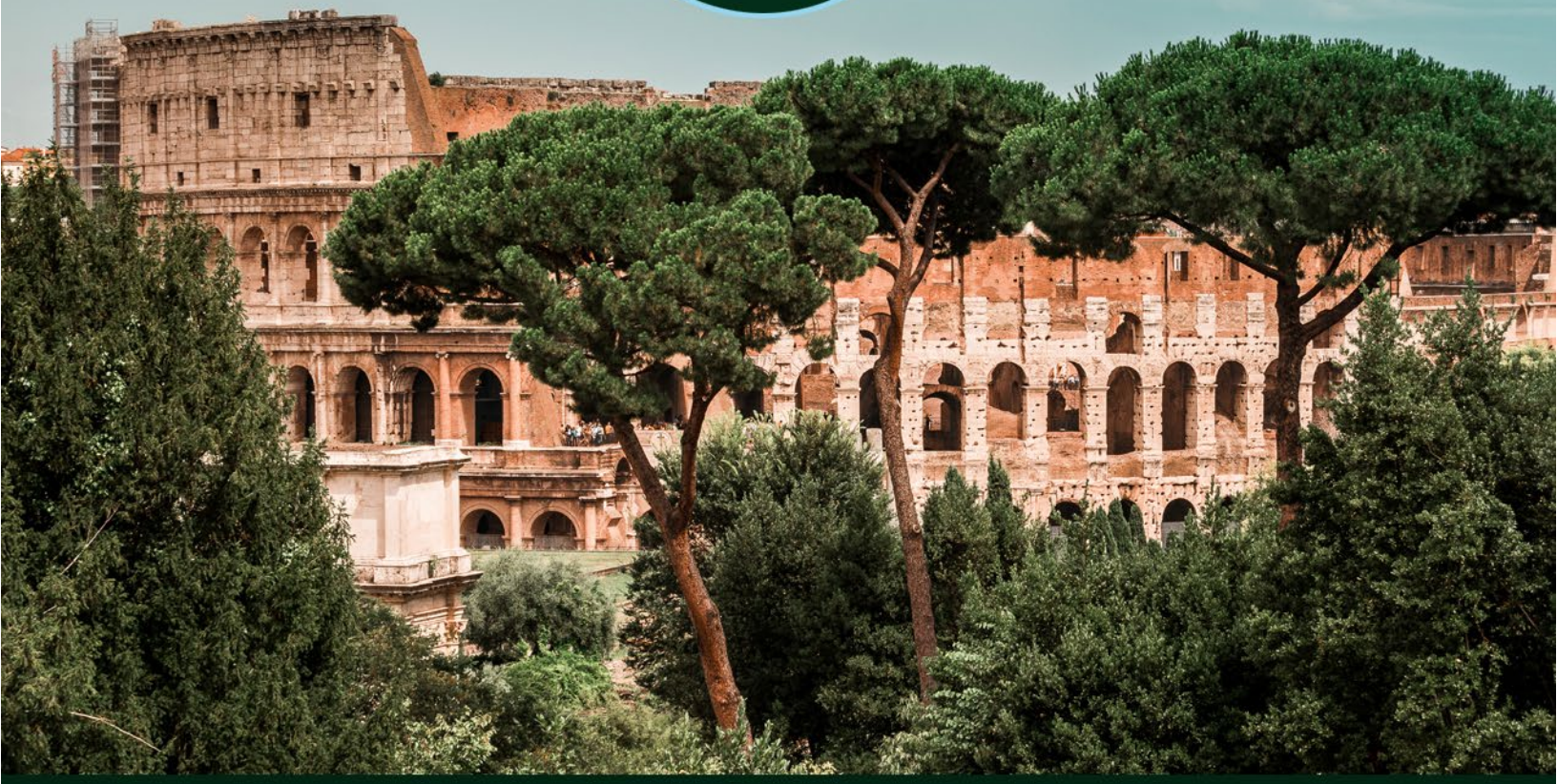
FLARE 2022 | ROME

8th Annual Meeting on Forests and Livelihoods

7-10 October 2022

Book of Abstracts

FLARE



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About the Meeting Hosts

The University of Notre Dame

Founded in 1842, Notre Dame is a leading American research university that offers undergraduate, professional, and graduate students a unique academic environment animated by Catholic social teaching. The University supports a diverse community of students, teachers, and scholars who, whatever their beliefs, are committed to "Learning to think rigorously, so as to act rightly and to serve humanity better" (Pope John Paul II). The University of Notre Dame is located adjacent to South Bend, Indiana, the center of a metropolitan area with a population of more than 315,000. It also operates Global Gateways in five major international cities— Rome, Dublin, Jerusalem, Beijing, and London—and six Global Centers in Hong Kong, Kylemore Abbey (Ireland), Mexico City, Mumbai, São Paulo, and Santiago.

