Regional Workshop: Conservation Priorities for Asian Tree Species and Their Genetic Resources

Colombo, Sri Lanka 18th-21st March 2019

Bioversity International

APAFRI

APFORGEN
ASIA PACIFIC FOREST GENETIC RESOURCES PROGRAMME

National Institute of Forest Science

Federal Ministry of Food and Agriculture

DARWIN INITIATIVE

CGIAR
RESEARCH PROGRAM ON Forests, Trees and Agroforestry

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Background

Thousands of ecologically and socio-economically important tree species in Asia are threatened, yet very little information is available on their historical and current distribution, patterns of genetic diversity, intensity of threats across their distribution ranges, or availability of seed sources to support restoration. Effective conservation strategies for these species and their genetic resources cannot be identified without improving knowledge on the species' distributions and the threats they are facing.

"APFORGIS – Establishing an Information System for conserving native tree species and their genetic resources in Asia-Pacific" is a regional project aimed at addressing these gaps in knowledge and thereby supporting the conservation and restoration of socio-economically important, native Asian tree species. The project has the following objectives:

(1) Develop dynamic distribution maps for at least 50 Asian tree species, based on available information from government and research institutions, to enable spatially defining conservation priorities
(2) Develop decision-support tools for the establishment of gene conservation units for different species
(3) Develop a Road Map for establishing an Asian network of gene conservation units

The two-year project is implemented from Dec 2017 to Nov 2019. It contributes to the Regional Strategy 2018-2022 of the Asia Pacific Forest Genetic Resources Programme APFORGEN (www.apforgen.org), and the Global Plan of Action on the World's Forest Genetic Resources (FAO 2014). It is implemented by Bioversity International and APFORGEN, and funded by the Government of the Federal Republic of Germany.

This report summarizes the discussions and results of the project's second workshop, held in Colombo, Sri Lanka, 18-21 March. The workshop brought together more than 30 experts from 17 countries and regional and international organizations, to validate distribution maps for the project's target species and discuss their use in conservation planning. The workshop was jointly organized by Bioversity International, Sri Lanka Forestry Department and the Asia Pacific Association of Forestry Research Institutions (APAFRI), and funded by the National Institute of Forest Science of the Republic of Korea with contributions from the Government of Germany, the UK Darwin Initiative and the CGIAR Research Programme on Forests, Trees and Agroforestry.

Photographs in the report are curtesy of Mr. Panduka Weerasinghe of the Sri Lanka Forest Department. Workshop presentations are available online at the project's shared folder.

Day 1: 18th March 2019

Welcome and introductions

Participants were welcomed to the workshop by Director General of the Forest Department Sri Lanka, who explained Sri Lanka's commitment to increase the country's forest cover by 200 000 ha by 2020, and the need to conserve the remaining natural forests and enhance the seed sources to enable the target. Dr Hong Kyung Nak presented the greetings Dr Chun Bom Kwon, President of National Institute of Forest Science (NIFOS), the main funder of the workshop. He highlighted the opportunities to widen the implementation of the Global Plan of Action on Forest Genetic Resources through regional collaboration, and that it has the potential to become an additional driving force for research excellence in forest sciences.

Photo 1. Welcome and introductions

Participants introduced themselves. Riina Jalonen of Bioversity International then introduced the workshop objectives:

- Review and validate the distribution maps for 72 species
- Agree on approaches for threat mapping and seed zone identification
- Discuss a shared definition of genetic conservation units, building on existing approaches in Asian countries
- Identify follow-up actions for regional collaboration, including address knowledge and capacity needs, conservation planning and future project development

