Asia-Pacific Forest Sector Outlook: Roadmap for primary forest conservation in Asia and the Pacific

Report of the online expert workshop
23-25 March 2021

Table of contents

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Acknowledgements

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Summary

Following-up on the FAO "Third Asia-Pacific Forest Sector Outlook Study", launched in June 2019 at the Asia-Pacific Forestry Week in the Republic of Korea, FAO and CIFOR, lead center of the CGIAR research programme on Forests, Trees and Agroforestry (FTA), collaborate to develop two inter-related roadmaps for the Asia-Pacific region, focusing on: *(i) primary forest conservation* and *(ii) innovative forest technologies*, including key policy recommendations informed by science. These roadmaps are being developed through an inclusive and participative process involving a wide range of key regional decision-makers and technical experts, as well as students and young people involved in the forest sector. Three online expert workshops have already been organized: the first one, in July 2020, to launch the whole process and start building a strong community around it; the second one, in November-December 2020, focusing on innovative technologies.

This report presents the results of the third expert workshop, held online on 23-25 March 2021, which focused on primary forest conservation in Asia and the Pacific. This workshop, open only upon invitation, attracted a diverse audience of about 100 experts, coming from 28 different countries, mainly from the Asia-Pacific region.

The purpose of this expert workshop was to take stock of the progress made in the development of the roadmap and prepare the next steps. Building upon the annotated outline circulated ahead of the workshop, and reproduced in **Appendix 4**, participants were invited to: (i) examine the extent, status and diversity of forest types in the region, as well as the forest typology to be used in the roadmap (**Session 1**); (ii) discuss the multitude of threats and increasing pressures faced by different types of primary forests in diverse contexts (**Session 2**); (iii) link threats to forest types in order to identify priority areas for primary forest conservation (**Session 3**); and, (iv) review the governance mechanisms and measures that can support primary forest conservation at different scales (**Session 4**). Finally, based on these discussions, participants were invited to suggest collectively broad areas for policy recommendations regarding (i) classification and mapping of primary forest ecosystems and of the threats they face in the region; and, (ii) governance strategies and action plans to strengthen and enhance primary forest conservation (**Session 5**). These areas of recommendations will be further refined during the development of the roadmap. Discussions were stimulated by expert presentations illustrating the wide diversity of situations encountered across the region. Breakout sessions in smaller groups were organized as appropriate to allow more dynamic, interactive and fruitful exchanges.

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Thomas Hofer, Senior Forestry Officer in FAO Regional office for Asia and the Pacific (FAO-RAP, Bangkok), Natural Resources Management (NRM) Group Leader and Secretary of the Asia Pacific Forest Commission (APFC), welcomed all participants and encouraged them to be very proactive during the workshop, to contribute with innovative and forward-looking ideas, and to focus on what is really needed on the ground.

Vincent Gitz, Director of the CGIAR research programme on Forests, Trees and Agroforestry (CIFOR/FTA) then presented the process of development of the roadmap on primary forest conservation in Asia and the Pacific, the purpose and expected outcomes of the workshop and the organization of the discussions. He highlighted that the purpose of the workshop is to go beyond

general considerations on primary forest conservation and to identify priorities and means that have shown to be efficient in specific contexts with the view to elaborate policy recommendations that could be context specific or adapted to different contexts.

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The objective of **Session 1** was to compare the ecological classification and mapping of primary forests in the region with the field knowledge of national and regional experts. Moving away from long-standing debates about the definition of "primary forests" and related concepts such as "old-growth", "natural", "intact" or "protected" forests, the objective of the roadmap is to dig into the wide diversity of forest ecosystems present in the region and define priorities and means for their conservation. Yves Laumonier (CIFOR/FTA) identified 25 to 30 different forest ecosystems in the region, some of which have already disappeared recently or are endangered. He suggested, for the purpose of the roadmap, a broad forest typology, based on elevation, climatic conditions and soil types, that could structure the ecological classification and mapping of forest ecosystems in the region. Participants agreed that the roadmap should go beyond the initial focus on primary forests to consider also: other natural forests that can act as buffers and contribute to primary forest conservation, as well as other land-uses and the dynamics at stake around primary forests, that support or threaten primary forest conservation.

In her keynote address, Anne Branthomme (FAO) recalled and explained the FAO definition of primary forest that is used for the purpose of this roadmap, i.e.: a *"naturally regenerated forest of native tree species, where there are no clearly visible indications of human activities and the ecological processes are not significantly disturbed"*. She presented the FAO Global Forest Resources Assessment (FRA), its methodology and main results, as well as the challenges related to primary forest reporting, which include: (i) missing data in some country reports or insufficient information on the methodology followed; (ii) considerable variation in the way countries apply FAO definitions in their national circumstances, and in the proxies[1] they use to assess primary forest area. These issues, she said, question the cross-country comparability of the FRA data and, hence, their relevance for informing policy- and decision-making. She finally presented the ongoing study, launched by FAO, to address these issues and improve the consistency and quality of primary forest reporting in the FRA.

Four experts were then invited to illustrate briefly, based on their own experience, the diversity, extent and status of primary forests in the Asia-Pacific region. Li Diqiang (Chinese Academy of Forestry) recalled that China's natural forests have been excessively damaged due to large-scale logging in the past and that undisturbed forests now account for only 2 percent of China's total forest area. She also presented China's recent efforts to protect and restore natural forests across the whole country, with the strong support of the central government. Ate Poortinga (Servir-Mekong project, Thailand) explained how Servir-Mekong, and other partners, used satellite data and artificial intelligence to map forest disturbances and develop the Cambodia Protected Area Alerts System. Rajan Kotru (Trestle Management Advisors, India) described the diversity, status and trends of primary forests in the Hindu Kush Himalayan region, as well as the various threats they face. Finally, Jalesi Mateboto (Secretariat of the Pacific Community) explored the diversity, extent and status of primary forests in Pacific Islands and highlighted the need for new approaches to sustainable forest management in the Pacific, building on both traditional and scientific knowledge.

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Building on concrete examples, the objective of **Session 2** was to discuss the specific threats faced by different types of primary forest in different contexts. The session started by three expert presentations, from different countries. Nguyen Manh Hiep (Vietnam Administration of Forestry) recalled that, despite huge pressures linked to a high human population density, economic

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[1] Among these proxies, figure the following: legally established protected areas; national parks; intact forests; or old-growth forests.

development and climate change, forest cover increased remarkably in Vietnam over the past 20 years, thanks to important conservation efforts recognized by the international community. He also pointed out some shortcomings in the system and issues to be addressed. In particular, he highlighted the need to provide more incentives for local people and communities and get them more involved in natural forests governance and management. Lilik Budi Prasetyo (IPB University, Indonesia) then focused on mangrove, swamp, and peatland forests in Myanmar, Malaysia and Indonesia, which, he said, deserve more attention because they face severe anthropogenic disturbances and are highly vulnerable to climate change. Finally, Jennica Masigan (Center for Conservation Innovation Ph. Inc., the Philippines) explained how remote sensing and geographic information systems were used to monitor spatial and temporal changes in the forest cover in two important biodiversity areas in the Philippines, as well as the increasing pressures they face.

Yves Laumonier (CIFOR/FTA) listed the main threats, facing the different primary forest types in the region, including: urbanization and infrastructure development; climate change, sea level rise; forest fires; pollution (water and soil); shifting cultivation and agriculture expansion; logging and mining concessions; unsustainable NTFP collection; and invasive species. Participants, split in 4 breakout groups, were then invited to link these different threats to the various forest types identified in Session 1. Group 1 highlighted that definition issues, as well as political and cultural differences in perceptions and understanding of primary forests, challenge any scientific basis to monitor their status and address the threats they face, and could be considered a threat in itself. Group 2 reviewed the different categories of threats presented by Yves Laumonier in the light of participants' experience and considered also other threats including: tensions and conflicts over natural resources; and youth out-migration from rural areas that affect the transmission of traditional knowledge. Group 3 questioned the need to differentiate primary forests from other natural forests because the threats they face and the ecosystem functions they offer are similar. The challenge is to design tailored solutions to protect their unique ecological features. Group 4 highlighted the need to build synergies among the different ministries involved in forestry and to adopt an integrated and cross-sectoral landscape approach.

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Building upon the three criteria suggested during the inception workshop in last July (i.e., size, level of importance, level of threats), the objective of **Session 3** was to define and identify priority areas for primary forest conservation in the Asia-Pacific region. Yves Laumonier (CIFOR/FTA) introduced the session, presenting the methodology suggested by CIFOR to identify these priority areas. He explained how existing datasets can be used to assess and map the level of threats, based on a few indicators[2] for which data is available, and how these threat maps can be superposed to other layers, such as protected areas or ecological zones, reflecting the level of importance (the uniqueness) of forest ecosystems.

Three experts were invited to present tools and methodologies supporting the definition and identification of priority areas for primary forest conservation. Edward Game (The Nature Conservancy) illustrated the potential of acoustic monitoring for assessing forest status and identifying priority areas for conservation, as well as the role civil society can play in primary forest conservation. Kasturi Devi Kanniah (Universiti Teknologi Malaysia) showed how satellite-based remote-sensing data and geographical information systems have been used in Malaysia to monitor and map forest status and trends over large areas in a very fast and cost-effective manner. Riina Jalonen (Bioversity and CIAT, Malaysia) highlighted that the overall vulnerability of a forest ecosystem depends on the diverse responses of individual tree species to different threats. She then presented a multi-threat[3] vulnerability assessment realized on 65 native Asian tree species.

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[2] Including: deforestation, roads, human settlements, night-time's light, digital elevation model, burn severity, industrial plantations.

[3] Including: habitat conversion, over-exploitation, fire, over-grazing and climate change.

Participants, split in three breakout groups, were then invited to review the three abovementioned criteria and discuss how they can be applied concretely to different forest types, to identify priority areas for conservation, considering the diversity of situations in the region. Group 1 underlined that priorities and needs differ among stakeholders. Hence, the engagement of all stakeholders is required to define and prioritize the areas to be conserved in order to avoid and limit conflicts. In particular, the voice of local communities and indigenous peoples need to be considered. Participants also stated that the status of ownership and rights, as well as the cost-effectiveness of protection measures should be considered as criteria to support prioritization. Group 2 considered that the question of size is important but should be closely linked to the connectivity existing among the remaining forest fragments. Small patches, if well managed and connected, can contribute to preserve biodiversity and to the provision of ecosystem functions and services. The level of threats should be considered in relation with an assessment of forest status or "health"[4]. Conservation efforts should focus on "healthy" forests, whereas heavily damaged forests may not be prioritized. Conservation efforts should also prioritize forests located near large population centers, rather than remote and inaccessible forests already protected by their geographic location. Participants also highlighted the importance of integrated landscape approaches, policy coordination and large coalitions among actors, as key enabling conditions to support conservation efforts. Group 3 noted that it can be very difficult to determine what is to be protected in primary forests and how to assess the different values of a forest (what value for whom?). Participants also noted that the official designation as conservation area is not enough for effective protection: implementation and law enforcement are critical and require a strong coordination among administrations in charge.

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The objective of **Session 4** was to review the governance tools and mechanisms that can support primary forest conservation at different scales and to identify the transformations needed in forest governance, land tenure and land planning to better prevent deforestation and forest degradation and enhance primary forest conservation in the region. Introducing the session, Alexandre Meybeck (CIFOR/FTA) distinguished the main categories of actors involved in forest governance[5], and reviewed different governance tools and mechanisms existing at different scales, from international to local. He linked forest governance with global objectives (sustainable development, biodiversity and climate change) and with international trade. And he recalled that, beyond states and big private actors, local actors need to find their interest in primary forest conservation, if global goals and national commitments are to be achieved.

In its keynote address, Ryosuke Ujihashi (Forestry Agency of Japan) focused on biodiversity conservation in national forests in Japan. 25 million ha, about two-thirds of the total country area, are covered by forests, out of which 7.58 million ha are national forests, owned and managed by the state, that play a key role in biodiversity conservation. He presented the protected forest system in place in Japan and its evolution over time. As of April 2020, 661 sites, covering an area of 978,000 hectares, or 13 percent of the national forests, were designated as protected forests. Japan also established a network of "green corridors" around protected forests to secure wildlife passageways and connect wildlife habitats. As of April 2020, 24 green corridors have been set up, covering an area of 584,000 hectares, or 8 percent of the national forests.

Three experts, from different countries and organizations, were then invited to discuss issues related to forest governance, based on their own experience. Vongvilay Vongkhamsao (National Agriculture and Forestry Research Institute, Lao PDR) provided an overview of current forest conservation policies in Lao PDR. He described key policy achievements in the past five years, challenges faced and future directions. Ricardo Calderon (Asian Forest Cooperation Organization, AFoCO) presented the AFoCO and demonstrated how it supports forest conservation and restoration, through restoration

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[4] Forest status and "health" is closely linked to the second criteria: "level of importance".

[5] Namely: (i) public actors and institutions; (ii) the private sector; (iii) civil society, local communities and indigenous populations. He also highlighted the specific role of academia and research.

projects, participatory forest management and training activities in its 15 member countries. Finally, Tetra Yanuariadi (International Tropical Timber Organization, ITTO, Japan), explained how ITTO promotes the sustainable management and conservation of tropical forests and supports the international trade of sustainably managed and legally harvested tropical timber, through: the publication of agreed policy guidelines and norms; the collection and analysis of data on tropical timber production and trade; capacity-development and assistance to member countries.

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At the end of **Day 2**, Robert Nasi, Director General of CIFOR, gave an inspiring talk to draw the main lessons from the first two days and provided useful insights to prepare the last day's discussion on recommendations. He recalled that recommendations for decision-makers should consider the dynamics at stake, not only within primary forests but also at their margins. He raised and discussed three issues, fundamental for primary forest conservation. First, "primary" or not? Where do we put the threshold of human use to define a primary forest? How should we consider selectively logged forests that maintain most of the biodiversity and ecological functions of primary forests? Second, do we need to practice "triage"? How small is too small? When do we consider that a primary forest remnant is too small to be worth protecting? How to prioritize our scarce resources for the largest efficiency? Third, are novel forests the new primary? Novel, naturally regenerated, forests, although completely different from the original pristine forests, still contain most of the original endemic flora and fauna, as well as the most iconic tree species. Should these novel ecosystems be conserved like primary forests?

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The objective of **Session 5** was to suggest collectively broad areas for policy recommendations regarding (i) classification and mapping of primary forest ecosystems and of the threats they face in the region; and, (ii) governance strategies and action plans to strengthen and enhance primary forest conservation. Based on the key points and main insights emerging from the discussions during the first two days, the CIFOR organization team, delineated six broad areas for recommendations[6]. and suggested, for each area, a series of draft recommendations that served as inputs for the breakout group discussions. Participants were split in three breakout groups, each group focusing on two broad areas. This report includes draft recommendations prepared from the discussions during the workshop in breakout groups and in plenary. These draft recommendations will be further refined during the course of elaboration of the roadmap, considering all the feedback received.

During the discussions, in breakout group and in Plenary, participants insisted on the importance of storytelling. The first step, if we want to convince large donors to invest in forest conservation and build large coalitions, is to build a compelling narrative and a convincing communication strategy, aligning forest conservation objectives with other sustainable development goals (climate action, biodiversity), and considering the diversity of perspectives, needs and interests among actors, as well as synergies and trade-offs across objectives, sectors and scales. Linked to this narrative, two areas of concern were highlighted by Thomas Hofer (FAO): first, how to clearly earmark land tenure and responsibilities? Second, how to assess and take into account the full value of primary forests, with all their ecosystem services? As long as primary forests are considered as commons, and less valued than other land-uses, they will remain under pressure.

Participants also called for going beyond generalities and crafting operational, actionable recommendations, that can be implemented by public decision-makers, investors, and actors on the ground, with clear mechanisms for measuring impacts. They highlighted the potential of innovative

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[6] Namely: (i) improve knowledge and understanding of natural forests to orient land-use planning, management and conservation efforts; (ii) improve monitoring and reporting; (iii) ensure policy coherence across sectors and scales and privilege integrated landscape approaches; (iv) build / consolidate new coalitions of actors; (v) align sustainable land-use, climate action and biodiversity objectives with conservation of primary forests; and, (vi) strengthen regional and international cooperation for conservation and management of primary forests.

technologies, crowdsourcing and community involvement for increasing awareness and measuring real-time or near-real time impacts, thus enabling more efficient and reactive decision-making. They recalled that the issue of primary forest conservation is eminently solvable. Money is there: the problem is to deploy that money and connect properly big donors and small projects on the ground. Private sector and civil society organizations will be instrumental in that regard. They need to be involved, not only because they are major actors in their own right, but also because they contribute to build the national consensus needed for governments to push forward transformational changes.

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Closing the workshop, Thomas Hofer (FAO) highlighted some keywords, heard over and over again during these three-days discussions, among which: definitions, criteria, methods and tools; size and connectivity; context specificity in a very diverse region; integrated landscape approaches; multi-stakeholder approaches and youth engagement; communication and capacity-development. The challenge now, he said, is to bring all the evidence collected and shared during these three days into concrete actions at different levels. We need policy recommendations to enhance political awareness, as well as practical recommendations for different target groups. Thomas Hofer praised all the speakers and participants for their time and sincerity, for sharing their wisdom and experience, and for their active contribution to the success of this workshop. He recalled that this workshop was only one step in the development of the roadmap and encouraged the participants to provide further contributions on case-studies and best practices.

Introduction

Following-up on the 'Third Asia-Pacific Forest Sector Outlook Study' (FAO, 2019)[7], launched in June 2019 at the Asia-Pacific Forestry Week in the Republic of Korea, FAO and CIFOR, lead center of the CGIAR research programme on Forests, Trees and Agroforestry (FTA), collaborate to develop *two inter-related roadmaps for the Asia-Pacific region on: (i) primary forest conservation* and *(ii) innovative forest technologies*, including key recommendations (for policy and concrete actions) informed by science. These roadmaps are being developed through an inclusive and participative process involving key regional stakeholders and technical experts from governments and intergovernmental organizations, private sector, civil society organizations, academia and research institutions, and encouraging also contributions from students and young people engaged in activities linked to the forest sector in the Asia-Pacific region.

An online regional inception workshop was organized on 30th July 2020 to launch the development of the two roadmaps and start building a strong and diverse community around this project[8]. A second technical workshop, focusing specifically on the use of innovative technologies in the forest sector in the region, was organized online on 30th November, 1st and 3rd December 2020[9]. A third technical workshop was organized online on 23-25 March 2021, which focused on primary forest conservation in Asia and the Pacific. The detailed agenda of this workshop is reproduced in **Appendix 1**.

The purpose of this expert workshop was to take stock of the progress made in the development of the roadmap and prepare the next steps. Building upon the annotated outline circulated ahead of the workshop, and reproduced in **Appendix 4**, participants were invited to: (i) examine the extent, status and diversity of forest types in the region, as well as the forest typology to be used in the roadmap (**Session 1**); (ii) discuss the multitude of threats and increasing pressures faced by different types of primary forests in diverse contexts (**Session 2**); (iii) link threats to forest types in order to identify priority areas for primary forest conservation (**Session 3**); and, (iv) review the governance mechanisms and measures that can support primary forest conservation at different scales (**Session 4**). Finally, based on these discussions, participants were invited to suggest collectively broad areas for policy recommendations regarding (i) classification and mapping of primary forest ecosystems and of the threats they face in the region; and, (ii) governance strategies and action plans to strengthen and enhance primary forest conservation (**Session 5**).

To stimulate the discussions and illustrate, through concrete examples, the wide diversity of situations encountered across the region, a number of experts have been invited to make presentations on specific realities or on specific issues of interest for the workshop. They were also invited to share their rich and diverse experiences in summary papers that are included in this workshop report. Breakout sessions in smaller groups were organized as appropriate to allow more dynamic, interactive and fruitful exchanges. These breakout group discussions are also extensively reflected in this report.

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[7] FAO. 2019. Forest futures – Sustainable pathways for forests, landscapes and people in the Asia Pacific region. Asia-Pacific Forest Sector Outlook Study III. Bangkok. 352 pp. http://www.fao.org/3/ca4627en/ca4627en.pdf

[8] The final workshop report is accessible here: https://www.foreststreesagroforestry.org/wp-content/uploads/2020/10/FAO-FTA_Roadmap-Inception-Workshop-Report_30-07-2020.pdf

[9] The final workshop report is accessible here: https://www.foreststreesagroforestry.org/wp-content/uploads/2021/02/FAO-FTA-Asia_Pacific_Roadmap_Technologies-Workshop-Report-30Nov-1_3Dec_2020.pdf

The workshop was on invitation. The full list of participants is included in **Appendix 2**. The 100 people registered, among which 29 women, were coming from 28 different countries, mainly from the Asia-Pacific region. They represented all the key regional stakeholder groups, including: 37 experts from research and academic institutions; 25 representatives of international or intergovernmental organizations and international donors; 21 officials from national governments; 10 people from civil society organizations and 7 experts, either independent or working for private sector organizations. 9 students or young people engaged in the forest sector in the Asia-Pacific region, selected from those who participated to the call for abstracts organized as part of the development of the roadmap, contributed actively to the workshop, providing valuable technical inputs as well as their own forward-looking perspectives.

1 Opening remarks and overall organization of the workshop

1.1 Welcome remarks, by Thomas Hofer (FAO)

Distinguished Participants and Colleagues,

I take this opportunity to extend a warm welcome to all of you to this 3-day online workshop on *primary forest conservation in Asia and the Pacific.*

Over 80 persons have registered to attend the workshop, including the leading experts and practioners in the field of forestry in the region. I am indeed delighted to see all of you in this workshop despite several restrictions and challenges posed by the COVID crisis. So let me extend my sincere gratitude to all participants, on behalf of FAO and of CIFOR, the lead center of the Research Program on Forests, Trees and Agroforestry, our partner for this initiative.

As a follow-up to the recommendations of the Asia Pacific Forestry Commission on the 3rd Asia Pacific Forest Sector Outlook Study, FAO and CIFOR are engaged in a collaboration to address two major areas of concern for the region, namely: (i) innovative technologies for sustainable forest management; and, (ii) conservation of primary forests. An inception workshop was held in July 2020 to launch the work on these two topics. A second workshop in November 2020 focused on innovative technologies and was the occasion of very rich discussions among experts, coming from different countries and specializations.

This third workshop will focus on primary forest conservation. It will examine the diversity, extent and status of primary forests in the Asia-Pacific region, discuss the multitude of threats and pressures faced by different types of primary forests in diverse contexts, identify the priority areas for conservation, and review the governance tools and mechanisms that can support conservation at different scales. There will be expert presentations on specific aspects and contexts and breakout groups to allow more interactive discussions.

Based on these discussions, experts will be collectively invited to contribute to the elaboration of a roadmap to conserve and manage the unique forest ecosystems of the Asia-Pacific region. In particular, participants will be invited to formulate key recommendations for decision-makers regarding: (i) classification and mapping of primary forest ecosystems and of the threats they face in the region; and, (ii) governance strategies and action plans to strengthen and enhance primary forest conservation.

I trust that our deliberations over the next three days will help shed light on these important issues related to the conservation of primary forests, and strengthen our efforts to advancing sustainable forest landscape management in the region. I am particularly pleased to see your enthusiasm to participate and I am confident that our efforts will focus on what is really needed on the ground.

Dear friends and colleagues, let me underline that the successful outcome of this initiative is not only important for the Asia-Pacific region but will also make a major contribution to the achievement of

ongoing global commitments such as the Sustainable Development Goals (SDGs)[10], the UN Global Forest Goals[11] and the UN Decade on Ecosystem Restoration (2021-2030)[12].

I encourage you all to be very proactive in this workshop, to contribute with innovative and forward-looking ideas and to think outside the box.

Last but not least, my immense thanks to all the IT and communication colleagues for their efforts in organizing this virtual workshop in these challenging times.

I look forward to a fruitful workshop with many exciting deliberations.

Many thanks to all of you.

1.2 Introduction, by Vincent Gitz (CIFOR/FTA)

Presentation of the roadmap

Following-up on APFSOS III, FAO and CIFOR, lead center of the CGIAR research programme on Forests, Trees and Agroforestry (FTA), are developing a roadmap on primary forest conservation in the Asia-Pacific region. In particular, FAO and FTA will prepare and co-publish a technical paper, with key recommendations (for policy and concrete actions) informed by science, to support primary forest conservation in the Asia-Pacific region. A policy brief, directed to key decision-makers, will gather the main findings and concrete recommendations emerging from this work.

The roadmap is developed through a participative process, launched with an online inception workshop co-organized by FAO and FTA on July 30th, 2020, involving key regional stakeholders and technical experts from governments and intergovernmental organizations, from the private sector and civil society organizations, as well as from academia and research institutions. Technical information is also gathered through online interviews with key stakeholders.

This workshop is a key moment in this participative process. A final validation workshop will be organized at the end of the process to discuss and validate the main findings and key recommendations of the study. The final draft of the technical paper will be submitted in parallel to an independent scientific peer-review. The objective is to publish the technical paper and the corresponding policy brief before the end of the year.

Organization and expected outcomes of the workshop

This workshop is organized in 5 sessions, along 3 days, following globally the draft annotated outline of the study circulated to you all ahead of the workshop (see **Appendix 1**).

For each session there will be an introduction on the purpose and expected outcome of the session, expert presentations of case studies giving food for thought, followed by breakout groups for more in-depth discussion on specific items.

The first day is focusing on the description of primary forests in the region and of the threats they face. **Session 1** aims to compare the ecological classification and mapping of primary forests in the region with the expertise and field knowledge of national and regional experts. **Session 2** aims to identify the different threats faced, in different contexts, by the different types of primary forest discussed in **Session 1**.

Day 2 is focused on governance and policies. The objective of **Session 3** is to discuss a methodology to map priority areas for primary forest conservation in the region. **Session 4** will focus on governance tools and mechanisms for primary forest conservation in the Asia-Pacific region.

The last day is dedicated to the identification of potential areas for recommendations to governments and other actors.

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[10] See: https://sdgs.un.org/goals
[11] See: https://www.un.org/esa/forests/wp-content/uploads/2019/04/Global-Forest-Goals-booklet-Apr-2019.pdf
[12] See: https://www.decadeonrestoration.org/about-un-decade

Overall, the purpose of the workshop is to go beyond general considerations on primary forest conservation and to identify priorities and means that have shown to be efficient in specific contexts. The objective is to identify collectively potential areas for recommendations that could be context specific or adapted to different contexts.

I will now give the floor to Yves Laumonier, principal scientist in CIFOR, who is leading the work on this study.

2 Session 1. Primary forests in the Asia-Pacific region: diversity, extent and status

The objective of this first session was to confront the ecological classification and mapping of primary forests in the region with the field knowledge of national and regional experts.

2.1   Introduction to the session

Primary forests in the Asia-Pacific region: status, extent and diversity

Yves Laumonier, Adzan Gemasakti, Agung Rizqi, Ardianto Ridwan, Khikmak Fithrotul, Narulita Sari (CIFOR).

Background

Forest habitat degradation and fragmentation are a threat to global biodiversity (Krogh, 2019; Fischer and Lindenmayer, 2007), particularly in the Asia-Pacific region. In the Indo-Malayan region for example, the rate of loss is predicted to reach 26 percent in 2030, if 1990-2000 deforestation rate trends remain unchanged (Brook *et al.*, 2006). The importance of these primary forests has long been reminded (Gibson *et al.*, 2011).

According to FAO (2019), of the Asia Pacific region's 723 million hectares of forest, only 19 percent (140 million hectares) is primary forest, much lower than the global average (32 percent). Indeed, while overall tree cover in the region has increased, the area of primary forests in the Asia-Pacific region is declining – and with it, the ecosystem services they provide (e.g., wood, food and medicines, biodiversity, water and soil protection, climate regulation, carbon sequestration, and cultural values). Reversing the trends of primary forest degradation and fragmentation must be a priority for the region, especially in light of climate change. The COVID-19 pandemic will most likely put additional pressure on forests and their capacity to provide essential environmental services (e.g., FAO, 2020a).

In addressing forest loss, concepts such as "Intact Forest Landscape" (Potapov *et al.*, 2017), "intactness" (Watson *et al.*, 2018), "Forest Landscape Integrity index" (Grantham *et al.*, 2020), "Deforestation Fronts" (Pacheco *et al.*, 2021), and assessments of tropical humid forest degradation (Vancutsem *et al.*, 2021) have been gaining traction. This presentation looks at the status, extent and diversity of primary forests in the Asia-Pacific region, by first addressing trends in natural forest cover and then exploring three tested approaches for assessing primary forests[13].

Natural forests: historical trends over the period 2000–2020

Methodology

Before assessing primary forest cover and degradation, a study was conducted to assess historical changes in natural forest cover between 2000 and 2020. This was done using Landsat satellite data, performing classic pre-processing for cloud masking and image correction, using stratified random sampling[14] and visual interpretation, and finally cross-checking against available forest maps for each country. The Shuttle Radar Topography Mission (SRTM) digital elevation model[15] data was then pre-stratified using ecological zoning and taking into consideration seasons when analyzing forest cover. Forests were then classified by ecological zones in order to reduce misclassification of very different forest types (humid, seasonal, temperate, mountains). Outside the tropical zone, classification assessment required working at different seasons, to determine the best month (low cloud cover) for identifying the forests.

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[13] Forest definitions influence how trends in forest cover and degradation are assessed. For this reason, "natural forest" cover trends are first discussed, to then address "primary forests" specifically. According to FAO, "naturally regenerating forests" are those that are composed of trees established through natural regeneration. FAO then defines primary forests as "naturally regenerated forest of native tress species, where there are no clearly visible indications of human activities and the ecological processes are not significantly disturbed." (FAO, 2018)

[14] A sampling method that breaks down a population into smaller sub-groups known as strata.

[15] See: https://www2.jpl.nasa.gov/srtm/

Results

Preliminary results indicate that natural forest cover declined from 771,142,000 ha in 2000 to 732,264,000 ha in 2020. While still in progress, this work allows us to identify areas where the rate and impact of deforestation are the most drastic.

Natural forests and ecological zoning

The Asia-Pacific Region is home to a high diversity of forest types and habitats. Hence, the idea for this study is to go beyond the usual distinction between forest and non-forest cover and examine various forest types. This information is essential to then analyze priorities for primary forest conservation. Forest types were classified within the framework of the FAO Global Ecological Zones (GEZ) [16], which were developed based also on a long history of ecological zoning assessment made together with Toulouse University and UNESCO in the 70s and 80s. Using these ecological zones, various sub-types were further distinguished within each of the GEZ divisions, based on: e.g., altitudinal zonation; edaphic and bioclimatic conditions; and eco-floristic zoning[17].

Identifying primary forests

Several approaches were tested:

1st tested approach: K-Means clustering

K-Means clustering[18] can be powerful enough to differentiate "intact" vs. "degraded" forest[19] samples. In addition, Principal Component Analysis (PCA)[20] can be used to identify correlations between classes and input bands. We wanted also to test how efficient the approach was in detecting degradation criteria[21], in our case biomass.

Limitations

- Needs a good reference map to do labelling. In our case, we used Vancutsem *et al.* (2021) results for year 2020 as reference.
- K-Means labelling results are rarely used as "final map". Instead, they are often used as an alternative approach to build samples to be used later in a supervised classification process.
- The labelling process is done manually. It is effective and easy to do labelling per-region (or country) as wall-to-wall process, but labelling the whole Asia-Pacific was a challenge.

Advantages

- The approach is consistent and accurate to classify intact vs. degraded forest.
- It is relatively fast.

In conclusion, we will probably not use K-Means as our final method, but as part of our classification workflow, integrated with other approaches, for instance the time-series trajectories' approach presented below.

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[16] See: http://www.fao.org/forest-resources-assessment/remote-sensing/global-ecological-zones-gez-mapping/en/

[17] Laumonier *et al.* (2010) presents an example of eco-floristic zoning in Sumatra (Indonesia).

[18] K-Means clustering is a simple but effective way to segment an image into k different classes (such as water, forest, roads etc.). The weakness of this approach lies in its ability to cluster also some pixels into context-specific unknown classes.

[19] Forests are degraded when human activities, climatic events, fire, pests and other natural disturbances negatively affect their structure or functions, thus reducing their resilience and health, their different values (economic, environmental, social, cultural), and their capacity to provide forest goods and ecosystem services. Forest degradation may also negatively affect surrounding land uses (e.g., loss of downstream water quality), and cause GHG emissions (FAO, 2000; FAO, 2020b). A forest is intact when it as remained essentially unmodified by human activity.

[20] Principal Component Analysis reduces the dimensionality of a dataset, while preserving as much 'variability' (i.e., statistical information) as possible" (Joliffe and Cadima, 2016).

[21] Criteria used to assess forest degradation vary across countries and actors, however, four criteria for forest degradation were identified by FAO (2011): forest biodiversity; biomass, growing stock and carbon; productive functions; and protective functions.

2nd tested approach: Intact forest classification, using Landsat time-series trajectories[22]

Intact, or undisturbed forest tends to have very low slope of regression and very low standard deviation. Forests that experienced large disturbances are expected to have a higher Coefficient of Variation (CV) than undisturbed forests.

Limitations

- Due to the high volume of input layers (in our case 66 variables) from Landsat image collection 1990-2020, we could not run some image correction like we did for the K-Means Clustering process (i.e., Bidirectional Reflectance Distribution Function (BRDF), and topographic correction).
- Need good quality of samples (this is absolutely compulsory). In our case we used previous K-Means result to build samples of "intact" forest, "degraded" forest, and non-forest. This is why we should combine these two approaches.

Advantages

Despite the limitations mentioned above, the results appear very satisfying:

- Our results were similar to those of the Global Forest Management mapping approach of the Copernicus Global Land Service (Buchhorn *et al.*, 2019). The difference was in the definition of some classes, especially the "disturbed/degraded forest" class.
- In our opinion it is also easier and more accurate when compared with using other time-series approaches like Breaks for Additive and Seasonal Trend (BFAST) (or, Break Detection in the Seasonal and Trend Component of a Univariate Time Series, Verbesselt *et al.*, 2012) or LandTrendR (Landsat-based Detection of Trends in Disturbance and Recovery, Kennedy *et al.*, 2018).

Our approach seems to have very good results, especially when applied to large areas, such as to the entire Asia Pacific region; BFAST is more appropriate to cover smaller areas.

3rd tested approach: Forest Area Density (FAD) tool and techniques[23]

Riitters and Wickham (2012) developed a framework to study forest fragmentation, using Forest Area Density (FAD)[24], observed at five observation scales[25]. This framework can also be used to assess forest degradation, using six classes defined by the authors[26]. The result is a set of five maps (one for each observation scale) showing forest area density (FAD) values in percentage for neighboring areas over each forest pixel[27]. The user can choose to calculate FAD (density) values per-pixel (FAD 6-class) or aggregate them per patch (FAD Average-Per-Patch, FADAPP)[28]. It is a very interesting approach but after testing it for Borneo, we came to the conclusion that it would be too complicated to use it for the whole Asia-Pacific region.

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[22] Adapted from Wang *et al.* (2019).

[23] See: GUIDOS Toolbox (Vogt *et al.*, 2019)

[24] i.e., the spatial density of forest cover.

[25] Using a moving window analysis, with square neighborhood areas, long respectively: 7, 13, 27, 81, and 243 pixels, at a spatial resolution of 0.09 ha/pixel (Riitters and Wickham, 2012).
Using a moving window analysis, with square neighborhood areas, long respectively: 7, 13, 27, 81, and 243 pixels.

[26] Rare (FAD < 10%), Patchy (10% ≤ FAD < 40%), Transitional (40% ≤ FAD < 60%), Dominant (60% ≤ FAD < 90%), Interior (90% ≤ FAD < 100%), Intact (FAD = 100%) (Vogt *et al.*, 2019).

[27] The origin of the concept of using contextual information of correlation in neighbourhood of a pixel for change detection is the simple geo-statistical fact that the same geographical area (neighbourhood window) on two dates of imagery will tend to be highly correlated if no or little change has occurred and uncorrelated when change occurs.

[28] The arithmetic average of FAD values at pixel-level of the given forest patch (Forest Europe, 2019).

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2.2 Keynote address

Towards improved global reporting on primary forest.

Anne Branthomme and Anssi Pekkarinen (FAO, Global Forest Resources Assessment)

FAO Global Forest Resources Assessment (FRA)

Since 1948, at the request of its member countries, FAO collects, analyzes and disseminates information on the status and trends of the world's forest resources, as well as on forest management and uses. In 2020, the latest Global Forest Resources Assessment (FRA2020), collected information on more than 60 broad variable categories for all 236 countries and territories of the world, covering the period 1990-2020. FRAs rely on country data compiled through a well-established network of officially nominated national correspondents. This network, which is the cornerstone of the whole process, has grown progressively to cover 187 countries and territories[30].

The FRA is the most comprehensive and authoritative global assessment of forests. It also collects information for and reports on two indicators of the Sustainable Development Goal 15 – Life on Land – and contributes to monitoring progress towards a number of Global Forest Goals of the United Nations Strategic Plan on Forests 2017-2030.

Processes related to primary forest reporting

Primary forest area and related trends are among the key biodiversity and conservation indicators of FRA and relate to a number of other processes. In particular, primary forest area is mentioned among the potential indicators of the post-2020 Global Biodiversity Framework of the UN Convention on Biological Diversity (CBD, 2020). The importance of primary forests, intact forests and old-growth forests and associated knowledge has also been recognized by the International Union for Conservation of Nature (WCC, 2016; IUCN, 2020). Primary and old-growth forests have been specifically addressed in the recent biodiversity strategy of the European Union (EC, 2020). Primary forest and/or intact forests have been mentioned as part of the certification criteria in some of the documents of the two main global certification bodies – the Forest Stewardship Council (FSC)[31] and the Programme for the Endorsement of Forest Certification (PEFC)[32]. These are a few examples among many more.