The Keough School of Global Affairs

The Donald R. Keough School of Global Affairs at the University of Notre Dame advances integral human development through research, policy and practice; transformative educational programs: and partnerships for global engagement. Founded in 2014, the Keough School builds on the strengths of 9 institutes focused on international research, scholarship, and education at Notre Dame. The Keough School addresses some of the world's greatest challenges, with particular emphasis on the design and implementation of effective and ethical responses to poverty, war, disease, political oppression, environmental degradation, and other threats to dignity and human flourishing. The School offers undergraduate and graduate degrees in global affairs, with concentrations in governance and policy, international peace studies, and sustainable development.

The FLARE Network

The Forests & Livelihoods Assessment, Research, and Engagement (FLARE) Network was launched just prior to the landmark Conference of Parties (COP) on Climate Change meeting in Paris in 2015. The mission of FLARE is to advance knowledge at the intersection of forests and livelihoods and facilitate its application to policy and practice. Through annual meetings, working groups, impact assessments, and other research and engagement efforts, FLARE seeks to create and nurture a vibrant global community of practice to understand, imagine, and help bring about more just and sustainable futures for people and forests. In 2021, the FLARE secretariat moved from the University of Michigan's School for Environment and Sustainability to a base at the Keough School of Global Affairs at the University of Notre Dame.

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Foreword

The 2022 FLARE Annual Meeting was held from October 7th – October 10th, 2022 in Rome, Italy and hosted by the University of Notre Dame Rome Global Gateway, in cooperation with the Auditorium Antonianum. The Annual Meeting included 35 sessions over the course of two main programming days with 177 total presentations (posters and lightning talks included) that focused on 10 major themes.

Below are the abstracts for the work that was presented. We sincerely thank the presenters and all who supported them for their hard work and dedication to creating such rich scholarship for the Annual Meeting. Without the thought provoking and engaging content from the researchers involved, there would no FLARE. We aim to continue this success in the future so that FLARE can continue to inspire those working to support and protect forest-based livelihoods around the world. See you in 2023!

Poster Session

Alice Farrelly, University of Edinburgh

"Using a socio-ecological systems approach to model woodfuel use and land cover impacts at regional scales in sub-Saharan Africa."

Woodfuels provide energy and income to millions of households in sub-Saharan Africa (SSA). Renewed emphasis on zero-deforestation however poses threat to the livelihoods of woodfuel reliant households as the legacy of the woodfuel crisis narrative could result in the implementation of ineffective top-down harvesting bans. The current siloed nature of the woodfuels literature does not lend itself to a holistic description of the woodfuel system that is sympathetic to both the needs of woodfuel users and the need to avoid altering valued natural ecosystems. Economists and social scientists often model the socio-economic determinants of fuel choice using the 'energy ladder' and 'fuel stacking' theories, whilst ecologists focus on the impact of harvesting on ecosystem structure and function. Both aspects of the literature are heavily reliant on case study analysis with little known about fuel choice determinants or the woodfuel – ecology interaction at national or regional scales in SSA. Here we bring these two literatures together using a socio-ecological systems approach. Using publicly available household survey data, we model the socio-economic drivers of household woodfuel use at a regional scale for SSA. Subsequent modelling based on these determinants will allow us to produce a spatially explicit map of woodfuel consumption for the region and link this to observed land uses. This research sets the groundwork for later analysis which will compare regional woodfuel consumption in SSA to maps of above ground biomass change, to understand the role of woodfuel consumption as a socio-ecological force in the context of other environmental changes to woodlands and savannas. Initial results on the regional determinants of woodfuel use will be discussed, with particular focus on the socio-economic drivers of rural firewood-to-charcoal transitions. This work will address unanswered questions about the regional impacts of the socio-economic drivers of fuel choice on land cover at regional scales in SSA, in the context of other environmental change. The outcome of this work aims to provide a more nuanced view of the woodfuel system to contribute to the zero-deforestation policy discussion that benefits both forests and livelihoods.

Louis Frimpong, Readi Agroprocessing and Farms

"Towards Meeting Sustainable Biodiversity: Evidence from Cocoa Agroforestry System in Ghana"

Cocoa agroforestry system is regarded as a multiple-win practice as it can protect, restore and promote sustainable use of terrestrial ecosystems, sustainably manage forests, combat desertification, and halt and reverse land degradation and halt biodiversity loss for a sustainable future. The primary objective of the paper is to examine cocoa agroforestry as an option in meeting sustainable biodiversity. This paper aims at bridging the knowledge gap by providing empirical by seeking to evaluate conservation value of cocoa and forest interaction as well as showing how cocoa agroforestry system can contribute to the development of rural and community forestry to achieve the sustainable development in Ghana. Simple random sampling technique was used to select four cocoa growing communities and 300 cocoa agroforestry farmers in the Western Region of Ghana were selected. Both descriptive and inferential analyses were used to analyze the data. About 95% of the respondents indicated that cocoa agroforestry places emphasis on the potential of smallholder tree based systems to expand regional forest resources and, produce forest products and services as well as representing a major contribution to local livelihoods for rural communities. Further analysis showed that cocoa agroforestry has multiple benefits

in the form of both products and services: they yield food, fuelwood, fodder, timber and medicines. Over 25 species of timber trees were retained on the farm. Farmers indicated that retaining shade trees on cocoa farms improved yield, create a micro climatic environment for sustainable yield over time. In conclusion from the study, cocoa agroforestry system emerges as a promising land use option to meet the biodiversity and Sustainable Development Goals. Policies to promote this integrated landscape approach, that incorporates agroforestry concepts and practices, to overcome barriers and accelerate action for achieving biodiversity goals associated targets need being promoted.

