30% women) have gained information about income opportunities and skills related to seed production, developed working relationships with forestry authorities, established connection with FLR implementers and potential seed buyers in their area, and had access to seed funding to support local seed enterprises.

What positive signs do you see? Who has done what to make you feel that we are on the right track?	
India	Realizing the need for quality planting materials especially private nurseries.
	Positive response from several community-based nurseries for seed and seedling quality training.
Philippines	Realization of the need for genetically diverse seed sources.
	Increased awareness of native trees for FLR.
What challenges do you face with stakeholders? What frustrates you in the interactions with the stakeholders?	
India	Reluctance to share information as it may attract penalties.
Comments, suggestions, thoughts. Is there anything else we should track?	
Bangladesh	Need to connect community people with the Forest Department.

- At least 12 potential new seed sources, of which at least 8 in community forests, other communal lands or smallholders' lands, have been identified to fill in gaps in the supply of quality seed of known origin for native species. Process for registering seed sources has been initiated but may extend beyond project duration.

What positive signs do you see? Who has done what to make you feel that we are on the right track?	
India	Departments realize the importance of genetic assets in the context of FLR.
Philippines	Datu provided us with other native tree seedling producers.
What challenges do you face with stakeholders? What frustrates you in the interactions with the stakeholders?	
None	None
Comments, suggestions, thoughts. Is there anything else we should track?	
Bangladesh	Bangladesh Forest Department (BFD) wants to register seed seller for good quality maintenance.
Philippines	Government through Department of Environment and Natural Resources (DENR) to craft policy on seed and seedling quality certification.

- Forestry and FLR authorities in 4 countries have increased data and improved data management on native tree seed sources relevant to FLR

What positive signs do you see? Who has done what to make you feel that we are on the right track?	
Bangladesh	Bangladesh Forest Department (BFD) wants to preserve seed source data.
Indonesia	Many stakeholders
What challenges do you face with stakeholders? What frustrates you in the interactions with the stakeholders?	
India	Initially hesitant to collaborate and sought many clarifications as they felt it would involve germplasm exchange.
	Apprehension about sharing data with foreign agencies.
	Private nurseries are skeptical to part with information as it may affect their business.
Indonesia	Slow response from government institutions to implement the information system nationally.
Philippines	Limited or no response for data needs.
Comments, suggestions, thoughts. Is there anything else we should track?	

None	None
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- 40 local forestry department staff and other FLR implementers (at least 30% women, except Bangladesh) have gained skills in evaluating and sourcing quality, genetically diverse seed, documenting seed origin, collaborating with local communities in seed supply and incentivizing sustainable management of seed sources.

What positive signs do you see? Who has done what to make you feel that we are on the right track?	
India	Private nurseries are interested to know more as it would enable them to get accreditation or recognition from the government.
	Department staff very forthcoming in coming forward to facilitate capacity building for newly joined staff.
	Eager to extend the information and implement large-scale planting programs.
Philippines	Desire to share new learnings.
	Follow-up trainings were being requested already.
	Datu of an indigenous peoples (IP) group with knowledge welcomed new learnings.
	Use of vegetatively propagated stocks to supplement species with erratic seed production.
What challenges do you face with stakeholders? What frustrates you in the interactions with the stakeholders?	
None	None
Comments, suggestions, thoughts. Is there anything else we should track?	
Bangladesh	Bangladesh Forest Department (BFD) staffs need training for handling seed storage capacity.

The workshop ended with a vote of thanks to the organisers and participants for their active involvement.

## Annex 1. Workshop programme

Time	Activity
<b>TUESDAY 27 FEBRUARY: COUNTRY EXPERIENCES</b>	
<b>Session 1: Welcome and introductions</b>	
9.00-9.30	Welcome – <i>Anang Setiawan Achmadi, National Research and Innovation Agency (BRIN), Indonesia</i> Participant introductions
9.30-9.40	Workshop objectives
9.40-9.50	Overview of the UK Darwin project on Strengthening tree seed systems – <i>Riina Jalonen, Alliance</i>
9.50-10.00	Regional collaboration on forest genetic resources: Strategy of the Asia Pacific Forest Genetic Resources Programme (APFORGEN) for 2023-2030 <ul style="list-style-type: none"><li>• <i>Rekha Warriar, Institute of Forest Genetic and Tree Breeding, India</i></li></ul>
10.00-10.30	Coffee break & group photo
<b>Session 2: Forest restoration targets and tree seed systems in Indonesia</b>	
10.30-12.15	<ul style="list-style-type: none"><li>• Forest plant seed policies and programs in Indonesia – <i>Nurul Iftitah, Directorate of Forest Tree Seed, Ministry of Environment and Forestry</i></li><li>• From forestry to forest rehabilitation: changing roles of West Java Forestry Service – <i>Dodit Ardian Pancapana, West Java Province Forestry Service</i></li><li>• Restoration of ecosystems and biodiversity based for green economy: research and innovations – <i>Anang Setiawan Achmadi, BRIN (20)</i></li></ul> Plenary Discussion
12.15-13.30	Lunch
<b>Session 3: Emerging results and lessons of seed system development in other Asian countries</b>	
13.30-15.30	<ul style="list-style-type: none"><li>• India – <i>Rekha Warriar, Institute of Forest Genetic and Tree Breeding</i></li><li>• Indonesia – <i>Vivi Yuskianti, BRIN</i></li><li>• Philippines – <i>Enrique Tolentino jr., University of the Philippines</i></li><li>• Bangladesh – <i>Md Zahidur Rahman Miah, Bangladesh Forestry Department</i></li><li>• Decision-support tools for species selection for restoration and agroforestry – <i>Tobias Fremout, Alliance</i></li><li>• Monitoring and reward mechanisms for seed value chains in restoration – <i>Chris Kettle, Alliance</i></li></ul>
15.30-16.00	Coffee break
16.00-17.00	Discussion: mainstreaming seed supply considerations in FLR programmes in Asia
17.00-17.15	Synthesis of day 1
18.30	Welcome dinner
<b>WEDNESDAY 28 FEBRUARY: FIELD TRIP</b>	
8.00-17.00	<ul style="list-style-type: none"><li>• Technical Implementing Unit for Forest Tree Seed and Certification, Forestry Service of West Java Province – <i>Dede Mahmiludin, Head of Unit</i></li><li>• Certified seed source of <i>Pinus merkusii</i> in Cijambu, Sumedang</li><li>• Nursery of the Giri Jaya Forest Farmer Group, Nagrog Village, Sumedang</li></ul>