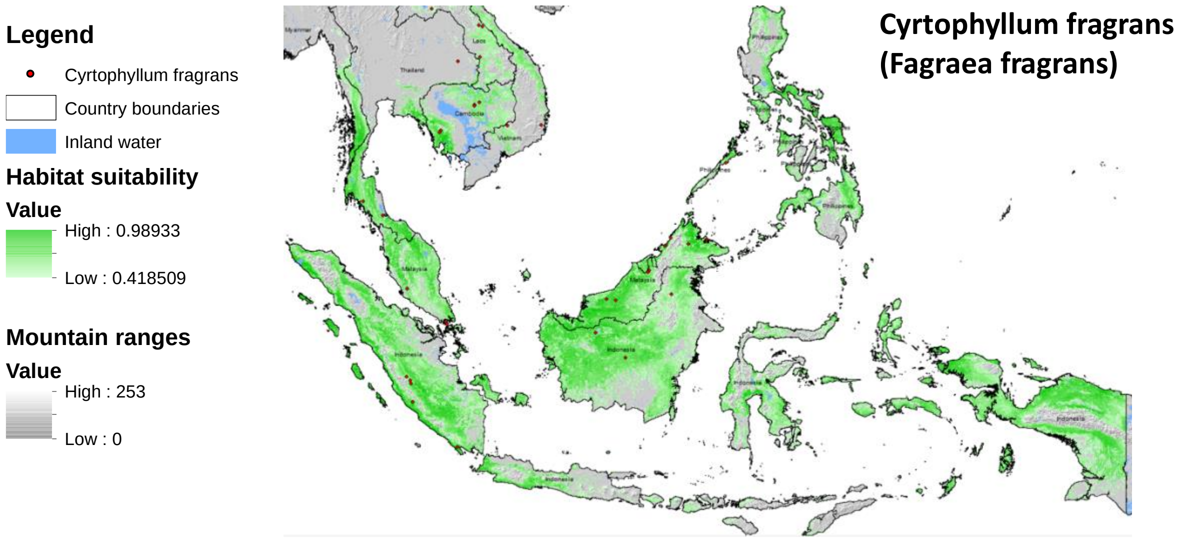

Figure 1. Example of species distribution map for validation

Presentation: Towards an information system for conserving native tree species and their genetic resources in Asia-Pacific: overview of the APFORGIS project and progress to date

Riina Jalonen, Bioversity International

The APFORGIS project contributes to the Regional Strategy of the Asia Pacific Forest Genetic Resources Programme (APFORGEN, www.apforgen.org). The strategy recognizes that effective conservation, restoration and sustainable use of Asian tree species and their genetic resources first requires improving the available information about the species distributions, conservation status and the threats they are facing. This enables, among other things, (i) designing effective networks of conservation units and seed production areas, (ii) studies on genetic diversity and (iii) assessing impacts of climate change on the species. At the moment, information about species distributions across their ranges is generally only available as lists of countries of occurrence, and different databases may give contradicting information. The APFORGIS project aims to improve this knowledge and its usability for conservation planning by developing: (1) distribution and threat maps for at least 50 native and socio-economically important Asian tree species, (2) decision-support tools for genetic conservation, and (3) action plans for regional collaboration in conservation planning and related research.

Presentation: Compilation and cleaning of occurrence data

Della Kemalasari, Bioversity International

Ensuring the quality of input occurrence data is crucial for reliable species distribution models. Five main steps were performed to ensure data quality: (1) Data Compilation. Approximately

59,000 records of data were compiled from the project partners, literature search, online databases and online herbaria; (2) Data pre-cleaning. This step includes formatting the data into the standard MCPD (Multiple Crop Passport Descriptor) format, defining natural distribution for every species at country level, and removing occurrences that are not natural (e.g., planted, introduced, cultivated, grow in plantations, botanical gardens, etc.). After pre-cleaning processes, the data is reduced into 42,000 records. (3) Data Cleaning. Coordinate check was performed, for instance removing duplicates, removing coordinates that were in ranges, fell into the sea, had less than two decimals, or used unrecognizable format. GEOQUAL tool available in CAPFITOGEN software (http://www.capfitogen.net/en/) was used to address spatial uncertainty. Only those data were retained that met the 50% cutoff (Totalqual values from 50-100), resulting in ca. 8,800 records. Majority of the data removed was due to not having accurate enough coordinates, or because they were duplicates from plot studies; (4) Data modelling. MaxEnt software was used as it has spatio-temporal predictive abilities from the input of coordinates data and environmental data (e.g., soil, precipitation, humidity, etc.). The model extrapolated the data into other areas with similar environmental conditions to indicate potential areas of habitat suitability. (5) Mapping. After re-formatting the excel files into a .csv (Comma Separated Value) format, the data can be plotted in a map using DIVA-GIS software. All results were visualized using ArcGIS software, with additional data, e.g., the country administrative boundaries from GADM (Global Administrative Data), Mountain ranges (hill shade), inland water map and WDPA (World Database on Protected Area), to help evaluate reliability of the predicted distributions. Each species' data points were plotted on maps along with the gradient of Habitat Suitability model prediction. Relatively few data points per species (20-30) are generally sufficient for good prediction, as long as they are not clumped (are well distributed) and have high quality.