Mary Ann George, University of Zürich

"Effect of Trees on Croplands on Biodiversity and Food Security in the Global Tropics"

The predicted growth of the human population and its needs confronts us with the challenge of identifying agricultural practices that could enable meeting both food security and biodiversity conservation goals concurrently. Agroforestry systems, i.e. growing trees alongside crops on agricultural land, enable conservation of biodiversity, provide ecosystem services and mitigate climate change; however, we are yet to determine if agroforestry systems also ensure food security. In other words, while agroforestry holds the promise of contributing to food security globally, often it focuses on cash crops, and the households that practice agroforestry are food insecure themselves. We conduct a global analysis to understand if agroforestry mediates the relationship between food security and biodiversity. We identified 'Trees on Croplands' pixels for tropical areas globally for 2015 at 10km x 10km resolution. We attributed 'Trees on Croplands' pixels with a set of newly developed food security-biodiversity indices, namely yield-abundance index, production-richness index and value of production-richness index. These indices combine data on intactness in species richness and species abundance as indicators of biodiversity, with data on crop yield, crop production and crop value of production as indicators of food security. We find that approximately 2,069,162km2 are covered with 'Trees on Croplands' in tropical regions, in contrast to approximately 63,573km2 of croplands without trees. We find a two-times higher yield-abundance index value for 'Trees on Croplands' as opposed to croplands without tree cover (meanToC = 0.2±0.14; meanTw/oC = 0.10±0.08). Subsequently, we find that food-biodiversity indices' values increase with fraction of tree cover up to about 25% tree cover, after which indices' values decline steadily. We also find that food-biodiversity indices values increase with increasing number of crop species in 'Trees on Croplands' up to about 16 crops, beyond which they gradually decrease. Our preliminary results show that trees on farms have a different range of values for the relationship between food security and biodiversity than croplands without trees in tropical regions. However, there seems to be a threshold beyond which this relationship disrupts, and future work needs to start unveiling the mechanisms that lead to this decoupled relationship.

Ritah Kigonya, Norwegian University of Science and Technology

"Biodiversity offsetting in protected areas: Towards attaining biodiversity and livelihood benefits."

In the face of the current biodiversity extinction crisis, protected areas (PAs) are key for the protection of biodiversity. The areas permit evolvement of and safeguard biological diversity which is a source of numerous products and ecosystem services critical for human wellbeing. Among the major hindrances to effective PAs management is lack of resources including funding, staff members and equipment. With limited national budget allocations for PAs management especially in the developing countries, biodiversity offset measures are being promoted as innovative ways to finance PAs management. However, there is limited evidence regarding their effectiveness in attaining desired conservation

benefits. As different conservation measures are promoted, the conservation community needs to understand the measures that work, why they work and when they work. Using the case of Gangu Central Forest Reserve (CFR) in Uganda, our study explores the effectiveness of using biodiversity offset funds to restore and manage a portion of the degraded CFR. The study maps the different forest management areas in the forest: private forests managed by private tree farmers; Collaborative Forest Management (CFM) area managed by forest communities; the offset site and Corporate Social Responsibility restoration site managed by the National Forest Authority (NFA). Using forest cover change analysis (over a period of 12 years) and community surveys, the study reveals intermittent forest cover change in the offset site, with a general forest cover decline in areas managed by the National Forest Authority, compared to areas under private and CFM management. Encroachment of the biodiversity offset site was minimized through continued community access to forest livelihood benefits in other forest management areas. The findings reveal that the success of offset sites within protected areas cannot be determined in isolation but influenced by the broader protected area management and governance context. Forest buffer zones from which communities can obtain livelihood benefits or community livelihood projects are essential for the successful implementation of biodiversity offsets."

Eleanor Moore, Newcastle University

"The compositional and functional contribution of home-garden trees to livelihood resilience of smallholder farmers"

Ecosystem restoration has often placed insufficient focus on the human and social dimensions of tree planting. In rural areas, trees kept around the home may provide important livelihood benefits for local people, particularly in the face of external shocks trees can provide an alternative source of income or food in times of drought.

Smallholder farmers in the Northern Kilombero Valley, Tanzania are facing multiple challenges to their livelihoods due to increases in drought, flooding, and wildlife crop raiding. Many trees on farms have been removed for the planting of rice and sugarcane monocultures and farmers are restricted from using the surrounding forests. Therefore, trees kept in home gardens within the village may provide important benefits to local people while also increasing landscape connectivity and biodiversity.