Time	Activity
<b>THURSDAY 29 FEBRUARY: APFORGEN DAY</b>	
9.00-9.10	Recap
9.10-9.30	Implementing APFORGEN's strategy: key themes and funding opportunities – <i>Riina Jalonen</i>
	Discussion
9.30-9.50	Existing initiatives and collaboration opportunities in the region <ul style="list-style-type: none"> <li>• OneCGIAR Initiative on Nature-positive solutions and Alliance research projects in India – <i>Smitha Krishnan, Alliance</i></li> </ul>
9.50-10.00	Group discussions: introduction
10.00-10.45	Group discussions: project idea development
10.45-11.15	Coffee break
11.15-12.15	Group discussions: project idea development
12.15-13.30	Lunch break
13.30-14.00	Recap of discussions
14.00-14.30	Existing initiatives and collaboration opportunities in the region <ul style="list-style-type: none"> <li>• Seed to tree: Proposed UK Pact project for Malaysia – <i>Adrihani Rashid, Tropical Rainforest Conservation and Restoration Centre, Malaysia</i></li> <li>• Scientific exchanges under the Asia-Pacific Association of Forestry Research Institutions – <i>Pin Kar Yong, APAFRI</i></li> </ul>
14.30-14.40	World Cafe: introduction
14.45-15.45	World Cafe: discussions
15.45-16.15	Coffee break
16.15-17.00	Plenary
	Recap of word cafe
	Collaborative work plan
	Vote of thanks and closing
<b>FRIDAY 1 MARCH: UK DARWIN INITIATIVE DAY (FOR PROJECT PARTNERS)</b>	
8.30-8.50	Taking stock of project progress against log frame – <i>Riina Jalonen and Ronaldo Estera, Alliance</i>
8.50-10.00	Country-level progress and work plans for 2024
10.00-10.30	Coffee break
10.30-11.00	Outcomes and impacts
11.00-12.00	Project-level outputs & publications
	Annual report preparation
12.00-13.30	Lunch
13.30-14.30	Group work on selected outputs
14.30-15.15	Plenary: results of group work and way forward
15.15	Coffee break & farewell

## Annex 2. List of participants

<b>Name</b>	<b>Organisation</b>	<b>Country</b>
Md. Zahidur Rahman Miah	Forest Department	Bangladesh
Md. Tauhidur Rahaman	Forest Department	Bangladesh
Tobias Fremout	Alliance of Bioversity International and CIAT	Belgium
Rekha Warriar	Institute of Forest Genetics and Tree Breeding	India
Smitha Krishnan	Alliance of Bioversity International and CIAT	India
Ambar Dwi Suseno	Directorate of Forest Tree Seed, Ministry of Environment and Forestry	Indonesia
Anang Setiawan Achmadi	National Research and Innovation Agency (BRIN)	Indonesia
Bintoro	National Research and Innovation Agency (BRIN)	Indonesia
Dede J. Sudrajat	National Research and Innovation Agency (BRIN)	Indonesia
Denny	National Research and Innovation Agency (BRIN)	Indonesia
Evayusvita Rustam	National Research and Innovation Agency (BRIN)	Indonesia
Taofik Hidayat	Technical Implementing Unit for Forest Tree Seed and Certification, West Java Province Forestry Service	Indonesia
Vivi Yuskianti	National Research and Innovation Agency (BRIN)	Indonesia
Dede Mahmiludin	Technical Implementing Unit for Forest Tree Seed and Certification, West Java Province Forestry Service	Indonesia
Dodit Ardian Pancapana	West Java Province Forestry Service	Indonesia
Chatarina Sri Rustini	BPTH Wilayah I Palembang	Indonesia
Esty Siske Setioriny	BPTH Wilayah I Palembang	Indonesia
Adisti PP Hartoyo	IPB University, Bogor	Indonesia
Muhammad Rifqi Abdurrahman	Perhutani Forestry Institute	Indonesia
Pin Kar Yong	Asia Pacific Association of Forestry Research Institutions (APAFRI)	Malaysia
Adrihani Rashid	Tropical Rainforest Conservation and Research Centre (TRCRC)	Malaysia
Syed Danial	Tropical Rainforest Conservation and Research Centre (TRCRC)	Malaysia
Riina Jalonen	Alliance of Bioversity International and CIAT	Malaysia
Cristino Tiburan, jr.	University of the Philippines Los Banos	Philippines
Enrique Tolentino jr.	University of the Philippines Los Banos	Philippines
Alie Galeon	Alliance of Bioversity International and CIAT	Philippines
Ronaldo Estera	Alliance of Bioversity International and CIAT	Philippines