Definition of primary forest

FAO has reported on primary forest for more than 40 years, since FRA 1980. The FAO definition of primary forest has evolved throughout the reporting cycles, through a consultative process with experts. In FRA 2010, FRA 2015 and FRA 2020, countries reported on the area of primary forest applying the definition that identifies primary forest as "*Naturally regenerated forest of native tree species, where there are no clearly visible indications of human activities and the ecological processes are not significantly disturbed*" (FAO 2018a). The definition is accompanied by explanatory notes, which facilitate consistent interpretation of the definitions. Those indicate that primary forest:

a)   includes both pristine and managed forests that meet the definition;
b)   includes forests where indigenous peoples engage in traditional forest stewardship activities that meet the definition;
c)   includes forest with visible signs of abiotic damages (such as storm, snow, drought, fire) and biotic damages (such as insects, pests and diseases);
d)   excludes forests where hunting, poaching, trapping or gathering have caused significant native species loss or disturbance to ecological processes;
e)   some key characteristics of primary forests are:

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[30] For the countries and territories without national correspondent, the FRA Secretariat write directly the national report based on available documentation and previous assessments. However, the 187 countries and territories with national correspondents account for 99.5 percent of the global forest area.

[31] See: https://fsc.org/en

[32] See: https://pefc.org/

- they show natural forest dynamics, such as natural tree species composition, occurrence of dead wood, natural age structure and natural regeneration processes;
- the area is large enough to maintain its natural ecological processes;
- there has been no known significant human intervention or the last significant human intervention was long enough ago to have allowed the natural species composition and processes to have become re-established.

A decision-making tree was provided in FRA 2020 Guidelines and Specification (FAO, 2018b) to support more consistent interpretation and reporting of forest types, including primary forest (see **Figure 1**).

Figure 1. FRA 2020 Forest characteristics decision tree
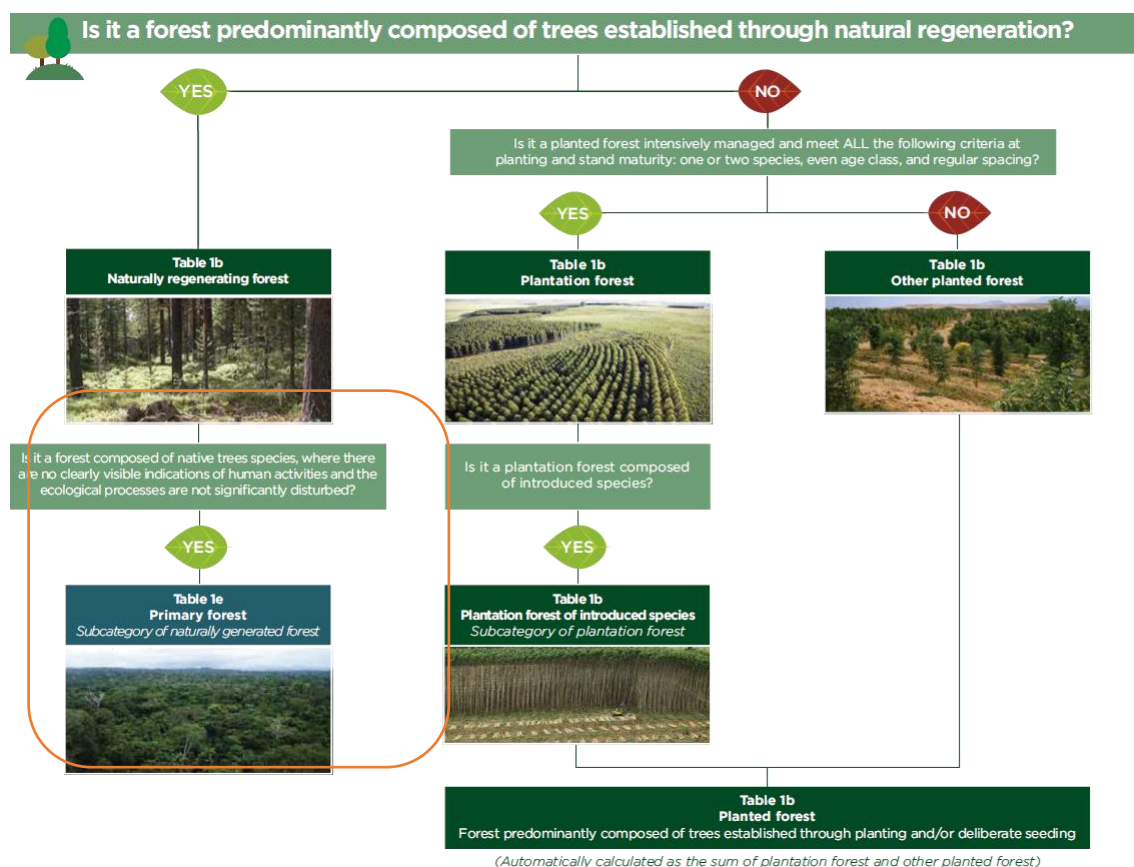
Source: FAO (2018b).

FRA 2020 Results on primary forest area

FRA 2020 received information on the area of primary forest from 146 countries and territories representing 81 percent of the world's forest area. In Asia and Oceania, data were received from 47 countries and territories (respectively 33 and 14 countries) representing respectively 91 percent of the forest area in Asia, and 7 percent in Oceania. The low coverage observed in Oceania is due to the lack of data on primary forest area for the year 2020 from countries with important forest cover, including for instance Papua New Guinea and Australia.

In 2020, the global area of primary forests is estimated at 1.11 billion ha or about one-third (34 percent) of the forest area of reporting countries and most of them are found in Northern and Latin America and in Europe.

Figure 2. Primary forest extent in 2020
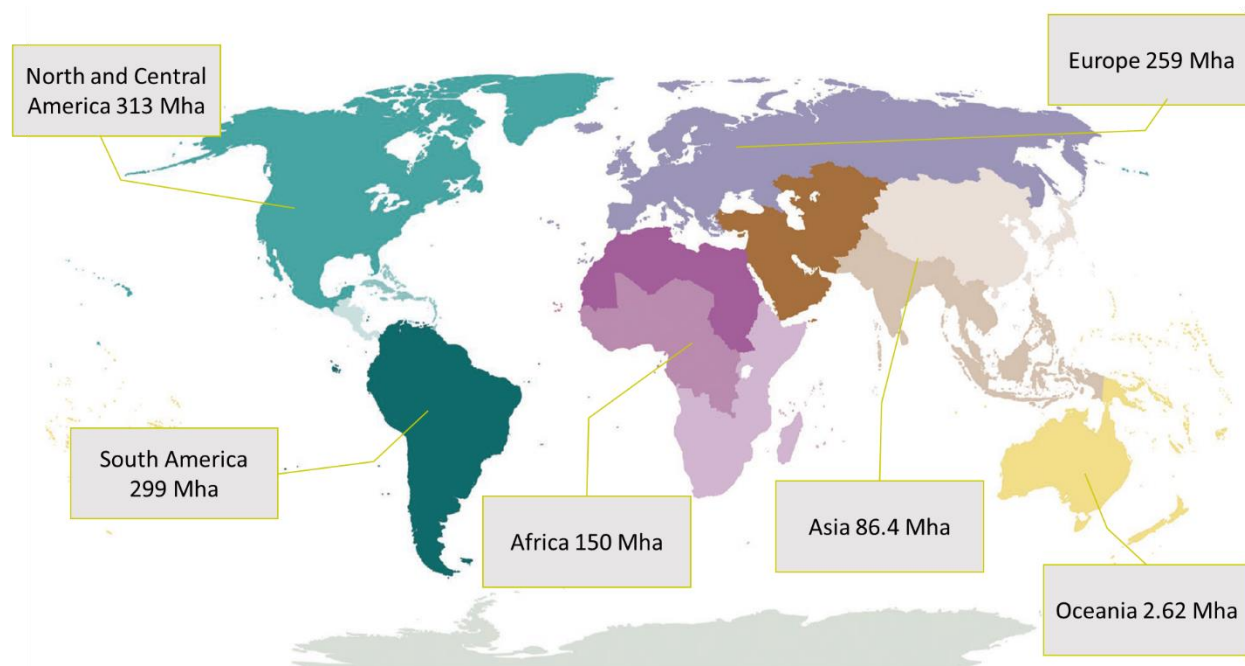
Note: The breakdown by region and subregion is different from the one used for APFSOS III.

Source: adapted from FAO (2020).

As illustrated in **Figure 2**, North and Central America reports the largest area of primary forest in 2020 (313 million ha), followed by South America (299 million ha) and Europe (259 million ha, but only 4.18 million ha if the Russian Federation is excluded), Africa (150 million ha), Asia (86.4 million ha) and Oceania (2.62 million ha). As highlighted above, the primary forest area reported for Oceania is vastly underestimated.

Issues related to primary forest reporting

While the definition of primary forest may be broadly accepted, and despite the relatively high coverage of reporting on primary forest at the global level, some issues have been observed in FRA 2015 and FRA 2020. In addition to the lack of data in some countries, consistently measuring the actual area of primary forest among countries has proven to be challenging.

Studies have shown considerable variation in how countries apply the definition in their own circumstances. First, the lack of operational guidance on primary forest reporting has resulted in the use of proxies that can vary greatly among countries. Among these proxies, figure: legally established protected areas; national parks; intact forests; or old-growth forests. Second, the metadata – describing how the national reporting was done –, is often lacking or insufficient to understand how the national estimates were actually derived. Furthermore, time series and trends are often missing or, for lack of better data, some countries report the same value for all reporting years. Data reported for primary forest area may also increase when countries use proxies, such as protected area or old-growth forest area.

These issues raise questions about the comparability across countries of the data submitted to FRA and, hence, about their relevance for informing policy- and decision-making. They make it difficult to draw any sound conclusions and to understand what are the real trends of primary forest area at global, regional and national levels.

Objectives of the FRA special study on improving reporting on primary forest

Acknowledging these limitations, during the FRA expert consultation that took place in Joensuu, Finland, in 2017, FAO together with some partners and large primary forest countries decided to initiate a special study on primary forests whose main objective is to improve the operational guidance on primary forests reporting, as

well as the consistency, comparability, completeness and quality of national data reported to FRA on primary forests.

This work was initiated with the following expected results:

- Review existing definitions and methodologies to assess primary forest extent.
- Provide recommendations to countries on how to interpret FAO-FRA definition of primary forest in different contexts and biomes.
- Provide recommendations to countries on suitable approaches, methods and tools for improving measurement and reporting on primary forest by biomes.

A number of partners have already joined this process, including countries, CBD, Griffith University (Queensland, Australia), the Joint Research Center (JRC) of the European Commission, the United Nations Environment Programme World Conservation Monitoring Centre (UNEP-WCMC), the United Nations Economic Commission for Europe (UNECE) and the Center for International Forestry Research (CIFOR). All countries with significant area of primary forests are invited to participate.

Process and results of the special study

First concrete steps towards implementation of the special study were taken in late 2019. A draft background paper was developed in close collaboration with Canada and the Griffith University of Queensland, Australia. This paper was then made available for comments through an open online consultation, and revised according to the feedbacks received. This background paper is currently being presented and discussed in a number of regional workshops. These workshops aim at: (i) collecting experiences from the countries and other stakeholders on current primary forest monitoring and reporting practices and associated challenges; and, (ii) discussing emerging methodologies that could support more consistent reporting in the future.

The first workshop held for the boreal biome in November 2020 discussed the definitions and methods applied in boreal countries for reporting to FRA on primary forests, as well as the related challenges. The workshop was successful in identifying commonalities and differences in country reporting for that biome. A preliminary decision tree, yet to be further consolidated, has also been proposed to support the reporting process through an operational approach (**Figure 3**).

Figure 3. Preliminary decision tree prepared during the boreal workshop on improving reporting on primary forest
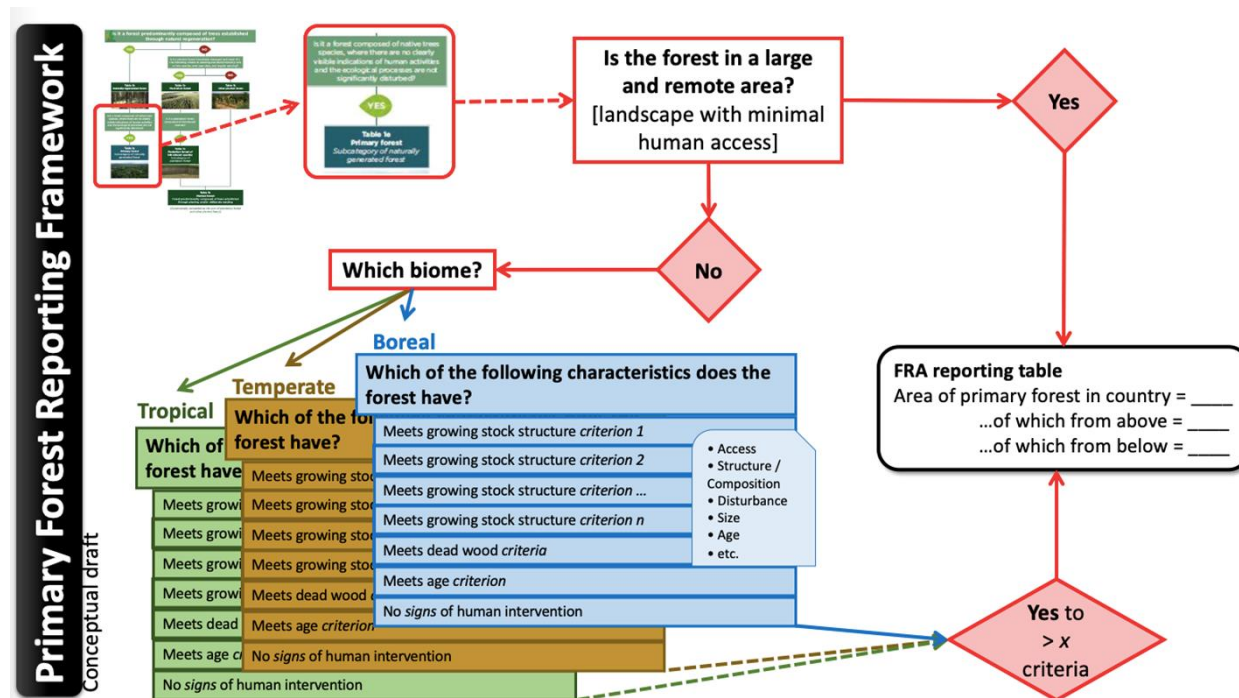
The input received during these workshops will be further processed in FAO and discussed during the next FRA expert consultation, planned in 2022. Some options and emerging geospatial monitoring techniques are also being piloted in a few countries for each region and ecological domain. The pilot phase initiated in the boreal biome aims to: (i) further elaborate some of the operational criteria contained in the proposed decision tree (e.g. what is remote, what is large, primary forest characteristic); (ii) discuss the practical options for more consistent measuring and reporting on primary forest extent and trends in the boreal biome; and, (iii) test the use of available national, regional and global geospatial datasets to identify primary forests.

Other regional workshops will be organized for the tropical zone for the coming months. This will be the opportunity to extend the discussion, in particular to the Asia Pacific region, and to link this FAO special study with the Asia-Pacific roadmap on primary forests, as there are obvious synergies between enhanced data reporting and improved primary forest management and conservation.

For more information:

- Access all FRA reports and highlights: http://www.fao.org/forest-resources-assessment/en/
- FRA data platform, a new way to explore FRA data: https://fra-data.fao.org/
- Video summarizing FRA process: https://www.youtube.com/watch?v=SmMyfNlZ-jQ

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2.3   Expert presentations

Rao Matta (FAO) presented the four experts invited to illustrate briefly, based on their own experience, the diversity, extent and status of primary forests in the Asia-Pacific region.

**The diversity, extent and status of primary forests in China
and their importance for biodiversity conservation.**

*Li Diqiang,
Institute of Forest Ecology, Environment and Protection, the Chinese Academy of Forestry.*

China's vast territory, diverse climate and rich geomorphic types, provide a variety of habitats for the formation and development of various biological and ecosystem types. The natural, historical and geographical conditions of the tertiary and quaternary allowed the development of biodiversity in China. Forest ecosystems in China can be divided into coniferous forest, broad-leaved forest, bamboo forest and shrub ecosystem. Coniferous forest can be further subdivided into cold temperate coniferous forest, temperate coniferous forest, temperate coniferous broad-leaved mixed forest, warm coniferous forest and hot coniferous forest ecosystem. Broad-leaved forest can be further subdivided into deciduous broad-leaved forest, evergreen and deciduous broad-leaved mixed forest, evergreen broad-leaved forest, hard leaf evergreen broad-leaved forest, seasonal rainforest, rainforest and coral Island evergreen forest.

China's natural forests have been excessively damaged due to large-scale logging in the past, leaving few virgin forests. At present, undisturbed forests account for only 2 percent of China's forest area. Undisturbed forests are mostly concentrated in the Greater and Lesser Xing'an Mountains, Qinba Mountains and Hengduan Mountains. Other relatively concentrated areas include the mountains at the junction of Hunan, Guizhou, Hubei and Chongqing, Changbai Mountains, Altai Mountains in Xinjiang, the mountains at the junction of Fujian, Zhejiang, Jiangxi and Anhui, the mountains in the middle and south of Hainan, the limestone areas in the southwest of Guangxi and Xishuangbanna, and the Nanling Mountain. Hengduan Mountain area is an obvious center of species distribution and differentiation. It is also one of the 25 hotspots of global species protection proposed by Myers *et al.* (2000), indicating that forest ecosystems provide a rich and diverse habitat for animal and plant species, and that protection of forest ecosystems is of great significance for the protection of biodiversity.

After more than 60 years of development, China's nature reserves account for 18 percent of the total land area, and the main virgin forest areas have been established as nature reserves. In particular, the National Park pilot area covers the main primary forest distribution areas in China.

In response to massive flooding of major river basins in 1998, China initiated a Natural Forest Protection Program heavily supported by the central government (Yang, 2017). Since then, natural forests have been protected across the whole country: timber production has been reduced in some areas while commercial logging has been completely stopped in others. 13 provinces, autonomous regions and municipalities in the upper reaches of the Yangtze River and the upper and middle reaches of the Yellow River have all stopped commercial logging of natural forests. Key state-owned forest areas in Northeast China, Inner Mongolia, Xinjiang and Hainan have significantly reduced timber production.

As a result of this program, the management and protection of forest resources have been strengthened. The annual cutting volume has been reduced by nearly 20 million m³. The number of forest management and protection personnel in the project area increased from 55,000 in 1998 to 150,000 in 2001, and the area under forest management and protection plan reached 1.39 billion mu (about 93 million ha)[33]. Various forms of individual contract mechanism are being carried out, and forest management and protection based on professional teams is gradually becoming the norm. The establishment of public welfare forest was accelerated. Important progress has been made in the resettlement of surplus workers in these forest areas. The employees of forest industry enterprises are included in the social overall planning of provincial endowment insurance. Many

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[33] In China, 1 mu is equivalent to 1/15 or about 0.066 hectares.

localities have actively developed wood intensive processing and diversified operations, increasing employment and income opportunities.

Forest ecological degradation has been successfully addressed in some areas and the ecological environment has gradually improved. The habitat of wild animals and plants has been improved, and the activities of wild animals have increased. For example, the traces of Amur tiger have been found many times in Northeast China. Primeval forest is characterized by high levels of biodiversity and ecosystem services (including environmental protection and climate regulation), strong environmental adaptability and resilience, stable forest structure and distribution, and high economic value. It is a kind of forest that maintains natural state and is the top community of forest evolution. According to the research on the priority areas for biodiversity conservation in China, the existing areas with high richness of plants, birds and mammals are all located in the concentrated distribution area of virgin forest.

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Mapping forest disturbances using Synthetic Aperture Radar (SAR) and Artificial Intelligence (AI)

Ate Poortinga, senior scientist for the Servir-Mekong Project

Land-use change and deforestation in tropical forests is a significant source of carbon emissions and a significant threat to wildlife and biodiversity. They adversely impact the livelihoods of local communities and indigenous peoples. Cambodia has grappled with deforestation for many years. Cambodia experienced a significant reduction in forest cover from 73.4 percent in 1965 to 46.9 percent in 2018. Protection of the last remaining primary forests has become a key priority. However, continued illegal timber trade across the country's porous borders, extensive land clearance, poor law enforcement, and lack of good governance systems challenge forest protection.

The USAID's Greening Prey Lang (GPL) project[34] aims to promote resilient, low-emissions, inclusive, and sustainable management of the Prey Lang Extended Landscape in Cambodia. The Prey Lang Extended Landscape covers more than 3.3 million hectares of forest, watersheds, and agricultural land in North-Eastern Cambodia. It is home to more than 1 million people and includes numerous protected areas. However, monitoring and protection of large areas remain difficult. Whereas methods using optical satellite technologies are available to map forest disturbances from space, they cannot be used most of the year because of persistent cloud cover.

SERVIR-Mekong[35], a regional initiative of USAID and NASA, has teamed up GPL to address these problems by developing the Cambodia Protected Area Alerts System. The system uses the Sentinel-1 C-band Synthetic Aperture Radar (SAR)[36] to map forest disturbances. The system was built, using *Google Earth Engine*[37] leveraging the latest integration with the *Google AI Platform[38]*. A time series of four dual polarized SAR images was used to train a U-net convolutional neural network[39] with a MobileNetV3 network[40] as encoder. The model was trained using historical alerts from the Global Land Analysis and Discovery (GLAD) laboratory[41]. The model was trained for both ascending and descending orbits with validation accuracies around 90 percent.

The Cambodia Protected Area Alerts System is currently fully operational. It provides near real time information on forest disturbances regardless of weather conditions and enables the Cambodian Ministry of Environment to monitor an area of 6.2 million hectares. The integration of big data and artificial intelligence provides verifiable, transparent, and accountable site-specific information to protect the last remaining primary forests of South-East Asia.

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[34] See: https://usaidgreeningpreylang.exposure.co/

[35] See: https://servir.adpc.net/

[36] See: https://sentinel.esa.int/web/sentinel/missions/sentinel-1/overview,and https://sentinel.esa.int/web/sentinel/technical-guides/sentinel-1-sar/sar-instrument

[37] See: https://earthengine.google.com/

[38] See: https://cloud.google.com/ai-platform/

[39] A convolutional neural network is a type of deep neural network, using convolution (a mathematical operation) in at least one layer, commonly applied to analyze visual imagery. U-Net is a convolutional neural network, developed at the Computer Science Department of the University of Freiburg, for fast and precise segmentation of images. See: https://lmb.informatik.uni-freiburg.de/people/ronneber/u-net/

[40] MobileNetV3 is the latest version of a family of Google neural networks designed for mobile applications analyzing visual imagery, that bring artificial intelligence and machine learning tools on mobile devices. See: https://ai.googleblog.com/2019/11/introducing-next-generation-on-device.html

[41] See: https://glad.umd.edu/

Diversity, extent and status of primary forests: the Himalayan case in India.

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Background

The New York Declaration on Forests and the related Action Agenda (NYDF, 2014), adopted at the UN Climate Summit in 2014, declared that forests are essential to our future, recalling that:

- "More than 1.6 billion people depend on them for food, water, fuel, medicines, traditional cultures and livelihoods"; and that:
- "Forests also support up to 80 percent of terrestrial biodiversity and play a vital role in safeguarding the climate by naturally sequestering carbon".

One of the targets adopted in the Declaration was "At least halve the rate of loss of natural forests globally by 2020 and strive to end natural forest loss by 2030". In 2020, according to Global Forest Watch[42], the world has lost 25.8 million ha of tree cover, including 4.2 million ha of primary forests. Hence, ending natural forest loss by 2030 requires a rapid paradigm shift by the global community towards valuing forests for their essential benefits and prioritizing their protection (NYDF, 2020).

In that context, the IPBES (2018) global assessment report invites to move away from a model centered exclusively on economic growth towards an enlarged perspective focusing also on restoring habitats, growing food on less land, and combating environmental degradation. It also suggests countries to reduce subsidies to industries harmful for nature and biodiversity, and, conversely, increase subsidies and funding to environmentally beneficial programs. Restoring the sovereignty of indigenous communities around the world is also suggested, as their lands have seen lower rates of biodiversity loss and most of these depend on natural forests rather than on plantations.

Population growth and associated demands for food and fuel within and outside the mountains are increasing pressures on mountain forests, threatening their resilience and integrity. Primary forest cover continues to be fragmented and to decrease rapidly (Price *et al.,* 2011; FAO, 2020). Further pressures include more frequent wildfires, urbanization and infrastructure development projects, such as roads, dams and hydropower plants, the development of tourism infrastructure, and the transformation of primary forest to other land uses. The establishment of plantations does not fully compensate for such ongoing losses.

In the Hindu Kush Himalayan region (HKH), the abovementioned burgeoning basic human needs of food, water and energy and macro development initiatives are such that current condition of residual primary forests, forest management practices, or forest ecosystem thinking of policymakers to secure and sustain the host of environmental services whilst forest ecosystems adapt to climate change, are unable to cope. This is manifested in the fact that barring India, China and Bhutan, most of the HKH countries have high deforestation rate. India and China have intensive afforestation programmes in mountain regions but natural forest cover is being gradually replaced by planted forests or high-density forest cover is getting gradually converted into medium canopy density forest (FSI, 1987, 2017 and 2019). On the other hand, North-East India, Bangladesh and Myanmar exhibit degradation and loss of primary forest cover due to shifting cultivation. Overall, some forests have been degraded as a result of selective logging, over-harvesting and heavy grazing by domestic livestock and need to be managed in order to fulfil their protective function. Often the wide landscape of rangelands below or around site specific treelines is an aftermath of deforestation and forest degradation due to heavy grazing (Kotru, 2020).

Status

The status of primary forest -where no clearly visible indications of human activity and the ecological processes are not significantly disturbed- in HKH and, more broadly, in the Indian Himalayas is extremely difficult to document. This is given the fact that India's first State of the Forest Report was published in 1987 (FSI, 1987).

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[42] See: https://www.globalforestwatch.org/dashboards/global/

This report provided an overview of forest cover status and trends based on information dating back to the early 1970's, at a period when timber production was still dominating the state use of forests. It is assumed here that the more we go back in time, the more forests in Indian mountains were of primary origin. These primary forests have been gradually affected by the increased human and livestock population, as well as by fast infrastructure development in the Indian Himalayas. Year after year, planted and secondary forests have progressively replaced erstwhile primary forests. To a great extent, monocultures of pine species (*Pinus Roxburghi*) have replaced mixed and broadleaved forest in the lower-middle range of the Himalayas, threatening the much higher biodiversity present in primary forests and on which rural mountain communities depend for their subsistence. Reviewing the history of man-nature interactions in the Himalayas, Kotru (1993) indicated that Himalayan forests were pristine even until the early 19th century and that the actual organized forest management took shape under colonial rule after the 1860's when secondary forest cover started to increase at a greater pace.

Forest Assessment Methodology

Forest cover assessment methodology in India has changed drastically since 1987 when interpretation of coarse resolution Landsat Imagery (1:1 million scale), supported by limited ground truthing, generated plenty of inadequacies. Since then, new technologies and refined methodologies of Forest Survey of India (FSI) have transformed and evolved to state-of-the-art status. The latest India State of Forests Report (ISFR: FSI, 2019) is based on Ortho-rectified linear imaging self-scanning (LISS III) data from Indian Remote Sensing Resource Satellite 2, with a spatial resolution of 23.5 m (scale 1:50,000) and minimum mappable units of 1 ha. For this assessment, 2,200 locations served as ground-truthing sites and 30,000 samples were realized. In other words, neither methodologies (e.g., sampling method and sampling intensity) nor the type of datasets and their interpretations can be fully compared between the 1987 and 2019 ISFRs. It is assumed that prior to 1972-1975, the primary forest cover still dominated especially in the North Eastern states, Western ghats and tribal districts, which were less accessible and less populated than other areas.

According to the latest ISFR (FSI, 2019) Indian forest cover has increased since 1990, mostly due to the National Afforestation Programme, and now stands at 712,249 km^2 (about 22 percent the total country area), including 99,278 km^2 of very dense forest. It can be assumed that primary forests in India have been substantially replaced by secondary forests. This is further evidenced from the fact that all tribal districts, and North-Eastern states (part of Himalayan terrain) have experienced a decrease of forest cover within recorded forest areas and "green wash areas"[43] of 741 km^2 and 765 km^2 respectively when compared to 2017. The Northeast region is used through "Shifting Cultivation" and has maintained the trend of losing forest cover, largely primary forests as local communities access fresh primary forest areas to practice agriculture.

In Western Himalayas likewise, human impacts have increased multi-fold since the first ISFR (FSI, 1987) based on data from the early 1970s (e.g., 1972), and primary forest cover has been mostly restricted to remotest and steepest areas (mostly that of species: *Betula, Juniperus*, Fir-Spruce, *Quercus Semecarpifolia* etc.). It will demand a specific methodology to truly assess the cover of residual primary forest. Kotru (1993) proposed a methodology to distinguish between forests – from original constitution as primary forest to totally degraded/secondary forest based on the degree to which human impact is physically measurable.

It can be safely concluded that the primary forest cover in the Himalayas as well as in India is consistently getting reduced and last residues must be mainly in exclusively protected areas such as National Parks, Sanctuaries and Heritage sites. Apart from this, there is a tradition of sacred forest groves or religious forests which has emanated from local community's strong relationship with neighboring forests (on which they depend) and therefore a respectable relationship with nature that leads to local forest conservation.

Given the range of issues related to forest governance that have upstream-downstream linkages (e.g., illegal cross-border trade of forest products, corridor connectivity, human-wildlife conflicts, water management, value

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[43] Recorded forest areas (RFAs) largely consist of reserved forests and protected forests, constituted under the provisions of the Indian Forest Act 1927 or counterpart State Acts. Areas recorded as forests in the revenue records or under any other State Act or local law are also included in the RFAs. However, in the states and territories, where digitalized data on RFAs are not available, the ISFR 2019 used the so-called "green wash" areas, i.e., forested areas at the time of the Survey of India (SOI), as a proxy for RFAs (FSI, 2019)

chain sustainability), the Mountain Forestry Symposium (2015) on HKH came to the conclusion that, to sustain numerous forest ecosystem services from 25 percent of forest cover in HKH, in the context of climate change and other contemporary issues, stakeholders in the region must consolidate current assessments of future challenges and opportunities and build the case for sustainable and inclusive forest management that brings together practice, policy, and science (Kotru *et al.*, 2015).

Few Recommendations

Despite the appropriate policy and practice frameworks for sustainable forest management in India, there is a range of issues that vary from institutional and governance deficits to extreme pressure on forest lands to be converted to other land-uses. Apart from this, the National Working Plan Code (MEF, 2014), on which the instrument of forest management is now mandatory for new Working Plans, is yet not fully adopted or covering all operational Working Plans that envisage focus on forest ecosystem services and community based micro-plans. However, the entire forest resource assessment is not related to whether forests are primary or secondary. Hence, a few preliminary main recommendations can be made, including the following:

- Forest resource assessment methodology must be customized for identification and documentation of primary forests and their original characteristics.
- Since primary forest cover cannot be limited to protected forest areas, proactive forest management must be used to trigger natural regeneration processes to recover ecological status of degraded forests (Here we must use the argument of climate change: the resilience of natural forests is likely higher than that of monocultures or secondary man-made forests).
- Use traditional practices and knowledge to maintain the bio-physical characteristics as well as near-to-nature dynamics of such forests.
- Find alternatives and restore near-to-primary forest characteristics of forest affected by shifting cultivation.
- Create regional cooperation mechanisms as well as joint research networks aimed to understand the ecological dynamics of primary forests and create practical evidence for managing such forests on a sustainable basis.

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<u>Diversity, extent and status of primary forests in the Pacific Island Countries</u>

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Background

The 22 Pacific Island countries and territories include more than 20,000 islands dispersed over some 29 million km² of ocean. With very few exceptions, tropical forest is the natural vegetation in these islands. The main forest types found in the Pacific Islands are: montane rainforest and cloud forest, tropical lowland rainforest, tropical dry forest, swamp forest, coastal forest, mangrove forest, agro-forest and plantation forest. The extent and nature of these forests on each Pacific Island depends on various factors including the island type, elevation, location within the ocean and climate.

Forests and trees play a significant role in the economic, social, environmental and cultural development of the people in the Pacific. They constitute the natural capital and inheritance of the present and future generations of the Pacific Islanders. Our livelihood and culture are very much linked to our forests and trees.

Unfortunately, land, forests and trees in the Pacific are increasingly threatened in many ways, including by over-utilization, improper land-use and climate change. The significant loss of biodiversity due to destructive human activities associated with mining, agricultural clearing and unsustainable logging, particularly within the larger Melanesian countries, has been featured in many international fora where issues like extreme poverty, climate change and environmental degradation are now the main focus of concern.

Many tree species have become rare, including culturally valuable species, because of over harvesting for both commercial use and traditional uses such as wood carving, firewood and medicine. Given the limited arable land available in most of the countries, continuous pressure to clear additional forests and trees for agriculture expansion and other economic developments in the context of climate change and current financial situation, will continue.

Forest status, diversity and extent in some Pacific Island countries

Forest, in Fiji, covers about 1.14 million ha (i.e., over 60 percent of the total land area) (FAO, 2020), out of which 449,000 ha (about 40 percent) classified as primary forest, the most biodiverse and carbon-dense form of forest, and 177,000 ha of planted forest. Fiji's total forest cover lost an average of 3,050 ha or 0.32 percent per year between 1990 and 2010. To date, Fiji continues to lose its native forest because of infrastructure development, agriculture expansion and other land use changes. According to the World Conservation Monitoring Centre (WCMC[44]), Fiji has some 164 known species of amphibians, birds, mammals and reptiles, out of which 28.7 percent are endemic, and 15.2 percent are threatened. Fiji is home to at least 1518 species of vascular plants, of which 50.1 percent are endemic[45].

In Papua New Guinea (PNG), forest covers about 35.9 million ha (i.e., 78 percent of the total land area) (FAO, 2020), out of which 27.4 million ha (76.3 percent) are classified as primary forest (PNG Forest Authority, 2019). PNG has about 86,000 ha of planted forests. PNG forests host some 1,571 known species of amphibians, birds, mammals and reptiles, of which 25.6 percent are endemic and 7 percent are threatened. PNG hosts at least 20,000 species of vascular plants, of which 50 percent are endemic. It is estimated that there are more fern species on the mainland of New Guinea than in the rest of the world (Moorhead, 2011). PNG is also famous for having one of the richest orchid flora on Earth. PNG forests however are being deforested and degraded at a rate of 0.05 percent and 0.4 percent, respectively. Between 2000 and 2015, about 253,847 ha (0.71 percent) were deforested for agricultural activities and 2.3 million ha (6.6 percent of the total forest) were degraded, mainly because of commercial logging (6.1 percent) (PNG Forest Authority, 2019).

In 2020, the total forest area in Solomon Islands covered over 2.5 million ha (over 80 percent of the total land area), out of which 1,7 million ha (almost 70 percent) classified as primary forest, and 24,270 ha of planted forest. Overall, between 1990 and 2020, the Solomon Islands lost almost 22,000 ha of forest cover (0,9 percent)

(FAO, 2020). Solomon Islands host some 4,500 species of vascular plants (including 230 orchids), out of which 3,200 (71 percent) are native species.[46] There are 47 mammal species, 200 bird species of which 45 percent are endemic. There are more than 20 frog species, 85 reptile and 14,500 insect species. Out of the known species of amphibians, birds, mammals and reptiles, 11.7 percent are threatened.[47]

In Vanuatu, forests cover approximately 440,000 ha (i.e., about 36.1 percent of the total land area) (FAO, 2020). Vanuatu hosts 108 known species of amphibians, birds, mammals and reptiles, out of which 21.3 percent are endemic and 13 percent are threatened. Vanuatu harbors at least 870 species of vascular plants, of which 17.2 percent are endemic[48]. Vanuatu's forests are impacted by infrastructure and livestock development. For all islands of Vanuatu between 1990 and 2000, the gross deforestation, based on satellite observations, has been estimated at 4,677.6 ha (Herold *et al.,* 2007).

Forest in Samoa covers 161,670 ha in 2020 (i.e., about 57 percent of the total land area) (FAO, 2020). The country's flora consists of 500 species of native flowering plants and about 220 species of ferns in 96 families and 298 genera, making it one of the most diverse flora in Polynesia. Overall, about 25 percent of the native plant species are endemic to Samoa and 32 percent endemic to the Samoan archipelago. Ecosystems of global and national significance, such as coastal and montane rainforests, are currently being critically degraded.

Forest in Tonga covers about 9,000 ha (i.e., 12.5 percent of the total land area), out of which 4,000 ha (44.4 percent) are classified as primary forest and 1,000 ha as planted forest (FAO, 2020). Tonga's forest is being degraded by agriculture development and cyclones. According to the WCMC, Tonga hosts some 46 known species of amphibians, birds, mammals and reptiles, out of which 17.4 percent are endemic, and 15.2 percent are threatened. Tonga harbors at least 463 species of vascular plants, of which 5.4 percent are endemic.[49]

Forest in the Cook Islands covers nearly 16,000 ha (66.7 percent of the total land area), out of which 1,100 ha of planted forests. Between 1990 and 2020, forest cover in the Cook Islands increased by nearly 700 ha (FAO, 2020). The Cook Islands host some 35 known species of amphibians, birds, mammals and reptiles, out of which 28.6 percent are endemic, and 51.4 percent are threatened[50]. The Cook Islands harbor at least 284 species of vascular plants, of which 32 species (11.2 percent) are endemic[51].