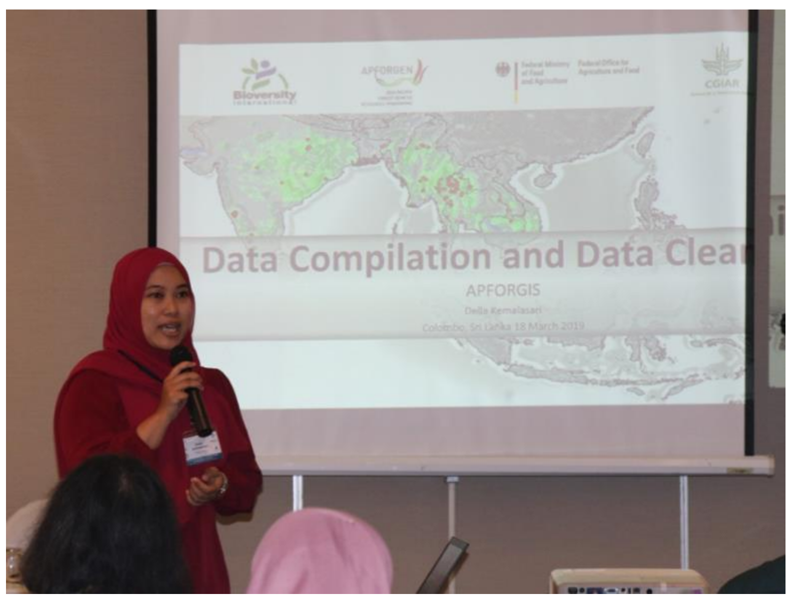

Photo 2. Della Kemalasari presenting on data compilation and cleaning

Presentation: Species distribution modelling and threat mapping: methods, data and validity

Hannes Gaisberger, Bioversity International

This presentation included details on the spatial analysis already undertaken and a preview on what is planned. First, a summary statistic was shown of the cleaned occurrence records for the 72 target species of the project that were finally used for the analysis and briefly described the species distribution modeling (SDM) software that was used, MaxEnt. Next, the different steps to take into consideration when working with species distribution models (SDMs) were describe, such as the selection of environmental variables, sampling bias correction etc. Additionally, an overview on model training, evaluation and prediction was provided. The second part of the presentation described steps planned on how to assess conservation status and threats; the modelled potential distribution for each species will be combined with spatial data on protected areas, climate change and converted land. The portion of species potential distribution found within protected areas, areas that will likely become unsuitable in the future (2050), land converted to cropland/plantations/urban areas can be determined in order to derive an indicator for the *in situ* conservation status of the species.

Photo 3. Hannes Gainsberger presenting on species distribution modeling and threat mapping

Discussion

- *Certain locations have a lack of occurrence points. How can this be addressed?*
  - The threshold value that was used in the creation of this model could be lowered to help account for data gaps.

- *Can planted trees be considered in suitable distribution maps if the species also occurs naturally in these given locations?*
  - It is important to be very careful about promoting planted sites as genetic resource conservation sites, because their genetic diversity is often not well known and may have been reduced during germplasm collection.
  - These issues can be addressed on a country-by-country basis.

- *The term 'habitat suitability' sounds unclear. 'Potential environmental niche' or 'likelihood of occurrence' might be clearer terminology. The most suitable location for a species, in reality, may be different from what this model is predicting.*
    - Modeled habitat suitability refers to species potential niche, and does not necessarily reflect actual occurrence.
    - Another way of defining 'habitat suitability' would be to take the location of occurrence for a given species and establish a geographical range around that location
    - The benefit of using a habitat suitability model is that modeling based on ecological variables includes areas where species aren't necessarily existing currently, but where it seems that conservation efforts for that species could be fruitful
    - The model of 'habitat suitability' is based on 34 environmental variables (e.g. rainfall) and has the potential to be very helpful in terms of climate models, because climate models can provide a lot of information about environmental variables
- ATREE has established planting trials along habitat suitability gradient. Species show higher growth and survival in areas modelled as more suitable habitat