<b>Name</b>	<b>Organisation</b>	<b>Country</b>
Verna Marcelo	Alliance of Bioversity International and CIAT	Philippines
Ysabel Lee	Alliance of Bioversity International and CIAT	Philippines
Le Khai	Northern Mountainous Agriculture and Forestry Science Institute (NOMAFSI)	Vietnam
Le Viet Dung	Northern Mountainous Agriculture and Forestry Science Institute (NOMAFSI)	Vietnam

## Annex 3. Notes from group discussions – Day 1

### Seed source management

The group on seed source management identified good practices in seed source management, barriers in scaling these, ways how APFORGEN and other regional initiatives could support the adoption and scaling of seed source management in the region, and stakeholders who need to be involved to ensure effective seed source management.

- Good practices
  - MyFarmTrees initiative has a promising community involvement aspect (i.e., potential of including indigenous peoples and implementing capacity building activities)
  - Incentivizing the use of native species by highlighting the economic benefit of intercropping native tree species in already developed high-value crop plots
  - Highlighting the value of planting high demand native species like *Aquilaria* that grows best in restored forest to also gain economic benefits
  - Providing a certification mechanism (including a robust business process system) for quality seed supply by having polices in place to gain economic benefits
- Barriers to scaling
  - Technology disenfranchisement can be hindrance to maximized use of tools and technologies by diverse stakeholders
  - Economy-driven use of exotic tree species
  - Increased demand for wood results in short rotations instead of waiting for trees to mature and allow seed collection
  - Private nurseries producing and planting on their own often use poor seed quality sources at the lack of capacities and knowledge
  - Policy and bureaucracy restrictions
    - Working with indigenous peoples (i.e., requiring Free Prior Informed Consent)
    - Removal and cutting of native tree species
    - Overall bureaucracy
  - Penalizing use of spurious seed sources
    - Legislation is key to penalize spurious seed sources but generally, the slow enactment of policies is also delaying protection against these kinds of sources. While waiting to have legislation in place, awareness raising for buyers could be done emphasizing the importance of sourcing seed from certified sources.
    - The complexity of penalties also needs to consider long gestation for tree species that result to late observance of poor tree characteristics.
- Supporting adoption and scaling through regional collaboration
  - Working with governments to support legislation and setting up an enabling environment – sending powerful messages using leaders to emphasize the urgency of restoration and conservation, and appointing experts in environment and forest ministries



- Empowering indigenous seed collectors to help them become business actors while securing livelihoods and protecting them from abuse
- Standardizing carbon prices
- Linking APFORGEN work with ASEAN priorities
- Key stakeholders
  - Government leaders
  - Indigenous peoples
  - Private sector

### Seed collection and seedling production

#### Seeds

- Problems:
  - Species identification
  - Seeds based on commercial demand
  - Gaps between demand and supply
- Solutions:
  - Awareness creation and efforts to familiarise users with wider diversity of species
  - Prioritising species
  - Resource apportioning
  - Invest in establishing more seedorchards

#### Seedlings

- Problems:
  - No assured return
  - No buyback guarantees
  - Income is spaced out
- Solutions:
  - Advance planning (Release of funds for production as 30/30/40)
  - Enabling cluster formation of producers to tap on synergies
  - Transparency in the availability of stock (seeds and seedlings)
  - Efforts to popularise organic cultivation – encourage vermicompost, compost, bioinoculants etc. to improve local livelihoods
  - Database management

### Delivery to end-users

The group zoomed in on Indonesia's established Information System as the best case for strengthening seed supply chains amongst Asian countries. **Bintoro** from BRIN demonstrated the use and features of the system, emphasizing that the database contains information from the national, regional, provincial, district, and village levels. For each of the seed source accounts, information varies, and users can input needed data including traits, photos, and other relevant information. At the regional level, officers are given the ID and password for monitoring (i.e. how many species, emerging concerns).

Next steps:

- Train administrative officers from national and regional levels and seed source owners for IS scaling.
- Develop plans on how to combine e-catalogs into the IS.
- Set a standardized information that should be present in the system as most seed source owners only input information they like.
- Finalize agreement with the ministry to make the IS fully operational and available online. As is, the IS is ready for use.