Policies and measures for the management of primary forests

The threats associated with environmental change, invasive species, rapid population growth and economic development loom large, while at the same time governments need to make difficult choices with limited resources. The importance of forests now and in the future is clear, and most agree that sustainable forest management is the way forward. In the Pacific, new approaches to forest management are needed, approaches that build on traditional systems while at the same time using the latest scientific knowledge available to realize new economic opportunities while conserving essential ecological services and traditional roles of forests and trees.

Countries are putting in place policies and reviewing their legislations to provide a legal basis for sustainable forest management, including the conservation and protection of their primary forests. The Melanesian countries of Fiji, PNG, Solomon Islands and Vanuatu are now into REDD+ and are putting in place measures to conserve their primary forest and safeguard its diversity.

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3   Session 2. Increasing pressures on primary forests

The objective of this second session was to go beyond general discussions and, building on concrete examples, produce a matrix identifying the different threats faced by different types of primary forest (**Session 1**) in different contexts. This exercise helped identify the needed actions, whether in or at the margins of forest, in each situation (see **Session 4**).

3.1   Expert presentations

Rao Matta (FAO) introduced the three experts to the participants and invited them to present and discuss the main threats facing different types of primary forests in their respective countries and in different contexts.

Natural forest in Vietnam

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We were invited to prepare a short presentation to share the threats to primary forests in Vietnam. When I received the request, I thought about primary forests in Vietnam. In my understanding the definition of primary forests varies across countries. In my country, we do not use the term "primary forests" but "natural forests".

In this presentation, I will focus on four points: (i) general information about natural forests in Vietnam; (ii) pressures on our natural forests; (iii) shortcomings of our system; and, (iv) issues that need to be addressed in the future.

First, here are some general information about natural forests. After the war, as in many developing countries, the forest cover was decreasing dramatically. Over the past 20 years, forest cover increased remarkably in Vietnam. Now, as of December 2019, we have about 14 million ha of forest, nearly 42 percent of the total country area (Decision No. 1558/QĐ-BNN-TCLN, dated April 15th 2021). The international community recognizes that we protect very well our forest network. Out of these 14 million ha, natural forests account for about 10 million ha and plantations for about 4 million ha.

We have some pressures on natural forests in my country. Our big population, nearly 100 million people[52], put a huge pressure on natural forests and natural resources. We also over-exploit our natural forests with illegal poaching, illegal logging. Now, Vietnam is one of the international roads for wildlife trafficking. Another pressure is forest land conversion. As a developing country, we convert vast forest areas for agriculture purposes (coffee, rubber, acacia) and for development activities (hydropower plants, road construction, mining and other development demands) that affect our natural forests. We also suffer from pollution of our river basins and coastal areas, as well as from invasive species expansion. A lot of forest areas are affected by *Mimosa Pigra,* an invasive species coming from Australia. Our huge human population generates an increasing demand for food and economic development: this is one of the main threats facing our natural forests. We have about 35 million people living close to the forest and depending on natural forests for their livelihood. Finally, Vietnam is one of the countries most affected by climate change. We have a long coastline: coastal areas and especially plains in the South-Mekong river delta and Red river delta are influenced by climate change.

We need to address the current shortcomings in our system, including the following. Legal and institutional framework have some gaps and overlaps. Law enforcement for natural forest conservation is limited. Financial investment for natural forest conservation and restoration activities is insufficient. Capacity-building and incentives for staff involved in forest management are limited. We lack data and information on natural forests. Social interest and awareness on the importance of natural forests are limited. The local communities living nearby natural forests are not really involved in forest management and do not really benefit from forests.

I also want to share with you some issues that need to be addressed in our country. We need to improve and renovate investment policies related to conservation of natural forests. Most of our natural forests are integrated in our protected area system or watershed system but there is not enough investment from the government for the effective conservation of these natural forests. We need more investments in scientific studies. We need financial support and external expertise for forest restoration. Now we protect the forest, setting aside huge areas for natural regeneration but we think that we could learn a lot on forest restoration from the experience and expertise of Korea, Japan and other countries. We need to improve protected area management capacity and local people awareness. We need to establish collaborative mechanisms for natural forest management. We need to provide more incentives for local people and communities and get them more involved in natural forests governance and management. We need a sustainable mechanism of benefit and responsibility sharing. In my country, we apply payment for environmental services (PES) for hydropower dam, for freshwater, for water supply to industrial zones, and for aquatic breeding site services.

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[52] Meaning an average density of around 300 inhabitants per km^2.

Disturbance of Forest Ecosystem in Indonesia

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Indonesia comprises various types of forests, such as coastal, mangrove, swamp, peat, lowland and mountain forests. However, mangrove, swamp, peat, and lowland forests are the forest types under great pressure, while mountain forests are relatively free from disturbances.

Over the past hundreds of years, because of human activities, mangrove forests in Indonesia declined from over 4.1 million hectares in 1800 to about 3.1 million ha in 2000 (Giri *et al.,* 2010). Since then, the area covered by mangrove forests has remained quite stable, between 3.1 and 3.2 million ha (Ilman *et al.*, 2016; Rahadian *et al.*, 2019). However, data are hardly comparable across studies due to methodological differences. Studies show that the process of deforestation especially in Java, Sumatra, Sulawesi and Kalimantan, is caused by the development of fishponds, exploitation of timber, and expansion of agricultural land.

A study carried out by Richards and Friess (2015) on drivers of mangrove deforestation in Southeast Asia from 2000 to 2012 showed that each country's dominant drivers are different. Deforestation of mangroves in Myanmar is due to conversion to paddy field, while in Malaysia and Indonesia, it is the result of the expansion of oil palm plantations. A similar conclusion was also presented in a study carried out by Fauzi *et al.* (2019). As illustrated in **Figure 1**, mangrove deforestation in Indonesia does not only occur in production forests but also in protected or conservation areas, such as Karang Gading and Langkat Timur Wildlife Reserve, Teluk Adang, Apar Bay and Tanjung Panjang Nature Reserves.

Figure 1. Qualitative assessment of mangrove forest in protected areas in Indonesia
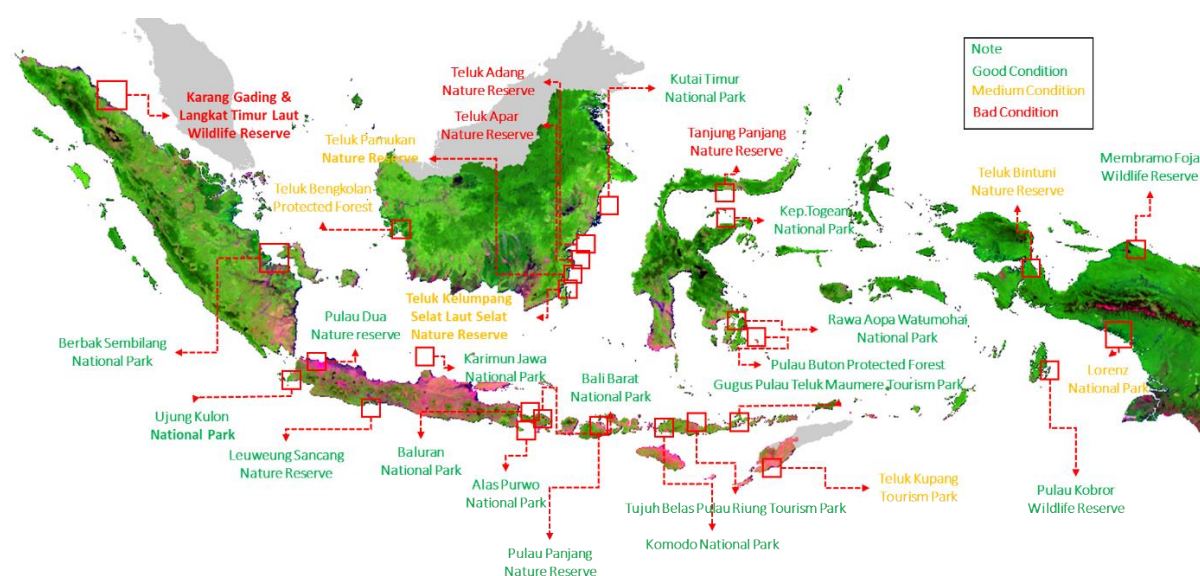
With the availability of satellite image data, the disturbance monitoring process is carried out quickly and regularly. The IPB University developed an Ecosystem dashboard, monitoring monthly the de-vegetation process in Indonesia [53]. This early detection platform monitors land-cover's monthly and yearly dynamics using two indices, the normalized difference vegetation index (NDVI) and the open area index (OAI) based on MODIS[54] data (Setiawan *et al.*, 2016). The detected area changes on this dashboard indicate decreasing vegetation cover. In the 2018-2020 period, detected area changes have decreased. The areas where changes are

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[53] See: https://lulcc.ipb.ac.id/map/frontend/viewer
[54] Or: Moderate Resolution Imaging Spectroradiometer. See: https://modis.gsfc.nasa.gov/about/

still detected are mostly located in lowland forests and swamp forests, especially in oil palm and industrial forest plantations/concessions.

The main disturbance to swamp, peatland and lowland forest ecosystems is forest fire. The NASA Fire Information for Resource Management System (FIRMS)[55] provides near real-time information on fire hotspots across the globe. Between 2002 and 2020-2021, FIRMS showed a significant decrease in the number of hotspots from 25,972 hotspots to 352 with a confidence level above 85 percent[56]. Prasetyo *et al.* (2016), analyzing historical forest fire occurrence in the Jambi Province between 2000 and 2015, showed that forest fire incidents are always preceded by a de-vegetation process, such as land clearing for industrial plantation development.

Forest disturbance has been described as "a relatively discrete event causing a change in the physical structure of the environment (vegetation and surface soil)" (Clark, 1990). It is often anthropogenic and/or can be associated with climate change. Disturbance does not only directly affect the forest structure, rather, it also has a gradual effect on its function. Based on the worst IPCC scenario (RCP8.5[57]), Indonesia is likely to experience an increase in the average temperature and more extreme precipitations (Condro *et al.* 2021). These changes are not evenly distributed, as most provinces are likely to be drier and warmer. According to Condro *et al.* (2021), these changes will affect forest capacity to function as habitat for wildlife, including primates.

In conclusion, mangrove forests, swamp forest and peatland forest should be given more attention due to the severe anthropogenic disturbances they face and to their high sensitivity to global climate change. Meanwhile, global climate change will not only directly influence the structure of forest ecosystems but will also gradually reduce its capacity to function as wildlife habitat. Understanding the shift of suitable habitat should be investigated for mitigation measures. Robust near real-time monitoring system based on available satellite imagery should be developed for mitigation action.

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[55] See: https://firms.modaps.eosdis.nasa.gov/map/

[56] See: https://firms.modaps.eosdis.nasa.gov/download/list.php

[57] The Intergovernmental Panel on Climate Change (IPCC), developed a wide set of climate scenarios, called Representative Concentration Pathways, identified by their targeted level of total radiative forcing (in 2100 as compared to 1750). The highest emission scenario (RCP8.5) corresponds to a global warming of 4 to 5°C in 2100 as compared to the pre-industrial period (IPCC, 2014).

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Extent of Forest Cover Change in Mt. Bulanjao and Puerto Princesa Subterranean River National Park, Palawan, Philippines

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Introduction

In many regions of the Philippines, primary forests are undergoing immense natural and anthropogenic pressures. Palawan island, hailed as the "last ecological frontier" (Diesmos and Palomar, 2004), is also a conservation hotspot threatened by deforestation, mainly due to extensive clearance of forests for crop production, or commercial and industrial use (Mallari *et al.*, 2011, 2015). Of the 955,200 ha of key biodiversity areas and forests in Palawan, only 339,600 ha (36 percent) are covered by Protected Areas (Mallari *et al.*, 2015). The remaining 64 percent are still threatened by firewood gathering, bushmeat hunting and agricultural expansion.

To understand the impacts of anthropogenic threats to forest landscapes, we looked at the results of studies conducted on spatial and temporal changes in the forest cover of two important biodiversity areas in Palawan (CCIPH, 2018, In prep.). Mt. Bulanjao, home to the Palawan tribe, covers the municipalities of Rizal and Bataraza in southern Palawan. Mt. Bulanjao is characterized by forests over ultrabasic rocks and, despite its rich biodiversity value, it is not designated as a protected area. The Puerto Princesa Subterranean River National Park (or PPSRNP) is a Protected Area covering over 22,000 ha, a UNESCO World Heritage Site, and a Ramsar Wetland Site in Puerto Princesa City. It is also the ancestral home of the Tagbanua and Batak Tribes.

Methods

Remote sensing and geographic information systems (GIS) were used to detect the extent of forest cover change in Mt. Bulanjao between 2000 to 2017 (CCIPH, 2018) and in PPSRNP between 2009 and 2019 (CCIPH, in prep.). Readily available global datasets (using e.g., Google Earth Engine) of tree canopy estimates were accessed (see Hansen *et al.,* 2013). Images were processed to discriminate forests from non-forests, using the threshold approach and decision tree algorithms explained in Hansen *et al.* (2013). Ground-truth surveys via foot patrols and drone sampling were conducted to collect reference points to train and calibrate the spectral signature profiles for supervised image classification. The classified images were then subjected to an accuracy assessment using a minimum standard of 85 percent (Foody, 2008; CCIPH, 2018). Finally, the results were validated with community consultations and key informant interviews to get first-hand accounts of threats occurring in the area.

Forest loss in Mt. Bulanjao is severe between 2000 and 2017

The adoption of the Environmentally Critical Areas Network (ECAN) zones, as the main strategy of the Philippines' SEP law[58], was a landmark for natural resources management in Palawan. However, merely designating ECAN zones does not ensure forest protection (Supsup and Asis, 2018). As expected, forested areas designated as multiple use (i.e., in which human activities are allowed, to a certain extent) showed massive forest loss between 2000 and 2017 (CCIPH, 2018). Deforestation is especially high in lowland forests where management is considerably relaxed. Widespread fragmentation and degradation are also detected in high elevation areas designated as core zones that should be under strict protection, free of human activities. This suggests that zoning regimes are not positioned effectively to ensure protection of forests and naturally occurring habitats in Mt. Bulanjao.

Local communities in Mt. Bulanjao are highly dependent on forest resources for their basic needs such as food, fuelwood, building materials, and other economic activities. Most of the locals practice traditional kaingin

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[58] Strategic Environmental Plan (SEP) for Palawan Act (Republic Act No. 7611), adopted by the Congress of the Philippines on 19th June 1992. See: https://thecorpusjuris.com/legislative/republic-acts/ra-no-7611.php

farming[59] as their primary source of livelihood, while others are engaged in logging and crop production. The local communities identified poverty, marginalization, lack of incentive systems, lack of alternative livelihood options, and migration of lowlanders to the uplands as the main drivers of deforestation (CCIPH, 2018). There is also added pressure from the mining sector with the approval of the Mineral Production Sharing Agreement (MPSA) that gives a contractor the right to mine within a contract area. The MPSA poses a looming threat to the remaining high elevation forests (CCIPH, 2018). The MPSA may also have deleterious impacts on the culture and economic activities of the upland communities.

Forest management in PPSRNP is improving

Forests in PPSRNP are estimated to cover 17,588 ha or 80 percent of the total land area. Forest loss is estimated at 821.22 ha between 2009 and 2019 (CCIPH, in prep). It was observed in areas near established community settlements, alongside the roads, and at forest margins. Consulted, the protected area staff attributed the forest loss to agricultural and built-up land expansion because of population increase within the protected area. Natural factors such as typhoons and landslides were also identified as threats. Degraded forests (i.e., closed forest degraded into open forest)[60], estimated at 1,717 ha, are observed at mid to high elevations (CCIPH, in prep). Areas that underwent degradation appear to be distant from community settlements but are near riverine ecosystems and forest trails. This suggests the prevalence of subsistence timber harvesting in these areas. Forest gains and regrowth of 732ha were detected mainly at reforestation sites (CCIPH, in prep). However, during our consultations, it was suggested that portions of the detected forest gains may be attributed to the spread of introduced and invasive trees from previous tree planting activities. The extent of invasion is unknown and the PPSRNP has yet to conduct studies on this issue.

Conclusion

This case study paints a general picture of the increasing pressures that Philippine forests are experiencing in different socioeconomic and management circumstances. Mt. Bulanjao suffers from inconsistent environmental policies and poor natural resources governance. There is a clear mismatch in the management prescriptions of the ECAN zones, the location of the MPSA, and the ecological and social conservation values existing in Mt. Bulanjao. There is a need to recalibrate the zones, strengthen enforcement, and provide appropriate incentive systems to communities to protect their own forestlands. For PPSRNP, now that the management is moving towards a more science-driven and proactive approach, we hope that it will continue to sustain the forests and contribute to the persistence of biodiversity.

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[59] Filipino word for swidden agriculture or "slash-and-burn" farming system.

[60] Closed forest: Formations where trees in the various storeys and the undergrowth cover a high proportion (> 40 percent) of the ground and do not have a continuous dense grass layer (cf. The following definition). Open forest: Formations with discontinuous tree layer but with a coverage of at least 10 percent and less than 40 percent. Generally there is a continuous grass layer allowing grazing and spreading of fires. , see FAO Global Forest Resources Assessment (FRA 2000: http://www.fao.org/3/ae217e/ae217e00.htm

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3.2   Introduction to the breakout group discussions

Typology of the main threats facing different forest types

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Typology of the main threats facing different forest types

Primary forests and natural landscapes in the Asia-Pacific Region are under increasing pressure from a range of threats, ranging from environmental to socio-economic ones. Examples include climate change and sea level rise; proximity to settlements, infrastructure and road network; forest fragmentation; overharvesting of non-timber forest products; agriculture expansion; industry (e.g., logging, mining); forest fires; pollution[61]; invasive species; and weak governance, to name a few.

Climate projections speak of temperature increases in the Asia-Pacific region in the range of 0.5–2°C by 2030 and 1–7°C by 2070 (Preston *et al.,* 2006). Temperatures are likely to warm more quickly in the arid areas of Northern Pakistan and India and Western China. Furthermore, climate change is likely to further alter the availability of water resources, driven by seasonal reductions in rainfall and runoff in South and Southeast Asia and increases in runoff in other areas, particularly the Pacific Islands. Models indicate expected increases in rainfall throughout much of the region, including greater rainfall during the summer monsoon period; in South and Southeast Asia, however, rainfall is projected to decline during the winter monsoon, which suggests increased aridity (Preston *et al.*, 2006). More intense tropical cyclones and ocean warming are other potential impacts (Hijioka *et al.*, 2014).

The global sea-level in the region is expected to rise by approximately 3–16 cm by 2030 and 7–50 cm by 2070 (Preston *et al.,* 2006). This global sea-level rise, in conjunction with regional sea-level variability, will affect the

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[61] See for instance: https://www.pollution.org/, a good site to look at the potential impact of sulphur dioxide; nitrogen oxides; ozone; aerosols etc.

region. Kulp and Strauss (2018) developed a new digital elevation model (DEM), called COASTDEM, focusing specially on coastal areas, which allows a much more precise modelling of the sea-level rise.

With regards to forest fires, the Moderate Resolution Imaging Spectroradiometer (MODIS)[62], aboard NASA's Terra and Aqua satellites, has been used to scan the Earth's surface for fires on a daily basis for almost 15 years. Since 2012, the Visible Infrared Imaging Radiometer Suite (VIIRS)[63], aboard the NOAA/NASA Suomi National Polar-orbiting Partnership (SNPP) weather satellite, has contributed to this effort by producing higher resolution images of the Earth's surface. While MODIS had a 1,000-m resolution per pixel, VIIRS has a 375-m resolution per pixel. This higher resolution enables VIIRS to detect smaller fires and delineate more precisely fire perimeters. VIIRS is a well-suited tool for monitoring fire activity. It enables scientists and firefighters to model and predict shifts in a fire's behavior more accurately. VIIRS also allows to estimate the greenhouse gas (GHG) emissions released into the atmosphere as a result of a fire. The latest FAO Global Forest Resources Assessment (FAO, 2020) found that the second-largest area of tree covered land as a proportion of the total wildfire area was in South and Southeast Asia (44 percent).

Commercial agriculture and logging concessions are an example of another major threat to Asia-Pacific forests, with oil palm plantations and the timber industry being some of the main players. Here, governance in trade can have an important role, as seen through forest certification schemes and voluntary trade agreements that are increasingly being used in the region. Nightlights can give unique insights on population and economic development. Earth night-time images are processed to create freely available open datasets. Data on road networks are available on Open Street Map[64].

Another threat is forest fragmentation. In Borneo, for instance, half of the intact forest landscape has been lost and replaced by small patches. As a result of forest fragmentation, intact forest area has decreased while the number of patches smaller than 100,000 ha, as well as their isolation[65], have increased. Over the past two decades, suitable habitats decreased with a total core area (TCA) diminishing from 7.4 million ha to 5.2 million ha and edge density (ED) from 9 m/ha to 5.8 m/ha[66]. As demonstrated by Laurance *et al.* (2002), forest disturbance can occur up to 500 m inside fragment margins, while the most conspicuous changes appear below 200m from the edges.

Orangutans, for example, require areas of 50,000–100,000 ha to maintain genetically viable populations (Marshall *et al.*, 2008). Edwards *et al.* (2011) argue that large expanses of habitat should be protected (over 20,000–500,000 ha, depending on the country). At the same time, they argue that future agricultural demand can be met by clearing only forest patches below a 1,000-ha threshold. Therefore, Edwards *et al.* (2011) recommend the development of a new High Conservation Value (HCV) criterion that recognizes the conservation value of habitat patches within the agricultural matrix and that protects patches above 1,000 ha (Edwards *et al.*, 2011)[67].

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[62] See: https://modis.gsfc.nasa.gov/about/

[63] See: https://www.globalforestwatch.org/blog/fires/fighting-fires-with-satellites-viirs-fire-data-now-available-on-global-forest-watch/; or, https://firms.modaps.eosdis.nasa.gov

[64] See: https://www.openstreetmap.org/#map=5/-2.546/118.016

[65] Isolation is measured by the Nearest-Neighbour Distance (ENN_MN), which is a distance-based classification.

[66] Total Core Area and Edge Density are indices used in landscape metrics. See for instance: http://www.umass.edu/landeco/teaching/landscape_ecology/schedule/chapter9_metrics.pdf

[67] High Conservation Values are biological, ecological, social or cultural values of outstanding significance. There are six HCV classes: HCV1: areas containing globally, regionally or nationally significant concentrations of biodiversity values (e.g., endemism, endangered species); HCV2: areas containing globally, regionally or nationally significant large landscape natural habitats, contained within, or containing, the management unit, where viable populations of most if not all naturally occurring species exist in natural patterns of distribution and abundance; HCV3: areas that are in or contain rare, threatened or endangered ecosystems; HCV4: areas that provide basic services of nature in critical situations (e.g., watershed protection, erosion control); HCV5: areas fundamental to meeting basic needs of local communities (e.g., subsistence, health); HCV6: areas critical to local communities' traditional cultural identity (areas of cultural, ecological, economic or religious significance identified in co-operation with such local communities).

The HCV stakeholder groups[68], in turn, have set thresholds in the tens of thousands to hundreds of thousands of hectares: 20,000 ha in Indonesia, and 500,000 ha in Papua New Guinea (Edwards *et al.,* 2011).

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[68] Such as government policy-makers; forest managers and owners; investors and donors; and organizations working in conservation and development. See HCV resource network: https://hcvnetwork.org

3.3   Organization of the breakout group discussions

Participants were split in four breakout groups. In each breakout group, a chairperson was chosen to moderate the discussion and report to Plenary. Each chair was assisted by a rapporteur. After a roundtable to introduce all participants and considering the draft annotated outline circulated to all participants ahead of the workshop, the discussions focused on the following guiding questions.

Guiding questions:

1.   From your experience, what are the main challenges and threats for primary forest conservation in the region?

2.   How do these threats apply to the different forest types identified in session 1?

Expected outcome:

Each group was expected to suggest a matrix linking the different threats facing primary forest conservation to the different forest types identified in session 1.

3.4   Breakout groups: reports to Plenary

This section summarizes the main points of the discussions held in each breakout group. More detailed notes of these discussions, as shared by the rapporteurs, can be found in **Appendix 3**.

Breakout Group 1

Chair: Russel Warman.
Rapporteur: Monika Kiczkajlo.

When talking about primary forest conservation and related threats we need to consider altogether numerous aspects, and the complexity is increasing.

Some specific threats identified by participants in the group were:

- forest loss, as a result of community land speculation;
- high population density, high demand for food, economic development and rural development (China example);
- lack of awareness on primary forest and conservation concepts by people living near protected areas;
- incentives for converting primary forests to plantations and agriculture;
- climate change: even in remote areas, where a lot of forests are still intact, climate change may affect species composition;
- over-exploitation of natural resources, including non-timber forest products, as well as wildlife poaching and illegal trafficking (example of illegal trade of birds in Indonesia);

Not all of these threats are easy to map.

Definition issues, as well as political and cultural differences in perceptions and understanding of primary forests, contribute to an imperfect knowledge, challenge any scientific basis to managing threats, and could be considered a threat in itself. This is reflected in the discrepancies and information gaps in and across countries' reports on primary forests.

Participants in the group recognized the value of a general matrix, crossing the threats with broadly defined forest types to support regional engagement. However, they also recognized that there is much granularity in biophysical and political scales that need to be considered.

Assessment over time is important to be able to capture the dynamic nature of ecologies in the face of climate change and the mobility and evolution of threats.

What kind of forest monitoring and knowledge systems in themselves need to be put in place? There is an additional risk for misdirecting policies if we don't have these elements in place to make analysis.

Breakout Group 2

Chair: Rajan Kotru.
Rapporteur: Nathanaël Pingault.

The group reviewed the different categories of threats presented by Yves Laumonier in the light of participants' experience.

1. **Proximity to settlements, infrastructure, road network.**

Urbanization and infrastructure development lead to forest fragmentation and degradation. In Indonesia, the capital city could move to central Kalimantan, with major impacts on forest ecosystems. Huge hydropower projects, as well as solar energy plants, in many Hindu Kush Himalayan countries are consuming substantial forest areas. Conversely, lack of accessibility can become a conservation issue, limiting for instance fire control capacities. In Himalayan mountain areas, aerial fire control is a challenge and often the appropriate level of "forest opening" is not done.

2. **Climate change and sea level rise**

Climate change will likely increase the intensity and frequency of forest fires, typhoons, floods, droughts, species invasions, pests and disease outbreaks. Global warming gradually affects forest ecosystems but people and local communities, focusing more on short term priorities, have not yet considered this issue with due attention. Due to global warming, climatic zones are shifting poleward and upward in mountainous regions. This climatic shift might occur faster than the migration speed of many vegetal or even animal species and threaten particularly some fragile ecosystems such as mountain forests or mangroves. Not much research is done, and learning from forest management concepts is limited.

3. **Agriculture expansion**

In Malaysia, agriculture expansion (and the development of aquaculture activities) is a major threat, affecting particularly lowland forests (and mangroves). Eco-tourism could be developed as an alternative economic activity to contribute to forest conservation in specific areas. Shifting cultivation, with shortened fallow period, is a major threat for forest ecosystems in Indonesia and North-Eastern India.

4. **Pollution**

Urbanization, mining or industrial activities and agriculture expansion can generate soil, water and air pollution in forest ecosystems. In some areas, Himalayan forests have become dumping sites for garbage and waste water. Preserving remote and steep-slope primary forests from pollution due to human activities is a challenge.

5. **Invasive species**

Ill-conceived national programmes of reforestation and intensive agriculture (e.g., chemical fertilizers) have promoted invasive species that affect regeneration of primary forest ecosystems.

The group also considered other threats, not covered in the typology suggested by Yves Laumonier.

6. **Conflicts**

Tensions and conflicts over natural resources (land, forest, and water) can lead to armed conflicts and even wars, which, in turn, impact biodiversity and forest ecosystems. Because many of the remaining forests are along international borders, their conservation requires international cooperation.

7. **Traditional Wisdom**

Youth out-migration from rural areas is affecting the transmission of traditional knowledge, often critical for sustainable forest management. The loss of traditional knowledge figures among the major threats facing primary forests. Cultural and religious dimensions had, once, an important role in forest conservation, the sacred character of a forest being a sufficient protection. Because of economic development, out-migration and loss of traditional wisdom, this is changing in many areas.

After the discussions, Rajan Kotru, as chair, drafted a table illustrating the links between threats and forest types, as they emerged from the discussions in the breakout group. This table is reproduced in **Appendix 3.**

Breakout Group 3

Chair: Clarence Gio Almoite.
Rapporteur: Alexandre Meybeck.

There are some initial questions around the notion of primary forest, which is differently apprehended by countries. Are the threats to primary forests the same than for other forests? Is there a unique feature of primary forests that is specific? Part of the answer was that threats to primary forests are the same than for other forests. One question is whether primary forests can be managed and to what degree.

It is very challenging to summarize threats for such a large and diverse region.

In Australia, uncontrollable wild fires occurred repeatedly these last 20 years in old growth forests, as well as invasive species outbreaks, both invasive grasses and animal species. In some places of the Asia-Pacific region, habitats are lost for infrastructures and urbanization, but this is quite well addressed by protected areas.

Generally, economic development, agriculture expansion, mining, infrastructures, roads, hydropower are major threats.

Transfer of land is a main threat, especially land grabbing by big players, for mining for instance, as not all primary forest is protected.

A lot of accessible areas are already affected by human disturbances. Mountain areas are better preserved. But shifting cultivation is now threatening remote areas of higher elevation because more accessible areas are already cultivated.

In coastal regions, rising sea level and aquaculture are major threats, including for mangroves.

Non timber forest products (NFTPs) collection can also threaten some conservation areas.

Breakout Group 4

Chair: Jalesi Mateboto.
Rapporteur: Federica Coccia.

Our group identified the following challenges and threats for primary forest conservation:

In general:

- *Inappropriate policy and regulatory frameworks.* Some were developed 20-30 years ago and need to be reviewed to integrate biodiversity consideration. So far, we used to focus only on timber production, rather than looking at forest in its entirety. Similarly, the lack of synergy amongst different policies and ministries involved in forestry is a challenge. For example, in Fiji, mangroves are regulated by three different ministries.
- *Unsustainable systems and practices.* Most of the threats to the forests are out of the forests. There is a need to build synergies across sectors, including agriculture, water management, or animal health. We should adopt an integrated landscape approach.

- *Technology limitations*. Many countries still lack the needed technology to map the areas to be protected.
- *Lack of capacity.* Many countries lack the capacity needed to better manage their forests. Only some countries have forestry schools.
- *Climate Change and adverse climate factors*. Cyclones destroy forests. Also, the sea level rise has meant the loss of coastal forest.
- *Invasive species.*

For primary forests:

- *Oil palm expansion.* It is a major threat to primary forest. In many countries across South-East Asia, oil palm cultivation has spread into protected areas. In Malaysia, some national protected areas have been intruded by oil palm plantations. In Malaysia, indigenous peoples are manipulated by plantation companies: as a result, in some villages, up to 600 hectares of forest have been cleared to plant oil palm.
- *Land tenure.* In Papua New Guinea (PNG), it is a big challenge. Logging is a huge threat, especially since the country's GDP depends upon it. The multiple local languages [69]spoken in PNG makes it challenging to interact with local indigenous peoples.

For Mangroves: Aquaculture and Urban Development are big threats as evidenced by the example of Malaysia.

4 Session 3. Priority areas for primary forest conservation

The objective of this third session was to discuss the methodology suggested by CIFOR to map priority areas for primary forest conservation in the region. Yves Laumonier (CIFOR/FTA) introduced the session recalling the three criteria, suggested during the inception workshop, that should be used to identify and map priority areas for primary forest conservation: (i) the size of the forest; (ii) the level of importance of the forest; and (iii) the level of threats to the forest. Assessing the levels of importance, and the level of threats requires a range of data on many factors. The level of importance of a forest should consider for instance: protected areas, forest types, deforestation and forest degradation. Whereas the level of threats should consider a range of factors such as: infrastructure, road networks, burn severity or fire risks, digital elevation models, night-time light, and industrial plantations. By overlapping maps illustrating the level of importance and the level of threats in a given forest area, it is possible to define and identify priority areas for primary forest conservation in the Asia-Pacific region. Yves Laumonier illustrated this methodology with examples on Borneo during the workshop. The assessment of priority areas in the region is still a work in progress.

4.1 Expert presentations

Rao Matta (FAO) introduced the three experts invited to discuss the definition and identification of priority areas for primary forest conservation.

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[69] Papua New Guinea is the most linguistically diverse country in the world, with over 800 living languages spoken for less than 9 million inhabitants.

The Nature Conservancy

Edward Game, Lead Scientist for the Asia Pacific Region in The Nature Conservancy

Presentation Overview

My presentation addressed two main themes: (i) the question of defining and identifying primary forests, and particularly the role acoustic techniques can play in this; (ii) the role the civil-society organizations can play in primary forest conservation in the Asia-Pacific region. I approached these two themes through a series of three vignettes on the forest conservation work being led by The Nature Conservancy (TNC)[70] in Papua New Guinea, Indonesia, and Myanmar.

Role of acoustics in primary forest assessment

As an organization, TNC is not focused on the conservation of primary forests per se, but rather on the conservation of forest biodiversity and of the ecological functions of forests. That has led us to focus more on techniques for assessing the ecological value or integrity of remaining forests, rather than on the question of what is primary or not. As recognized by a number of speakers during the workshop, there is a real limit to what we can learn from satellite data about the ecological value or integrity of forests. This is why TNC is actively developing and using acoustic sampling approaches to supplement remote-sensing data. Good introductions to the potential roles of acoustic sampling in tropical forests can be found in Burivalova *et al.* (2019a) and Deichmann *et al*. (2018).

There is, of course, a great deal you can learn from sound about individual species but, in my presentation, I focused on the whole soundscape[71], i.e., on the overall complexity and saturation of sounds in the forest. One of the very striking and consistent things we have learned is that primary forests "sound different" to forest experiencing a higher intensity of anthropogenic impact.

In Papua New Guinea, we studied forests that would be considered highly intact by all, comparing acoustic saturation between forest zones where local communities clear patches for very small-scale agriculture, and zones where there is no clearing but there may be hunting. This showed clearly how sensitive the acoustic sampling method is at detecting human impacts (here clearings) on the forest, which can be particularly seen by reduced saturation around the dawn and dusk chorus. More information on this work can be found in Burivalova *et al.* (2018). This work is particularly germane to the question raised during the workshop about thresholds of community impacts on forest ecology.

Data from Kalimantan show very high β-diversity [72] in primary and mature forests. Such data help explain the paradox that, often, α-diversity observed in logged forests do not decrease and, in fact, sometimes increases. Our acoustic data show that logged forests do have a high α-diversity, but a much lower β-diversity than primary and mature forests. This is likely due to the fact that, in these disturbed forests, the same incoming species can be observed throughout the forest at landscape level, while species lost might be very local and differ widely across habitats. Part of this β-diversity can be gradually recovered over time, after logging. More information on this work can be found in Burivalova *et al.* (2019b).

Data from the Saiging region in Myanmar show how acoustic monitoring can also help us in identifying primary forests or their equivalent. Acoustic sampling can help us understand how the faunal community relates to forest intactness. It can also reflect other forest disturbances not picked up by satellite. Acoustic sampling can thus contribute to the important task of ground-checking and validating satellite data, which was mentioned by a number of participants during the workshop. By integrating acoustic and satellite data, we are able to develop a map, or a model, of the likelihood that the forest is functioning like a mature forest. As I illustrated with the Myanmar example, this is very different from a straight satellite derived forest intactness map. This work is still

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[70] The Nature Conservancy (TNC) is a global environmental non-profit organization, working to create a world where people and nature can thrive. Founded in the United States of America in 1951, TNC now gathers over a million members and impact conservation in 72 countries and territories. See: https://www.nature.org/en-us/

[71] A soundscape is the acoustic environment as perceived by humans, in context (Southworth, 1969; Schafer, 1977).

[72] According to Whittaker (1960), the total species diversity in a landscape (γ-diversity) is determined by two different parameters: the mean species diversity at habitat level (α-diversity); and the distance or dissimilarity observed across habitats at the landscape level (β-diversity).

in the process of being published. However, more information can be obtained by contacting myself (egame@tnc.org) or Tim Boucher (tboucher@tnc.org).

Role of civil society organizations in primary forest conservation

Overall, although there are many potential roles for civil society organizations in primary forest conservation, I wanted to highlight three general ones:

- help finding appropriate forest conservation solutions, adapted to the local context;
- help financing these solutions and actively engaging local communities;
- developing cost-effective ways to report on that financing.

Finally, it is widely recognized that a great deal of money (hundreds of millions of dollars) is required for primary forest conservation across the Asia-Pacific region. There is an opportunity for private philanthropy to make a very significant contribution to this. However, this will need to be through civil society organizations because that money will not flow to governments. At present, many countries in the Asia-Pacific region do not have policy environments that allow civil society organizations to be effective for large-scale conservation, and there are very few, if any, locations and projects ready to receive and effectively use large-scale donations for forest conservation. This should be a policy priority around primary forest conservation in the region.

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Geospatial technology for identifying and mapping priority areas of primary forest for conservation in Malaysia

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Primary forests refer to forests consisting of native species that are naturally regenerated and subject to minimal, or negligible anthropogenic disturbances (FAO, 2020). They are primarily found in remote areas in the tropics (Potapov *et al.*, 2017). They play a critical role for biodiversity conservation, indigenous people protection, carbon sequestration and climate change mitigation (Hubau *et al.*, 2020). Nevertheless, primary forests are undergoing depletion to cater for the needs of an increasing human population (Jha and Bawa, 2006). If no actions are taken to protect and conserve them, deforestation and degradation will greatly disrupt forest ecological functions.