Our study aims to show if and how trees contribute to the livelihood resilience of smallholder farmers in Tanzania. We will combine a composite indicator of livelihood resilience and qualitative interviews with 65 farmers across 3 villages with an ecological tree and functional trait inventory (eg. Nitrogen-fixing, wood density, chlorophyll content). We will aim to show (1) the compositional and functional attributes of trees within home gardens and (2) how trees within home gardens contribute to building livelihood resilience and whether trade-offs occur between dimensions of livelihood resilience, and the types of shocks farmers are attempting to adapt to.

Smallholders have historically been side-lined in decision making around natural resource management and ecosystem restoration in areas such as the Kilombero Valley, Tanzania. We aim to contribute to evidence regarding the social dimensions of tree planting for smallholders through a livelihood resilience framework. We add a novel perspective by examining the functional attributes of the tree community to understand what types of trees are important to smallholders in building their livelihood resilience.

Tree planting interventions in and around human settlements need to start by understanding the reasons people have for growing trees, and understanding this in the framing of livelihood resilience can allow us to look and plan towards the future.

Ratna C. Purwestri, Czech University of Life Sciences Prague

"Forests in Women's Hands: current situation of women's role and representation in the Czech forestry"

The Czech forests cover approximately 34.1% of the country's total land area, with their significant contribution to the ecosystem. The present economic contribution of forestry (mainly from the wood provisioning service) is comparable to the Czech agriculture sector. The forest sector is traditionally considered a male-dominated area, and some forms of gender inequalities persist in Czech society. The paper aims to describe the present situation of women's role and their representation in the Czech forestry. The quantitative results of the Czech Republic are part of the Interreg Danube Transnational Programme, Forests in Women's Hands (Fem4Forest) project coordinated by the Slovenian Forestry Institute that involves 14 project partners from 10 countries in Europe (2020-2022). Thus, an online survey using a structured questionnaire was employed to 880 respondents in those ten countries from March to April 2021. Particularly in the Czech Republic, a total of 103 women working in forestry were surveyed; 70.2% of them were female employees, followed by a similar proportion of forest owners and students/trainees in forestry (17.3%); 12.3% of the respondents were both forest owners and the employees (n=9). The median of forest land was 3 ha. 83.5% of the respondents agreed that forestry is a male-connotation sector, and 40.8% of them were unsatisfied with the representation of women in forestry. However, about half of them concurred that even a female forest owner often placed her male family member at the management level. Consequently, the stereotypes and role attributions (48%) and the physical and psychological resilience (47%) were the most significant obstacles/challenges, in addition to less support in family care obligations (37%). The results confirmed that women are less favored as forest owners with disadvantages in a low share of forest land and a less family-friendly working environment. The unsatisfaction proportion (about 40%) indicated the women in forestry in the Czech Republic experienced a transition phase in understanding their capacity and role in this sector; thus, support in resources, facilities, and training can give them a broader choice in balancing between work and families.

(Acknowledgment: The research project is funded by Fem4Forest-Interreg and EVA 4.0)

Marc Ramzy, Conservation International

"Beyond Tree Planting: Chat Circle on New Restoration Resources that Harness the Power of Nature"

Despite the flurry of international commitments to restoration, on-the-ground restoration progress has been slow. Initiatives like the Bonn Challenge goal aim to inspire an ambitious 350 million hectares of restoration. However, globally, the number of binding Nationally Determined Commitments covers only 57 million ha, most of which is allocated to tree planting and woodlots, reflecting a common over reliance on tree planting to restore forests. Although tree planting is needed and works well in some conditions, in others it costs more and is less effective than helping forests regenerate naturally. Assisted natural regeneration (ANR) promotes natural forest recovery processes to restore forests. It holds great promise for restoring forests at the scales needed to meet global commitments, but is less often used for a range of cultural and policy reasons – including a lack of awareness and technical know-how. We have produced four resources for restoration practitioners with guidance on the where, why and how of restoration to enable countries to meet their commitments in a more cost-effective and ecologically tailored way. These guides on spatial analysis for restoration, ANR, Applied Nucleation and case studies from around the world span geographies, ecosystems, political and tenure systems, climate vulnerabilities, and languages (English, French, Portuguese, Spanish). We highlight models, examples

and methodologies to accelerate action towards restoration, and the challenges and opportunities comparative restoration strategies offer for livelihoods and communities. This evidence-based guidance incorporates the authors and Conservation International's extensive experience implementing these restoration practices and hopes to transform the information space around how we plan and do forest landscape restoration in partnership with communities around the world. We hope to gather with FLARE participants around our poster to engage with these resources and discuss how they natural-regeneration-related restoration strategies are or could be used in their work around the world.