- *How well can occurrence data from different years be used in modeling?*
    - Model is based on long-term average environmental conditions

- In silviculture, species-site -matching is used to indicate suitability outside of the species range. This concept may be relevant in distribution modeling
    - The further away a certain area is from an occurrence point, the less likely the model is to predict occurrence there (built-in model characteristics)

Overview of the received feedback on the maps

Riina Jalonen, Bioversity International

An online consultation was organized over two weeks at the end of February 2019, to seek initial feedback on the modeled habitat suitability for the project's 72 target species. Comments were requested on the overall quality of prediction, missing areas and overpredicted areas. The feedback request was circulated to all data contributors as well as other contacts who had been reached out to during data compilation. Comments on the initial maps were received from 21 data contributors, and from the Botanical Gardens Conservation International. Comments included feedback on the native range of species and taxonomic issues regarding some of the species. Based on the feedback, the species were categorized into groups of very well predicted

(5 species), quite well predicted (35 species), and quite poorly predicted (23 species). Stable distribution models could not be developed for 9 species due to inadequate data.

Discussion

- *Can more species be added to the list of 72 that have been focused on so far?*
    - The goal of the project is not to address all important species, as that is impossible with the given timeline and funds. Rather, the goal is to develop a methodology to assess conservation status of different species. Other partners/countries could use this approach/methodology with other species in the future.

Reviewing and validating the species maps: Overview of the process

Participants were asked to divide into the three sub-regional groups to validate the species distribution maps for the 72 species of interest.

- South Asia: India, Sri Lanka, and Bangladesh
- Indo-China: Cambodia, China, Lao PDR, Myanmar, Thailand, and Vietnam
- Malesia: Indonesia, Malaysia, and the Philippines

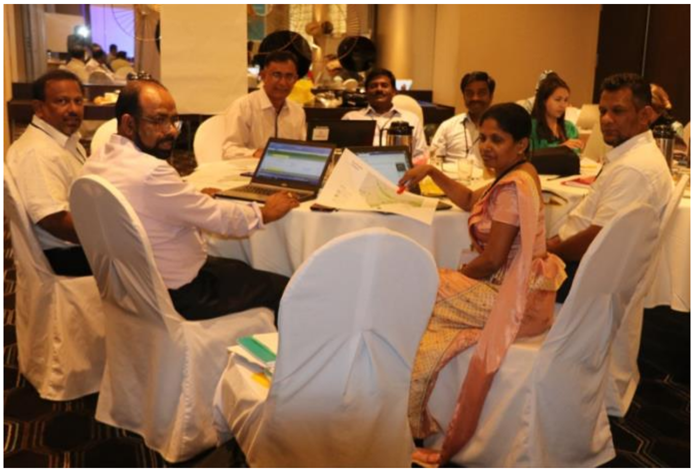

Photo 4. South Asia group validating species distribution maps

Participants were given the following instru

- Focus on validating modelled distribution (green areas) as opposed to individual data points only
- Mark missing and overpredicted areas on maps
- Record all comments in excel (even if map does not require changes)
- Start with the maps that are already good or relatively good

Participants then validated the species distribution maps one by one in groups.

Photo 5. Malesia group validating species distribution maps

Day 2: 19th March 2019

In the morning of day 2, participants continued to validated the species distribution maps. The groups that had already finished with the maps were requested to (1) georeference added occurrence points based on personal observation where possible; (2) identify information that can be overlaid with the maps, and then record existing data in a template (e.g. existing in situ reserves / ex situ collections, genetic studies etc), (3) Compile information on species biology. Validation was finalised by noon, with all groups having validated each of the species occurring in their sub-region.

Presentation: Assessing conservation status: threat mapping and seed zones

Hannes Gaisberger, Bioversity International
Mauricio Parra, National University of Colombia

Specific eco-geographic maps for each of the 72 species were created based on variables related to abiotic plant adaptation. In total 48 environmental variables were included in this analysis, consisting of 19 bioclimatic variables, 8 geophysical and 20 edaphic variables at a resolution of 2.5 arc-minutes (ca. 4.5 km at the equator). A global ecoregion shape file and the species occurrence points were used to obtain the ecoregions occupancy for each of the species. From the ecoregions occupancy a so-called Ecogeographic Land Characterization (ELC) map was created by delineating species-specific abiotic variables representing current climatic conditions. In the absence of adaptive genetic information across the species, such ELC maps can be used as proxies for Seed Transfer Zones. Then the ELC maps were projected to different future climatic conditions as well as between current climate and different future climatic scenarios.