In 2016, forests in Malaysia covered 18.24 million ha, out of which 11.18 million ha were designated as Permanent Reserved Forest (PRF)[73] and 3,171,180 Ha as protected areas, national parks and wildlife and bird sanctuaries (FAO, 2020). The area reported for primary forests, 1.08 million ha or 5.9 percent of the tropical rainforest area, has remained unchanged since 1990 (FAO, 2020). According to the Forestry Department of Peninsular Malaysia (FDPM, Forestry Statistics 2020[74]), in 2019, forests in Peninsular Malaysia covered 5.73 million ha out of which 4.81 million ha (83.92 percent) were designated as PFR. Approximately 38 percent (1.83 million ha) of the PRF are protected to ensure they function well to stabilize the country's climate, control water resources, manage storm water, conserve biodiversity, regulate air quality and soil fertility. Protected forests located on elevated/steep land are largely unexploited (Laidlaw, 1999). Nevertheless, PRF area has decreased from 4.91 million ha in 2011 to 4.81 million ha in 2019 (FDPM, Forestry Statistics 2020). Thus, in 2019 an additional 0.09 million ha of forest is proposed to be designated as PFR while the remaining forests are used for wood production (FDPM, Forestry Statistics 2020). The Virgin Jungle Reserves (VJRs) of Peninsular Malaysia, small, undisturbed, samples of natural forest are included within the protection forest (Laidlaw, 1999). The VJRs aim primarily for conservation: in particular, they help protect plant species, limestone flora, terrestrial mollusks and serve as bird sanctuaries (Laidlaw, 1999).

Accurate data is required on forest cover, on its changes over time, and on its other functions such as carbon storage, not only for implementing forest conservation programs and policies, but also for assessing the impacts of forest conservation programs. New approaches and tools are necessary for mapping and monitoring forest resources for conservation purposes. To map forest cover in Peninsular Malaysia, the FDPM relies mainly on a field inventory, realized every 2 years, and still makes a limited use of satellite data and aerial photos (Rahman, 2014). The Forest Research Institute of Malaysia (FRIM) geo-information unit also conducts researches to map forest resources based on remote-sensing imagery, Global Positioning System (GPS) and Geographical Information Systems (GIS). These geospatial technologies help map consistently biophysical properties of large forested areas in a fast and cost-effective manner.

Satellite-based remote-sensing provides data at sufficient spatial and temporal resolutions, suitable for mapping and monitoring forest cover at a large scale in Malaysia. Mohd Najib and Kanniah (2018) mapped forest cover in Peninsular Malaysia at a 30-m resolution, using a combination of Landsat Thematic Mapper[75] and ALOS

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[73] The Malaysian National Forestry Act (Act 313, 1984) allows the relevant State Authority to declare, by notification in the Gazette, any area as "Permanent Reserved Forest (PRF)". This Act defines PRF as "any land constituted or deemed to have been constituted a permanent forest reserve under this Act". See: https://www.forestry.gov.my/images/JPSM/wargaperhutanan/AktaAPN_en.pdf

[74] See: https://www.forestry.gov.my/en/2016-06-07-02-53-46/2016-06-07-03-12-29

[75] The Landsat Thematic Mapper (TM) is an advanced, multispectral scanning, Earth-resources sensor designed to achieve a higher image resolution. See: https://landsat.gsfc.nasa.gov/landsat-4-5/tm

PALSAR[76] satellite images. They estimated the total forest area in Peninsular Malaysia at 5,914,421 ha in 2010, with a 95 percent classification accuracy. Omar *et al.* (2017) used ALOS PALSAR data from 2016 to map the coverage of different forest types in Peninsular Malaysia using topography height information. This study estimated the total forest area in Peninsular Malaysia at 5,895,810 Ha. The map produced by Omar *et al.* (2017) is used together with Global Positioning System (GPS) to delineate the geographical distribution of rare or threatened forest species. The results are subsequently used by FDPM for conserving such areas. An example of an area conserved thanks to geospatial technology is the Kancing forest reserve in the state of Selangor in Peninsular Malaysia (Hamidah and Chua, 2021). Two compartments of the forest contain rare species of *Hopea subalata,* locally known as Merawan Kanching (Hamidah and Chua, 2021). One of the compartments has been designated officially as high conservation value forest while the other one has been designated as PRF (personal communication with Ms. Hamidah, FRIM).

Omar *et al.* (2020) also used remote-sensing technology to identify the geographical distribution of the *Melaleuca* swamp forest, one of the freshwater swamp forests in Peninsular Malaysia exploited for charcoal, poles and honey production. They used various vegetation indices, calculated from Landsat-8 OLI[77] data, to assess and map the abundance of the *Melaleuca* swamp forest in Peninsular Malaysia. They mapped a total of approximately 23,000 ha of intact remaining *Melaleuca* swamp forests, with an accuracy estimated at up to 94 percent. Although this forest type does not cover extensive areas, its conservation is of utmost importance for flood protection and biodiversity conservation. Data generated from this study has been brought to the respective state governments' attention for designating these forests as PRFs (Personal communication with Dr. Hamdan Omar, FRIM).

Kanniah *et al.* (2015) analyzed land cover changes using the results of the Landsat Thematic Mapper images. They reported a loss of forest and mangrove cover in a fast-developing region known as Iskandar Malaysia in the South of Peninsular Malaysia, from 1989 to 2014. According to them, forest cover decreased by as much as 65 percent between 1989 and 2000, and then stabilized until 2014. Meanwhile, mangrove cover declined by 33 percent since 1989. Similar forest cover changes were also detected in other states in the North of Peninsular Malaysia. Wan Mohd Jaafar *et al.* (2020) reported a forest cover loss of 9 to 16 percent over a period of 29 years (1988-2017), which increased the surface temperature and decreased vegetation density. Such studies aim at providing scientific data on the trend of forest cover changes at local scales to support natural resources' protection.

Analyzing the spatial patterns of above-ground biomass (AGB) and carbon stock in primary forests is crucial for conservation efforts. Data on AGB and carbon stocks are also essential for harnessing forest climate mitigation potential. The Royal Belum forest reserve located in the Northern part of Peninsular Malaysia covers an area of 117,500 ha. It is one of the largest VJRs in Malaysia. A survey conducted in this forest revealed that it contains the highest mean AGB values (293.16 t per ha) compared to other forests in Malaysia, tropical Africa and tropical Bazilian Amazonia (Kanniah *et al.*, 2017). This shows that the Royal Belum forest reserve is an important carbon reservoir. The AGB of *Intsia bijuga* species, *Koompassia malaccensis* species and *Shorea* genera were comparatively higher, owing to their greater wood density, tree height, and diameter at breast-height. This result is all the more important because some of these species are categorized as threatened species. Omar *et al.* (2017) mapped the AGB of lowland, hill, and upper hill forests in peninsular Malaysia using ALOS-PALSAR and Sentinel-1A[78] satellite data. They found that more than 50 percent of the study area contained AGB between 300 and 400 t per ha. The largest amount of AGB was found within the national parks which are

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[76] ALOS (Advanced Land Observation Satellite) was launched in 2006 by Japan Aerospace Exploration Agency (JAXA). ALOS-2 was launched in 2014. PALSAR (Phased Array type L-band Synthetic Aperture Radar) is an active microwave sensor, imaging the Earth day and night, regardless of atmospheric weather conditions. See: https://www.eorc.jaxa.jp/ALOS/en/about/palsar.htm

[77] The Landsat-8 Operational Land Imager (OLI), provides high-resolution images in the visible, near infrared, and short-wave infrared portions of the spectrum. See: https://landsat.gsfc.nasa.gov/landsat-8/operational-land-imager

[78] The Sentinel-1 mission is the first of the five missions developed by the European Space Agency as part of the Copernicus programme. It comprises a constellation of two polar-orbiting satellites (Sentinel-1A and 1B), using C-band synthetic aperture radar to acquire satellite images day and night, regardless of the weather. See: https://sentinel.esa.int/web/sentinel/missions/sentinel-1

still intact, including in the Royal Belum State Park. Lower amounts of AGB appeared near forest edges, more subject to human interactions.

In a recent study, Yu *et al.* (2021) utilized ALOS PALSAR data, at a 100-m resolution, to monitor oil palm plantations' expansion from 2007 to 2018 and to detect if any protected and conservation priority zones are intruded by oil palm plantations. They showed that, in 2018, more than 50 percent of oil palm plantations occurred within areas covered by level-1[79] of conservation priority zones, especially in Indonesia, Malaysia, and Thailand. Interestingly it was found that 231 protected areas were encroached by oil palms including within some national parks. Such results have important policy implications for primary forest conservation and sustainable development.

Assessing changes in forest cover, above-ground biomass and other biophysical properties of primary forests in Malaysia are essential for identifying ecologically vulnerable areas and, hence, formulating conservation strategies to protect them from further anthropogenic pressures. Conserving these ecosystems is vital for addressing natural disasters, climate change, water security and biodiversity protection.

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Conservation priorities for native Asian tree species from a multi-threat assessment

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Tree species and their populations respond to threats differently, depending on their functional traits and genetic composition. Understanding the diversity of these responses helps assess the vulnerability of forest ecosystems to threats, as well as impacts on the provision of ecosystem services. In particular, species-specific assessments help predict the impacts of climate change, which cannot be easily assessed at ecosystem level because of the diversity of species' responses. However, such assessments require knowledge on the distributions and traits of tree species, which is lacking for the majority of native tropical tree species in South and Southeast Asia (Serra Diaz *et al.*, 2017).

We carried out an assessment of the vulnerability of 65 native Asian tree species to multiple threats, including habitat conversion, overexploitation, fire, overgrazing and climate change. The study species were identified using country priority species lists and validating these with a regional network of experts. Criteria for species selection included that the species should be socio-economically important and that they should occur naturally in more than one country, to help understand the needs and opportunities for cross-country collaboration to conserve, restore and sustainably use these species.

Once the species were selected, we compiled data on their occurrences through an international network of over 50 experts and partner organisations, as well as from literature and from existing global databases such as the Global Biodiversity Information Facility (GBIF)[80]. Occurrence data were quality-checked to exclude, for example, occurrences that fell outside of the species natural ranges or that were from botanic gardens or other planted populations. We also collected information on the species' uses, and on their traits (such as growth rates and seed dispersal), that affect their sensitivity to threats. We then used the occurrence data to model the current and future distributions of the species and compared these to global and national datasets (e.g., on land cover change, human population density and fire incidence). Lastly, we combined the information about the species distributions, threat exposure and sensitivity to arrive at species-specific vulnerability maps for each species and threat across their ranges (**Figure 1**). For more details on the methodology, see Fremout *et al.* (2020).

The assessment covers 17 countries in tropical and subtropical Asia that together form the Indo-Malayan floristic realm, namely Bangladesh, Bhutan, Brunei, Cambodia, China, India, Indonesia, Lao PDR, Malaysia, Myanmar, Nepal, the Philippines, Singapore, Sri Lanka, Thailand, Timor Leste and Vietnam, to which we added Papua New Guinea from the Oceanian realm. This is also the area that the expert network 'Asia Pacific Forest Genetic Resources Programme' (APFORGEN)[81] was able to assess, in terms of accurate species occurrence points and detailed knowledge on the distribution of important tree species. We included Papua New Guinea in the spatial analysis for greater continuity because several of the study species that occur in Indonesian West Papua have continuous distribution across the border with Papua New Guinea. Several of the study species also occur naturally outside the 18 study countries, including in Africa and the Pacific Islands, but these areas were excluded from the analysis.

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[80] A global platform providing free and open access to biodiversity data. See: https://www.gbif.org/
[81] See: http://www.apforgen.org/

Figure 1. Species vulnerability maps
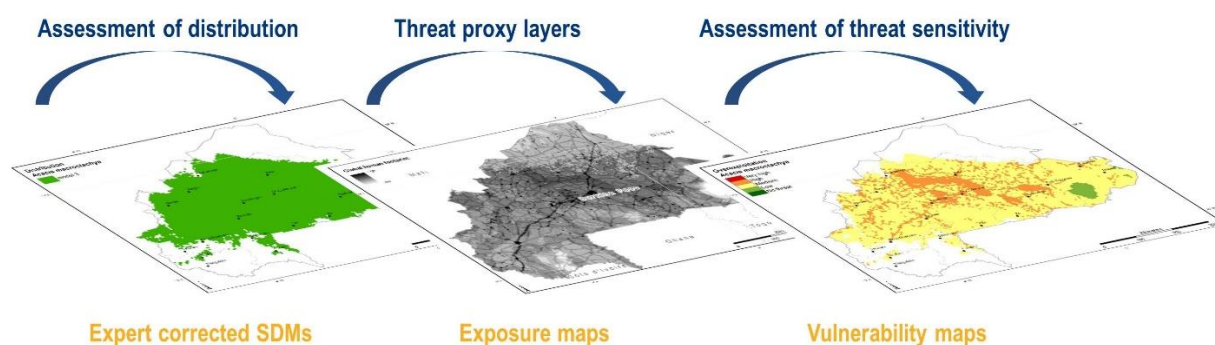
Species vulnerability maps are developed through combining maps of modelled species distributions, spatial data layers on threats such as habitat conversion and fire, and information on the sensitivity of individual species to these threats (adapted from Gaisberger et al., 2017). SDM = species distribution modelling.

The results indicate that all studied species are highly vulnerable to at least one of the studied threats in, on average, more than half of their natural ranges. We recommend intensifying primary forest conservation efforts, in particular in Northern Tenasserim rainforests between Myanmar and Thailand, as well as in the Borneo lowland and montane rain forests in Kalimantan, Indonesia. These are areas where the distributions of a high proportion of the study species coincide with natural, relatively undisturbed forests that are currently not formally protected. At the same time, these forests in Kalimantan are also the most vulnerable to climate change for the studied species diversity. Overall, species' vulnerability to climate change varies widely, with some species being at risk of losing over 40 percent of their current habitats as a result of climate change by 2050, while other species are predicted to be little affected or may even benefit from the changes.

The detailed results of the study will be published in 2021 and will be available on the website of APFORGEN. A new *Tree Diversity* data portal[82] is under development. As of April 2021, the portal is already operational and new distribution and threat maps are added regularly.

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[82] See: https://www.tree-diversity.org/

4.2   Organization of the breakout group discussions

Participants were split in three breakout groups. In each breakout group, a chairperson was chosen to moderate the discussion and report to Plenary. Each chair was assisted by a rapporteur. The discussions focused on the following guiding questions.

Guiding questions:

During the inception workshop, participants suggested that the priority areas for primary forest conservation are defined according to the following criteria: (i) size; (ii) level of importance (ecosystem environmental value and uniqueness, ecosystem social, economic and cultural values); (iii) level of threats.

1. How can the three abovementioned criteria be applied concretely to the different types of forest identified during the previous session, with the view to define priority areas and guide political action for primary forest conservation in the region?

2. Crossing threats (**Session 2**) and forest types (**Session 1**), can you identify priority areas for primary forest conservation, considering the diversity of situations in the region?

Expected outcome:

By crossing forest types (**Session 1**) and level of threats (**Session 2**) each group was expected to identify priority areas for primary forest conservation, illustrated by examples representative of the diversity of threats and of primary forest types encountered in the region.

4.3   Breakout groups: reports to Plenary

This section summarizes the main points of the discussions held in each breakout group during **Session 3**. More detailed notes of these discussions, as shared by the rapporteurs, can be found in **Appendix 3**.

Breakout Group 1

Chair: Russell Warman.
Rapporteur: Anne Branthomme.

The definition of priority areas for primary forest conservation in the Asia-Pacific region should be guided by an overall vision (what do we want to preserve) and identify those areas where conservation measures are most likely to be effective (prioritization needs to consider not only values, but also the likelihood that our efforts succeed in generating positive change).

In particular:

- Engagement of all stakeholders, including policy makers and communities is needed to agree on criteria to be used and on areas to be conserved, and to avoid or limit conflicts.
- Regarding the minimum size criteria:
  - Though there is no consensus on the critical size to be applied, the size of primary forest patches should be large enough to sustain biodiversity value and ecological processes.
  - Protection of larger patches (vs. smaller patches) can be more effective. However, small patches can also be important, in particular in degraded landscapes, to protect particular species or ecosystems (e.g., mangroves), and should not be disregarded.
  - Fragmentation is very context specific: configuration, composition (different forest types), isolation, connectivity, corridors should be considered. Also, the landscape context of primary forest patches is important, to ensure effective protection and limit edge effects.

- Existing geospatial datasets can be used to identify the level(s) of importance and threats, recognizing that there is still a lack of data at local and regional levels on, e.g., endangered species.
- Overlaying forest typology (at a fine scale) and identifying the best remaining parts of each of those forests, and which parts of these patches are most at risk would be a practical way forward.
- We need to recognize that priorities and needs can differ among stakeholders. In particular, the needs of local indigenous people must be taken into consideration.
- The status of ownership and rights as well as the cost-effectiveness of protection measures should be considered as criteria to support the prioritization.

Breakout Group 2

Chair: Mike May.
Rapporteurs: James Roshetko, Nathanaël Pingault.

The group reviewed the three criteria suggested to identify priority areas for primary forest conservation.

1. Size

"How small is too small"? as Robert Nasi asked in his intervention. The answer to this question lies in the connectivity existing among the remaining fragments. Smaller areas of primary forest clustered together could, or even should be prioritized, particularly if corridors linking them can be developed, providing mutual conservation support.

2. Level of importance (ecosystem value and uniqueness)

As highlighted by Robert Nasi, logged-over forest may still contain most (up to 99 percent) of the original species and conserve many characteristics and functions of an intact high conservation value forest. Participants considered that there are many nuances to the types of forests that need to be prioritized.

3. Level of threats

Robert Nasi questioned the need to practice "triage". Participants considered that, the "level of threats" should be considered in relation with an assessment of forest status or "health". Conservation efforts should focus on "healthy" forests, whereas heavily damaged forests may not be prioritized. Conservation efforts should also focus on forests situated near large population centers, hence more impacted by human activities rather than on remote and inaccessible forests, whose geographic location already provides a form of protection.

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The group then discussed two enabling conditions to support conservation efforts, highlighting the need for:

1. Integrated landscape approaches and policy coordination

Landscape level approaches are essential for priority setting: decision-makers need to consider the bigger picture and the interactions across sectors. Hence, a forest-centric approach will likely lead to faulty priority setting. Forest conservation is not the only priority. It is thus important to ensure policy coordination across sectors (e.g., cities, agriculture, economic development, forestry, environment, etc.). This policy coherence must be sought at all scales and particularly at the landscape level where all these policies are implemented.

2. Coalitions among actors

Integrated approaches also require to bring all stakeholders around the table to agree on priorities and strategies. New coalitions of actors must emerge for forest conservation. Governments and public

agencies at different scales play a critical role in coordinating the different priorities and actors' expectations and in making all stakeholders work together. The private sector has a key role to play and is increasingly involved in biodiversity and forest conservation. In many countries, however, forests are mostly owned or managed by states which are reluctant to give more control to the private sector. The question is how to move from this old state-controlled model to a more dynamic engagement of the private sector. The group discussed extensively new financial instruments that could facilitate private investments in conservation (including payments for environmental services; green bonds; Environmental, Social and Governance – ESG - criteria; Corporate Social Responsibility – CSR -, impact finance[83], etc.).

Breakout Group 3

Chair: Hannes Gaisberger.
Rapporteur: Alexandre Meybeck.

In the assessment of priorities, the level of importance should come before the level of threats. Important areas, e.g., for birds, should be designated as conservation areas. Participants highlighted the need for clear criteria to identify conservation hotspots.

Each country has its own system to identify conservation areas. The question is how to integrate primary forests in existing conservation mechanisms, using available scientific knowledge. How to encourage countries to integrate primary forests in conservation systems?

Further identification of biodiversity rich areas outside the protected areas is required for management and conservation.

One approach is to conserve values, ecological, cultural. But the question is: how to assess these values? What are we protecting in primary forests? People are depending on them. It comes back to how we define primary forests and the importance they have for people. The question is also: what value for whom? What is particularly important is that they have value for the people closer to them who are those that can effectively protect them (or not).

Traditional and indigenous knowledge is globally recognized for its support to the principles of coexistence with Nature, sustainable use practices and conservation of forests. Community forests and sacred sites around the globe are good examples of successful and sustainable conservation practices.

Sometimes, it is very difficult to determine forest values. Each country has its own ways of doing it. Given the urgency, we may need first to conserve and then to assess the value.

Participants also noted that the designation as conservation area is not enough: implementation and law enforcement are also needed. Implementing conservation measures is sometimes difficult, particularly when the administrations in charge of productive forestry and of conservation are not coordinated.

An important question is: how to finance globally recognized values? The idea of payments for ecosystem services (PES) should be put forward.

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[83] Impact investing refers to investments pursuing a beneficial, social and/or environmental impact alongside a financial return. See for instance: https://thegiin.org/

5 Session 4. Primary forests: governance tools in the Asia-Pacific region

The objectives of this fourth session were:
- to highlight successful policies and measures for primary forest conservation that would deserve a specific attention in the roadmap;
- to identify the areas lacking appropriate governance mechanisms and the gaps in existing rules and norms;
- to identify the transformations needed in forest governance, land tenure legislation and land planning policies to fill these gaps, better prevent deforestation and forest degradation and enhance primary forest conservation in the region.

5.1 Introduction to the session

What governance for primary forest conservation in Asia-Pacific?

Alexandre Meybeck and Nadine Azzu, CIFOR/FTA.

Conservation of primary forests relies on successful policies, measures and efficient governance of forests, land-use and land planning. The purpose of this presentation is to give a broad overview of the elements that need to be considered in the governance of primary forests. What are examples of successful policies and measures? What are the gaps in governance mechanisms? What transformations are needed? The presentation will look at opportunities available through commitments to the Sustainable Development Goals (SDGs), as part of Nationally Determined Contributions (NDCs)[84], and also in the momentum of what is now called "building back better", and nature-based solutions. As has been shown in the previous session many of the threats to conservation are found outside of the forestry sector. It is thus important to consider ways to reduce these external threats and influence broader policies that have an impact on forests.

We start by considering the main actors that have an influence on forest governance. A key group is the range of public actors and institutions, including national governments, state authorities and intergovernmental organizations. At the national level, institutions and organizations relevant for forest governance vary by country. In some countries, forestry is separated from conservation, whereas in others, they are in the same ministry but are separated at the level of implementation. The private sector is another group of actors who are also important drivers of deforestation as they primarily exploit forest resources for, for example, timber extraction and transnational trade. Critical is the role of local communities and Indigenous Peoples (including community forestry, smallholders, etc.). These three categories of actors are essential and we need to understand their interest to act. But other actors are also important because they inform, influence the debates and also act: environmental non-governmental organizations (NGOs) and other civil society organizations (CSOs), academia and research.

There are numerous mechanisms, tools and instruments by which governance can promote sustainable forest management. They can be organized by levels, from international with global goals, forest instruments and initiatives, and transnational trade mechanisms, to regional and sub-regional levels, including transboundary cooperation. But most mechanisms are national, for instance: logging concessions and logging bans, legal incentives and market-based instruments, fiscal transfer mechanisms, payments for ecosystem services, land tenure rules, rules for the establishment and management of protected areas, alignment of national policies and legislation, as well as measures to ensure coherence between all these policies. Finally, local implementation is critical, including to ensure effective engagement of local communities including through Community-Based Forestry (CBF), ensure tenure security, implement institutional reform, facilitate relations between actors, prevent and manage conflicts.

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[84] Pledged by countries under the UN framework convention on climate change (UNFCCC).

There is a range of global objectives to which countries have subscribed and that may also, to a certain degree, engage private actors. These global objectives include: (i) the SDGs; (ii) the objectives of the Convention on Biological Diversity, with the Strategic Plan for Biodiversity 2011-2020 and its Aichi Biodiversity Targets, and with the Expanded Programme of Work on Forest Biological Diversity[85]; and, (iii) the objectives of the UNFCCC, with the Paris Agreement, the UN REDD+ mechanism, as well as the national commitments made by countries and the plans to achieve their commitments, including the National Adaptation Plans (NAPs). One of the questions is: how these objectives, that are separated at strategic level, can come together in implementation? This may be one of the points on which some proposals could be made.

All these commitments of governments create opportunities. Governments are committed to results which they need to deliver. From this perspective, forests can become a means through which to achieve objectives. This creates opportunities for the forestry sector and those actors depending on it. They can show the contributions they can make to global objectives, the contribution they can make to the objectives of a government or a private actor and claim support to do so -whether compensation or incentive- as well as a better recognition of their role by and through their inclusion in forest governance. For example, because of the private sector commitments on zero deforestation or as part of corporate social responsibility, enterprises may now have an interest to contribute to the conservation of primary forests. The global goals, the publicity around them, the interest of consumers, and the concern of importing countries create an interest for exporting countries and for the private sector to reduce deforestation, and conserve primary forests. The question is: how can this be transformed into an interest for local actors, in the form of a better recognition in governance institutions and rules, as well as by specific incentives? This is absolutely essential to achieve efficient primary forest conservation.

Taking the example of international trade, there can be an interest to protect primary forests because of the concerns of importing countries and of consumers. What are the instruments that govern this? There is the Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES)[86]. There are some government-led instruments like the EU Forest Law Enforcement, Governance and Trade Action Plan (FLEGT)[87], the European Union Timber Regulation (EUTR)[88], and Voluntary Partnership Agreements (VPA)[89]. There are also forest certification schemes like the Forest Stewardship Council (FSC)[90], and the Programme for the Endorsement of Forest Certification (PEFC),[91] as well as certification schemes for agricultural products, including a growing number of claims and labels for "deforestation free" commodities.

NDCs can offer major opportunities to the forestry sector. FAO has conducted regional synthesis of the NDCs in Asia and in the Pacific, from an agriculture, forestry and fisheries perspective. In both Asia and the Pacific, more than 80 percent of the countries include mitigation commitments on forests in their NDCs: mainly reducing deforestation and degradation, promoting sustainable forest management and also reducing forest fires. In both Asia and the Pacific, more than 80 percent of the countries that have an adaptation component in their NDC include measures related to forests, e.g.: reducing deforestation and degradation, monitoring forest health, improving ecological connectivity, restoring ecosystem and species, controlling invasive species, and preventing forest fires. Nepal, for example, commits to decrease deforestation rate with quantified targets. There are also commitments to enhance coastal resilience and explore carbon sequestration in mangrove plantations (Timor Leste), or to reduce forest fires (Indonesia).

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[85] See: https://www.cbd.int/forest/pow.shtml

[86] See: https://cites.org/eng

[87] See for instance: https://www.euflegt.efi.int/what-is-flegt and https://www.atibt.org/en/p/100/legality-of-the-timber-trade-and-forest-governance

[88] Regulation (EU) No. 995/2010 of the European Parliament and of the Council of 20 October 2010 laying down the obligations of operators who place timber and timber products on the market. See: https://ec.europa.eu/environment/forests/timber_regulation.htm

[89] Bilateral timber-trade agreement between the European Union and a timber-exporting country outside the EU. See: https://www.euflegt.efi.int/vpa

[90] See: https://fsc.org/en

[91] See: https://fsc.org/en

NDCs are quite high-level documents with principles and commitments. Other important documents are the NAPs that all developing countries (and many others) are preparing and implementing. NAPs assess vulnerabilities and risks and identify adaptation measures to address them on the medium- and long-term. They can include more precise measures. Examples of adaptation measures, taken from NAPs, and from the adaptation component of NDCs, include: monitoring impacts of climate change on biodiversity with local communities (NAP Sri Lanka); forest fire watch and prevention (NAPs Fiji, Sri Lanka); or mangroves and coastal forests protection, restoration and sustainable management (NAPs Fiji, Kiribati, Sri Lanka, NDCs India, Vietnam). There are both measures to adapt the forests and to increase their contribution to the adaptation of other sectors. This is very important because it shows the possibility to have a kind of deal with the sector to which adaptation the forest is contributing. Mangroves are very emblematic in this respect. They are presented as a way to protect cities or rice fields from sea-level rise, and therefore cities could provide financial support for their restoration and conservation. As they reduce costs in other sectors, providing them a benefit, these other sectors should contribute to their restoration and conservation.

There is, thus, a range of opportunities to strengthen conservation and create appropriate measures for effective forestry protection. However, most of the commitments mentioned are geared towards conservation of forests in general. Very rarely do they consider specifically primary forests. This may be one of the points on which to work and make proposals. There are clear biodiversity objectives for the conservation of primary forests, but with limited funding options, and not very connected to other sectors. On the other hand, the climate change mechanisms available are economy wide, facilitating cross-sectoral approaches, and have significant funding, but they are blind to biodiversity: a forest is of interest because it sequesters carbon. Therefore, how to prioritize, in the forest conservation objectives for climate action, those forests that are more important for primary forest conservation? A second key question is: how to engage local communities to participate in the protection of their forest if they cannot benefit directly from the forest? And so, there might be trade-offs between totally protecting areas of forest and allowing some forms of interactions that, in the long run, create an interest in their protection, as part of sustainable forest management.

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5.2   Keynote address

Initiatives in biological diversity conservation of national forests in Japan

Ryosuke Ujihashi and Junichi Fujiwara, Japan Forestry Agency[92]

Japan's National Forests: Outline

Japan is one of the most-forested countries in the world, with forests covering 25.08 million hectares, i.e., about two-thirds of the total national land area (37.79 million hectares). The Forestry Agency of Japan administers and manages 7.58 million hectares of national forests, i.e., about 20 percent of the total national territory and 30 percent of the entire forest area. Broad areas of national forests are located around mountainous backbones and reservoir areas, and have important ecosystem functions to perform for public benefit, such as soil loss prevention and watershed conservation. National forests also cover a great diversity of ecosystems, include both planted forests and primeval forests serving as habitats for a wide variety of wildlife, including rare species. The various ecosystems found in national forests - including satoyama (managed forests around human settlements), riparian forests, coastal forests - interact with other ecosystems, such as farmland, rivers, and the sea. As a core of the ecosystem network covering the entire national land, national forests hold a key position for conserving biodiversity.

"Protected forests" and "Green corridors" among national forests

Protected forest

For National Forest Management, parts of national forests that are precious as a core for biodiversity, such as primeval forests and habitats for rare wildlife, are designated as "protected forests." As of April 2020, 661 sites, covering an area of 978,000 hectares, or 13 percent of the national forests, are designated as protected forests. In the World Natural Heritage sites located in Japan, Shiretoko, Shirakami-Sanchi, Ogasawara Islands, and Yakushima, 95 percent of the entire land surface is covered by national forests, most of which are designated as "Forest Ecosystem Reserve" a category of protected forests[93]. Forest Ecosystem Reserve is recognized as a guarantee to preserve the value of World Natural Heritage sites into the future.

Green corridor

A "green corridor" is a network of areas set up around protected forests to secure the wildlife passageways connecting their habitats for promoting interaction between populations and preserving species and genetic diversity. In green corridors, a great care must be paid to wildlife habitats and their environment. For instance, to secure raptors' better feeding and habitat environments, open clearing operations are conducted in dense forests, and/or broad-leaved trees growing in artificial forests are deliberately preserved. As of April 2020, 24 green corridors have been set up, covering an area of 584,000 hectares, or 8 percent of the entire national forest.

Forests designated as protected forests or green corridor will be monitored and be assessed by the Committee for Administration of Protected Forests[94].

The protected forest system in Japan: its history and revision

History from inauguration to the present

The protected forest system was set up in 1915. It was an epoch-making initiative at that time. Most of the protected forests designated within 20 to 30 years after 1915 have also been designated as natural parks or natural monuments, systems that were set up later. In 1989, some modifications were made to the system of protected forests, with the concept of "zone category" adopted as a tool for protection and administration,

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[92] The English website of Japan Forestry Agency is accessible here: https://www.rinya.maff.go.jp/e/

[93] For more information, see: http://kyushu.env.go.jp/okinawa/amami-okinawa/plans/area/index-en.html

[94] The Committee for Administration of Protected Forests is established to consider the setup, amendment, elimination, management and monitoring of protected forests, as well as the conservation of biodiversity related to the protected forests. The committee is composed of experts on forest, forestry, and natural environment, relevant local governments, and other parties appointed by the Director-General of the Regional Forest Office.

connecting the two categories to popularize the zoning idea of protected areas. The "Forest Ecosystem Reserve," one of the new zone categories introduced at that time, is also recognized as a mechanism working to preserve the value of the World Natural Heritage sites and UNESCO Biosphere Reserves into the future. Almost the entire land area of the World Natural Heritage sites in Japan, Shiretoko, Shirakami-Sanchi, Ogasawara Islands, and Yakushima, has been designated as protected forest.

As of April 2020, 661 sites covering an area of 978,000 hectares are designated as protected forests.

As seen above, the system of protected forest has gone through several modifications for adapting to the times to clarify which part of the forests should be developed and which should be protected. It has been serving as a model of forest management that enables forest management and conservation to go together, one of the successes it has achieved so far.

Revision of the protected forest system

The protected forest system has so far greatly served to protect primeval natural forests and precious wildlife. The Expert Council on the Protected Forest System and Other Initiatives[95], set up in June 2014, met several times by February 2015 to review and sort out issues concerning, among others, designation of protected forests, and challenges to address for protection and administration. The protected forest system was revised in September 2015, based on a report provided by this council and considering the growing interest of people in biodiversity and the accumulation of scientific knowledge built up through research, both remarkable in recent years.

As part of this revision, several new zone categories and biodiversity conservation methodologies, such as "restoration," were designated to support simpler and more efficient administration.

The categories of protected forests have been replaced by a more concise and effective classification, focusing on forest ecosystems and related wildlife populations. The former seven categories have been restructured to three:

- "Forest Ecosystem Reserve," primeval natural forests representative of climates or forest zones observed in Japan;
- "Biocenosis[96] Protected Forest," for forests with an endemic biological community; and,
- "Rare Population Protected Forest," for forests providing habitat to rare wildlife.

New methodologies were adopted for the treatment of protected forests in line with advances in scientific knowledge on conservation of biodiversity. In Biocenosis Protected Forests, "restoration" has been admitted as a biodiversity conservation method. In forests that have lost their self-sustained rehabilitation capacity, long-term forest operations are implemented, according to experts' opinions based on their scientific knowledge, to restore biocenoses composed basically of their potential natural vegetation. For Rare Population Protected Forests, when a specific species to be protected needs, for its survival, a group of other populations (meta-population) whose habitats are located as enclaves around a core forest, these can be included as part of the protected forest for preserving and managing the overall population in an integrated manner. When any disturbance, such as temporary appearance of bare area, needs to take place through the process of transition, necessary forest operations can be conducted to create such environments.

The scheme for administration of protected forests has been made more efficient by consolidating several existing committees into the Committee for Administration of Protected Forests, a unified organization set up for each of the Regional Forest Offices, with subcommittees created when needed. Greater effectiveness and efficiency have been achieved in protected forest monitoring by allowing different intervals to be set between surveys, depending on each forest specific conditions.

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[95] The Expert Council on the Protected Forest System is a panel composed of academic experts to review and organize the current status and issues of protected forests related to their conservation and management.

[96] The biocenosis - also called biotic, biological or ecological community - designates the interacting organisms living together in a given habitat (biotope).

Seven categories of protected forests used before the reform, including "specific topography protected forest" and "hometown forest," will be reclassified in the new three categories in a few years, based on opinions of experts.

Under the new scheme, the Forestry Agency of Japan have registered its protected forests to the IUCN international database[97]. The agency will continue to work for biodiversity conservation in national forests, striving specially to reform the way national forests monitoring surveys are conducted, with the aim of making the Agency's effort better understood by the people and recognized by the international community as endeavouring to protect and administer protected forests in an appropriate manner.

Further reading

> **Japan Forestry Agency (JFA).** 2019. *State of Japan's Forests and Forest Management.* 3rd Country Report of Japan to the Montreal Process. July, 2019.
> https://www.maff.go.jp/e/policies/forestry/attach/pdf/index-8.pdf

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[97] The World Database on Protected Areas (WDPA) is the most comprehensive global database on terrestrial and marine protected areas (see: https://www.iucn.org/theme/protected-areas/our-work/quality-and-effectiveness/world-database-protected-areas-wdpa). Japan Forest Ecosystem Reserve corresponds to IUCN category Ib; Biocenosis Protected Forests and Rare Population Protected Forest to category IV; and Green Corridor to category V.

5.3   Expert presentations

Rao Matta (FAO) introduced the three experts, hailing from different countries and organizations, and invited them to discuss issues related to forest governance, based on their own experience.

Policies and Directions for Primary Forest Conservation in Lao PDR

Vongvilay Vongkhamsao, Director of the Forest Science Research Centre,
National Agriculture and Forestry Research Institute (NAFRI),
Ministry of Agriculture and Forestry (MAF), Lao PDR.

This document provides an overview of current forest conservation policies in Lao PDR. It describes government's target to increase forest cover, policy and legal documents, key achievements of policies implementation during the past five years 2016-2020, challenges faced and future directions.

The Government of Lao PDR's 8th Five-Year (2016-2020) National Socio-Economic Development Plan (MPI, 2016) recognized that forests are vital for sustainable socio-economic development as the Government of Laos adopted a Green Growth Development Policy[98]. By 2020, the Lao Government targeted to increase forest cover at 70 percent of the total land area, that is about 16.5 million hectares, including 8.2 million ha of protection forest; 4.7 million ha of conservation forest, 3.1 million ha of production forest and 0.5 million ha of plantation forest.

Policies and legal documents

The Government of Laos has developed a number of policies and regulations to support sustainable forestry development, including the following.

Forestry Strategy 2020

The overall objective of the Forestry Strategy 2020 (MAF, 2005) is to contribute to achieve the indicative targets of the national socio-economic plans, to provide goods and services to the economy and the society, to reduce dependence and increase concrete efforts to manage sustainably the country's natural resources.