Alexandra Rasoamanama, University of Göttingen

"Who are we empower to conserve tropical forests? Evidence from Congo Basin"

Up to 80% of forest loss in the Congo Basin is attributed to small-scale farmers for subsistence agriculture. It is well documented that protected areas have social and economic impacts on forest-dependent communities, including small-scales farmers. Since the early 1990s, Congo Basin countries have been strongly encouraged by massive international financial incentives to create new or extend their existing protected forest areas. To date, up to 15% of Congo basin forests are formally protected for their biodiversity, with strict restrictions to the related forestlands for forest-dependent people. In the following of recent international biodiversity debates, this expansion is expected to increase in the future with the new global goal to protect 30% of the earth. However, the conditions needed for a fair and equitable conservation remains questionable and poorly understood from a policy perspective, especially in forest-rich regions. It is undeniable that protected areas, in order to reconcile conservation and development, need to be aligned with the rights and livelihoods of indigenous and local populations. This paper aims to assess whether EU-funded regional conservation and development programmes such as ECOFAC, have empowered different actors in the Congo basin? In term of method, we conducted a forest policy analysis to identify the key target actors who have benefited most from this programme, and to what extend forest-dependent people were privileged or marginalized, and why? We found that the programme targeted three actors that play a key role in the success or failure of conservation in the Congo Basin: eco-guards, forest-related officials and non-governmental organisations, and forest-dependent land users. Based on the financial distribution of the different activities carried out under the programme, eco-guards and forest-related officials and non-governmental organisations have benefited most from ECOFAC. Forest-dependent communities, such as small-scale farmers, have benefited the least, even though their livelihoods are the most impacted by protected areas. In short, ECOFAC tends to empower those who can impose restrictions using coercive measures rather than improving the livelihoods of forest-dependent communities. EU Policy-makers need to pay more attention to how their interventions create or reinforce power asymmetries and inequality in biodiversity conservation policies.

Saturday Sessions

Session 1: Facilitating evidence-based decision making for improved livelihoods and sustainable forest management: FAO snapshot

Ashley Steel, Food and Agriculture Organization

"Estimating Global Wood Fuel Production"

Wood fuel consumption and production are intimately linked with poverty, environmental conditions, local economies, and sustainable development. It is an affordable fuel to those who cannot access other energy sources, yet takes time to collect and therefore presents a tremendous opportunity cost, particularly for women. According to estimates in Tracking SDG7 - The Energy Progress Report 2021 (IEA, IRENA, UN, World Bank and WHO, 2021), one third of the global population, or about 2.6 billion people worldwide, rely on traditional fuels, mainly biomass (wood, agricultural residues, etc.) and charcoal for household cooking in 2019. Use of woodfuel can also lead to indoor air pollution; illegal charcoal production is associated with deforestation and forest degradation. Estimating the global production of wood fuel is therefore of particular importance for designing energy, land management, and human health policies that can lead toward sustainable development. Estimating the global production of wood fuel is also of particular importance for understanding and tracking the share of wood-based energy in total final energy consumption, the proposed indicator 10 of the Global Core Set of Forest-related Indicators. However, data to understand and quantify the production of wood fuel, particularly, wood fuel that is informally collected, are sparse. We have conducted a systematic country-by-country search for available data to update the model used by FAO in estimating wood fuel production for countries which do not submit official statistics and convened an expert group to design a conceptual model of drivers of wood fuel production, at national level, that can be used for creating future estimates. Revised estimates were created using Random Forest models built on the strongest FAO data and the newly found data as well as the suite of potential covariates identified in the conceptual model. We share the revised estimates, the covariates that were most influential across different areas of the globe and how revised estimates compare to past estimates. We conclude with a discussion of the implications of revised wood fuel estimates on our understanding of global trends.

Yonca Gurbuzer, Food and Agriculture Organization

"Estimating the number of people employed in the forest sector"

Forests and the forest sector are important sources of employment, livelihoods and incomes for millions across the globe, particularly in rural areas. Despite the relevance of forests for employment and income generation, limited quantitative information is currently available on the subject. This lack of data makes it challenging to quantify the number of people employed in the forest sector, and their contribution to global employment.

Estimating forest-related employment involves methodological challenges such as the standardization and comparability of data collected, as well as the availability of reliable and detailed employment statistics. This paper outlines recent work done by FAO in cooperation with the International Labour Organization (ILO) and the Johann Heinrich von Thünen Institute, Federal Research Institute for Rural Areas, Forestry and Fisheries, Germany ("Thünen Institute") to employ a new method to fill the gaps of missing data points in order to provide sound total employment estimates in the forest sector on a global scale.

Using information from the ILO microdata collection and ILO-modelled employment estimates from 185

countries, the annual average number of persons employed in the forest sector is estimated to be approximately 33 million for the period 2017–2019. This accounts for about 1 percent of total employment across all economic activities. Overall, a declining number of persons are employed in all subsectors of the forest sector. Informal employment plays a significant role in the forest sector labour market. The share of informal employment is above 80 percent of the total forest-related employment in most of the countries in Africa and Asia where data are available. The analysis further reveals that females are more likely to have informal jobs. A disproportionately higher share of informal female employment is found in Asia and Africa, especially in the subsectors of forestry and logging and the manufacture of wood and wood products.