Discussion

- *How accurate are the climate models used?*
    - A medium-severity climate change model and a high-severity climate change model were used to account for a range of possible outcomes
- *How far into the future are these climate models looking? Models that predict far into the future are not very convincing for policy-makers. Climate policies may change between now and then, reducing greenhouse gas emissions.*
    - APFORGIS is bound by what future dates are used in the climate models
    - 2030 and 2050 are not so far in the future when it comes to long-living organisms like trees, or when considering the amount of time it takes for conservation projects to be implemented
    - Multiple possible scenarios were selected to account for policy change between now and the future predictions

Presentation: Current species conservation approaches: results of a regional survey

Riina Jalonen, Bioversity International

A survey was conducted in December 2018 – February 2019 among APFORGEN National Coordinators, with the following objectives: (1) Understand how native tree species and their genetic resources are currently conserved; (2) Identify good practices, and common challenges that could be addressed through regional collaboration, and (3) Identify interests and priorities for developing a regional information system on tree species. The survey compiled information about *in situ* and *ex situ* conservation, tree seed sources, and interests and priorities for regional collaboration on conservation planning. A presentation about the detailed results is available in the project's shared folder.

Presentation: Development of common guidelines for species conservation units

Tania Kanchanarak, Bioversity International and University of Aberdeen

Conservation and sustainable use of forest genetic resources (FGR) is important as many people depend directly on forest and forest products for their food security and livelihoods. Currently, the conservation of FGR is limited by a widespread lack of information on tree species (distribution, reproductive ecology and genetic diversity). Because of this, it is necessary to create general guidelines for conservation while addressing the knowledge gap on species characteristics. One of the objectives proposed by APFORGIS is to develop decision-support tools for the establishment of the Genetic Conservation Units (GCU) for Asian native tree species – areas where tree populations have adapted to a specific environment. The European Forest Genetic Resource Network (EUFORGEN) has developed and implemented a tree species conservation planning approach based on such units, with the objective to maintain the adaptive potential of tree populations in the long term. The criteria for the units were developed based on expert opinion and empirical research. This approach has enabled EUFORGEN to set up a regional network of tree species conservation sites in the absence of genetic information on the species. This presentation proposed potential common guidelines and strategies for the establishment of GCUs that are relevant and feasible in the context of the Asia Pacific region. Feedback on the presentation will be used to evaluate and refine common strategies for conservation and create a better understanding of those valuable species. Shared conservation priorities and objectives will increase collaboration between countries, improve knowledge on species and save limited funding resources, making tree conservation more effective at a regional level.

Discussion

- *How should* in situ *conservation be defined?*
    - In Europe, the definitions for *in situ* and *ex situ* are different from the definitions for *in situ* and *ex situ* in Asia. In much of Asia, *in situ* conservation often refers to lands that are highly protected by law. There is a long administrative process to get access to these areas.
- *How should conservation priorities be established?*
    - *Species-specific vs. eco-biogeography?*
        - An eco-biogeographical approach should be taken, conserving ecosystems that APFORGIS has more information about and species that could give an umbrella protection to other species. Therefore, it needs to be studied which species coexist in the same habitat.
        - Information about genetic diversity is only available for some species. Where that information is available, it would be practical to consider those as future genetic conservation units.
        - Scattered species such as *Azadirachta indica, Pongamia pinnata* need different approaches and guidelines
        - It is not feasible to manage 10 conservation stands per species in a country: more synergistic approach is needed
        - An eco-biogeographic approach may be more challenging in Asia than it would be in Europe, as in much of Asia there are many different ecosystems grouped in a small area
        - Simulation studies don't replace field studies, but may help to target field studies.
    - *Entire gene pool or high-quality stands?*
        - It is important to conserve the entire gene pool of the species, so as to have a higher genetic diversity among conserved species
- *How should conservation guidelines be established?*
    - At this point, not enough is known about each species to come up with species-specific guidelines.
    - Each country could select 10 flagship/key species. There would be some overlap. From there, each country could create a list of 20 species that are a shared priority. This will enable a model to be built that that works across countries
    - The number of trees proposed (15-50): Individuals should be selected from at least three generations, to ensure natural regeneration in the area.
- Possible approaches for defining conservation guidelines:

- The first approach would be to look at the range/ecogeographic zones of species and compare those with protected areas, then do a gap analysis of what is being currently conserved.
- The other approach would be to look at the seed production areas. The feedback that we have received from the survey is that that there are not enough stands to cover the range. In this case, a gap analysis could be done based on the understanding of the range of the species across the region.

- *How to prioritize which species to conserve?*
  - It is a given that protected areas will be protected. Resources should be allocated to species in those areas.
- *What are the roles of social, economic, and political stressors in gap analysis?*
  - For the gap analysis, we are mainly focusing on biophysical issues. But social, economic, and political stressors must be considered if our efforts are to be fruitful.
  - This is why it is so good to get a spatial idea of these areas first. We will be able to overlay the initial species distribution maps with maps about social, economic, and political stressors.
  - We need to develop a methodology to create a database of threats that can be used to overlay with species distribution. More discussion on how to build data-collection for threats would be useful, as threats to species are different in different countries.

Day 3: 20st March 2019

Field trip

The Sri Lanka Forestry Department organized a one-day field trip during which participants visited the mangrove forest and lagoon at the Maduganga Sanctuary, the Dombagaskanda Forest Reserve, and the Labugama Forest Reserve and water purification plant.

Photo 6. Group photo taken in the Maduganga Sanctuary

Photo 7. Boat trip in the Maduganga Sanctuary

Photo 8. Demonstration of cinnamon-processing in the Maduganga Sanctuary

Photo 9. Visit to the Dombagaskanda Forest Reserve

Photo 10. Tour of the Labugama Water Purification Plant

Day 4: 21st March 2019

Synthesis of progress

Riina Jalonen provided an overview of the progress made during the first two workshop days, and suggestions for follow up work and discussions. Integrating genetic conservation in species conservation plans is important, but the approaches differ between countries and regions. In Europe, Genetic Conservation Units are established mainly outside of protected areas and managed specifically for genetic conservation. In Asia, high diversity of species, high human population densities and funding constraints require a more integrated approach. The first step would be a gap analysis to understand what is already sufficiently conserved through a protected area network. In selected countries, this can be followed up with an assessment of how identified gaps can be filled ('Road Map'). The process will help identify and conserve material for selection and adaptation (not already selected material), and the resulting information can be used for planning genetic studies and provenance trials in ways that are representative of the species range and the variation in environmental conditions. By assessing genetic variation and conservation status across the species range, synergies can be found so that fewer conservation units per country are sufficient.

Discussion: Perspectives from different countries

- It would be good to involve key parties such as the National Forest Inventory. In Vietnam there are more than 200 permanent sample plots.
- In Myanmar, some monitoring of species composition has been carried out, but no systematic mapping. Forest inventory is now ongoing and the results will be available within one year.
- Different species need different approaches: for example, widespread species such as *Alstonia scholaris*, or Critically Endangered species such as *Aquilaria crassna*. It is difficult to standardize requirements for conservation.
- In India, *in situ* conservation is difficult for researchers to implement, but *ex situ* conservation is under the control of the Indian Council of Forestry Research and Education, and a lot of work has been achieved in that area already
- In Indonesia, seed orchards exist in mostly for commercial species. There are also some ex situ conservation plots.
- In Bangladesh, community forestry is important. The Forest Department has good ongoing collaboration with 15 communities.
- Botanical gardens keep a list of their collections, which could be overlaid with the modeled species distributions
- It is clear that there are many existing conservation practices. Spatial analysis provides a common platform for approaching the issues. What is needed for it is accurate data, and a practical approach for identifying threats.

- It is difficult to establish a common database since different countries have different ideas and approaches.
- APFORGIS results can help synchronize conservation efforts at country level. In Sarawak, it is not well-known what species exist in protected areas or how representative the protected areas are. There are also conservation areas within production forests that should be considered.