Prime Ministerial Order No.15 (PMO 15)

The Prime Ministerial Order No.15 (PMO 15)[99] suspended the export of unprocessed wood products from natural forests, and thus played an important role in the reduction of timber harvesting from natural resources, illegal logging and timber movements.

Land Law

The purpose of the recently amended Land Law is to ensure the effective protection, development and proper use of land, and to improve people's livelihood, ensuring peace, social order, social security and justice, thus contributing to national socio-economic development, sustainability, environmental protection and national security of the Lao PDR (Article 1, Law No. 70/NA dated 21 June 2019)[100].

Lao National Green Growth Strategy 2030

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[98] See: https://www.worldbank.org/en/news/press-release/2017/05/31/lao-pdr-to-adopt-green-growth-with-world-bank-support
[99] See: https://www.ecolex.org/details/legislation/prime-ministers-order-no-15pm-on-strengthening-strictness-of-timber-harvest-management-and-inspection-timber-transport-and-business-lex-faoc170814/; or http://extwprlegs1.fao.org/docs/pdf/lao170814.pdf
[100] See: https://laolandinfo.org/wp-content/uploads/2020/09/Land-Law-No70-21.06.2019-Eng-unofficial-Translation.pdf

The overall objectives of the "National Green Growth Strategy of the Lao PDR till 2030" [101] are: to increase efficiency, effectiveness, and suitability of natural resources use; to reduce economic risks and vulnerability; and to reduce pollution, wastes and greenhouse gases emission.

Key achievements of policies implementation

During the past five years (2016-2020), many achievements have been reached, including the following:

- according to the Forest inventory 2019, forest cover has already reached 62 percent, a 4 percent increase in 4 years (2015-2019);
- completed Management and Development Plan for the 3 forest categories;
- 174 conservation forest areas, including 24 national sites, were identified and established for a total area of 4.8 million ha;
- 139 protection forests were identified and established, for a total area of 7.9 million ha;
- 51 production forests were established for a total area of 3.1 million ha;
- Tree plantation and forest restoration have been promoted to increase forest cover and reduce pressures on natural forest resources. About 500,000 ha of forest plantation have been established.
- Three conservation forests have been approved and accepted as national parks. One conservation area has been proposed to be a world natural heritage site and another one as an ASEAN heritage site.
- Since the Government issued PMO 15 on banning export of unfinished forest products from natural forests, illegal forest land occupations, as well as illegal logging and transportation operations, have decreased dramatically (by nearly 70 percent).

Overall Challenges

Increasing forest cover raises many challenges, among which:

- conversion of forest area to other land uses: agriculture plantation, commercial tree plantation, resettlement, infrastructure construction, mining and other socio- economic development;
- unclear resource and land tenure;
- incomplete land use planning;
- lack of coordination among sectors and scales (central and local) on land use approval;
- challenges in law enforcement and governance.

The Future Directions for increasing Forest Cover

Based on Forestry Strategy 2020, the Plan sets a major target to increase forest cover at 70 percent of by 2030 by focusing on the following major areas:

- Maintain and improve the quality of current forests.
- Restore degraded forests both inside and outside the three forest categories.
- Support the expansion of industrial tree plantations for sustainable market supplies.
- Preserve endangered plants and wildlife species including their unique habitats, and establish a fair benefit sharing mechanism for forest resources management.
- Strengthen Forest law Enforcement and Governance (FLEG).
- Participatory land use planning at the village level with focus on agro-ecological zoning.
- Policy reforms and strengthening of interagency cooperation.

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The role of Asian Forest Cooperation Organization (AFoCO)
to support primary forest conservation in Asia and the Pacific

Ricardo Calderon, Executive Director of AFoCO.

As the world faces the compounding challenges of climate change and pandemic risks, the international community is continuing its collective efforts to contribute to achieving the Sustainable Development Goals (SDGs). Asia is laden with rich forest resources. Still, it remains very vulnerable to the threats of climate change and forest degradation due to socio-economic and environmental pressures caused by economic growth and natural disasters.

The Asian Forest Cooperation Organization (AFoCO)[102] was established in April 2018 as an intergovernmental organization to promote cooperation towards achieving shared sustainable development goals and regional and global forestry objectives. AFoCO aims to contribute to the global goals of increasing forest cover and implementing the Paris Agreement on climate change through action-oriented practices.

Since its initial phase, AFoCO is committed to facilitating the transfer and translation of proven technology, best policies and experiences into site-specific actions where it is most needed. Through its member-driven approaches, various contextualized projects have been developed and implemented to achieve its mission.

These include promoting sustainable forest management practices, maintaining healthy ecosystem services, addressing climate change and its impacts through REDD+ initiatives, forest landscape restoration, and building resilience of forest and communities against forest-related disasters like forest fires. In over 30 project sites, more than 4,500 ha of forest are restored and managed. AFoCO implemented participatory forest management for empowering local communities in 42 community forests in Member Countries. AFoCO programs and projects also promoted ecosystem services in 8 model forests, contributed to livelihood improvements through forest-based activities in 46 villages, and strengthened the institutional framework of the members by supporting improvements of national forest policies and laws.

To address capacity development needs in the forest sector, AFoCO established the AFoCO Regional Education and Training Center (RETC) and operates diverse capacity-building programs. AFoCO's regular training courses have benefitted nearly 6,000 participants so far. Also, 39 young forest professionals from AFoCO member countries participated in AFoCO's capacity-building programs such as: the AFoCO's Scholarship Program, Fellowship Program, and the Science and Technology Exchange Partnership program.

Historically, forests in Asia and the Pacific have been largely subjected to intensive harvesting and conversion to agricultural purposes after the colonial and post-colonial industrial periods in mid-20th Century. Though the region's forest area has increased since 1990s through the pioneering efforts of many state leaders, primary forests in the region are still declining in terms of both extension and quality. Continued illegal logging, forest conversion for agricultural expansion or infrastructure development can be viewed as explicit drivers for these changes. At the same time, state policies and governances need to be scrutinized to see if they are enabling and supporting the conservation of ecologically and environmentally significant primary forests.

In addressing these challenges, AFoCO will continue to support enhanced regional cooperation in the following key areas of action:

1. Providing a platform for exchange of expertise and technical cooperation in areas of forest restoration and rehabilitation through the implementation of Regional Projects and Landmark Programs.
2. Strengthening forestry institutions and enhancing forest governance through capacity-development programs for forest policy-makers, technical forestry practitioners and researchers in the forestry sector to contribute to the sustainable management of forests and address climate change and societal challenges.
3. Contributing to poverty reduction and resilience of upland and forest-dependent communities through investment in sustainable and economically viable livelihood country projects.

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[102] See: http://afocosec.org/

4. Promoting private sector participation and investment in forest resources management through our Fund Mobilization Program and Partnership Program.
5. Expanding our partnership in restoring Asian drylands and drought prone areas in Southeast Asia, South Asia, East Asia and Central Asia through our Landscape Partnership Asia, in partnership with CIFOR-ICRAF, and Global Evergreening Alliance.
6. Raising the level of awareness of the private and public sectors and of the youth on the importance of forest resources through our intensive information sharing and education campaign

Furthermore, as a formal regional body, AFoCO will continue to enhance cross-sectoral cooperation and coordination among member parties and partner institutions on the management of forests for the sustainable production of goods and ecosystems services, biodiversity conservation, and climate change mitigation.

About AFoCO:

Vision and mission

AFoCO envisions a greener world, promoting our common ideals for humanity, through strengthening forest cooperation, fighting climate change to improve human well-being, and to protect the environment.

Under the broader scope of climate change impacts, AFoCO will promote and undertake realistic action-oriented forest cooperation programs and projects to achieve its mission. AFoCO works to support sustainable forest management, rehabilitate degraded forest land and prevent deforestation and forest degradation. It also explores common interests and positions among the member states as a unique intergovernmental organization in the forest sector.

Member States

Currently, AFoCO gathers 15 Member States, including 13 Parties and 2 Observers:

- Parties: Bhutan, Brunei Darussalam, Cambodia, Indonesia, Kazakhstan, Lao PDR, Mongolia, Myanmar, the Philippines, Republic of Korea, Thailand, Timor-Leste, and Vietnam.
- Observers: Malaysia and Singapore.

Institutional Arrangement

AFoCO has two institutional organs, namely the "Assembly" and the "Secretariat". The Assembly is the policy-making body comprised of the representatives of all Member States. The Secretariat, headed by the Executive Director and located in Seoul, Korea, is responsible for implementing its policies and strategies. The current Executive Director is Mr. Ricardo L. Calderon from the Philippines. The Vice Executive Director is Mr. Sunpil Jin from the Republic of Korea.

Strategic Priorities

AFoCO will continue to develop and implement new programs and projects under the strategic priorities presented below:

a. Initiating customized reforestation models
b. Research and development in climate change adaptation approaches
c. Introducing technology in managing forest-related disasters
d. Local livelihood improvement and community-based small enterprise development
e. Strengthening organizational capabilities and regional actions

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<u>Sustaining tropical timber trade: ITTO's roles in preventing illegal logging and supporting primary forest conservation in Asia and the Pacific.</u>

Tetra Yanuariadi and Steven Johnson (ITTO, Japan)

The International Tropical Timber Organization (ITTO)[103] is an intergovernmental organization[104] promoting the sustainable management and conservation of tropical forests and the expansion and diversification of international trade in tropical timber from sustainably managed and legally harvested forests.

The ITTO:

- develops internationally agreed policy guidelines and norms to encourage sustainable forest management (SFM) and sustainable tropical timber industries and trade;
- assists tropical member countries to adapt such guidelines and norms to local circumstances and to implement them in the field through projects and other activities;
- collects, analyzes and disseminates data on the production and trade of tropical timber;
- promotes sustainable tropical timber supply chains;
- helps develop capacity in tropical forestry.

ITTO's policy guidelines to promote SFM

ITTO's voluntary guidelines for the sustainable management of natural tropical forests, first published in 1990, were updated in 2015 to incorporate the latest knowledge and to address emerging challenges and opportunities for tropical forest management (ITTO, 2015). These voluntary guidelines provide guidance for addressing policy, legal, governance, institutional, economic, social and environmental issues in the planning, implementation and evaluation of SFM in natural tropical forests. Since its inception, ITTO has also worked with its member countries[105] to develop different policy guidelines focusing on various topics, including:

- Establishment and sustainable management of planted tropical forests (ITTO, 1993);
- Fire management in tropical forests (ITTO, 1997);
- Criteria and indicators for the sustainable management of natural tropical forests, first published in 1998, updated in 2005 and 2016 (ITTO, 2016; see also Caswell *et al.,* 2014);
- Restoration, management and rehabilitation of degraded and secondary forests (ITTO, 2002);
- Conservation and sustainable use of biodiversity in tropical timber production forests (ITTO and IUCN, 2009);
- Forest landscape restoration in the tropics (ITTO, 2020).

Many of these policy guidelines make explicit reference to primary forests: for instance, ITTO (2016) guidelines include specific indicators for reporting on the extent, policies and management related to primary forests.

ITTO is an action and field-oriented organization with more than 30 years of experience. It has funded and assisted the implementation of more than 1,000 projects and other activities addressing many aspects of SFM, such as:

- forest restoration;
- wood-use efficiency;
- competitiveness of wood products (see for instance: Oliver and Donkor, 2010);
- market intelligence and transparency in tropical timber trade and tropical timber supply chains;
- forest law enforcement and governance;
- illegal logging;
- biodiversity conservation;
- climate-change mitigation and adaptation;

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[103] See: https://www.itto.int/

[104] Operating under the International Tropical Timber Agreement (ITTA), lastly revised in 2006 (ITTO, 2006).

[105] The ITTO comprises 74 member countries across the world, including 36 tropical timber producing countries and 38 consuming countries. See: https://www.itto.int/about_itto/members/

- contributions of non-timber forest products and environmental services; and,
- livelihood of forest-dependent communities.

ITTO takes a dual approach to biodiversity conservation. First, it aims to reduce the loss of biodiversity associated with the extraction of forest products and services, particularly timber, through improved forest management. Second, it assists member countries to manage protected areas. In particular, ITTO has supported efforts to improve the management of more than 10 million hectares of transboundary conservation areas.[106] In the Asia Pacific Region, ITTO's transboundary projects are implemented in the conservation areas of Borneo (Indonesian-Malaysia) and in the Emerald triangle Complex - Thailand, Cambodia, and Laos (ITTO & CBD Secretariat, 2017). These transboundary projects are of importance for the conservation of the remaining tropical primary forests, which ITTO's most recent assessment, covering 65 member countries, found to amount to just under half of all tropical forests (Blaser *et al.,* 2011).

FAO (2020), in its latest Global Forest Resources Assessment (FRA 2020[107]), indicates that forests cover globally 4.06 billion ha, i.e., nearly 1/3 of the global land area. Brazil, DRC, Indonesia, Peru and India, all ITTO's member countries, host 21 percent of the world forest. The world still has at least 1.11 billion ha of primary forest but the area has decreased by 81 million ha since 1990 (FAO, 2020). ITTO's producer member countries, with 867 million ha of primary tropical forests (Blaser *et al.,* 2011), account for the vast majority of this important forest type globally.

ITTO and CITES[108] are jointly running a multi-year collaborative programme[109] to ensure that international trade in CITES-listed timber species is consistent with their sustainable management and conservation. The programme assists national authorities in meeting the scientific, administrative and legal requirements for managing and regulating trade in *Pericopsis elata* (Afrormosia) found in Central Africa, *Swietenia macrophylla* (Bigleaf mahogany) found in Latin America, and *Gonystylus spp.* (Ramin) found in Asia. The programme also assists the countries in developing guidance to ensure that utilization is not detrimental to the survival of CITES-listed tropical timber species. The programme has more recently expanded its work to other timber and non-timber species, including rosewoods (*Dalbergia spp.*) and African cherry (*Prunus Africana*), the bark of which is used for medicinal purposes.

Ensuring sustainable tropical timber trade

Ensuring sustainable tropical timber trade requires optimizing utilization, and improving productivity of production forests, which will, in turn, benefit conservation and protected forests, by reducing pressures and disturbances. A key requirement of sustainability is compliance with all relevant legal frameworks. ITTO began to work on forest governance and legality issues almost three decades ago to counter the negative impacts of illegal practices in tropical forests on the attainment of the Organization's objective to promote SFM.

ITTO policy work and projects, guided by the ITTO Strategic Action Plan 2013-2018 (ITTO, 2013), extended to 2021 in accordance with Decision (LVI), aim at strengthening the capacity of member countries to improve law enforcement and governance in the forest sector, and to address illegal logging of tropical timber and related trade. This Strategic Action Plan is one of the means of achieving the objectives of the ITTO (ITTO, 2006). ITTO's approach to forest governance covers the following:

- Rationalize policy & legal environment.
- Increase capacity to enforce rules and regulations.
- Improve information and knowledge base.
- Promote stakeholder participation.

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[106] i.e., areas in which two or more countries cooperate in the management, conservation and sustainable use of ecologically important ecosystems, straddling national borders.

[107] See: http://www.fao.org/forest-resources-assessment/2020/en/

[108] The Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES) is an international agreement between governments aiming at ensuring that international trade of wild animals and plants does not threaten the survival of endangered species. See: https://cites.org/eng

[109] See: https://www.itto.int/cites_programme/

The perception that illegal operations are widespread in tropical forests taints the image of the tropical timber sector in certain major import markets. Some markets have responded by introducing requirements for legality and sustainability to provide assurance for buyers and consumers. Adherence to such requirements needs verification, i.e., arrangements for testing and validating claims about legal compliance and conformity with agreed standards. ITTO works with its member countries to strengthen forest governance and verify legality and sustainability, thereby improving the credentials of tropical forest products in global markets.

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6   Keynote address: Robert Nasi (CIFOR-ICRAF)

At the end of Day 2, Robert Nasi, Director General of CIFOR, gave an inspiring talk to draw the main lessons from the first two days and provided useful insights to prepare the last day's discussion on recommendations.

Dear colleagues,

I will try to be at the same time short and challenging to keep people awake. These last two days, we focused a lot on the issue of primary forests. However, a lot of things are happening, not only within primary forests, but also at their margins or outside primary forests, that matter if we want to suggest policy recommendations for decision-makers.

I would like to leave you three questions, as food for thought. Primary or not primary? Do we need to practice triage? And, are novel forests the new primary?

Regarding the first question, primary or not primary, where do we put the threshold of human use to define primary forest? There is, of course, the question of shifting cultivation.

There is also the question of selective logging. If, in a forest once selectively logged, something like 99 percent of the species are left intact, except a few trees, should it be considered as a degraded forest, or still as something more like a primary forest? Are such forests still worth conserving? And to which extent such logged-over forests are similar to primary forests in terms of ecosystem functions and biodiversity value? We wrote a book a few years ago about this life after logging[110], and you see that in fact these logged-over forests are very often of similar biodiversity value than primary forests, as long as they have not been fully degraded. These logged-over forests can also act as a buffer to protect primary forests. Whereas, if you focus only on primary forests and consider that the rest is degraded and can be transformed in oil palm plantations, then you will have problems.

Related to this issue, how should we consider primary forests that have been disturbed by natural events? In Vanuatu or Fiji, you can find forests that have been smashed down by hurricanes and then regrow. Should we consider these as primary forests or degraded forests? I don't know – it's unclear. It certainly depends on what we grow, if it's an endemic species of the natural ecosystem.

All these questions need to be considered when trying to design policy recommendations because they have an incidence on what we are going to do, what we are going to protect, and how we are going to do it.

This brings us to the second question: do we need to practice what medical people call "triage", as doctors must do during a big catastrophe, when they have to prioritize scarce resources, thus deciding who will live and who will die? There is the same concept in conservation: is it really worth spending millions of dollars on the last white rhino, or is it better to save the thousands of black rhinos that still exist? This issue is linked to the question mentioned by Yves Laumonier in his presentation: how small is too small? When do we consider that a primary forest remnant is too small to be protected? The whole idea is: how to prioritize our scarce resources for the largest efficiency, knowing that we won't have enough money to protect everything we want to protect?

The third question, which was called in 2014 the next big idea in forest conservation, is about the value of novel forests. This is something that came initially from Puerto Rico[111]. Puerto Rico lost all of its natural forest because of sugar cane plantations. Then, sugar cane was abandoned and now the

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[110] **Meijaard, E. et al.** 2005. *Life after logging: Reconciling wildlife conservation and production forestry in Indonesian Borneo.* CIFOR and UNESCO. https://agritrop.cirad.fr/524785/1/ID524785.pdf

[111] **Lugo, A.E.** 2013. Novel tropical forests: nature's response to global change. *Tropical Conservation Science.* 6(3): 325-337. https://doi.org/10.1177/194008291300600303

country is covered again by forests naturally regrown. These novel forests are completely different from the original primary forest. However, they still contain most of the endemic flora and fauna, as well as the most iconic tree species originally present in the natural primary forest. You can find such novel ecosystems in several Pacific Islands in specific places. So, what is the conservation value of this novel ecosystem? How do we consider these novel forests in our roadmap on primary forests, and if they contain enough remnant primary forest elements, should they be conserved like primary forests?

These are the three questions I wanted to push forward and I leave them to you.

7   Session 5. Recommendations

Based on the previous discussions, the objective of this last session was to define broad areas for policy recommendations regarding (i) classification and mapping of primary forest ecosystems and of the threats they face in the region; and, (ii) governance strategies and action plans to strengthen and enhance primary forest conservation. As Vincent Gitz (CIFOR/FTA) said, these recommendations need to be forward-looking and, at the same time, both realistic and aspirational. They should contribute to address the two following questions: What is our ambition? What is required to move forward? What could be game-changing solutions?

7.1   Draft recommendations: organization of the work

Considering the key points and main insights emerging from the discussions during the first two days, the CIFOR organization team delineated six broad areas for recommendations, six broad headlines under which critical actions can take place, and suggested, for each area, a series of draft recommendations that served as inputs for breakout group discussions.

Participants were split in 3 breakout groups, each group focusing on two broad areas. The purpose of the breakout group discussions was not to spend time in drafting and fine-tuning each recommendation but to get the big ideas and to highlight what would be really new, i.e., what is already there but not so apparent in the picture. Each breakout group was moderated by a chair or two co-chairs, assisted by a rapporteur as illustrated in the table below.

Breakout groups	Chairs and rapporteurs
Group 1	Chair: Edward Game.
	Rapporteur: Vincent Gitz.
Group 2	Co-chairs Rajan Kotru and Mike May.
	Rapporteurs: Nathanael Pingault, Fabio Ricci.
Group 3	Co-chairs: Nadine Azzu and June Mandawali.
	Rapporteur: Alexandre Meybeck.

7.2   Draft recommendations for primary forest conservation in Asia and the Pacific

The challenge, during the workshop, was to craft recommendations able, at the same time, to embrace the diversity of the Asia-Pacific region and to ground/lead to concrete action plans in specific contexts. Participants were invited: to focus on disruptive or catalytic recommendations; and, to open new avenues for the future. Draft recommendations, as they emerged from the breakout groups and Plenary discussions, are reproduced below.

Some of these recommendations may not seem new. As has been pointed out, good solutions to difficult problems are not many and need to be repeated until they are widely adopted. They need to be appropriately argued, articulated and combined for specific contexts. Participants agreed that

primary forest conservation requires: (i) a compelling narrative, i.e., a shared vision and clear picture of the various values of primary forests and of the challenges ahead; (ii) a clear understanding of land tenure and responsibilities; and, (iii) efficient mechanisms to connect big funds and small projects. This will allow to: (i) align various sustainable development objectives and adopt cross-sectoral, integrated approaches, particularly at the landscape level where all these objectives need to be balanced; (ii) involve large coalitions of actors, not only those living close to forests, but also distant actors, somehow connected to forests; and, (iii) harness the potential of innovative technologies to support improved monitoring and reporting, as well as inclusive and participative governance and decision-making processes.

Overall, the originality of these draft recommendations resides more in the way they are articulated, in the key concepts they push forward, and in the means of implementation they promote. They can also contribute to raise awareness on specific points of attention, already known but that need to appear more clearly in the big picture. They are grouped under 6 broad areas of work. **Recommendation I.** focuses on the need to improve data collection, monitoring and reporting on natural forests, including primary forests, using all the means at our disposal (e.g., innovative technologies, and engagement of local actors). This improved and, where possible, real-time monitoring and reporting will contribute to improve knowledge and understanding of natural forests, and to better orient land-use planning, management and conservation efforts. It will also contribute to: increase ownership across sectors and actors (your treasure is what you measure); inform and better ground sound decisions by policy-makers and other actors; allow to better understand and address climate change impacts; contribute to prevent and combat illegal activities (logging, poaching, cross-border trafficking); identify, delineate and map priority areas for conservation (**Recommendation II**). Based on this comprehensive knowledge, a compelling narrative can be built, to raise awareness, strengthen and broaden actors' engagement in primary forest conservation through large multi-stakeholder coalitions (**Recommendation III**). Such cross-sectoral coalitions and dialogues will help: enhance policy-coherence across sectors, actors, jurisdictions and scales, especially at landscape level where it is particularly needed (**Recommendation IV**); and, align primary forest conservation with other sustainable development goals, particularly climate action and protection of biodiversity (**Recommendation V**). Finally regional and international cooperation can help address transboundary issues and support primary forest conservation through technology transfer, capacity-building, exchange of knowledge and experience between countries and actors (**Recommendation VI**). It can also help working together on common research areas

These draft recommendations will be further refined during the course of elaboration of the roadmap, considering all the feedback received. They will be illustrated, as appropriate, by case-studies showing how they can be adapted and implemented in specific contexts. *[In that regard, the paragraphs between brackets and in italic below, provide as appropriate, for each recommendation, further explanations, precisions, examples or case studies].*

I. Explore innovative ways to improve monitoring and reporting on natural forests

1. Support the uptake and upscale of innovative technologies to support real-time monitoring and data collection *[remote-sensing satellite or drone observations in inaccessible areas; acoustic monitoring; etc.]*.

2. Support the uptake and upscale of innovative technologies to improve reporting, information sharing and data analysis, and develop near-real time alert systems *[Using open cloud-data platforms integrating various information and datasets collected by different actors; Develop near-real time alert systems on forest degradation focusing on various threats; e.g., existing fire alert systems]*.

3. Support local actors and communities' engagement and participation in monitoring and data collection *[crowd-sourcing of field data; using digital technologies, such as mobile apps or open-*

data platforms, e.g., Hutanwatch, Urundata, etc.] and uptake their observations in decision-making at higher levels.

4. Clarify and harmonize national definitions, criteria, and indicators used to monitor forest status and trends *[On definitions: primary vs. intact, old growth or natural forests. On criteria: size, level of importance, including biological diversity, level of threats, etc.]*.

5. Improve transparency and replicability of reporting, in line with international processes and guidelines *[link with, e.g., ITTO guidelines or others]*.

6. Improve monitoring and reporting on tenure status and rights, including on customary and traditional rights.

7. Link such monitoring (including of social impacts) to commodity value chains, and to incentives; both to gather data and give value to it.

8. Link the data gathered through reporting to other relevant contextual information (e.g., economic, etc.), especially at country level.

II. Improve knowledge and understanding of natural forests to orient land-use planning, management and conservation efforts.

1. Dedicate increased resources to the knowledge and understanding of natural forests, their ecological diversity, status, fragmentation, dynamics and functioning, including in buffer zones

2. Integrate local and indigenous actors' knowledge; co-produce knowledge with local actors *[e.g., citizen-science initiatives at local or national level]*.

3. Acknowledge and assess the different values (environmental, economic, social, cultural, religious and existence values) of natural forests and of the ecosystem services they provide, taking into account all available knowledge, including local and indigenous knowledge.

4. Use these assessments to reflect the value of natural forests and their ecosystem services in integrated systems of environmental and economic accounting, and to better ground conservation policies and actions *[UN-SEEA: See:* https://seea.un.org/*]*.

5. Use this knowledge to define and identify priority areas for conservation, based on clear criteria, agreed nationally and grounded on sound evidence, and to orient land-use planning. *[Criteria such as: size; level of importance - including ecological value, cultural value, ecosystems services -; and level of threats]*

6. Translate this knowledge into a compelling narrative and make it available, through training and capacity-building, to all actors involved in forest management and conservation, or in activities that impact it, and to the broad public

7. Identify the key knowledge and information gaps, that need to be addressed to support land-use planning and conservation efforts, including:

   • Detailed ecological mapping of different forest types to adapt conservation efforts to the specificities of different ecosystems.
   • Coordinated studies on fragmentation and configuration of landscapes (natural forests, remnant forests and other land-uses).
   • Better and more transparent understanding of tenure.
   • Better understanding of the protected area status of different areas.

III. Build a compelling narrative and consolidate new coalitions of actors

1. Build a compelling narrative, highlighting the amazing contributions of forest to sustainable development objectives (including climate change mitigation and adaptation, protection of biodiversity and poverty reduction).

2. Adopt a cross-cutting perspective and articulate this narrative consistently: over time (integrating short- and long-term); across sectors (identifying synergies and mutual benefits and addressing trade-offs); and, across scales (from local to global).

3. Pay a specific attention to forest margins and forest borders, as the frontier of conservation, and as the thin line where most conflicts are concentrated.

4. Use this compelling narrative, as well as the related knowledge and information (maps, data, plans), to: improve transparency, raise awareness and encourage buy-in; build large coalitions of actors and strengthen ownership across actors and sectors; gain traction on the political agenda and enable policy coherence; attract funding and deliver true impact.

5. Encourage and incentivize land-owners and private actors (including remote ones) to contribute to forest conservation, through regulation, standards and incentives

6. Strengthen ownership, and encourage participation of less powerful actors, including women, youth, indigenous peoples and local communities, in forest governance and decision-making processes, and make the forestry sector more attractive to them.

7. Secure the access and use rights of local communities and indigenous peoples dependent on primary forests for their subsistence and livelihood.

IV. Ensure policy coherence across sectors and scales and promote integrated landscape approaches

1. Enhance policy coherence over time, as well as between land-use policies (forest, agriculture, infrastructures) and other sectoral policies that impact forests (energy, water, mining), at all levels (local, national, regional), and especially at the landscape level where all these policies interact.

2. Organize, as appropriate, dialogues at different scales, between foresters and relevant actors, in other sectors that impact primary forest conservation, and encourage actors in these other sectors to contribute to primary forest conservation.

3. Elaborate sustainable and integrated landscape management plans and strategies, at local and national levels, that strengthen synergies and address trade-offs across, land-uses, sectors and actors, and that articulate coherently short- and long-term objectives, challenges and opportunities.

4. Ensure that forests are recognized by themselves, not only as land reserve for agriculture and other sectors, and that forest management and conservation objectives are incorporated in broader integrated land-use planning and landscape management plans and strategies, at local and national levels.

5. Consider, in integrated land-use planning and landscape management plans, not only conservation areas but also the surrounding landscapes, as well as the need to create buffer zones and ecological corridors between forest fragments to reduce forest degradation, limit forest fragmentation and restore connectivity.

6. Mobilize sustainable and innovative finance mechanisms (green bonds, climate bonds, blended finance, impact finance) for integrated landscape management that contribute to primary forest conservation.

7. Design appropriate mechanisms to facilitate flows of financial resources towards local actors on the ground, connecting big funds, including internationally sourced, to small projects.

V. Align sustainable land use, climate action and biodiversity objectives with the conservation of primary forests

1. Promote sustainable land-use, integrating primary forest conservation, in the policies and mechanisms related to climate action and biodiversity conservation and sustainable use.

2. Recognize the contribution of primary forests to overall adaptation to climate change and integrate primary forest conservation and management in National Adaptation Plans (NAPs).

3. Take into account, in Nationally Determined Contributions (NDCs), the vulnerability of primary forests, as well as their potential for climate action, both adaptation and mitigation.

4. Recognize, in the design and implementation of the NDCs, the specific biodiversity and conservation values of primary forests, in addition to their carbon sequestration potential.

5. Ensure consistency and maximize the synergies between NDCs and National Biodiversity Strategies and Action Plans (NBSAPs).

6. Consider primary forest conservation objectives in international climate finance mechanisms to orient and prioritize funding.

VI. Strengthen regional and international cooperation for conservation and management of primary forests

1. Exchange knowledge and lessons learned across countries and categories of actors about defining, identifying and managing primary forests.

2. Transfer technologies, including for mapping, monitoring and managing primary forests.

3. Track and prevent illegal logging and illegal collection of wood and non-wood forest products in primary forests *[innovative technologies can help for wood species identification and tagging]*.

4. Facilitate capacity-development through appropriate means at regional level *[communities of practice, regional platforms]*.

5. Facilitate transboundary cooperation for conservation and management of primary forests *[e.g., peace parks]*

6. Promote international cooperation on deforestation-free commodities

7.3 Plenary discussion on recommendations

This section summarizes the main points of the discussions on recommendations, held in Plenary after the breakout groups. More detailed notes of these discussions can be found in **Appendix 3**.

Vincent Gitz (CIFOR/FTA) first invited the breakout groups' chairs to share with all participants the main points emerging from the discussion in each group, focusing on the new things that came up, more likely to attract large donors.

Edward Game, for Group 1, underlined the high value and social impact of participatory and real-time forest monitoring enabled by the upscale of innovative technologies. He also highlighted some knowledge gaps, including the need for: more detailed information regarding ecological classification and mapping of forest types; improved metrics to assess fragmentation and consider forests in broader, agricultural and mosaic landscapes; a better understanding of land tenure, customary rights, and protected areas. He made a plea to adopt a multi-scale and cross-sectoral perspective reflecting the complexity of the challenges ahead and highlighted the importance of knowledge co-production, integrating local and indigenous knowledge, and translation into storytelling. He recognized the potential of innovative technologies and citizen engagement for improving monitoring and reporting.

Mike May, for Group 2, insisted on the importance of storytelling. The first step, to build large coalitions, bring new actors around the table, attract youth in the forest sector, and strengthen policy coherence across sectors and scales, is to build a compelling narrative, a convincing communication

strategy. The next step is to identify synergies, trade-offs, and cross-cutting issues, as well as the varying perspectives, needs and interests across actors, and to find the right incentives for different categories of actors. This is a long process requiring the engagement, and ownership, of all stakeholders. Obviously, he said, governments and public actors are central in this process: the coordination between sectoral administrations needs to be strengthened.

Nadine Azzu, for Group 3, highlighted that primary forest loss might have a greater impact than other forest loss, not only for climate change, but also for biodiversity conservation and other sustainable development objectives. Therefore, primary forests should be explicitly considered in Nationally Determined Contributions (NDCs) and National Adaptation Plans (NAPs). International finance mechanisms, in particular climate finance, should consider conservation objectives when orienting and prioritizing funding. Given the huge diversity of situations on the ground, Group 3 highlighted the importance of community of practices and regional platforms for knowledge generation and sharing.

Vincent Gitz (CIFOR/FTA) highlighted a few points, emerging from the discussions, including the growing recognition of the importance of primary forests, and of the need to involve many different actors in primary forest conservation (e.g., public actors, consumers, private sector, youth, local communities, etc.), not only people living close to the forest but also very distant actors, connected to the forest through different value chains, and opened the floor for broader discussion. Thomas Hofer (FAO) identified two areas of concern that need further analysis in the roadmap. First, how to clearly earmark land tenure and responsibilities? Second, how to assess and take into account the full value of primary forests, with all their ecosystem services? As long as primary forests are considered as commons, and less valued than other land-uses, they will remain under pressure.

During the discussions, participants called for going beyond generalities and crafting operational, actionable recommendations, that can be implemented by public decision-makers, investors, and actors on the ground. They recalled the importance of clear mechanisms to assess the costs and measure impacts. Such mechanisms can help identify and attract investors with the willingness and capacity to pay.

Participants also highlighted the potential of innovative technologies, crowdsourcing and community involvement for increasing awareness and measuring real-time or near-real time impacts, thus enabling more efficient and reactive decision-making. They recalled that the issue of primary forest conservation is eminently solvable. Money is there: the problem is to deploy that money and connect properly big donors and small projects on the ground. Private sector and civil society organizations will be instrumental in that regard. They need to be involved, not only because they are major actors in their own right, but also because they contribute to build the national consensus needed for governments to push forward transformational changes.

8   Closing remarks, by Thomas Hofer (FAO)

Dear colleagues and friends,

This is the end of a very successful 3-day online workshop. Looking back over Day 1 and 2, we discussed: (1) diversity, extent and status of primary forests, (2) the threats and pressures on primary forests; (3) priorities for primary forest conservation; and, (4) governance tools. Today, we pulled together all that input to draft recommendations for primary forest conservation.

We had very rich discussions on so many different elements, but I would like to highlight for you the main keywords, heard over and over again during our deliberations in the last three days:

- Definitions and criteria;
- Critical size, corridors and connectivity to preserve the different functions of primary forests;
- Diversity of situations in Asia-Pacific in terms of environmental, socio-economic, political and institutional contexts: this diversity must be reflected in our roadmap;

- Methods and tools for prioritization are critical to identify priority areas for conservation;
- Context specificity, landscape approach: primary forests are a key component of broader landscape mosaics;
- Multi-stakeholder approaches emerge as a must in all workshops: this is a strong call to bring all stakeholders around the table;
- Values, incentives, conflicts of interest and competition (e.g., between primary forest conservation and agriculture expansion): dialogue is key to reconcile different interests and perspectives;
- Enabling environment and policy coherence are needed across the various sectors that impact forests (e.g., agriculture, environment, trade, urban planning, …);
- Youth involvement. new opportunities and new incentives would encourage youth engagement and reduce out-migration from rural areas;
- Communication (to policy-makers) and capacity-development came out as important points during this workshop.

What does all this mean now to take concrete action? How can we bring all the available evidence, shared during these three days, into concrete action at different levels (political and economic, public and private) down to the field level?

We need useful and pragmatic recommendations on the way forward. We need policy recommendations to enhance political awareness and will, as well as practical recommendations adapted to different target groups.

This workshop is only one step in the long process of development of our roadmap. We invite you to remain involved and encourage you to provide further contributions on case-studies and best practices. you are not off the hook!

This process is itself to be seen in a broader context. At the regional level, it follows up on APFSOS III, considering its different scenarios. At the global level, it has to be articulated with the FAO FRA special study presented by Anne Branthomme, as well as with global commitments and events including: the SDGs, the Paris Agreement, the UN Decade on Ecosystem Restoration, or the World Forestry Congress (WFC). The WFC, initially planned for this year, has been postponed due to the COVID crisis and should happen around May 2022 in the Republic of Korea. It will be a wonderful opportunity to showcase and further discuss what we are doing here.

More than 60 participants remained connected throughout all the three days: thanks for your perseverance in spite of a busy schedule. On behalf of FAO, CIFOR, ICRAF, and the Forest, Trees and Agroforestry (FTA) team, I would like to thank you all, participants and experts, for your time and sincerity, for sharing your wisdom and experience, and for your active contribution to the success of this workshop.

I express my thanks to colleagues in CIFOR/FTA and in FAO (James, Vincent, Nathanaël, Alexandre, Yves, Rao) for their work to prepare this workshop and for their guidance during the discussions.

Special thanks to Fabio Ricci and his support team. Organizing an online workshop with participants from all around the world is not easy (registration, orchestrating speakers, plenary discussions, breakout rooms, …). Yet they have made it seem effortless.

Good bye for now and stay tuned!

Appendix 1. Agenda of the workshop

This appendix reproduces the detailed agenda of the workshop, as circulated to all participants ahead of the workshop.

This expert workshop on primary forest conservation in Asia and the Pacific will consist of three online sessions, to be held on **23-24 March 2021,** from 13h00 to 17h00, and on **25 March 2021,** from 13h00 to 16h00 Bangkok time (UTC+7). It targets an audience of 50 to 60 regional experts, from research organizations, governments and intergovernmental organizations, the private sector or civil society organizations.