Peter Newton, University of Colorado, Boulder

"The number of forest- and tree-proximate people: a new methodology and global estimates"

Mapping the spatial relationship between forests, trees, and the people that live in and around them is key to understanding human-environment interactions. Evidence on the number and spatial distribution of people living within or near forests and trees outside forests may help decision-makers to target projects, programs, and strategies in priority areas, and to estimate the numbers of people that will be affected or have been affected as a result of an intervention. We developed a new methodology to quantify and map the number of people living in and around forests (forest-proximate people). We also estimated the number of people living close to trees outside forests (tree-proximate people). We address two closely related research questions: 1) How many people live in and around forests? and 2) How many people live close to trees outside forests? On a global scale, we combined 1) forest cover and human population density data to map the spatial relationship between people and forests, and 2) tree cover, agricultural land cover, and human population density data to map the spatial relationship between people and trees outside forests. We estimated that 3.27 billion and 4.17 billion people lived outside of urban areas and within 1 km and 5 km, respectively, of a forest with a minimum size of 1 ha in 2019. These 'forest-proximate people' correspond to 75% and 95% of the global non-urban population, respectively. We estimated that 3.50 billion people lived outside of urban areas and within 1 km of agricultural lands (i.e., croplands plus grazing land) with at least 10% tree cover and a minimum size of 1 ha in 2019. These 'tree-proximate people' correspond to 80% of the global non-urban population, respectively. The vast majority of forest-proximate and tree-proximate people lived in low- and middle-income countries. Our results shed new light on the spatial relationship between people, forests, and trees while demonstrating a methodology that can be readily used to produce updated estimates based on publicly available data.

Sven Walter, Food and Agriculture Organization

"Forest pathways for green recovery and sustainable economies – Supporting evidence-based decision making through sound data"

Session 2: Data & Methods for Understanding and Promoting Forests & Human Wellbeing 1

Elizabeth Linda Yuliani, Center for International Forestry Research (CIFOR) and Radboud University Nijmegen

"Forest or oil palm plantation? Interpretation of local responses to the oil palm promises in Kalimantan, Indonesia"

Global land use/land cover change is dominated by the expansion of cash crops plantations, replacing natural ecosystems including forests. International trade is an important factor in this process. Increasing demand on certain crops has triggered plantation expansion and deforestation, and influence local land use in other countries (land teleconnections). Oil palm expansion is one of the most prominent examples of land teleconnections. In Indonesia, oil palm plantations area increased from 1.1 million ha in 1990 to 11.2 million ha in 2015. According to the Indonesian Law on Plantation, the indigenous people's decisions play important roles in land use decisions. This paper investigates what were the factors (drivers) determining the individual-level responses to the oil palm promises in West Kalimantan. These questions are not only important for the future of Kalimantan's rainforest but will also enrich deforestation and conservation-development discourses. We selected 49 respondents for interviews and focus groups such that people who opposed and people who supported the conversion were both well represented. Much attention was paid to arrive at a balanced set of operational variables, such as the economic resilience, agency and embeddedness of actors and the degree to which actors had appreciated and believed the oil palm promise. Data were analyzed through the Qualitative Comparative Analysis (QCA) method. The outcomes show a perfect association of appreciation of the oil palm promises, belief in them and the decision to support the oil palm. This was not strongly associated with low economic resilience however; economically less resilient respondents could reject the oil palm conversion, while economically resilient respondents could support it. In other words, the data do not point to a poverty/deforestation nexus. Rather, the data suggest the existence of an 'embeddedness / rejection nexus'; people that were well-connected to community, traditions and nature held long-term motivations and rejected the oil palm promise, and vice versa. More attention to this phenomenon will help bridge conservation-development objectives in Kalimantan. (the paper is published in 2020, Land Use Policy 96:104616)

Nathan Badry, McGill University

"Boundary-spanning methodological approaches in moose and forestry governance in Eeyou Istchee"

Natural resource governance challenges are often highly complex, particularly in Indigenous contexts. These challenges span jurisdictional, disciplinary, social, and ecological boundaries. In Eeyou Istchee, the James Bay Cree Territory of northern Quebec, Canada, traditional livelihoods depend on wild food species such as moose, but these livelihoods are being impacted by forestry and other resource development projects. The complex relationships between moose, forests, and Cree livelihoods can limit understandings and the ability of governance actors to respond to these threats. Contributing to this complexity in Eeyou Istchee are different knowledge systems, from scientific and bureaucratic knowledges to Cree ways of knowing, as well as the many difficulties inherent to managing a boreal landscape and social-ecological system two-thirds the size of France. There are also numerous governance actors—including provincial government agencies, local and regional Indigenous governments, forestry co-management boards, and organisations representing Indigenous land-users—which, while not always aligned, have broadly shared conservation and sustainable development goals. To account for this complexity, a methodological approach was developed in concert with a steering committee of these governance actors, comprising a mix of natural and social science methods. Interviews, participant observation, and workshops with Cree land-users, as well as GPS data and video

from collared moose were used to understand the effects of various factors on moose habitat, particularly forestry and forestry policies. A variety of analytical methods were applied, but here we focus mainly on fuzzy cognitive mapping, and its use within the project to interpret the knowledge of Cree land-users and weave that knowledge together with other scientific and bureaucratic knowledges. The ways in which participatory, relational mapping approaches can be applied, and what these approaches can offer to natural resource governance research more widely are explored. As scholars and practitioners grapple with complex natural resource governance challenges, methods which can span boundaries are becoming increasingly relevant. By applying transdisciplinary methodological approaches which are grounded in the local governance context, and inclusive of multiple ways of knowing, both traditional livelihoods and the shared objectives of diverse governance actors can be better supported.