Web database

Riina Jalonen presented a proposal for establishing a web database for sharing the project results. Data contributors would be asked to confirm whether their data is published or not. Published data points will be included in the database. Unpublished data will be included or excluded depending on the consent of the contributor. All data contributors will have access to the database. For outsiders, access could be granted either by registration, or only by granted permission by contributing organization. All data contributors will be co-authors of the database and a data paper resulting from the project.

Photo 11. Discussion of the APFORGIS web database

Discussion

- *Is it a possibility that information published on the future APFORGIS website could fall into the wrong hands (loggers, etc.)?*
  - Some data has already been published. Since that is the case, there is no real concern about publishing that data on the database.
  - The database will be made available to those who register and agree to terms and conditions of data use. It will be managed by Bioversity International.
  - ASEAN Center for Biodiversity can provide APFORGIS with information regarding the different data rights rules among countries
  - The value of the database and the benefits of sharing the database with others should be determined. For example, the information can be very useful for researchers and students.
  - Ownership/management of the database will be clarified

In a show of hands, most participants tended to agree that sharing data through the database is not an issue since the data is mostly already published, and that access by registration would be sufficient to monitor use.

Project results and follow-up activities: Group discussions

Participants discussed in groups topics that were prioritized for further discussion to support successful project implementation: (1) Capacity needs for spatial analysis, (2) Road Map: using spatial approaches to assess conservation priorities at country level, (3) Genetic studies for species of common interest, (4) Conservation of Dalbergia species in the Greater Mekong (separate project that builds on the results of APFORGIS; notes not included). Key points from the discussions are summarized below. A collaborative work plan was developed, integrating the activities suggested by each group.

Breakout Group One: Species distribution modelling

1. Basic species distribution modelling
    a. Data must be prepared before being used in modeling
    b. How to choose variables (e.g. environmental variables)
2. There are many tools to consider: R, Maxent, Remote Sensing (e.g. species height with species distribution modelling), Drone and mapping software, Modelling species in protected area, Perception and participatory mapping
3. Understanding the output in the model

Four possible approaches for species distribution modeling:

- Use a single software, Maxent
- Use a single software, R: Creating species distribution models through the same process above, but using R instead of Maxent. This approach would require training to be provided in GIS/spatial analysis using R. R is widely used, but has a steep learning curve
- Use drones to do remote sensing analysis: would require additional experts to be brought in
- Participatory/perception mapping with local communities: Bioversity International has a lot of people who have experience in gathering local knowledge

Discussion

- Participants voted on the most relevant training option for them. Species distribution modeling using Maxent and using R were tied in the popular vote

- Moving forward: A plan about what training with either approach would look like will be prepared and be circulated to workshop participants

Breakout Group Two: Using spatial approaches to assess conservation priorities at country level/ ecosystem approach: how can spatial analysis help?

Step One: determine categories of species for conservation

- Categories
    - Widely distributed tree species
    - Narrowly distributed tree species
    - Intermediately distributed tree species
- Assess how many populations of the trees exist in each category
- Map those tree populations

Step Two: identify the threats

- Determine the threats for species by country (other than CC, fires, land use change, urbanization, etc.)
    - Threats faced by species will be different in different countries
    - The threats will come in different degrees (some threats will be very high, other will be less high)
- Identify:
    - Available data
    - Gaps in the data

Step Three: model in software package

- Use software to determine the current threats to species and to predict future threats to the species (based on severity of threats)

Step Four: countries share good practices

- Countries will share good practices on how data is gathered, generated, organized, maintained, updated, and secured

Step Five: policy, advocacy, and awareness

- Invite policy-makers to join in the conversation
    - Policymakers are important because they can generate power and resources for conservation programs/strategies
    - Policymakers can enact policies/regulations/programmes

Breakout Group Three: Collaboration through genetic studies

- It is important for APFORGIS to understand which approach to use related to genetic studies
- There is a lack of information on genetic studies;
    - where they are done
    - which species they have been done for
- Through collaboration between countries, an overview on the genetics of species can be completed
- Current genetics work on species can't be specific to all countries (different species, etc.)

How is genetic study related to spatial analysis?