The purpose of this workshop is to take stock of the progress made in the development of the roadmap and prepare the next steps. It will be an occasion to: (i) discuss the methodology used to map primary forests in the region and the forest typology used in the study; (ii) get feedback on the general orientation of the study; (iii) discuss in more depth threats in regards to the typology with the view to identify priority areas for conservation, as well as examples of measures (case studies) in order to progress towards recommendations; (iv) discuss areas for recommendations.

To stimulate the discussions and illustrate through concrete examples the wide diversity of situations across the region, a number of experts will be invited to make short presentations (6 min) on specific realities or on specific issues of interest for the workshop.

To ensure inclusive, interactive and fruitful exchanges, most of the discussions will be realized in breakout groups. Guiding questions and expected outputs are suggested below to structure the breakout group discussions. For each breakout group session, each group is expected to provide a short (300 words) summary that will be presented by chairs to the Plenary and a longer (1-2 pages) report of the breakout group discussions that will feed the final workshop report.

This document presents a detailed draft agenda for this workshop.

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Day 1: Tuesday 23 March 2021

Introduction

13.00: Opening and welcome, by Thomas HOFER (FAO)

13.10: Introduction, by Vincent GITZ (CIFOR/FTA)
Presentation of the roadmap: work done, expected outcomes of the workshop.

Session 1. Primary forests in the Asia-Pacific region: diversity, extent and status
The objective of this first session is to confront the ecological classification and mapping of primary forests in the region with the field knowledge of national and regional experts.

13.20: Introduction, by Yves LAUMONIER (CIFOR/FTA)
- Diversity of forest types and ecological classification of primary forests in the region.
- Methodology followed to map primary forests in the region.

13.40: Keynote address, by Anne Branthomme (FAO)
Update on the FAO special study on primary forests and possible synergies with the roadmap.

13.50: Questions & Answers in Plenary (Q&A)

14.00: Expert presentations, moderated by Rao MATTA (FAO)

Short expert presentations (6 min each) will illustrate the diversity, extent and status of primary forests in different countries of the region.

Experts:
1. Li Diqiang, CAF Research Institute of Forest Ecology, Environment and Protection, China.
2. Ate Poortinga, Senior scientist for the Servir-Mekong Project, Thailand.
3. Kotru Rajan, Lead Strategist Trestle Management Advisors & Fellow of the International Centre for Integrated Mountain Development (ICIMOD).
4. Mateboto Jalesi, Fiji, Pacific Community (SPC), Natural Resources Management Advisor.

14.25: Q&A

14.45: Break

Session 2. Increasing pressures on primary forests

The objective of this second session is to go beyond general discussions and, building on concrete examples, produce a matrix identifying the different threats faced by different types of primary forest (session 1) in different contexts. This exercise will help identify the needed actions, whether in or at the margins of forest, in each situation (see session 4).

15.00: Expert presentations, moderated by Rao MATTA (FAO)

Building on the forest typology discussed in session 1, short expert presentations (6mn each) will illustrate the main threats facing different types of primary forests in different contexts.

Experts:
1. Nguyen Manh Hiep, Department of Protected Forest Management, Viet Nam.
2. Ir. Lilik Budi Prasetyo, Professor, IPB University, Indonesia.
3. Masigan Jennica, Center for Conservation Innovations Ph, the Philippines.

15h20: Q&A

15.35: Introduction to the breakout group discussions, by Yves LAUMONIER (CIFOR/FTA)
- Typology of the main threats facing different forest types in different contexts;
- Presentation of the methodology proposed to map these threats;
- Organization of the breakout group discussions.

15.45: Q&A

15.55: Breakout groups discussions

Participants split in breakout groups of about 15 persons each, including a Chair and a rapporteur. After a roundtable to introduce all participants, and considering the draft annotated outline circulated to all participants ahead of the workshop, the discussions will focus on the following questions:

Guiding questions:
3. From your experience, what are the main challenges and threats for primary forest conservation in the region?

4. How do these threats apply to the different forest types identified in session 1?

<u>Expected outcome:</u>
Each group is expected to suggest a matrix linking the different threats facing primary forest conservation to the different forest types identified in session 1.

16.55: Wrap-up and next steps, by Vincent GITZ (CIFOR/FTA)

17.00: End of Day 1.

Day 2: Wednesday 24 March 2021

<u>Introduction</u>

13.00: Opening and introduction of Day 2, by Vincent GITZ (CIFOR/FTA)

13.05: Report of Day 1 breakout groups to plenary, moderated by Thomas HOFER (FAO)
Short reports of the breakout group discussions (3 min each), by each Chair.

13.20: Q&A

<u>Session 3. Priority areas for primary forest conservation</u>
The objective of this third session is to discuss the methodology suggested by CIFOR to map priority areas for primary forest conservation in the region.

13.35: Priority areas for primary forest conservation, by Yves LAUMONIER (CIFOR/FTA)
- Methodology followed by CIFOR to map the priority areas for primary forest conservation
- Resulting maps.
- Organization of the breakout group discussions.

13.45: Expert presentations, moderated by Rao MATTA (FAO)
Short expert presentations (6min each) will focus on identified priority areas for primary forest conservation and explore the needed transformations in these areas.

<u>*Experts:*</u>
1. Edward Game, The Nature Conservancy, Lead Scientist for the Asia Pacific Region.
2. Kasturi Devi Kanniah, UTM Malaysia.
3. Riina Jalonen, Bioversity International.

14.10: Q&A

14.25: Breakout groups discussions
Participants split in breakout groups including a Chair and a rapporteur.

During the inception workshop, participants suggested that the priority areas for primary forest conservation are defined according to the following criteria: (i) size; (ii) level of importance (ecosystem environmental value and uniqueness, ecosystem social, economic and cultural values); (iii) level of threats.

Guiding questions:
1. How can the three abovementioned criteria be applied concretely to the different types of forest identified during the previous session, with the view to define priority areas and guide political action for primary forest conservation in the region?
2. Crossing threats (session 2) and forest types (session 1), can you identify priority areas for primary forest conservation, considering the diversity of situations in the region?

Expected outcome:
By crossing forest types (session 1) and level of threats (session 2) each group is expected to identify priority areas for primary forest conservation, illustrated by examples representative of the diversity of threats and of primary forest types encountered in the region.

15.25: Break

Session 4. Primary forests: governance tools in the Asia-Pacific region
The objectives of this fourth session are:
- to highlight successful policies and measures for primary forest conservation that would deserve a specific attention in the roadmap;
- to identify the areas lacking appropriate governance mechanisms and the gaps in existing rules and norms;
- to identify the transformations needed in forest governance, land tenure legislation and land planning policies to fill these gaps, better prevent deforestation and degradation and enhance primary forest conservation in the region.

15.40: Introduction, by Alexandre Meybeck CIFOR/FTA
Overview of existing policies and measures at different levels in the region.

15.55: Q&A

16.05: Keynote address, by:
- Ryosuke Ujihashi, Assistant Director, International Forestry Cooperation Office, Forestry Agency, Japan; and,
- Junichi Fujiwara, Deputy Director, National Forest Ecosystem Conservation Office, Forestry Agency, Japan.

16.15: Expert presentations, moderated by Rao MATTA (FAO)
Short expert presentations (6 min each) will illustrate various policies and measures for primary forest conservation implemented in different countries of the region.

Experts:
1. Vongvilay Vongkhamsao, Director of the Forestry Research Centre (NAFRI), Lao PDR.
2. Ricardo Calderon, Executive Director, Asian Forest Cooperation Organization.
3. Tetra Yanuariadi, International Tropical Timber Organization (ITTO).

16.35: Q&A

16.45: Keynote address, by Robert NASI (CIFOR)

16.55: Wrap-up and next steps, by Vincent GITZ (CIFOR/FTA)

17.00: End of Day 2.

Day 3: Thursday 25 March 2021

Introduction

13.00: Opening and introduction of Day 3, by Vincent GITZ (CIFOR/FTA)

13.05: Report of Day 2 breakout groups to plenary, moderated by Thomas HOFER (FAO)
Short reports of the breakout group discussions (3 min each), by each Chair.

13.20: Q&A

Session 5. Key recommendations for primary forests conservation
The objective of this last session is to draft key recommendations, directed to different stakeholder groups (public and private actors, civil society and local communities, research) at different scales, to address primary forest conservation in the priority areas for conservation identified in previous sessions, considering the diversity of situations encountered in the region.

13.35: Introduction to the breakout groups, by Vincent GITZ (ICRAF/FTA)
- Presentation of the draft recommendations
- Organization of the breakout group discussions and expected outcomes.

13.40: Breakout groups discussions
Participants split in breakout groups, including a Chair and a rapporteur. The discussions will focus on the following questions:

Expected outcome:
Based on their experience, starting from the draft recommendations emerging from previous discussions, each breakout group is expected to formulate 3 to 5 key recommendations for primary forest conservation, adapted to the different situations (forest types, threats, level/quality of governance) identified in the previous sessions.

14.40: Break

14.50: Plenary discussion on recommendations, moderated by Vincent GITZ (CIFOR/FTA)
- Short reports (3 min) of breakout group discussions by each Chair
- Q&A

15.50: Concluding remarks, by Thomas HOFER (FAO)

16.00: End of Day 3 – End of workshop.

Appendix 2. List of participants

The table below contains basic information on the experts that registered or attended to the workshop.

Family Name	Given Name	Gender	Duty country	Organization
Almoite	Clarence Gio	Male	Philippines	Benguet State University
Azzu	Nadine	Female	Italy	CIFOR/FTA
Bajaj	Megha	Female	Thailand	Asian Institute of Technology
Bounithiphonh	Chaloun	Male	Lao PDR	National Agriculture and Forestry Research Institute (NAFRI), Ministry of Agriculture and Forestry (MAF)
Branthomme	Anne	Female	italy	FAO
Brawner	Jeremy	Male	United States of America	University of Florida
Byambasuren	Oyunsanaa	Male	Mongolia	Fire Management Resource Center - Central Asia Region, National University of Mongolia
Calderon	Ricardo	Male	Republic of Korea	Asian Forest Cooperation Organization (AFoCO)
Coccia	Federica	Female	Italy	CIFOR/FTA
Diqiang	Li	Female	China	CAF research institute of forest ecology; environment and protection
Dorji	Lobzang	Male	Bhutan	Department of Forests and Park Services, Royal Government of Bhutan
Dorji	Jigme	Male	Bhutan	Department of Forests and Park Services, Royal Government of Bhutan
Finke	Anna	Female	China	Asia-Pacific Network for Sustainable Forest Management and Rehabilitation (APFNet)
Fujiwara	Junichi	Male	Japan	Forestry Agency
Gaisberger	Hannes	Male	Italy	Alliance of Bioversity International and CIAT
Game	Edward	Male	Australia	The Nature Conservancy
Gan	KeeSeng	Male	Malaysia	Asia Pacific Association of Forestry Research Institutions (APAFRI)
Gerrand	Adam	Male	Indonesia	FAO
Gitz	Vincent	Male	Indonesia	CIFOR/FTA
Hlaing	Yimon	Female	Myanmar	Forest Department
Hofer	Thomas	Male	Thailand	FAO
Hussain	Faisal	Male	Maldives	Ministry of Fisheries, Marine Resources and Agriculture
Inoue	Yasuko	Female	Japan	Forestry and Forest Product Research Institute (FFPRI)
Inthirath	Baisone	Female	Lao PDR	National Agriculture and Forestry Research Institute (NAFRI), Ministry of Agriculture and Forestry (MAF)
Jalonen	Riina	Female	Malaysia	Alliance of Bioversity International and CIAT
Kamran	Shahrukh	Male	Germany	Eberswalde University for Sustainable Development
Kanniah	Kasturi Devi	Female	Malaysia	Universiti Teknologi Malaysia (UTM)
Keenan	Rod	Male	Australia	University of Melbourne
Kettle	Chris	Male	Italy	Alliance of Bioversity and CIAT
Khine Zaw Wynn	-	Male	Myanmar	FAO
Kiczkajlo	Monika	Female	Italy	CIFOR/FTA
Kieft	Johan	Male	Indonesia	UNEP
Kong	Young-ho	Male	Cambodia	Korea-Mekong Forest Cooperation Center
Kono	Marija	Female	Canada	US Forest Service
Kotru	Rajan	Male	India	TRESTLE Management Advisors

Family Name	Given Name	Gender	Duty country	Organization
Lama	Sony	Female	Nepal	Red Panda Network
Laumonier	Yves	Male	Indonesia	CIRAD/CIFOR
Lowe	Andrew	Male	Australia	University of Adelaide
Luo	Xi	Female	China	Asia-Pacific Network for Sustainable Forest Management and Rehabilitation (APFNet)
Maharjan	Sajeen	Male	Nepal	Environment Nepal
Mandawali	June	Female	Papua New Guinea	PNG Forest Research Institute
Masigan	Jennica	Female	Philippines	Center for Conservation Innovation Ph
Mateboto	Jalesi	Male	Fiji	Pacific Community (SPC)
Matta	Rao	Male	Thailand	FAO
May	Mike	Male	Brazil	FuturaGene Suzano
Meybeck	Alexandre	Male	Italy	CIFOR/FTA
Moore	Peter	Male	Italy	FAO
Nair	CTS	Male	India	Independent Consultant
Naito	Daisuke	Male	Indonesia/Japan	Center for International Forestry Research (CIFOR)
Nasi	Robert	Male	Indonesia	Center for International Forestry Research (CIFOR)
Negi	Vikram	Male	India	G.B. Pant National Institute of Himalayan Environment, Kosi-Katarmal, Almora
Nguyen	Manh Hiep	Male	Viet Nam	Viet Nam Administration of Forestry
Nguyen	Quyen	Female	Viet Nam	Asian Disaster Preparedness Center (ADPC)
Norbu	Pasang	Male	Bhutan	Department of Forests and Park Services, Royal Government of Bhutan
Norbu	Chencho	Male	Bhutan	Independent (Self employed)
Nuanvixay	Bounta	Male	Lao PDR	Earth Systems
Ogawa	Shun	Male	Japan	Forestry Agency
Ojeda	Michelle	Female	Philippines	Department of Environment and Natural Resources (DENR) - Forest Management Bureau
Palomar	Jamila Audrey	Female	Philippines	Center for Conservation Innovations Ph
Park	Joowon	Female	Republic of Korea	Asian Forest Cooperation Organization (AFoCO)
Patriarca	Chiara	Female	Italy	FAO
Pauig	Cathy	Female	Philippines	Department of Environment and Natural Resources (DENR) - Forest Management Bureau
Payn	Tim	Male	New Zealand	Scion
Peng	Peng	Male	China	Asia-Pacific Network for Sustainable Forest Management and Rehabilitation (APFNet)
Perez	Nikko Adrian	Male	Philippines	Sangguniang Kabataan Provincial Federation of Cotabato
Phongoudome	Chanhsamone	Male	Lao PDR	National Agriculture and Forestry Research Institute (NAFRI), Ministry of Agriculture and Forestry (MAF)
Pingault	Nathanael	Male	Italy	CIFOR/FTA
Poopathiyar	Arjunan Elayaraja	Male	India	AALAMARAM
Poortinga	Ate	Male	Thailand	SERVIR-Mekong
Pouli	Tolusina	Male	Samoa	Forestry - Ministry of Natural Resources and Environment
Prasetyo	Lilik Budi	Male	Indonesia	IPB University
Rai	Arun	Male	Bhutan	Department of Forests and Park Services, Royal Government of Bhutan
Rico	Edmund Leo	Male	Philippines	Center for Conservation Innovations Ph
Roshetko	James	Male	Indonesia	ICRAF/FTA

Family Name	Given Name	Gender	Duty country	Organization
Sapkota	Lok Mani	Male	Thailand	RECOFTC
Saputra	Angga	Male	Indonesia	IPB University
Sarigumba	Maria Paula	Female	Canada	University of Saskatchewan
Sarzynski	Thuan	Male	Viet Nam	Centre de coopération internationale en recherche agronomique pour le développement (CIRAD)
Satkuru	Sheam	Female	Japan	International Tropical Timber Organization (ITTO)
Setiawan	Yudi	Male	Indonesia	IPB University
Sinha	Rakesh	Male	India	FAO
Sobhan	Istiak	Male	Bangladesh	World Bank
Tamang	Sanjaya Raj	Male	Nepal	ForestAction Nepal
Temphel	KJ	Male	Bhutan	Department of Forests and Park Services, Royal Government of Bhutan
Tenneson	Karis	Female	United States of America	Spatial Informatics Group
Triraganon	Ronnakorn	Male	ASEAN	RECOFTC
Ugyen	-	Male	Bhutan	Department of Forests and Park Services, Royal Government of Bhutan
Ujihashi	Ryosuke	Male	Japan	Forestry Agency
Vigulu	Vaeno	Male	Solomon Islands	Ministry of Forestry and Research
Vongkhamsao	Vongvilai	Male	Lao PDR	National Agriculture and Forestry Research Institute (NAFRI), Ministry of Agriculture and Forestry (MAF)
Warman	Russell	Male	Australia	University of Tasmania
Wijaya	Arief	Male	Indonesia	World Resources Institute (WRI) Indonesia
Woodgate	Peter	Male	Australia	SmartSat CRC
Wu	Shengfu	Male	China	China National Forest Products Industry Association
Xin	Alisa	Female	China	Asia-Pacific Network for Sustainable Forest Management and Rehabilitation (APFNet)
Yanuariadi	Tetra	Male	Japan	International Tropical Timber Organization (ITTO)
Yanxia	Li	Female	China	International Bamboo and Rattan Organisation (INBAR)
Yasmi	Yurdi	Male	Cambodia	International Rice Research Institute (IRRI)
Zangpo	Dawa	Male	Bhutan	Department of Forests and Park Services, Royal Government of Bhutan
Zhang	Shiyi	Female	China	Asia-Pacific Network for Sustainable Forest Management and Rehabilitation (APFNet)

Appendix 3. Extensive notes of the discussions

This Appendix reflects the rich and extensive discussions held in breakout groups during the first two days of the workshop, and in the last day's plenary session on recommendations, as reflected in the notes shared by the rapporteurs.

Day 1: Session 2. Increasing pressures on primary forests

Breakout Group 1

Chair: Russel Warman.
Rapporteur: Monika Kiczkajlo.

The discussion focused on the two following guiding questions. What are the main challenges and threats for primary forest conservation? And how do they apply to the different forest types? Participants shared their experience on the threats to primary forest conservation. There may be different types of threats, facing natural forests vs., e.g., plantations.

There is a recognition that threats are context specific. Therefore, we need a general matrix of the threats and forest types and a reflection on how to best map potential sites, looking at various forest types. Historical assessment is important to be able to monitor the threats.

When talking about primary forest conservation and related threats, we need to consider various aspects altogether, and the complexity is increasing.

For instance, the concept of frontier is important, we need to consider also that in some cases increasing forest loss, can be a result of community-land speculation.

Governance of countries is important too in primary forest conservation. National policy initiatives have a significant role, and there have been changes in policies in the past few years. Shifting cultivation is not seen in the same way in different countries.

In China, the main threat to primary forest conservation is high population density, and what goes with it, i.e., high demand for food and economic development. These development demands lead to forest land conversion. Moreover, local people living near protected areas lack awareness on definition of primary forest and conservation concepts.

Participants discussed which datasets, different from the global datasets already available, could be useful for mapping the threats on the ground.

Part of the threats is imperfect knowledge and using wrong scientific base for targeting priorities. There are discrepancies and information gaps on how countries report on primary forest. Different definitions are used at country-level for forest and primary forest. For instance, in Vietnam, natural forests are considered as primary forests. These are important issues to be addressed, based on feedback from countries.

What kind of forest monitoring and knowledge systems need to be put in place? There is a risk of misdirecting policies if we don't have these elements in place to make analysis

There are challenges around the definition of primary forests and around the stakes and objectives of primary forest conservation. Characteristics like level of disturbance or size may be separate from why we want to protect primary forest.

Edward Game pointed out that there is also a risk that all attention is focusing on primary forest but not on other patches of forest that may be under greater threat and also of greater ecological significance as they are areas with little remaining primary forest.

This was seconded by **Riina Jalonen**, who illustrated an approach that uses global ecoregion mapping: 10 percent threshold coverage of remaining forest per ecoregion, ecoregions not meeting

the threshold could be targeted for more conservation action as they may still have primary forest left that are not conserved.

Incentives for converting forests to plantations and agriculture put additional pressure on the remaining primary forests.

Among other threats over-exploitation of natural resources was mentioned. It includes exploitation of non-timber forest products, illegal logging as well as wildlife poaching and illegal trafficking. For instance, there is still a high-level of illegal trade of birds in Indonesia. All this leads to biodiversity loss.

Jennica Masigan. In China, the government is now seeing primary forest as an ecological solution, contrary to what it was in the past when large areas were cut for timber.

Regarding climate related threats, **Riina Jalonen** provided examples of species distribution modelling showing that responses to climate change vary across species. Hence, even in remote areas where many forests are still intact, climate change is a threat because it may affect species composition.

Yves Laumonier agreed that we should consider climate change impacts. However, it is all the more difficult than we don't have a lot of historical data. Hence, it is difficult to monitor changes in species composition. For instance, in Borneo, we cannot easily assess the threats related to climate change because of the lack of historical data. Lack of data, lack of knowledge, lack of capability of doing proper modelling are all important challenges. How can we develop a matrix if the values you are trying to protect are changing?

Vincent Gitz. How can we can give appropriate advice to governments? How can we link the different threats to the different forest types, to make sure the instruments properly address the main threats?

Russell Warman. Even if the region is broad and diverse, knowledge, understanding and lessons learned can still be shared across the region

Riina Jalonen. Maybe we should think about typologies instead of individual threats and identify bundles of forest types and different combinations of threats. We could use existing datasets from identified areas where you have specific combinations of threats for different types of forests, and then go back to experts and discuss the groupings with them. Looking from this system perspective makes it easier to identify solutions, if you understand how the system works, and what is the combination of threats vs. the specific vulnerabilities of the system.

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Breakout Group 2

Chair: Rajan Kotru.
Rapporteur: Nathanaël Pingault.

Rajan Kotru, as chair of the group, introduced the discussions, recalling the guiding questions and inviting participants to make short interventions, starting from their own experience and work in different sectors and considering the diversity of forest types.

Rajan Kotru. The presentations we heard focused mainly on tropical forests, I can complete, sharing my particular experience of Himalayan forests. When it comes to challenges and threats, we first need to categorize the main threats, which include: social threats, development threats (linked to the development paradigm in each country), environmental threats, forest fires, over-use by forest communities in addition to forest management deficits. We will then try to organize a matrix, linking the different threats and forest types. Certain forest types are more overused or threatened than other forest types (e.g., forests growing in remote and steep areas, probably not under serious threats).

Lilik Budi Prasetyo. Based on real-time monitoring, the most threatened forest types in my country (Indonesia) are mangrove forests, lowland forests and swamp forests. The first kind of threat is linked to economic development, infrastructure development and agriculture expansion. The second is

linked to climate change: some areas in my country are getting hotter and drier. This will impact forest ecosystems. and the biodiversity they host as wildlife habitats. This is my experience, thank you.

Shahrukh Kamran. Remote sensing is a very good monitoring and management tool when you cannot access some places. Nowadays, remote-sensing technologies make it possible to predict, monitor and depict many threats, such as fire, forest fragmentation and degradation, land use change and conversion, etc. Almost every country is working on these issues. Still there is a need to map or depict the causes creating such environmental stresses. For instance, we should work on the direct and indirect effects that warfare and conflicts of interests have on forest ecosystems and conservation hotspots. Primary forests and old-growth forests are equivalent concepts. In some countries like Nepal, militaries contribute to conservation. Military forces must be trained on these aspects. Remote-sensing can be used as a tool to monitor no-man land areas, not accessible to anyone, where primary forest ecosystems can be restored. In Vietnam, they used agent orange to defoliate all the forest and facilitate the killing of elephants. In Cambodia and Kosovo, we still have land-mined areas where people cannot enter but where wildlife can be killed. We need to create indicators adapted for remote-sensing tools. This will help create maps for policy-makers.

KeeSeng Gan. In my opinion, in Malaysia, the major threat is the conversion of forest land to agriculture modern crops (such as oil palm or durians). In Malaysia, we have permanent forests and production forests. Lowland forests and peat swamp forests are more vulnerable to agriculture expansion. Conversion to agriculture is also happening in other countries of the region. Hill forests normally gazetted as permanent forests or protected forests where logging is banned. Mangrove forests are threatened by agriculture and aquaculture activities. Eco-tourism can be developed to contribute to conservation in specific areas. These are my inputs.

Jamila Audrey Palomar. We are encountering 4 major threats here in the Philippines. First, national maps do not distinguish or classify or completely capture primary forest areas. Usually, these maps follow the IPCC classifications for land-use: they do not really capture what is happening on the ground or they are not based on ground-truth data. Another threat is that it is difficult to access high elevation areas where threats are occurring in order to validate our maps. So, for example, in an area like Mindoro Island in the Philippines, fire is occurring up to about 1,600 m above sea level. It is hard and long to access such sites due to insufficient forest opening, and it is possible to encounter hostile anti-government groups. These are issues that can be addressed or solved by remote-sensing. However, in order to reach a certain level of accuracy in maps, ground validation is still required.

Rajan Kotru. Thank you very much. Definitely, forest fires, inaccessibility (and forest opening) are major issues in some areas of dense forest where accessibility has not been created. In case of forest fire, reaching remote or inaccessible areas of dense forests can be a problem. Maybe I can bring now my Himalayan perspective. Bhutan has a very limited population, a 60 percent forest cover, and very good and functional forest policy and management concepts are in place. Massive changes are happening in the Himalaya: urbanization of the mountains is an important threat to primary forests. Lilik and KeeSeng also mentioned agricultural expansion. Global Forest Watch, in 2019, pointed to 11.9 million ha of deforestation, affecting largely primary forests, mostly due to conversion of forests to agriculture. That is not the case in the Himalayan forest except in shifting cultivation areas. Few decades back the rotation period was much longer but now it is reduced to 2-4 years because forest area has been reduced. A lot of secondary forests are growing on abandoned agricultural land (swidden agriculture areas). This of course could be part of our restoration efforts in those areas where shifting cultivation is a big issue: there are few best practices that can be somehow replicated. Although for local people shifting cultivation is kind of a traditional use, the governments think it is a big issue because every year we are losing forest cover but we do not offer feasible and workable plans for people depending on primary forests. We need plans to preserve primary forests but also for the people who depend on them. Pollution (soil, air) is another issue. Most Himalayan forests have now become dumping sites for urban garbage and waste water, leaving apart those remote forests, far from population centers, which do not need any intervention because they are very remote (in very steep and inaccessible areas). Above 3,000 m, the pressures are a little bit less. However,

transhumance is still practiced and open grazing is an important threat for Himalayan forest ecosystems. Wandering graziers go up and down in the forest ecosystem and are prolific users of primary forests. Because human population is not very high above 3,000 m, the most threatened areas are located in the intermediate Himalaya (between 1,500 and 3,000 m): these are the areas where cattle is sent for grazing, and where forest fires have become a formidable threat in the past decade. In the lower Himalaya (between 600 and 1,500 m), road density is very high, infrastructure development creates huge pressure, and tourism is peaking up and eco-tourism is not happening in a classical way. Last but not least, big hydropower investments (10, 30, 100 Megawatts) are a major threat for forest lands in all the 8 Hindu Kush Himalayan countries[112]. Some huge hydropower stations are already in implementation, others are coming up.

When categorizing those threats and challenges, we need to consider direct human impacts (e.g., fuelwood collection, livestock overgrazing, harvesting of medicinal plants in primary forests, roads, infrastructure and hydropower). But there are also indirect human impacts (e.g., climate change, pollution), for which we have not been able so far to assess how these are affecting primary forests.

Shahrukh Kamran. I have a question for Lilik Budi Prasetyo. I recently heard about the Indonesian government planning to move its capital from Jakarta to Kalimantan: how do you see this? How the road accessibility and development will affect the current state of forests in Borneo and Kalimantan?

Rajan Kotru. I guess this has also implications for the forest cover.

Lilik Budi Prasetyo. The government has already adopted the regulation and will move the capital to central Kalimantan. In East Borneo also, a new city will impact the forest cover.

Rajan Kotru. I just talked about hydropower and infrastructure development in the 8 Himalayan countries. Let me also say that most of these 8 countries (may be not Bhutan) are planning economic corridors in the mountains. These economic corridors will finally encroach into the forest lands. Some environmental groups are already raising questions. If we are able to identify challenges and threats and which forest types might get more affected (lowland, mid-land or highland forests), we will be able to make suggestions on how to design and manage these economic corridors while taking care of primary forests. This could be one very important recommendation.

Lilik Budi Prasetyo. Actually, the area is under protection forest and still a lowland forest. Forest in Borneo is still conserved: most is national park. The location of the capital is still in the lowland forest: I hope it can be managed well. The government should stick to the regulations.

Rajan Kotru. As Audrey said, inaccessibility can also be a threat, for instance in case of forest fires. There has to be a minimum set of principles as well as a minimum level of infrastructure to access the forest because we are all saying that, with climate change, forest fires will increase. Primary forests will be much more threatened if forest fires are becoming kind of a continuous problem in the next 10 to 20 years. Therefore, inaccessibility is a disadvantage. So, taking care of primary forests is not only leaving them as they are but also creating some basic infrastructure to access the forest and combat those fires. In mountainous areas, we cannot use helicopters or planes for fire management easily like in Canada and the United States of America. We need to be very relevant and context specific when it comes to fire management in primary forests.

Shahrukh Kamran. I agree, inaccessibility is a problem as well but the question is how do you strike the right balance between accessibility and its negative consequences such as overexploitation, trafficking and so on.

Rajan Kotru. Yes, I fully agree but I think there are clear models for how dense is the forest, how big is the forest and, hence, what is the minimum requirement for forest opening. This is what is lacking in the Himalaya and also lacking in some parts of South-Eastern Asia. That's a real challenge for foresters. This is a big problem in Bhutan for instance: their substantial forest cover is not accessible.

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[112] Covering, from West to East, Afghanistan, Pakistan, India, China, Nepal, Bhutan, Bangladesh and Myanmar.

We don't have such models in this context, to define the minimum level of forest opening and what should be the course of such a road if it happens. Inaccessibility is an issue and can be a threat in the future due to climate change and increasing forest fires.

Lilik Budi Prasetyo. People don't really care about global climate change and its impact on forests, which is occurring gradually. Species will move to higher locations. The question is: how to facilitate species' move? As mentioned by Yves, our forest is fragmented. How to develop corridors to facilitate the gradual move of species?

Rajan Kotru. This is a very important input.

Shahrukh Kamran. Regarding this "movement ecology", we can build movement models: some countries are working on past and future movements, in relationship with ecosystem change and degradation. And there is the specific case of areas impacted by war and conflicts.

Rajan Kotru. Both inputs are very valuable. Research is still being planned: there is very limited research in Himalaya on species movements. We need to monitor better which species (such as rhododendron and juniper) are going upwards with climate change. In the Himalayas it is difficult to disentangle direct human impacts from climate change impacts. We need to have good research and models in place to give you "hands on fire" on what is happening in terms of species and ecosystems shifts. Some observations have been made here in the Himalaya about key species and we rely on traditional knowledge on what is changing. We also know that lots of invasive species are moving upwards, hindering primary forest growth. But there is no scientific study quantifying precisely these species movements. That is a deficit, and also a threat, without the right research, we might not be able to recommend appropriate management and restoration measures.

Jamila Audrey Palomar. I would like to mention another challenge, i.e., the lack of resources to protect our primary forests, even in areas designated as sacred sites. For instance, there was a long forest fire in Bud Bongao, a sacred mountain in Tawi-Tawi Island, which is a UNESCO World Heritage site. But the protection and local government units couldn't respond to that forest fire because there was no way to bring up water to the site. That is another big challenge for forest conservation in the Philippines. Another is that, even though there are national greening programmes in order to increase forest cover, the way they are implemented introduces certain invasive tree species, disrupting or changing the ecological balance in our primary forests.

Rajan Kotru. Thank you, Audrey, for this very important input. This reminds me of yet another threat: most of the young people are moving out of rural areas. Local forest-dependent peoples, who had a vision or knowledge on how to manage these forests, cannot transmit their traditional knowledge because young generations are not interested in shifting cultivation or in local medicinal plants collection or cultivation for their livelihoods. They are moving out, going to the universities, which is in a way also good. But we are losing traditional knowledge about these primary forests. This is definitely one of the threats we should mention in our presentation to Plenary tomorrow. Traditional knowledge is threatened, although it is very crucial in managing forests (Which species was originally dominating or growing there? How they have been locally used?). In Myanmar, North-Eastern India, Bhutan, Nepal for instance, there was this concept of forest groves: this forest grove is like religious forest. 40 years ago, the religious / sacred dimension of a forest was enough to ensure its effective protection. But this is changing now, because of economic development and other overall lifestyle changes happening.

Shahrukh Kamran. I have a suggestion for policy makers. In hostile political situations, there is the example of African peace parks. We should create something like that and implement also transboundary green belts, using no-man's land to restore and create a close to primary forest without frequent disturbances.

Rajan Kotru. Wonderful idea. Peace parks are very well known, especially from the African continent. We should consider this option as a kind of minimum cooperation between some of the countries in hostile situations in several areas in Asia-Pacific. Peace parks to save or even restore primary forests

could be a suggestion/recommendation that we could share tomorrow during our presentation in Plenary, learning from experience gained in peace parks and green belts in other contexts.

I think we had wonderful discussions, sharing recommendations and experiences from different countries, as well as ideas on how to transform threats in opportunities. Things are not looking at all good for primary forests in Asia-Pacific, at least in the Himalayan countries but there are also opportunities in the next 5 to 10 years to contribute, through our recommendations, and then interface with policy-makers and practitioners to see how primary forests can be saved and restored.

The table below, drafted by Rajan Kotru after the workshop, illustrates the link between threats and forest types, as they emerged from the discussions in the breakout group:

Primary Forest Types and Threats			
Forest Type	Threats	Impacts	Recommendations
Tropical /Lowland Forests	• Agriculture Expansion in Forestland • Economic Development and Infrastructure built-up • Other Land Use Changes • Border Warfare Zones • Inaccessibility • Warring Groups in the forest • Climate Change Impacts • Lack of resources for management	• Biodiversity loss • Habitat degradation • Forest Fragmentation • Threats to Wildlife • Aquaculture degradation • Wildlife conflicts	• Real Time Monitoring of set indicators • Remote Sensing as Monitoring and Management Tool • Mapping of Hotspots • Customized Forest Opening
Mountain/Hill Forests	• Overuse for fuel wood, fodder, NTFPs etc. • Anthropogenic Forest Fires • Transhumance • Intensive Open Grazing • Urbanization • Shifting Cultivation • Hydropower projects • Soil and Air pollution • Climate Change Impacts • Infrastructure investments • Mass Tourism • Invasive species • Inaccessibility • Lack of appropriate forest management • Lack of resources for Management	• Tree species movement hindered • Invasive species moving upwards • Reduced fallow period of Shifting Cultivation • Loss of traditional wisdom • Human-Wildlife Conflicts • Labor shortage • Waste generation • Soil erosion and landslides	• Transboundary Green Belts • Peace Parks • Eco-Tourism promotion • Adapted Forest Opening • Involve Armed Forces in Conservation • Sustainable Forest Management concepts

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Breakout Group 3

Chair: Clarence Gio Almoite.
Rapporteur: Alexandre Meybeck.

What are the main challenges and threats for primary forest conservation in the region?

Rod Keenan. This is a very challenging question for such a large and diverse region. For Australia: uncontrollable wild fires occurred repeatedly these last 20 years in old growth forests; as well as invasive species outbreaks, both invasive grasses and animal species. In some places of the Asia-Pacific region, habitats are lost for infrastructures and urbanization, but this is quite well addressed by protected areas. In other places, agriculture is often a major threat. While a lot of accessible areas are already used or affected by human disturbances, mountain areas are better preserved. Roads and hydropower development are also important threats. In coastal regions, rising sea level and aquaculture represent major threats for mangroves and other coastal ecosystems.

Clarence Gio Almoite. In the Philippines a big threat is land grabbing in areas that are not protected as not all primary forests are protected. Land-grabbers befriend indigenous populations to get land. Big threats are power plants and mining.

Joowon Park. The presentations question the distinction between natural forest and primary forest. In Vietnam, they use protected areas as a proxy for primary forests. Are the threats to primary forests the same than for other forests? Is there a unique feature of primary forests that is specific?

Manh Hiep Nguyen. When FAO asked the area of primary forests in Vietnam, we needed to find a way to answer. Primary forest is untouched, we do not have untouched forests in Vietnam, only

natural forest, often linked to watershed management, to protected areas. The threats to primary forests are the same as the threats to protected areas.

Rod Keenan. In the Asia Pacific region, there are heavily densely populated areas. People rely on forests. In Vietnam, there have been conflicts that have damaged forests. In PNG, people rely on forests for subsistence: is it primary forest?

Li Yanxia. Threats to primary forests are the same than for other forests: economic development, agriculture expansion, mining. The question is whether we can manage primary forests and to what degree.

Joowon Park. Do we really need to differentiate primary forests to arrive to tailored solutions for their unique ecological features? May be, we can start from this. In many countries, the definition of primary forests does not exist. May be the real challenge is that the definition and perception is not unified but differs depending on objectives (e.g., mitigation of climate change, biodiversity conservation).

Clarence Gio Almoite. What are the exact tools and criteria to differentiate primary forests?