Ana Cubas Baez, University of Florida

"Impacts of forest-based climate change mitigation strategies: understanding local perceptions of rural households in two sites of the Peruvian Amazon"

Deforestation has been one of the main causes of climate change and environmental degradation in the past decades. Reducing carbon emissions from deforestation and forest degradation and enhancement of carbon stocks (REDD+) has emerged as a key strategy to mitigate climate change. There is broad consensus that REDD+ should not only reduce emissions but also contribute to other sustainable development goals in compliance with "REDD+ safeguards".

It is challenging to monitor and assess safeguards on the ground. The main goal of this research was to analyze the impacts of participation in REDD+ projects in Peru on the well-being of traditional rural (Madre de Dios) and indigenous (Ucayali), using data from the CIFOR's Global Comparative Study on REDD+. Data were collected from eight "intervention villages" and eight "control villages" in 2011, 2014, and 2018, using village, women, and household surveys.

We used the surveys to analyze measures of participation in REDD+ and local well-being. First, group interviews held with village leaders and with women elicited their perceptions of what fraction of households had improved their well-being. Second, group interviews included a discussion of household characteristics associated with higher well-being, which allowed to identify household survey data to measure well-being from the village and women's perspectives. Third, we analyzed self-reflexive changes in perceived household well-being. We examined how measures of well-being were related to three types of participation in REDD+: living in an intervention village, self-reported participation in REDD+ and the forest interventions implemented through the REDD+ projects. Our study found that REDD+ had a significant impact on households' well-being in Madre de Dios, declining during our study period. In Ucayali, REDD+ did not have a significant impact on well-being. In both sites, perceptions of well-being were also influenced by the age, gender, education of the household head, adult members in the household, and access to utilities.

Findings from this study can improve understanding of local perceptions of well-being and how it is influenced by REDD+. These insights can inform future design and implementation of REDD+ initiatives, and the metrics and methods to monitor and report on safeguards to protect local livelihoods.

Patricia Carignano Torres, University of São Paulo

"Agent-based modelling of wildmeat consumption patterns: investigating how changes in human population demography impact the use and conservation of game species in Central Brazilian Amazonia"

Population growth and urbanization can increase the demand for natural resources. For instance, there is evidence of increased demand for wildmeat in some locations, which may lead to defaunation, compromising the wellbeing of rural people highly dependent on forests. In Amazonia, recent evidence indicates wildmeat consumption can be common and substantial in towns. However, it is still debatable whether urbanization threatens game species, as our understanding of the drivers of urban consumption advances. Here we propose to develop an agent-based model to understand how: (i) households' characteristics and decisions produce observed patterns of wildmeat consumption, and (ii) how changes in human population growth and urbanization impact game species populations. The model is being developed in the program NetLogo, using an extensive dataset from a field-based household survey in four municipalities in Central Brazilian Amazonia, in which we surveyed 798 urban households and 311 rural households in 63 riverine communities. Our model will represent a spatial explicit system of a municipality, with its urban center and riverine communities at varying distances. Different agents will represent different game species and urban and rural households, which interact with each other through wildmeat consumption, rural-urban mobility and social networks. Parameters governing decisions will be based on previous analysis of our survey data on how households' characteristics are associated with consumption, and secondary data (for game species populations). We predict our model will elicit how the pattern of wildmeat consumption we observed in our study area (i.e. high importance of gifting, higher rural consumption but less diverse urban consumption—placing intensive pressure on three preferred species) will emerge from interactions between agents via rural-urban mobility (i.e. household's origin, rural livelihoods, circulation between rural and urban areas) and social networks—important drivers of consumption we have found. After validating our model, we will simulate changes in population growth and urbanization to investigate how they impact households' use of wildmeat and species conservation. Model simulations may be particularly useful to inform strategies for sustainable use of wildmeat, and we expect that other researchers could use your model to understand consumption patterns and potential urbanization impacts in different study systems.

Session 3: (Forest) Landscape Restoration: People, Trees, Politics 1

Daniel Kofi Abu, Tropenbos Ghana

"Ties that bind: A critical reflection on community forest landscape restoration in Ghana's fragile savanna ecological and transitional zones"

According to its ardent proponents, participatory forest landscape restoration in Sub-Saharan is an opportunity to salvage several areas degraded by decades of exploitation due to inappropriate policies and create economic gains. Unlike state-led and private large-scale restoration efforts, they promise, that placing communities at the fore of restoration efforts lead to ownership and improve the chances that restoration efforts will succeed. Based on a case study of restoration activities in 10 communities across Ghana's transitional forest and savanna ecological zones, this (talk, paper, contribution) paper critically reflects on the inherent contradictions participatory forest restoration encounters within this volatile landscape. First, actor imaginaries that bundle communities without disaggregating their peculiar and/ or shared interests encounter a paradox where some actors support FLR. In contrast,

others are inconsiderate or resigned to activities to imperil the success of the innovators. Second, the inherent risk of fire within the landscape imperils the success of stakeholder efforts. Overcoming these contradictions requires disaggregating communities to understand their motivations and interests, but most importantly, finding a common metanarrative that galvanized competing actors toward collective action, and investing in the collective vision.