- E.g. in Thailand there is a study on Dipterocarps and how they are disappearing due to climate change (*which study?*)
- Species need to be chosen at a sub-regional level, so they can be chosen according to species distribution modelling.
- Spatial analysis can be useful to understand where to monitor regeneration more closely and then looking at adaptive traits (there is a general concern on long term monitoring).

Closing: Next workshop

- The next workshop will likely be organized in partnership with FAO in October. FAO has requested countries to update their country reports on the State of the World's Forest Genetic Resources, and would like to collaborate with APFORGEN to discuss new information, priorities, and needs for support.
- It is likely that a training workshop will occur at the same time on species distribution modeling
- Participants: Network members should bring people who they want to share APFORGIS results with (show those people how important FGR are)
- The training in conjunction with the third workshop should provide species experts with the ability to do species distribution modeling for many other species.

Table 1. Collaborative workplan.

What	Who	When	Notes
Workshop Report + presentations online	Sarah & Riina	15 April	
Additional occurrence data Shapefiles of protected areas	All participants	31 March	
Share information on genetic studies List priority species by country	All participants	30 April	Priority species will be used to develop a list of 20 top priority species at regional level
2nd version of maps	Hannes & Della	May-June	
Road Map - Identify species - Assess + map existing populations - Good practices - Advocacy	Group 2		
Training needs SDM: Proposal for 2 options (R and MaxEnt)	Group 1 Feedback from all		Think longer-term; tbd with sponsor
Follow up studies - Identify species - Ecol studies - Capacities	all based on group 3 template		4 additional sp, from SL + Chukrasia
Planning for final workshop	Bioversity + CAF + FAO, consult all	May-June	Objectives Participants

Annex 1: Workshop programme

Monday 18 March

9.00-9.30	Welcome and introductions
9.30-9.50	Towards an information system for conserving native tree species and their genetic resources in Asia-Pacific: overview of the APFORGIS project and progress to date *Riina Jalonen, Bioversity International*
9.50-10.10	Compilation and cleaning of occurrence data *Della Kemalasari, Bioversity International*
10.10-10.30	Species distribution modelling and threat mapping: methods, data and validity *Hannes Gaisberger, Bioversity International*
10.30-11.00	*Tea break*
11.00-12.30	Overview of the received feedback on the maps
12.30-13.30	*Lunch*
13.30-15.00	Reviewing and validating the species maps: *Group discussion*
15.00-15.30	*Tea break*
15.30-16.30	Reviewing and validating the species maps: *Group discussion*
16.30-17.15	Reviewing and validating the species maps: *Reporting back and synthesis in plenary*
19.00	*Welcome dinner*

Tuesday 19 March

8.30-8.45	Recap of the first day
8.45-10.00	Reviewing and validating the species maps: *Group discussion*
10.00-10.30	*Tea break*
10.30-11.30	Reviewing and validating the species maps: *Group discussion*
11.30-12.30	Reviewing and validating the species maps: *Reporting back and synthesis in plenary*

12.30-13.30	Lunch
13.30-14.00	Assessing conservation status: threat mapping and seed zones *Hannes Gaisberger and Mauricio Parra*
14.00-14.30	Assessing conservation status: *Plenary discussion on approaches*
14.30-15.00	Current species conservation approaches: results of a regional survey *Riina Jalonen, Bioversity International*
15.00-15.30	Tea break
15.30-15.50	Development of common guidelines for species conservation units *Tania Kanchanarak, Bioversity International and University of Aberdeen*
15.50-16.45	Development of common guidelines for species conservation units: *Plenary discussion*
16.45-17.15	Conclusions of the day and revisiting the plan for the third day

Wednesday 20 March

Field trip

Thursday 21 March

8.30-8.45	Recap of the previous day
8.45-9.30	Existing capacities and capacity needs for species conservation: *Group discussion*
9.30-10.00	Existing capacities and capacity needs for species conservation: *Reporting back and synthesis in plenary*
10.00-10.30	Tea break
10.30-11.30	Project results and follow-up activities: *Group discussion* • Linkages with other national or international programmes • Research papers from the project • Project ideas and proposals for follow-up
11.30-12.00	Project results and follow-up activities: *Reporting back and synthesis in plenary*
12.00-12.30	Closing plenary
12.30-13.30	*Lunch*
	Departures

Annex 2: List of participants

Participants

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