Rod Keenan. In Australia, we put a lot of efforts in assessing and mapping old growth forests. The definition includes a big biodiversity conservation component. It is not supported by indigenous peoples. They are actively modifying the landscape in many areas. How to provide for the protection of old growth forest value, structural diversity across the broader managed forest landscape?

Rao Matta. Ecosystem functions is the main angle. Threats vary from country to country. Shifting cultivation now threatens areas of higher elevation because more accessible areas are already cultivated. Mangroves are threatened by the development of aquaculture. There are also wild fires. In some cases, livestock is a threat to natural ecosystems. Non timber forest products (NTFP) collection can also threaten some conservation areas.

Clarence Gio Almoite. Natural forests can play a role of buffer. What is the highest risk in different landscapes?

Nadine Azzu. The notion of protected areas covers different types, with different modalities of access to land and activities, are there different threats?

Alexandre Meybeck. What is the best way to protect forests? Protect them totally or manage activities so that local populations have an interest in protecting them?

Clarence Gio Almoite. Mining companies have tactics to deal with indigenous populations. Transfer of land is a main threat. Land needs to be protected. But the process to declare a land protected can be long, e.g., in the Philippines, where it includes preliminary studies.

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Breakout Group 4

Chair: Jalesi Mateboto.
Rapporteur: Federica Coccia.

The group discussed the two following guiding questions:

1. From your experience, what are the main challenges and threats for primary forest conservation in the region?

Kasturi Devi Kanniah. Expansion of oil palm plantations is a major threat for primary forests, not only in Malaysia but also regionally. There is a study[113] looking at this expansion from 2000 to 2018,

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[113] **Yu, L., Cao, Y., Cheng, Y., Xu, Y., Cracknell, A.P., Kanniah, K.D., Lu, H., Yang, R., & Gong, P.** 2021. High-resolution remote sensing shows great conflicts between oil palm expansion and biodiversity conservation. Submitted to *Global and Planetary Change.*

comparing it with protected areas. Indonesia experienced the largest expansion of oil palm in protected areas. In Malaysia, some national protected areas have been intruded by oil palm plantations. On a smaller scale, an unpublished study looked at indigenous peoples in Malaysia – pristine area invaded by oil palm. Oil palm is still being planted. Some indigenous peoples are manipulated by plantations companies in order to have access to protected areas. Expansion of aquaculture and oil palm are also major threats for mangrove areas.

Jalesi Mateboto. Primary forest conservation faces the following challenges in the Pacific:

- Policy and regulatory frameworks: some, developed 20-30 years ago, need to be reviewed, to integrate biodiversity considerations. So far, in our countries, we generally focus on timber production rather than considering forest in its entirety, including biodiversity conservation.
- Agriculture and livestock systems and practices: some are not sustainable. Most of the threats to the forest are coming from outside the forests. Foresters need to work with other sectors (agriculture, water management, animal health). We should look at the whole landscape and adopt an integrated landscape approach.
- Technology: we are still lacking the technology that can help map areas to be protected.
- Capacity-building in countries on how they can manage their forests better: only some countries have forestry schools.
- Climate change and climatic events: cyclones destroy forests; and sea-level rise threatens coastal forests.
- Invasive species.

June Mandawali. In Papua New Guinea (PNG), land tenure is the main challenge. We have to deal with people to gain access to the forests. Many different local languages are spoken in PNG. Policy and regulatory frameworks should be reviewed. The PNG's first multi-purpose national forest inventory[114], focusing on forest and land-use change in PNG from 2000 to 2015, showed that 78 percent of the forest was still intact by 2015. Logging is a major economic activity and threatens the remaining forests. We also lack technology expertise. In Fiji, the REDD+ programme is supporting the training of foresters.

2. How do these threats apply to the different forest types identified in session 1?

Kasturi Devi Kanniah. Mangroves are threatened by aquaculture and urban development. Primary forests (virgin jungle in Malaysia) are threatened by oil palm expansion, either by big plantations companies or by local indigenous peoples. Malaysian government is trying to relocate indigenous peoples away from their native locations because they reside in protected lands. Their move means that they need more money to survive. In some villages as much as 600 hectares of forest have been cut down to plant oil palm.

Jalesi Mateboto. In Fiji, some mangroves have been cleared for development projects (tourism but also population growth). Mangroves are managed by different ministries (e.g., land, forestry and fisheries), all with different sets of policies and regulations. We need to strengthen synergies among policies across sectors.

Jennica Masigan. Synergies of policies is also a challenge in the Philippines. Slash-and-burn farming is part of indigenous communities' culture. Farming activities become destructive. Indigenous peoples suffer from lack of incentives. Forestry and biodiversity targets are not in synergy with the zones that are important for Indigenous Peoples.

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[114] See:
  Poesi, M., Piafu, M., Abe, H & Turia, R. 2018. Papua New Guinea's first multi-purpose National Forest Inventory Project. *Proceedings of a Research Conference held in Lae, Papua New Guinea, 14-15 February 2018.* NFI Project Proceedings, 188p.
  https://pngfa.gov.pg/images/articledocs/National_Forest_Inventory/Proceedings_Feb_2018_compressed.pdf

June Mandawali. In PNG, "primary forests" are called "natural forests". PNG has definitions of forest areas, with threshold values (Poesi *et al.,* 2018)[100]. These definitions may exclude some important forest areas which may have significant ecological value. These definitions should be harmonized. This session has identified primary forest but we also have mangroves, savannah.

Day 2: Session 3. Priority areas for primary forest conservation

Breakout Group 1

Chair: Russell Warman.
Rapporteur: Anne Branthomme.

The group discussed criteria to identify priority areas for primary forest conservation, including the three criteria identified during the Asia-Pacific roadmap inception workshop (July 2020), i.e.: (i) size; (ii) level of importance (ecosystem environmental value and uniqueness, ecosystem social, economic and cultural values); (iii) level of threats.

Chiara Patriarca. Engagement of all stakeholders, including policy-makers and local communities is needed to agree on criteria to define priority areas of primary forest to be conserved.

Raising awareness and improving our understanding of the importance and roles of primary forests should be a first step.

Vincent Gitz. Status of ownership and rights, as well as the underlying tenure situation of the forest should be investigated and added as a criterium.

1. **Minimum size**

Anne Branthomme. There is no consensus on the suitable / critical size to be applied, patches should be large enough to sustain ecological processes, but small patches could also be important in particular in degraded landscapes. For instance, small Mangroves patches (e.g., in South Malaysia), could also be prioritized.

Edward Game. As size is important for the biodiversity value, it would be reasonable to use size as a criterium. On the other hand, big remaining forests could be less threatened than smaller forests

Size is not only a number of hectares. It is also about biodiversity and surrounding landscapes

Beside the size, the landscape context is also important. If a small patch is entirely surrounded by crops, it has high risk to disappear, while a primary forest surrounded by selectively logged forest could be more easily protected.

Yves Laumonier. Fragmentation is very context specific. Configuration, composition (different forest types), isolation, connectivity, corridors should all be considered. It depends on the type of ecosystems as well as on scale. There has been some experiments but how to apply those at the landscape/ regional level?

Effectiveness. For some of the big actors, it might be easier to conserve big forests than a lot of small patches. What is the most effective? Small patches are almost gone, due to edge effects.

Co-management of landscape can play an important role.

2. **Level of importance**

We could rely on existing geospatial or other datasets, and on consultations with stakeholders to define important conservation areas (e.g., High conservation value forest, Important Ecological Areas).

It takes time to measure economic value, and ecological processes; experiments are difficult to implement at the landscape level.

3. **Level of threats:**

Economic value of extraction is a threat.

It is important to look at the distribution of threats across ecosystem types, as well as at the conservation value of forest fragments and the level of threat on them.

The lack of knowledge and data on, e.g., endangered species, is challenging at the local and landscape levels.

Oyunsanaa Byambasuren. In Mongolia, existing criteria include social, economic and wildlife aspects.

Kasturi Devi Kanniah. In Malaysia, there is a conflict between local indigenous peoples, residing in the pristine forest, and the local authorities / administrators who protect some areas and relocate local indigenous peoples. This is a political issue: policies and legislation must consider the needs of local indigenous peoples.

Can a forest, which has been managed by indigenous /local people for thousands of years, still be considered as pristine?

Ryosuke Ujihashi. To secure effectiveness, core areas should be connected with small lines.

Priorities differ across actors, communities, actions and objectives (priority for something or someone, production vs. nature conservancy, etc.).

Primary forest could be a priority (important value) / area of concerns at risk of loss.

Russell Warman. Signals that we send. How to get the trends reversed? Where are we going? What is the vision? How to prioritize protection efforts? This is not only about size, but also about impact (effectiveness)?

Edward Game. Concrete methods: It would be important to use something like Yves' forest typology (at a fine scale) and identify the best remaining parts of each of those forests, and which parts of these bits are most at risk. At "*The Nature Conservancy*" (TNC) we talk about these as "Last Chance Ecosystems".

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Breakout Group 2

Chair: Mike May.
Rapporteurs: James Roshetko, Nathanaël Pingault.

After a short roundtable of presentation, participants in the group reviewed the three criteria suggested to identify priority areas for primary forest conservation, in order to address the suggested guiding questions:

1. *How can the three abovementioned criteria be applied concretely to the different types of forest identified during the previous session, with the view to define priority areas and guide political action for primary forest conservation in the region?*

2. *Crossing threats (**Session 2**) and forest types (**Session 1**), can you identify priority areas for primary forest conservation, considering the diversity of situations in the region?*

Mike May. These guiding questions are very broad. Let's try to get these discussions as productive as possible. Let's start by collecting some thoughts from the group, either on question 1 or question 2.

Nathanaël Pingault. Beyond these questions and their general character, what is interesting in these breakout groups is to hear from participants' own experience, considering the diversity of situations in the region. The challenge for the CIFOR and FAO team elaborating this study is to go beyond generic statements. For that, we need concrete examples of the situations you encounter in your countries from different stakeholders' perspectives (government, private sector actors, NGOs working with local communities). This would be the main value added of this breakout group.

James Roshetko. I would agree with Nathanaël but I would like to comment on the third criteria (level of threats). While I think it is good, it should be also integrated with the concept of "triage". A primary forest experiencing a high level of threats, but still in good shape, should be prioritized. Conversely, a primary forest with a high level of threats, but already heavily damaged, should not be prioritized.

Mike May. This is a good place to start because it does raise the question of what the outcome would be. Are you going to save as much as possible? Or are you trying to take action on areas where damage has been inflected and that you try to recover? Any comments, reactions or experiences on what James said?

Shahrukh Kamran. As about level of importance, in one presentation we have seen that forest concessions and primary forests are somehow interlinked depending on how they are in the country. I suggest to shift the pressure from primary forests, that need to be conserved in priority, to forest concessions and plantations, whose exploitation can be optimized.

Mike May. I learned a lot from the presentations this morning. Yves highlighted the correlation between forest intactness and low level of risk. There are many possible reasons for that, one of which might be that much of the intact forest is intact because it is remote or very difficult to access. This means they have a good chance to stay intact. Such data would indicate that the level of threats in, e.g., some mountain regions, is lower, as far as human induced threats are concerned. This question of assigning priorities is actually very difficult to pin down to a concrete set of actions to be taken. This depends very much on geography, topography and regional influences. Any other comments: we are seeing something emerging here.

Rajan Kotru. We are talking about priorities. But forest is not the only one ecosystem in the landscape, there can be ten other ecosystems, each with its own different priorities. We, as scientists, can bring a lot of ideas but in the landscape, each sector has its own priorities that all need to be considered right from the beginning. For instance, a primary forest area whatever its size may be assigned for development in another sector in the next 5-10 years, which you don't know as a forester because you don't take that into consideration. The problem becomes that you plan nicely a map and what needs to be done and what could be the priority in this forest to regenerate its primary forest status and all that falls flat because we are not considering what is happening in the other ecosystems and what are the priorities in these ecosystems for the next 5 to 10 years.

Mike May. Very good point, Rajan, thank you very much.

Nathanaël Pingault. This point is also linked to the question of size discussed during these last two days. This is a very important question: should we focus only on the big fragments or should we consider also a network of smaller connected patches that can act altogether as a big habitat for wildlife and for high value tree species. This comment from Rajan leads us to the question of size and connectivity.

Chaloun Bounithiphonh. I agree with Rajan.

Mike May. We are gaining some momentum.

Ronnakorn Triraganon. The question is quite difficult to answer and I would agree with Jim and Rajan. Not easy to answer that question without understanding the context. And I like the idea that Rajan brought in to consider the whole landscape. We cannot work in a primary forest without looking at the other land-uses, which influence also the loss of primary forest. Otherwise, it becomes too isolated if thinking about primary forest without thinking about other land-uses.

Mike May. It is a very strong theme to this whole question. Rajan, I think you raised that in your summary this morning that, very often, at a landscape level, policies can be counterproductive. You may have an agriculture policy and a forestry policy and a very poor coordination between the different ministries. We have these questions of landscape and size and connexions but the underlying policies at a landscape level will determine whether or not you are going to have effective solutions.

Jalesi Mateboto. I do appreciate all the criteria that have been mentioned. I do agree with the contributions and comments made here regarding landscape management. I think this is one point also raised in our discussions yesterday. One thing that I would like to put on the table is that we can discuss and harmonize all these things with the commitment of the government. Because, even if we identify the forest areas that need to be protected, if the government is not really committed, forests will still be under threat. A typical example is a Pacific country that I'm aware of: they already have a gazetted protected area but, for political motives, they convert some of these reserve areas into hydro dam. This is an example how needed is government ownership and commitment for forest protection. Another thing is that we need synergies among policies. There are some countries in the Pacific where mining supersedes all other objectives. There are some areas in Fiji for example, already identified to be protected, where mining companies have also been given licenses to explore. Even if the area is declared as protected, if they find gold or minerals there, they will still mine the area and destroy the primary forest. We need to think about how we can actually best marry our drive to protect forest with the commitment of the government.

Shahrukh Kamran. I agree with Mister Rajan and Jalesi. Regarding the combination of different ecosystems in a landscape approach, it is hard to bring everyone on the same page because there are different policies for different ecosystems. We need to find a balance: as per size and level of importance, it is always better to see it in terms of landscape because structural diversity promotes different types of species in different niches. But the level of threats should rather be examined at patch level because policies and local interests are different.

Mike May. I'm very happy with the way this is going. Some clear patterns are emerging. A key thing here is these synergies and avoidance of conflicts between policies at landscape level, particularly when you have often very strong commercial interests attracting more of the attention of the government than, say, local communities' interests which have unfortunately a far weaker voice in these discussions. I think there is some hope considering the examples coming from around the world on how different actors can come together on a landscape level to make a difference. One question I would like to throw to the group here is clearly when decisions have been made about the priorities in the landscape, a key factor is finance. So, ultimately, we will come down to trade-offs in terms of opportunity, investments, costs. So, the question I would like to ask to the group is: do you have examples in your region where there has been evidence from the financial sector where they are taking the lead in looking for solutions meeting as many of the ecological, community, commercial interests? Any examples of impact finance approaches where financial bodies are putting money into projects where the main objective is not necessarily commercial? Any examples of new ways of project finance addressing this question of conflict of priorities?

Rajan Kotru. At the moment, there are two ways to see it. One thing of course is that you have a good business plan for your primary forest. Of course, this business plan must include communities. What happens at the moment is that you get those forest economists who assign a value of billions of dollars to the primary forest but local people give different values (cultural values, social values) to this forest. These different values need to be captured for support in the business plan. This relates to our second criteria (level of importance, ecosystem value and uniqueness). If you succeed in capturing the values (cultural, social, economic) that local people put on their primary forests, then you have captured a lot. But the tendency at the moment, at least in South-Asia, is to hear forest economists saying this particular forest is worth X billion dollars because it provides water, carbon services and so on. You lose the perspectives of taking local people on board. Local people are requested to evaluate the value of the forest for water, medicine plants, etc. Then, based on their micro business plans, you seek soft loans. This is one way of financing. Another way is, while you make plans for a landscape, landscape approach allows you to look into other sectors and see how they can pull resources because they have public schemes going on that can be used if properly synergized over time. The problem is that foresters are usually sitting in their silo. They don't want to look beyond their forest landscape. It's time to take other sectors on board in our plans for primary forests, using several public schemes already existing in every country. Billions of dollars are spent on

social welfare, on environmental welfare, and that can be put into such landscape business plans to save or regenerate primary forests.

Mike May. This summarizes the situation, that has been traditionally in place and that we are facing now. From my own experience, there is a move towards breaking down these silos and really tackling things on a landscape level. There are new financial mechanisms coming out: you have mentioned this German example.

Shahrukh Kamran. I totally agree with Mister Rajan. As you said, local interests, community interests, economic interests should be part of the plan. In Germany, they are teaching us not just as mere foresters but as ecosystem managers. They are teaching us ecosystem decision support systems to define the different priorities (economic, environmental) and integrate them in land-use planning and business plans at ecosystem and landscape levels.

James Roshetko. I'm a forester too and I want to reassure everyone that we are not all nasty. If corporations have concession rights to the land, there needs to be consideration about what type of compensation or rewards they will be provided if they do forego harvesting in the area. This is very important. Another thing they do in Indonesia is that a certain proportion of the concession has to be put aside for conservation. While that doesn't exactly address what we are talking about here, it can be part of the solution. In the areas that have already been converted, corporations can continue to manage these areas for timber harvesting but the areas that are still primary or pristine forests can be protected, including high conservation value forests, high wildlife value, ecological corridors, etc.

Mike May. A very significant factor in this whole balance of priorities and who get the rights and how rights are distributed comes down to the way the private sector is operating. You have given some very good examples there of the way a percentage of the concession have to go to conservation. You have mentioned Indonesia: it is exactly the same situation in Brazil where we operate and that is a very effective way of doing this. There is also, the whole question of free prior and informed consent[115] and all the other parameters that should be in place in these processes. That is bringing up some other very useful points for our discussions.

Adam Gerrand. These are quite complex and multi-dimensional questions. I strongly agree on the need for landscape-level approaches. We should be looking outside the forest. While I'm a forester and while this discussion has started on primary forest, I think we should take a step back and look at the bigger picture. Of course, there are priorities within the forest ecosystem, or areas we might see of higher value or importance. But to take just a forest-centric approach would be a lost opportunity here. We should be stepping back and looking at the landscape approach. Forests have a high biodiversity, a lot of values that need to be considered. But there are also values in grasslands and other landscapes (peatland, wetlands and so on) that need to be considered as well. So, I think we should put a strong message about the importance of landscape-level approaches and moving away from forests. We have a lot of data and information about species diversity. Naturalness is a very hard state to define. A colleague from Australia came up 15 years ago with a system called VAST (Vegetation Assets States and Transitions)[116], assessing the vegetation conditions and biodiversity values (asset), disturbance, distance to naturalness (state) and the dynamics in place and the direction towards which we are going (transition), whether worse or better. All this affect the decision you make about prioritization of that landscape. The degree of naturalness (or distance to naturalness) is another hard discussion but there is a framework with only seven classes that was very useful in Australia to define some conservation priorities, regardless of the land cover. They take grasslands as equivalent to forest for example.

Mike May. Great comment Adam. It highlights this point of how good is your baseline data when you are trying to take decisions, particularly when you are trying to set priorities. If your baseline data is

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[115] See for instance: http://www.fao.org/indigenous-peoples/our-pillars/fpic/en/
[116] See: http://data.daff.gov.au/data/warehouse/pe_brs90000004193/VASTv2Data_20100320_ap14.pdf

not going in the right direction and doesn't reflect, like you said, the dynamics of what is really there, you can take some horribly bad decisions. Definitely, I think that for the broader group as well, this VAST framework sounds as a very good approach. This comes back to question 1 on defining priority areas: again, if you don't have the right tools at disposition your priorities might not be the right one. So complex, that choosing where to start is very difficult. Obviously, you have to start with the right data.

Ten minutes left in the session. Let me just give a recap. There is a fairly broad view that things have to be looked at from the landscape level. You have to take into consideration all the land users and the possible weighting that different users might have in the decision-making process, bringing everyone on the same page and making sure that there are synergies and as few conflicts as possible between policies. I raised this question of the role of finance because I see that as one of the ways forward. We are seeing a lot of changes in the financial world in the way projects are being chosen. And I want to end here, clearly highlighting that your data will set you in the right direction or not. Are there any closing thoughts on these two questions?

Ronnakorn Triraganon. We have to admit that nowadays, there are quite high interests from private sector and private companies to contribute to forest and biodiversity conservation. But it is just a matter of whether or not the development agencies work closely with the member states to allow or provide opportunities for them to engage in biodiversity conservation. Many of the primary forests in Asian countries still belong to or are managed by states, which are reluctant to give opportunities for the private sector to invest in the conservation area. This could be a big bottleneck to getting more financial support from the private sector. We need more research and evidence to prove that the private sector can contribute to biodiversity conservation. ICRAF made a lot of research on payments for environmental services in that region. This should be explored more. Otherwise, we just blame the private sector as our enemies but, at some point, we have to consider them as our partners.

Mike May. Excellent point. I'm from the private sector. And the private sector is a key player in this. And many parts of the private sector are stepping up to really becoming much more involved in biodiversity issues. There are many examples of that and I know from the side of FAO that there is a discussion on how FAO can better engage with the private sector. There is currently a discussion related to this, through the Advisory Committee on Sustainable Forest-based Industries (ACSFI)[117], on landscape restoration. So, these things are going on. There is this question of coordination between states, the private sector and communities if these are the key stakeholders in a landscape. How do we move from the old models of state control and questionable concessions to a more dynamic role for, let's say, an enlightened private sector, coming in with new pressures from the financial bodies on how money is allocated through things like these "Environmental, Social and Governance" (ESG) principles, which, hopefully, are going to guide investment in the right direction? I think ESG could be a very useful tool for not just setting priorities but for imposing a far more balanced priority setting decision box.

Rajan Kotru. Just to back up what Ronnakorn said. Many countries are trying to address biodiversity conservation and there is no way you can leave the private sector out. India has also conducted so many dialogues with the private sector. I can tell you that, at least in the Himalaya, almost 40 private companies are on board and they know they have to contribute to biodiversity conservation. Tax is already being levied on them. And that money will be collected by the state biodiversity board and finally go to the people on the ground through the biodiversity management committee. This is one way of financing. Second point I think which is very important in the future is the payment for environmental services or incentive-based mechanisms that could be the way forward. Local communities are conserving for us primary forest, which is full of biodiversity, then they qualify for their performance. Therefore, we are developing incentive-based mechanisms in South-Asia for these communities if they are managing the forest in a much better way.

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[117] See: http://www.fao.org/policy-support/mechanisms/mechanisms-details/en/c/428525/

James Roshetko. Mike, is your company involved with blended finance approaches where the government or some conservation organizations pay for some of the community development and transition costs?

Mike May. We are operating in Brazil where there are different mechanisms. The forest code in place actually imposes landowners to set aside between 30 and 50 percent of the area for conservation as legally protected reserve. But there are voluntary mechanisms as well where companies are working with communities. There is an amazing new project, that has just been launched this week through the New Generation Plantations[118] project, led by WWF in Southern Baia, in Brazil. They have got together with the Danish fund to finance smallholders to work on the establishment of corridor systems between forest fragments and receive payments for doing that. I'm actually very optimistic that this is a very useful new mechanism for helping companies work much more closely with communities on this whole question of restoration and conservation. There are many examples of that and that is a whole new subject on which we could talk a lot. For instance, my company is working with green bonds and that's another way of using your assets to develop finance then assigned for social and environmental programs. Mentalities are changing hopefully for the better.

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Breakout Group 3

Chair: Hannes Gaisberger.
Rapporteur: Alexandre Meybeck.

June Mandawali. In Papua New Guinea (PNG), the forestry sector and conservation areas are managed/administered separately. In areas where the forest is exploited, sacred sites are identified by the resource owner during the forest inventory, as part of the Environmental Impact Assessment (EIA). The forest authority delivers the concession. It is then for the operator to respect these sites. Forest authorities only monitor lumber, not the respect of the sites designated by the resource owner. The conservation authority is not involved at all during logging operations.

Joowon Park. The risks of degradation increase at forest margins. In the priority assessment, the level of importance should come before the level of threats. Important areas, for instance important bird areas, should be designated as conservation areas. We need criteria to identify conservation hotspots.

Li Yanxia. Each country has its own system to identify conservation areas. The question is: how to integrate primary forests in existing systems, using available scientific knowledge? How to encourage countries to integrate primary forests in conservation systems?

Rao Matta. One approach is to conserve values, whether ecological or cultural. But how to assess these values and incorporate them in our metrics?

Li Yanxia. Payment for ecosystem services (PES) or carbon credits can be considered to reflect values. Sometimes, it is very difficult to determine the value. Each country has its own way of doing it.

Hannes Gaisberger. I remember an example in Mauritius, with a lot of endemic species, where, given the time needed to value everything, it would have been lost. So, in this case, you need first to conserve and then to assess the value. The idea of PES should be put forward.

June Mandawali. PNG has 71 conservation areas, determined according to national goals. The first national park was created in 1962 to protect two species. But there are encroachments. What are we protecting in primary forests? People are depending on them. It comes back to how we define primary forests and the importance they have for people.

Hannes Gaisberger. Assigning values might help authorities to protect primary forests.

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[118] See: https://newgenerationplantations.org/

Alexandre Meybeck. The question is also: value for whom? What is particularly important is that they have value for the people closer to them who are those that can effectively protect them (or not). Assigning a global value will have much less effect, if it does not translate in value for local communities. This leads to the question of giving access rights, as opposed to total protection, so that local communities have an interest in primary forest protection and give them value.

Vikram Negi. The value of traditional and indigenous knowledge is globally recognized for the principles of coexistence and sustainable use that are favourable to the conservation of forests. Community forests and sacred sites around the globe are examples. Thus, appreciation is required for local conservation initiatives, maybe in the form of incentives. Further identification of biodiversity rich areas outside the protected areas is required for management and conservation.

The fact that an area is designated as conservation area is not enough: implementation and law enforcement are also needed.

Hannes Gaisberger. An important question is: how to finance globally recognized values?

Day 3: Plenary discussion on recommendations

Chair: Vincent Gitz.
Rapporteur: Nathanaël Pingault.

Vincent Gitz. Hello, we are back in Plenary with less than an hour left. We had an excellent discussion in our group, I guess it was the same in the two others. I would like to invite the chairs of the three different groups to tell us what were the main points of discussions, trying to focus on the new things that came up, not necessarily unheard of but that would bring us to the next steps. This is a plea to all participants to get out of our comfort zone and envisage what would be really new. Robert Nasi reminded me this morning that Jeff Bezos has 9 billion dollars to invest in a trust fund. What would be the thing to sell to the fund in order to meet our joint objectives? We had some ideas in Group 1, I think. Over now to the different groups' chairs, starting with Group 1.

Edward Game, chair of group 1. On recommendation 1[119], one interesting suggestion was: maybe this shouldn't be the first point but rather the last one. We tried to focus on what kind of knowledge exactly is needed, and what are the gaps and a few of those that we listed were: (i) the need for more detailed mapping and classification of different forest types to allow representative protection of that forest type; (ii) studies on fragmentation and landscape configuration to better understand things like how remnant forests thrive or fail in agricultural landscapes; (iii) a better understanding of forest tenure (Who has the responsibility of the different forests? Who has claims on different parts of the forest?); and also, (iv) protected areas status and the challenges they face. I have a couple of other things to highlight. We focused on the need for any knowledge generation to involve a co-production of that knowledge, integrating local communities and indigenous knowledge. All this knowledge, wrapped-up, needs to be kept alive through capacity-building and training. Another critical question is: how do we weave this knowledge of primary forest and its challenges into storytelling? There could be quite a focused campaign of storytelling about primary forest in the region. In terms of change in different scientific paradigms, we make a plea to take a multi-sector and multi-scale look at conservation to reflect complexity and challenges. We need to bring together the regional perspective and the needed local knowledge.

Regarding recommendation 2[120], we recognized the need to upscale innovative technologies and improve access to remote-sensing. We discussed the idea of acoustic observatories, possibly even crowdsourced, bringing together a lot of sources, paired with satellite data. We talked in general about the value of community and citizen engagement in data collection. That's not an easy thing to do well

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[119] "Improve knowledge and understanding of natural forests to orient land-use planning, management and conservation efforts"

[120] "Improve monitoring and reporting".

but there is huge value in doing that. We highlighted the importance of monitoring and its social impacts, along with forest users and forest conservation. We discussed the importance of monitoring and reporting on tenure status, rights, customary and traditional rights. The final thing that I would flag here is that we should have real-time reporting on really high-value forest loss and trends, particularly to enable us to agree on some definitions of those that can be consistently analyzed and to establish real-time alert systems.

Vincent Gitz. If you have an idea, please use the chat or park it for later. Now we are just going through the groups to have a comprehensive view and then we will go into the details again. Group 2 was dealing with the next step after knowledge, monitoring and reporting, which is action, actors and sectors.

Mike May, Group 2. It was a collective co-creation system with Rajan and myself as co-chairs. We liked the comment of Eddie on knowledge and the dataset you are building up through this process. The idea is storytelling. A very strong theme that came out of our group was that, to build a coalition, maybe new coalitions bringing in new actors, you will have to develop a very compelling narrative and have a convincing communication strategy. That is absolutely fundamental. Part of that is telling these stories that are very special and often very context-specific. As someone from the forestry sector, I think that, in forestry, we are not very good at putting together a very good communication even though the content is so compelling. A lot of work needs to be done there.

We actually flipped around your recommendations 3 and 4[121]. We considered that this is a process: to get policy coherence, first of all you have to build coalitions. Building coalitions is the process and the outcome would be policy coherence. The first step, therefore, is to build this narrative and, then, identify the mutual benefits and address trade-offs. The idea of a win-win is sometimes a little bit utopic. Very often it is the cross-cutting issues between the interests of the different sectors involved in this coalition that actually bind them into the discussion. We are looking at this as a long-term process. You don't just have to create the coalition but you have to make sure that you build into that process a mechanism that actually keeps people engaged. So, the question of ownership of this whole thing is very important.

Obviously, the government is a key part of this process. Comments were made on the fact that, very often, within a government, you have a ministry of environment, and you have a department of forestry and so on. There is a need for better communication between government departments. We have seen in China over recent years that they have started to merge various parts to actually have a coherent environmental strategy. The State Forest Administration (SFA) became the State Forest and Grassland Administration for example. You also have to include youth and that's very much linked to the storyline, the storytelling. Comments were made over this last couple of days about this loss of youth from rural and forest areas to the cities as opportunities are there. If you have a compelling storyline and a compelling opportunity they will stay. How to make the opportunities more compelling? New technologies are coming in, as well as crowdsourcing activities. That sort of things makes it appealing and make them want to stay. It is their future. We are putting ideas together: they will inherit them. There is that process of trying to bring the different actors to the table to incentivize them. New mechanisms are coming in for finance. There are opportunities there but again you have to identify the trade-offs and make sure that people are prepared to stay.

Vincent Gitz. There is inevitably more to dig and we will come to that. Let's go to the last two areas for recommendations, looking at the interaction with climate and biodiversity action and also the issue of international and regional cooperation. Here again I invite the chair to speak

Nadine Azzu, Group 3. June Mandawali from Papua New Guinea and myself acted as co-chairs in this group. We focused on the last two recommendations. We actually spent the majority of our time

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[121] 3. "Ensure policy coherence across sectors and scales and privilege integrated landscape approaches". 4. "Build / Consolidate new coalitions of actors".

on recommendation 5[122]. The conversation started by a discussion on the Nationally Determined Contributions (NDCs) and discussed how forest should be prioritized within the NDCs. It was said that NDCs should cover LULUCF[123] and primary forest for climate action. Primary forest loss might have a greater impact than other forest loss, not only for climate change, but also for biodiversity and for other values. So, primary forests should also be included in NDCs. Then there was a discussion around the National Adaptation Plans (NAPs), on how primary forests actually contribute to adaptation to climate change. Discussions focused on ecosystem services provided by primary forests and on resilience. The group also discussed the measures for primary forest themselves to adapt to climate change, such as the establishment of biological corridors. Based on that, we moved around some bullet points and also added something else because another discussion that came in was why are we just looking at climate action and biodiversity objectives? What about other important objectives such as land-use? So, we re-worded recommendation 5 to add this last point. *[Reads the specific recommendations under point 5 as modified by the group].* A new thing that was brought up was international finance mechanisms and trying to encourage conservation objectives in orienting and prioritizing funding.

Then we went on to recommendation 6[124] and the main thing that we included here relates to the knowledge and lessons learned to also include the definition, identification and management of primary forests. In the third bullet point we added also illegal collection of wood, not only non-wood forest products. It was suggested to add a point on community of practices and regional platforms. Another important addition was to "promote international cooperation on deforestation-free commodities".

I guess that the most interesting points were that, for recommendation 5, we suggested to include sustainable land-use, we tried to strengthen the rationale for including primary forest in NAPs and NDCs, and we highlighted the importance of climate financing. For recommendation 6, we encouraged platforms for regional cooperation, we considered also the illegal collection of wood products and we suggested to promote deforestation-free commodities.

Vincent Gitz. Now we have 35 minutes left before the closure by Thomas. In the spirit of moving the roadmap forward with new ideas, that we will then probably try to dig into to see how they can be really be put in place, I think it is good to have a fully comprehensive view. There is a range of things that need to be there and it is quite nice to have a full picture. There are things that are quite striking to me. Just my own interpretation as chair, what is coming up, and perhaps it is an opportunity, is the recognition that a lot of different actors, not only those close to the forest or in the forest or in the region but also very distant actors connected to the forest through the different value chains that sometimes impinge on forest (consumers, public actors, public awareness, youth) need to be involved in primary forest conservation. In the idea of building a coalition, the often unknown values of these forests is in fact considered as one of the criteria for making choices in day-to-day life but also in planning, investing and in public policies. One of the things emerging is that there is a kind of non-written collective recognition of the importance of primary forests, including in the private sector which is pushed by all the movement towards environmental sustainability, ESG guidelines. Maybe that can also be a way to integrate shifts into the business and also into the financing of the business. Do you think that there is something we have missed here? What would be disruptive, or catalytic (i.e., something small but that can trigger lots of other changes)? The floor is yours.

Robert Nasi. I think nobody can disagree with all these recommendations. My main issue is that we could probably have had these recommendations before the workshop. So, the question I have is: what are the action points that we can develop, based on what we have discussed in the workshop in terms of a roadmap towards final recommendations at the end of the process? We don't want to make

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[122] "Align climate action and biodiversity objectives through conservation of primary forests".
[123] Land-use, land-use change and forestry.
[124] "Strengthen regional and international cooperation".

recommendations because they are good but we want to make recommendations for powerful people to implement them. So, if we can sell the idea that preserving the primary forests of the Asia-Pacific region is a critical task and get half a billion from Jeff Bezos, we need to take it. But, for that, we need something different to what we are used to produce in terms of this workshop recommendations. We need actionable points. We need more than generalities. And we also need to know how much this is going to cost and who are the people willing or having the capacity to pay

Vincent Gitz. That's exactly our ambition. Maybe difficult to get there in 40 minutes. By the way there is another linked roadmap on forest technologies' roles and there are clear links. Mike, you have the floor and the private sector is often seen as one of the powerful actors. So, what can be disruptive or catalytic here? What can the private sector do?

Mike May. My comment here, about the list of six recommendations just discussed in the three groups, is: how do you measure impact once all this has been put together, once your plan is built? What is your strategy for measuring impact? How are you going to quantify results? Because, going to the point of Robert, to attract people in, with the sort of money that is available, you have to show the impacts you want to deliver. You need to build into your plan mechanisms for measuring impact you really want to deliver and make them very clear.

Vincent Gitz. In Group 1, Eddie can testify that we also mentioned the fact that impacts cover a lot of dimensions, including social and cultural. Given the urgency, we need to know what is happening in real time and what is the real-time or near real-time impact, so that we don't act with so much inertia on the forest ecosystems. Otherwise, basically, when we take the right decision it's just too late. This is also where we discussed observatories and crowdsourcing. Obviously, these represent also heavy coordination and heavy investments. New technologies perhaps, like soundscapes monitoring, can help. Good points about that and about the economic dimension of impacts.

Rajan Kotru. I would like to see for primary forests in the Asia-Pacific region a kind of regional COP, something where you bring politicians. Recently, I wasn't there, about climate action in the Hindu Kush Himalayan countries, four ministers came on a platform together and started taking notes on what actions they need to take at country level. I would like to see a similar platform for primary forest conservation, maybe different for South Asia and South-East Asia, maybe they are already existing. How do we really bring this narrative, as Mike was saying, also at the politicians' level? How do we bring politicians on board? This is one set of actors. Second is, of course, how to bring together local actors and local development initiatives and instil this idea at the regional level. You don't need only a narrative but you need also to communicate it in a customized way to influent decision-making stakeholders.

Vincent Gitz. Basically, it is also an invitation to find what could make that happen. Hearing the comment from Robert, all these points could have been developed before the workshop. I will tell you an anecdote: there was the global Collaborative partnership on forests (CPF)[125] and there was a conference three years ago in FAO organized by the CPF on how to halt deforestation before 2020 because that was the objective. We had a panel on science and knowledge, chaired by the ambassador of the Netherlands. He opened the panel saying: "We don't need new science. We don't need new knowledge. We know what needs to be done to preserve forests and primary forests. So, let's just do it". So, the question is: what really needs to be done? Not things that we pleaded for repeatedly in the past and that actors have not done. What are the things that would work now in future? Monitoring, crowdsourcing, involving a large number of people in observation to replicate what is going on and increase awareness, are things that, I think, are fantastic. I was really impressed by some of the ideas shared during this workshop. Another point we may want to discuss and raise to the public is: how do we bring economics and finance into the agenda? You invest generally on productive elements, to get a return on your investment, taking a certain degree of risk. At the same time there is a call to integrate broader sustainability objectives in the overall scheme of investments.

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[125] See: http://www.cpfweb.org/en/

How can these actors enlarge their spectrum in order to put into action these mechanisms, to hardwire conservation objectives as well? What would be the next levers to take action?

Rao Matta. Very interesting. I fully agree with you Vincent on your observations about the importance of crowdsourcing and new innovations and technologies that are being developed and that have already been demonstrated through some case studies in our workshop. There are definitely a number of new insights, and new points that were shared. Answering to Robert's question, I think these recommendations can be differently oriented or structured to further elicit or to further link the sessions we had earlier, looking at: the identification, diversity, monitoring and reporting on primary forests (**Session 1**); then prioritization, challenges and governance mechanisms (**Sessions 2 to 4**). As they are organized, in six headings, the current recommendations appear very general and common. We need to dig a little bit deeper, because, definitely, as you noted, new opportunities need reflection, such as crowdsourcing, innovative financing, nature-based solutions, ecosystem-based adaptation, etc. All these things, if we highlight them further, would capture the essence of our three-days discussions and would add much value. This workshop is only one of the steps but there will be other inputs such as expert consultations which will further enrich these recommendations. My point is we need to link these recommendations better to what was already discussed in the earlier sessions, enriching them now or later on, and also with the additional inputs.

Vincent Gitz. Sorry to be a bit provocative here. The countries evolve at their own pace, some quicker than others, some developing some interesting ways of dealing with problems. If we can, through this exercise, bridge the gap in terms of bringing new actors into what works and, even if not fully disruptive, get a good base that can be shared, finding also ways to put it to the next level and be a bit more ambitious, that could be one value added of this study, compared to the so many others already existing on these issues. Eddie, you have been one of the most innovative of the whole three days.

Edward Game. Sorry to still be speaking. I just want to build on and respond to something Robert said about money and in particular Jeff Bezos' money. We, along with our colleagues in WRI have been lucky to receive some of that recently. The issue of primary forest is eminently solvable in the sense that this is not actually a money problem. There is so much money like the Bezos' money or corporate money out there, that can be channelled into forest conservation mechanisms. The biggest issue that we are facing at the moment is to be able basically to deploy that money. Policies and regulations in countries need to mature, and understand the kind of sources of money that can be directed to primary forest conservation and make possible for that money to come in and be stably spent. Something countries all need to work through is that these big private donors are not going to give money to national governments which is different from how a lot of forest conservation has been done in the past. You expect big bilateral donors and multilateral institutions to give money to countries. But big private donors are very unlikely to give money to countries. That means that there needs to be a really strong civil society presence in those countries and the legislative frameworks to make that possible. If we imagine all the primary forests in Asia-Pacific and do the sort of exercise discussed here where we did come up with some priorities, the area would be totally manageable from a funding point of view, if we can make the conditions on the ground suitable for that money to come in. And I have seen some tragedies recently, for instance, really big donors to us choosing to spend money in Canada and Australia over Papua New Guinea or Indonesia, just because the conditions were there to spend that money. Now, with respect to my Canadian or Australian colleagues, but neither of these two countries should be in anyone's priorities when talking about biodiversity conservation and critical primary forests.

Vincent Gitz. If the money is in one country and action needed in another, and if there is a global biodiversity concern, then we must find ways to know where the most efficient cost-benefit action is situated and establish the mechanisms to make the needed transfers, looking at new actors: not just public-to-public, or private-to-public, but also private-to-private. These may be some of the new things to investigate.

Edward Game. Obviously, there are many problems with some of the aspects of the awareness building we are going through in Indonesia but there are also some aspects that may make it easy. We need governments to really pick it up and be willing to enable partnerships. If we get some of these on a row, money will not be the problem.

Vincent Gitz. So, if the money is not the problem and if we think that also the objective, "primary forest conservation", may be one of the most commonly shared on the top of the environmental priority list everywhere, even if there are so many other issues (plastic, waste management, urbanization), what is the problem then? How to bridge the gap? Is that the private sector Mike?

Mike May. Definitely the private sector is part of the solution. Private sector is moving more ambitiously into this area. But I totally agree with Eddie that the civil society, local civil society networks, in many countries, it is my experience in Brazil, are extremely well organized, knowledgeable and very capable of managing large scale projects. In many remote areas, government influence is minimal so that the only people who actually get things done is civil society with the support of the private sector. The private sector has a role to play in many respects, particularly in this area of capacity-building, in developing knowledge and then applying it. It has processes that can be applied, just completely cut-and-paste in many cases. There is a huge resource there, without even then getting onto more sophisticated high-tech solutions. When you bring together the private sector's basic knowledge on how to run projects with local civil society networks, they produce amazing results. We have seen that all over Brazil on many levels. I also want to comment on this question of finance. The finance sector is getting organized. The way money flows into the private sector through new views on ESG and on the responsibilities of the private sector. In this way, checks and balances can be put in place. That's evolving all the time, in the right direction. The other point about these large funds that are available, Eddie commented on as well, the problem is in deploying the money. No large funds, I'm talking about funds of billions of dollars, are not going to disburse anything smaller than packets of 50 to 100 million dollars. They have to have scale. They cannot fund a small-scale project to set up a sawmill. They can only look at large-scale projects. This is the advantage of groups like this: the larger the scale you can put together, the better it is and, actually, the more attractive. Then money will come. So, don't think small-scale: that's the critical thing. Because they don't think small-scale.

Vincent Gitz. Don't think small-scale, but at the same time, as we have seen in many places in the research we have done in FTA, how to integrate the smallholder base, more difficult to reach and more disperse, into these initiatives. There are some interesting tools to do that, including not only on how to devise business models but also on how to look at the efficiency of targeted investments. It struck me from Yves' research in Kalimantan, sometimes the big players are not the bigger problem when we come to primary forest conservation. Maybe, bigger players can do a bigger damage if they do the wrong thing, but they can also do a greater good like preserving big patches of forests, if that's the objective, within forest concessions for instance. Looking at the integration of smallholder concerns, smallholder livelihood objectives, is sometimes a little bit more problematic. So, I see that we have a portfolio of tools (public tools, projects, programmes funded nationally or internationally, etc.). But there is the issue of finding new ways to connect money with actions by people living or operating in these landscapes. This is probably something we will need to think about in our recommendations.

Thomas Hofer. This is a really good discussion. And your question before, Vincent, of "what is then really the problem?", triggered a few thoughts in me also. Why primary forests are encroached or under pressure? What are the reasons? One is maybe a tenure issue, or a responsibility issue. Primary forests in many cases are considered in a way as commons, with no clear tenure and responsibility. Resources with no clear responsibility assigned might be more under pressure than when the responsibility is clearly earmarked. So, for me, the tenure issue is something that might need a little bit more discussion in the roadmap ahead. And the second one comes back to valuation, which was discussed already in the groups' reporting this afternoon. I think that as long as the value of primary forests is lower than that of different land-use systems (be it plantations or agriculture

crops), this pressure on primary forests will continue. The point that I want to make is that we really need a new way of valuing primary forests, with their ecosystem services. We are still taking the water service of primary forest, clean water, the biodiversity service, the soil conservation service and so on for granted. And we don't really make an effort to quantify these services because it is difficult. I think this is really something to consider in the future as something innovative. How can we better quantify these values and give them a price tag, which makes it attractive to protect natural and primary forests, and which creates incentives for communities and private companies to protect them? So, for me there is a tenure issue which needs further elaboration. And there is this valuation issue where I see a lot of potential. But we need a change of mindset to take that valuation seriously. Here are my two contributions to these discussions.

Vincent Gitz. Thanks Thomas. It is important to highlight that again. It was mentioned also in some of the groups' discussions. These are key things needed to enable awareness and action. I was wondering, before I give you again the floor Thomas to close, whether there was not something from the group to look at, at this specific point in time, where we are in the building back better, or I would say in the building forward better agenda, and where, by the way, there is also the question of how we manage the environment to avoid disruptions to the planetary and human health. Boundaries of pristine ecosystems are an issue as we know. From the take of the group, what could bring an additional motive to act, in this build back better from the COVID crisis? My second point is whether this group thinks that we should try to change a little bit the way our current discussion is currently functioning. FAO and Asia-Pacific Forest Commission (APFC) are kind of government stuff. But how to bring private sector, local actors, and civil society together? Do we need separate meetings with all these other actors without governments? Can we put everybody in the same room around something concrete and try to move it forward in a multi-stakeholder dialogue? Is it productive or counterproductive? So, two issues: (i) build back better; and, (ii) what is the ideal way to organize the dialogue around this issue with all the actors? We need inclusiveness but governments need absolutely to be there because they are accountable in the end, and they create the conditions for change. Note that the World Forestry Congress is coming up, probably in a year for now, in the region. This will be an opportunity here to have some engagement on some of the things that we are discussing.

Russell Warman. Just very briefly, thinking about this idea of a narrative, getting some sense of momentum is the turning point. It spoke to me again when you mentioned "build back better". I think there is a need for a story around it. We have been fighting and what has been observed is this ongoing process of decline and loss. When is the moment when that gets turned around? We can just declare now: this is it, this is the turning point. This is a narrative story that we can take with the portfolio of tools we clearly have, with the knowledge we have. We just need the story behind us to drive us.

Vincent Gitz. There are stories about doom days or about positive days. Maybe we need the two so that people can make the right choice.

Alexandre Meybeck. Just to comment on this idea of having broader engagement around governments: not only governments, but also civil society and the private sector and making a parallel with climate action. In Copenhagen, the governments seemed to be very prepared to have bold action but finally, at the last minute, they got cold feet because they were not followed by their own constituencies. Climate action showed that you cannot aim for a transformational change, especially long-term, if governments are not backed-up by the private sector, by the public opinion and by civil society. The mobilization of all actors in a country or a region is probably a way to facilitate a shared ownership of the objective and to stimulate a national pride for one's forest. It can support the government's action because it can create a national consensus for broad action. So, it may be of help, apart from the fact that civil society and the private sector are, in their own right, major actors. There are two things: (i) they are major actors: they need to be involved because of their action; (ii) they are also what allows government to act. A government cannot take decisions against economic actors and global opinion.

Vincent Gitz. This is a very good point and I think that part of the turning point we want to try to trigger lies in the economic actors and also in the consumers who are increasingly showing the way by their choices, not only in the North. Sometimes the leadership comes from the South in terms of sustainable consumption. If business and people move in that direction then, for sure, governments will follow.

Shahrukh Kamran. Hearing all these comments focusing on how to give incentives and how to get money from the funds for the projects. First of all, we need to slow down the pace of fragmentation and deforestation. This is only possible if we can somehow increase the charges against environmental crimes. Who will take the responsibility for damages like overexploitation and mining?

Vincent Gitz. Indeed, this brings us back not only to good governance but also to law enforcement (carrots and sticks). This workshop is only one step in the process. There will be further work on some of the presentations that Yves Laumonier has made. We really hope that, through this study, we will bring the knowledge further to help different actors at national level better understand what is the latest situation, the issue of threats. This study can be useful in practice for prioritization but, most importantly, for actors to understand what they need to bring from the aspiration for the future, into today actions. There will be in the process to finalize this study, further ways for you to send your suggestions and inputs. If there are no further remarks, I will invite Thomas to close the workshop.

Appendix 4. Status, trends and future outlook on primary forests in Asia and the Pacific (Draft annotated outline)

Introduction

Background

The 'Third Asia-Pacific Forest Sector Outlook Study' (FAO, 2019), launched in June 2019 at the Asia-Pacific Forestry Week in South Korea, highlighted that conservation of primary forests – i.e. forests largely unaffected by human activities -, and the sustainable management of other natural forests are urgently needed to safeguard biodiversity, ecosystem services and the quality and health of the physical environment in the Asia Pacific region.

Following up on this Outlook Study, FAO and the CGIAR research programme on Forests, Trees and Agroforestry (FTA), signed a letter of agreement (LOA) to develop a roadmap for primary forest conservation in the Asia-Pacific region. In particular, FAO and FTA will prepare and co-publish a technical paper on **the status, trends and future outlook on primary forests in the Asia-Pacific region** with maps and key recommendations (policy and concrete actions) for their conservation. A policy brief will also be prepared for decision-makers, gathering the main findings and concrete recommendations emerging from this work.

This publication is being developed through an inclusive and participative process, involving key regional stakeholders and technical experts from governments and intergovernmental organizations, from the private sector and civil society organizations, as well as from academia and research institutions.

Forests: FAO definitions

Multiple and very diverse definitions of forest and wooded areas are used around the world, reflecting both the diversity of forest ecosystems and the diversity of human perceptions and uses of forests. Most definitions of forests are based on land cover, usually combining criteria of canopy cover, tree height and minimum area, and on considerations of land use. The definition and criteria used determine which ecosystems can be considered as forest and impact strongly forest area (HLPE, 2017).

FAO global forest resources assessments (FRA) have contributed to harmonize at the global level the definitions and categorizations of forests allowing compared analysis across countries at regional or global level. In the FRA, forest is defined as *"land spanning more than 0.5 hectares with trees higher than 5 meters and a canopy cover of more than 10 percent, or trees able to reach these thresholds in situ"* (FAO, 2018). This definition excludes agricultural and urban tree stands. The FRA 2020 further distinguishes two main categories of forests defined as follows:

- Naturally regenerating forest (or natural forest): "forest predominantly composed of trees established through natural regeneration";
- Planted forests: "forest predominantly composed of trees established through planting and/or deliberate seeding". (FAO, 2018)

Among natural forests, primary forests are defined as *"naturally regenerated forests of native tree species, where there are no clearly visible indications of human activities and the ecological processes are not significantly disturbed"* (FAO, 2018). This FAO (2018) definition:

1. *"Includes both pristine and managed forests that meet the definition.*
2. *Includes forests where indigenous peoples engage in traditional forest stewardship activities that meet the definition.*

3. *Includes forest with visible signs of abiotic damages (such as storm, snow, drought, fire) and biotic damages (such as insects, pests and diseases).*

4. *Excludes forests where hunting, poaching, trapping or gathering have caused significant native species loss or disturbance to ecological processes.*

5. *Some key characteristics of primary forests are:*
   o *they show natural forest dynamics, such as natural tree species composition, occurrence of dead wood, natural age structure and natural regeneration processes;*
   o *the area is large enough to maintain its natural ecological processes;*
   o *there has been no known significant human intervention or the last significant human intervention was long enough ago to have allowed the natural species composition and processes to have become re-established".*

Purpose of the paper

The purpose of this technical paper is to provide a broad picture of the status, current trends and future perspectives for primary forests in the Asia-Pacific region and suggest key recommendations (policy and concrete actions) for primary forest conservation. This paper aims at identifying and mapping the "hotspots"/priorities for primary forest conservation in the Asia-Pacific region. The Asia-Pacific region is huge and contains multiple and very diverse hotspots; making it hard, if not impossible, to draw an exhaustive list of these hotspots. However, a more accurate knowledge of these hotspots could help develop efficient conservation strategies and prioritize conservation efforts. It is also important to anticipate the emergence of new hotspots in the future to start acting for conservation before it is too late.

Geographical scope of the study

The geographical scope of the study covers the countries of the FAO region of Asia and the Pacific (see: http://www.fao.org/asiapacific/countries/en/). However, it excludes France and the United States of America (USA) mainland, situated outside the region. The Russian Federation, although covering 29 percent of Asia, is also excluded because issues related to Russian forests are usually discussed within the European Forestry Commission.

Content / Structure of the paper

The paper will describe primary forests extent, fragmentation and degradation. It will highlight the diversity of primary forest ecosystems in the region and consider them within the broader areas that contribute to shape their evolution. It will study the main pressures / challenges / threats facing primary forests in the region, combining illustrative maps of diversity, importance and threats. It will propose recommendations.

1. Primary forests in the Asia-Pacific region: diversity, extent and status

Recent trends, current situation and future outlook. With graphs and maps. If possible, by sub-category of primary forests (see section 1.2).

1.1. Primary forests: historical trends, extent and status

Based on FAO definition of primary forests, building on the detailed results of the last FRA2020 and regional complementary sources as appropriate, this section will describe the historical trends of primary forests extent, fragmentation and degradation in the region, through graphs and maps showing their diversity, spatial distribution and evolution since the 1990s.

Historical trends and extent.

(Of which: Protected area)

Despite an overall increase of the regional forested area since 2000 due to the establishment of plantations and restored areas in some countries such as China, the area of primary forests is declining, along with the ecosystem services they provide (e.g., wood, food and medicines, biodiversity, water and soil protection, climate regulation and carbon sequestration, amenity and cultural values). Of the region's 723 million hectares of forest, however, only 19 percent (140 million hectares) is primary, which is much lower than the global average (32 percent) (FAO, 2019).

This evolution is variable depending on sub regions and countries.

Primary forest status (health of the forest)

Forest degradation and fragmentation.

Primary forests degradation and fragmentation weaken the ecosystem resilience, i.e., its capacity to cope with external shocks.

1.2.   A remarkable diversity of primary forest types in Asia and the Pacific

Biogeographically, the Asia-Pacific region that covers mainly East Asia, South Asia, Southeast Asia, and Oceania, represents an extraordinary cradle of the evolution of so many organisms, being at the crossroad of two paleo-continents where Asiatic elements of Laurasia origin meet with Australian elements of Gondwana origin (Turner et al. 2001).

This section will address the ecological classification and nomenclature of primary forests types in the Asia-Pacific region, building on existing works for the region (Whitmore 1984, Roy et al 2015, SOFR 2018), classifications, etc….

This regional typology could be illustrated/completed as appropriate by more detailed focus on specific ecosystems representative of the richness of situations existing in the region (e.g., mangrove, karst, hill and montane forest, forest of the small islands, etc.)

1.3.   The specificity, role and importance of primary forests in Asia and the Pacific

Primary forests make an irreplaceable contribution to globally significant environmental values, biodiversity, carbon sequestration and storage, water provision, indigenous cultures and the maintenance of human health (Watson et al 2018). Primary forests conservation is a necessary condition to achieve the sustainable development goals (add a box on the contribution of primary forests to the various SDGs).

This section will focus and describe the multiple ecosystem services provided by the different types of primary forests in the Asia-Pacific region and show their importance for food security, livelihood, and sustainable development. These multiple ecosystem services include: primary biodiversity reservoirs, pollination, soil erosion control, provision of clean water, water cycle regulation, carbon sequestration and climate regulation, contribution to food security and nutrition, social values and cultural heritage…

Concrete case studies from the literature will illustrate the specific contributions of different types of forests in different countries, for instance:

- The importance of mangroves for protection of deltas and coastal areas (India, Bangladesh, Indonesia, Mekong delta in Vietnam, etc… See Saenger *et al.*, 2019).
- The role of primary forests as primary biological reservoirs / genetic pools (three centers of origin of important food and medicinal species, Chinese, Indian and Indo-Malayan centers, e.g.: fruit crops, banana in Sumatra, wild mango in Borneo, rambutan, manggis, spice trees etc…).

- The importance of cloud forests, forested watershed in general for water provision and regulation.
- The importance of karst formations as water towers and species endemism.
- Etc.

This section will identify and discuss possible criteria that could help describing and mapping the hotspots for primary forest conservation across the region in terms of level of importance. Beyond the minimal size discussed in section 1.1, these criteria should consider the (environmental, economic, social and cultural) richness and uniqueness of the ecosystem.

1.4.   Discussion hotspots by level of importance.

The hotspots for primary forest conservation will be defined here in terms of forest ecosystems or functions (e.g., New Zealand rainforest, cloud forests, montane forest including Himalayan forests, peatlands, coastal forests including mangrove forests in India, erodible lands, important water catchment areas, habitat for wildlife and endangered species).

Building upon the discussions in the previous sections, this section will propose a set of criteria to define and describe these hotspots, e.g.:

Size. Participants in the inception workshop raised the question of the minimal size that should be considered to define a primary or intact forest. For some, conservation efforts should prioritize the larger patches where natural processes still work properly. For others, all remnant primary forests are worth considering and even the smallest patches should be protected, and potential connectivity between fragments (e.g., "ecological corridors") should be considered. This section will discuss the different criteria that can be used to define an "intact forest landscape" (Potapov *et al.*, 2017), and in particular, the notion of minimal size threshold for intactness.

Although many emphasized already the importance of conserving forest patches as small as 1000 ha (Edwards *et al.*, 2012), the threshold for intactness in the region has been estimated to roughly between 30 000 and 200 000 ha (FRA 2000; Lucey *et al.*, 2017)

Should conservation policies and efforts prioritize the largest remaining fragments or consider all remaining primary forest patches regardless of their size?

- *Ecosystem environmental value:* richness and uniqueness of the ecosystem (considering eco-floristic zoning[126]), biodiversity (keystone species, endangered species, endemism), ecological functions (e.g. carbon storage, watershed protection,).
- *Ecosystem social, economic and cultural values,* considering that different stakeholders, with different views, traditions and interests, will value differently the same ecosystem.
- *Level of threats* and pressure (last frontier effect) as well as the speed of changes.

This concluding section will finally propose a map of the "hotspots"/priorities for primary forest conservation in the Asia-Pacific region, considering the notion of intact forest landscapes introduced in section 1.4 and classifying these hotspots by forest type (see section 1.2) and by level of importance (see section 1.3).

2. Increasing pressures on primary forests

This chapter will consider the remaining primary forests within a broader perspective, analyzing the dynamics at stake in surrounding areas (whether other natural forests, planted forests, agricultural land, mining or industrial site, infrastructure or human settlement) that directly or indirectly impact forest status and trends. It will illustrate the increasing pressures on primary forests, due to a range of

drivers/stressors including: climate change, population growth, migrations and conflicts, globalization and economic growth, urbanization and infrastructure development, agriculture and planted forest expansion, illegal logging and illegal trade of forest products.

This chapter will describe the main threats facing primary forests and natural landscapes in the Asia-Pacific (section 2.1), as well as their underlying socio-economic drivers (section 2.2) in the context of climate change (section 2.3).

2.1.   Main threats on primary forests

Primary forests and natural landscapes in the Asia-Pacific region are under increasing pressure from a range of threats including: climate change and natural disasters, population and economic growth, overexploitation and illegal exploitation of forests, conflicting land uses (e.g., infrastructure development and agricultural expansion), inconsistent policies across sectors and scales, weak governance, migration and conflicts. The COVID-19 crisis risk putting additional pressure on forests and their capacity to provide essential environmental services – the nature and dimension of these impacts still need to be understood.

Specific vulnerability maps can be elaborated and inserted as appropriate throughout the whole chapter 2 to illustrate the main categories of threats facing primary forests in the Asia-Pacific region, e.g.: vulnerability to fire, droughts, illegal logging, etc. More detailed maps could be realized at local or national levels to illustrate specific threats.

This section will build on the main threats identified during the inception workshop (30th July 2020):

- Climate change and natural disasters: wildfires, droughts, storms, volcanic eruptions, invasive species and pest outbreaks.
- Population and economic growth, which increase pressure on natural forests.
- Overharvesting of wood (including for firewood or charcoal).
- Illegal logging and illegal activities (hunting and poaching) in forests.
- Agriculture expansion (shifting cultivation, conversion to monoculture plantations, cattle grazing).
- Conflicting land uses.
- Industrial and infrastructure development (e.g. dams, roads), mining, urbanization.
- Waste and inefficient use of wood and other natural resources.
- Pollution.
- Conflicting mandates, incoherence of policies across sectors (environment, agriculture, economic development) and across scales (at national, sub-national and local levels).
- Corruption. Weak governance and weak law enforcement, in particular regarding land access and tenure rights.
- Covid-19 reverse migration: due to the pandemic, people go back to their villages, increasing the pressure on natural forests.
- War and conflicts.

2.2.   Socio-economic drivers

Demographic dynamics

Population growth

The world's population is expected to grow from 7,7 billion in 2019 to 8,5 billion in 2030 (10% increase) and 9,7 billion in 2030 (26% increase) (UNDESA, 2019). This growth is very diverse by regions and subregions with +56% in Oceania excluding Australia and New Zealand, 46% in Norther Africa and Western Asia, 28% in Australia and New-Zealand, 25% in Central and Southern Asia, 3% in eastern and South Eastern Asia (UNDESA, 2019).

Rural-urban migration (leading to ageing and feminization in rural areas)

Migration and displacements following conflicts or disasters. (See for instance APFSOS III: BOX 4.7 Refugees and forest degradation p135)

Globalization and economic growth

Population growth and economic growth, particularly in middle income and developing countries are driving a considerable increase in demand for material products. The recent OECD global material resources outlook to 2060 projects a considerable increase of the consumption of all material resources to 2060 (OECD, 2019). Globally the use of material resource grew from 27 billion tonnes (GT) in 1970 to 89 billion tonnes in 2017. The OECD outlook projects that, in the absence of new policies, it would rise to 167 GT in 2060. This growth is reflected in all major categories of materials. It will bring significant environmental consequences that will hurt our economies and our societies. The group of biomass resources is expected to increase from 22 GT to 37 GT. Within that group wood grows more quickly, driven by industrial activities and construction, and fuelwood even more. All these increases in material resources uses are particularly pronounced in Asia, driven by economic growth, first in the BRICS, then in other developing countries. Changing lifestyles and changing consumption patterns, including increasing consumption of animal products, are driving the increase of the demand for food and feed.

Urbanization and infrastructure development

2.3.   Climate change

This section will consider impacts of climate change on the different types of primary forests identified in the first chapter, building upon the IPCC 5th assessment report including the contribution of WGII part A sectoral aspects and part B regional aspects, chapters 24, 25 and 29 as well as relevant literature.

It will recall that climate change induces a vicious circle, weakening the resilience and adaptive capacities of the remaining primary forests leading to increased forest degradation likely to enhance climate change.

2.4.   Conclusion: map of the hotspots by level of threats

Starting from the map of the hotspots identified in Chapter 1 (Section 1.4) and building upon the specific vulnerability maps mentioned above, this concluding section will identify the "hotspots"/priorities for primary forest conservation in the Asia-Pacific region, classified by level of threats and propose a synthetic mapping.

3. Primary forests: governance tools in the Asia-Pacific region

This chapter will draw a broad picture of primary forest governance in the region, describing the various governance tools, instruments and mechanisms implemented at different scales – from international and regional agreements to national rules and instruments and local arrangements. This section will cover critical governance issues such as land tenure security, access to forest and natural resources, and equitable participation of indigenous peoples and local communities in decision-making processes.

This section will assess the actual implementation of existing laws and regulations, inform on existing good practices and successful national legislations, and suggest innovative governance mechanisms and regulatory frameworks. A lot of policies and regulations already exist. The biggest institutional challenges lie in policy coherence, sustainable financing in the medium- and long-terms, and in effective enforcement and implementation of existing laws and rules.

This section will highlight the need to adopt an integrated, cross-sectoral, multi-stakeholder governance, articulated at all scales and to consider the remnant primary forests within a broader landscape, considering the dynamics at stake in surrounding areas (whether other natural or planted forests, agricultural land, mining, industrial or urban areas) that directly or indirectly impact deforestation, fragmentation and forest degradation. Similarly, primary forest conservation strategies should consider the dynamics at stake in other natural forests and in planted forests. For instance, harnessing the potential of planted forests as a primary source of wood would reduce the pressure on the remaining natural and primary forests and would provide an alternative to illegal logging.

Specific case studies, representative of the diversity of the region, will illustrate this chapter as appropriate, highlighting diverse governance tools implemented in different contexts in the region, assessing their impacts in terms of primary forest conservation as well as their underlying conditions of success/failure.

This chapter will present an overview of primary forest governance in the region:

- main actors and institutions,
- various tools and instruments at different scales,
- associated challenges and opportunities.

Primary forest conservation efforts involve many actors at different scales. This chapter will also consider the interactions and relationships across actors and levels of governance. For instance, action at one level is shaped/framed/constrained by the upper level. Actions on the ground at the local level depend on national legislative framework. National laws need to be consistent with international rules and commitments. This chapter will pave the way to the identification of concrete key recommendations directed to different actors at different levels of governance (see chapter 4 below)

3.1. Actors and institutions: an overview

This section will provide an overview of the different categories of stakeholders involved in forest management at different scales, including: public vs. private actors; civil society and local communities; academia; local vs. distant (national, international actors). It will also consider the range of institutions and mechanisms that have an influence on primary forests and their conservation including those that are linked to climate change policies.

3.2. International agreements/instruments

This section will cover international agreements, legally binding or not, that define global goals either covering all sectors (e.g., SDGs, Paris Agreement, Aichi Targets, VGGT) or focusing on forest (e.g. Bonn Challenge, New York Declaration, Global Forest Goals). It will also examine the international governance tools dedicated to the implementation of these common goals and national commitments (e.g., REDD+, …) some of which impact trade rules (e.g., CITES, EU FLEGT, EU biofuel norms, …).[127] This section will also present international voluntary standards and private commitments to reduce deforestation.

3.3. Regional initiatives and institutions

Regional and sub-regional cooperation is critical for primary forest conservation, because many issues are transboundary in nature. This section will present regional institutions and initiatives concerned with primary forest conservation, such as the FAO Asia Pacific Forest Commission or the Asia-Pacific Regional Strategy and Action Plan on Forest and Landscape Restoration to 2030 (APFLR).[128] This section will also cover sub-regional cooperation bodies such as ASEAN, the Mekong

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[127] See APFSOS III P235. List of "major developments in global governance in the past decade" (see also p240, p251, p274: page numbers of the pdf file).

[128] http://www.fao.org/3/i8382en/I8382EN.pdf

River Commission, the South Asian Association for Regional Cooperation or the Pacific Community (See APFSOS III, p301, p302, Box 10.1, Box 10.2).

3.4. National rules and instruments

This section will explore the national framework enabling forest management. It will study laws, regulations (e.g., logging bans, wood import regulations, land tenure policies and reforms) and legal incentives (taxes, subsidies, fiscal transfers[129]). It will assess the effective enforcement of existing regulations and measures, their strengths and weaknesses. It will also consider voluntary standards, certification schemes and other market-based instruments defined and implemented at the national level.

3.5. Governance mechanisms at local levels

This section will explore different governance mechanisms for forest management at the local levels, ranging from timber concessions, to different form of participatory forestry, including co-management of forests or community-based forest management. For each arrangement, it will examine the respective roles of different actors (public, private, local communities), as well as the related actor interplay and power dynamics.

3.6. Conclusion: map of the priorities for primary forest conservation.

Starting from the maps of hotspots by level of importance (Section 1.4) and by level of threats (Section 2.4), and considering the impacts (success/failure) of existing governance tools for primary forest conservation as assessed in this chapter, this concluding section will identify the gaps and needs for primary forest conservation and illustrate them on a synthetic map.

This work help prioritize the conservation efforts in the region and pave the way to the concrete recommendations suggested in the next Chapter.

4. Key recommendations for primary forests conservation

Reversing deforestation and primary forest degradation and fragmentation must be a priority for all countries in the Asia-Pacific region now and in the next decade to ensure our survival, especially in the face of dangerous climate change.

Building upon the discussions in the previous chapters, this section will suggest key recommendations for primary forest conservation. –. It will discuss the institutional changes required to achieve various objectives associated with primary forest conservation, including: the accurate monitoring of primary forest values; the sustainable funding of forest conservation; the importance of education and capacity building; the effective enforcement of existing laws and rules. These recommendations, to be developed at a later stage, will be directed to the main categories of actors and will consider the different levels of governance identified in chapter 3.

These recommendations could, in particular, draw upon the initial discussions held during the inception workshop.

Participants in the inception workshop insisted on the importance of education, information, and communication. Training and capacity building will enable forest stakeholders, particularly small-scale actors and local communities, to exercise their rights, access to technologies and markets, and improve their livelihood. A better understanding and consideration of the perspectives of young

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[129] See for instance APFSOS III: BOX 6.3 India's ecological fiscal transfer system to incentivize forest conservation by state governments p175

people is needed, since they will become tomorrow's leaders, responsible for sustainable forest management.

The discussions highlighted that respecting customary rights of indigenous peoples and local communities and considering indigenous and traditional knowledge can be instrumental for primary forest conservation. Participation of indigenous peoples and local communities in decision-making must be encouraged. Land access and tenure rights must be clarified, strengthened and enforced to protect the rights of the most vulnerable forest-dependent people and communities. Legal protection of primary forests and appropriate land planning mechanisms[130] must be effectively enforced to support forest conservation, considering the rights and needs of local populations and indigenous peoples. Legal instruments, such as logging bans in primary forests, should be considered and promoted.

Most primary forest values are not marketed, nor even recognized. Participants considered various policy tools recognizing the different values of primary forests to incentivize conservation actions, such as: payments for ecosystem services, forest bathing or ecotourism promotion. Reducing waste and improving resource use efficiency would provide a better economic return for forest-dependent people. This would increase the value of and reduce the pressure on remaining natural forests, thus contributing to their conservation and sustainable management.

The failure to accurately monitor the value of primary forests is seen as one of, if not the biggest threat to their conservation. Participants underlined the need to monitor and map more accurately the current extent and status of primary forest in the region, to better inform primary forest conservation strategies and programmes.[131] In that perspective, countries should work together to harmonize their definitions of primary forest, as well as the corresponding metrics and assessment methods. These definitions and metrics should reflect the diverse perceptions and views of diverse stakeholders, including indigenous peoples. Information and Communication Technologies (ICTs) hold a huge potential to improve data collection, data quality, information-sharing and transparency on primary forest status and trends.

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[130] For instance, in Brazil, land-owners are required by the law to set aside a portion of their land for conservation purpose.

[131] A participant highlighted that, in Philippines, the most accurate forest maps are often used by illegal loggers.

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Appendix 5. Expert presentations

This Appendix lists, session by session, all the expert presentations displayed during the workshop.
These presentations are accessible online here.

Session 1. Primary forests in the Asia-Pacific region: diversity, extent and status

Introduction:

1. Yves Laumonier, Principal scientist at the Center for International Forestry Research (CIFOR): *Primary forests in the Asia-Pacific region: status, extent and diversity. [pdf]*

Keynote address:

2. Anne Branthomme, FAO, Global Forest Resources Assessment (FRA): *Towards improved global reporting on primary forests. [pdf]*

Expert presentations:

3. Li Diqiang, Institute of Forest Ecology, Environment and Protection, the Chinese Academy of Forestry: *The diversity, extent and status of primary forests in China and their importance for biodiversity conservation. [pdf]*

4. Ate Poortinga, Senior scientist for the Servir-Mekong Project, Thailand will give a presentation entitled: *Mapping forest disturbances using Synthetic Aperture Radar (SAR) and Artificial Intelligence (AI). [pdf]*

5. Rajan Kotru, Lead Strategist Trestle Management Advisors & Fellow of the International Centre for Integrated Mountain Development (ICIMOD): *Diversity, extent and status of primary forests in India. [pdf]*

6. Jalesi Mateboto, Land Resources Division, Pacific Community (SPC): *Diversity, extent and status of primary forests in the Pacific Island countries. [pdf]*

Session 2. Increasing pressures on primary forests

Expert presentations:

7. Nguyen Manh Hiep, Vietnam Administration of Forestry: *Natural forest in Viet Nam. [pdf]*

8. Lilik Budi Prasetyo, Professor at the Division of environmental analysis and geospatial modelling, Faculty of Forestry and Environment, IPB University, Indonesia: *Disturbance of forest ecosystem in Indonesia. [pdf]*

9. Jennica Masigan, Center for Conservation Innovations Ph Inc., the Philippines: *Extent of forest cover change in West Mt. Bulanjao and Puerto Princesa Subterranean River National Park, Palawan. [pdf]*

Introduction to breakout group discussions:

10. Yves Laumonier, Principal scientist at the Center for International Forestry Research (CIFOR): *Typology of the main threats facing different forest types. [pdf]*

Session 3. Priority areas for primary forest conservation

Introduction:

11. Yves Laumonier, Principal scientist at the Center for International Forestry Research (CIFOR): *Assessment of priority areas for primary forest conservation in the Asia-Pacific region. [pdf]*

12. Edward Game, Lead Scientist for the Asia Pacific Region in The Nature Conservancy: *The Nature Conservancy. [pdf]*

13. Kasturi Devi Kanniah, from the TropicalMap Research Group, Centre for Environmental Sustainability and Water Security, Faculty of Built Environment and Surveying, Universiti Teknologi Malaysia: *Geospatial technology for identifying and mapping priority areas of primary forest for conservation in Malaysia. [pdf]*

14. Riina Jalonen, Alliance of Bioversity International and CIAT: *Conservation priorities for native Asian tree species from a multi-threat assessment. [pdf]*

Session 4. Primary forests: governance tools in the Asia-Pacific region

Introduction:

15. Alexandre Meybeck, special advisor at CIFOR/FTA: *What governance for primary forests' conservation in Asia-Pacific? [pdf]*

Keynote address:

16. Ryosuke Ujihashi, Forestry Agency of Japan: *Initiatives in biological diversity conservation of national forest in Japan. [pdf]*

Expert presentations:

17. Vongvilay Vongkhamsao, Director of the Forestry Research Centre, National Agriculture and Forestry Research Institute (NAFRI), Ministry of Agriculture and Forestry (MAF): *Policies and directions for primary forest conservation in Lao PDR. [pdf]*

18. Ricardo Calderon, Executive Director of the Asian Forest Cooperation Organization (AFoCO): *Role of AFoCO to support primary forest conservation in Asia. [pdf]*

19. Tetra Yanuariadi, International Tropical Timber Organization (ITTO): *Sustaining tropical timber trade: ITTO's roles in preventing illegal logging and supporting primary forest conservation in Asia and the Pacific. [pdf]*

Conclusion of Day 2:

Keynote address:

20. Robert Nasi, Director General of the Center for International Forestry Research (CIFOR): *Asia-Pacific roadmap on primary forest conservation: food for thoughts. [pdf]*