Further to the above, the detailed analysis carried out in ten (10) communities in the transitional and Northern Savanna ecological zones used a case study approach of mixed data collection methodology of both qualitative and quantitative. These communities benefited from an FLR implemented project. The project intervention has resulted in 990ha of land being committed to the restoration of which 237ha comprise community woodlots, 493ha of natural forest, and 263ha of agroforestry. The project has planted 690,000 seedlings so far with 2,641 persons engaged in planting and weeding of which 1,690 are women representing 64% and 819 youth representing 31%.

The paper contributes significantly to forest landscape restoration approaches and the role of communities in creating a sustained impact.

Laurence Richards, Agroforestry Research and Development CIC

"Land-use and Livelihood Typologies and Dynamics."

There is a growing body of evidence and calls from high-level policy papers for the contribution agroforestry can make in developing global societies by sustainably increasing food production while restoring landscapes and adapting to climate change. Despite this evidence, adoption of agroforestry technologies remains low.

The history of agroforestry science has been characterised by an emphasis on a handful of priority species over last scales, with little reference to the needs and circumstances of farmers and the biophysical conditions present at a fine scale of analysis. This has led to calls for agroforestry development efforts to be embedded within a nuanced understanding of the dynamics and heterogeneity of socioecological systems present. This research addresses these issues while focusing on how trees function and are used on farms by a range of stakeholders across a sampling transect that represents a variety of agroecological zones in Makoni district, Zimbabwe.

We used a range of participatory methods including, in depth interviews and landscape walks with key resource people, household surveys, semi-structured interviews and farm walks and focus group discussions.

Our results show that farmers are overwhelmingly believe that trees on farms are good for livelihood resilience and landscape restoration and are interested in increased tree planting. We have identified portfolios of tree species present in field and landscape niches, as well as farmers' knowledge and preference relating to trees, how they were propagated and how they are used. We have identified increased on farm soil erosion and degradation of communal forests due to population expansion and tobacco farming as key threats to livelihood systems.

Makoni district is an area where there are many potential socioeconomic and ecological benefits from deploying agroforestry interventions, though the lack of knowledge severely limits the ability of extension agents, policy makers and farmers in making informed interventions. This research breaks new ground by providing a nuanced understanding of the socioecological systems that smallholders

operate in within and a detailed identification of how trees are used on farms for various products and services.

Ruth Metzel and Sarah Wilson, Conservation International

"Beyond Tree Planting: Harnessing the Power of Nature to Restore Forests at Scale"

Despite the flurry of international commitments to restoration, on-the-ground restoration progress has been slow. Initiatives like the Bonn Challenge goal aim to inspire an ambitious 350 million hectares of restoration. However, globally, the number of binding Nationally Determined Commitments covers only 57 million ha, most of which is allocated to tree planting and woodlots, reflecting a common over reliance on tree planting to restore forests. Although tree planting is needed and works well in some conditions, in others it costs more and is less effective than helping forests regenerate naturally. In this presentation we provide an overview of the need for alternative restoration strategies, why and how they can be effective at meeting global targets, and the resources we have produced to implement them. Assisted natural regeneration (ANR) promotes natural forest recovery processes to restore forests. It holds great promise for restoring forests at the scales needed to meet global commitments, but is less often used for a range of cultural and policy reasons – including a lack of awareness and technical know-how. We have produced four resources to help restoration policy makers and practitioners decide where, why and how to use ANR and other techniques to meet restoration commitments in a cost-effective, socially beneficial, and ecologically tailored way. These guides on using spatial analysis to identify restoration opportunities, ANR, Applied Nucleation, and case studies from around the world span geographies, ecosystems, political and tenure systems, climate vulnerabilities, and are available in multiple languages (English, French, Portuguese, Spanish). We highlight the challenges and opportunities comparative restoration strategies offer for livelihoods and communities, and showcase models, examples and methods to accelerate action towards restoration. This evidence-based guidance incorporates Conservation International's and the author's extensive experience putting restoration practices into action.

Session 4: Beyond the Forest Edge: Trees on Farms and in Cities 1

Anirban Roy, Ashoka Trust for Research in Ecology and the Environment; Manipal Academy of Higher Education

"Investigating the performance of trees in cities: Effectiveness of Miyawaki forests across an age-spectrum in Bangalore Urban district, India"

Recent studies reported the creation of urban forests through the Miyawaki method- a forestry technique meant to balance today's edaphic and climate conditions. Based on the principle of 'restore native forests by native trees', Miyawaki urban forests are highly-dense, biodiverse pocket forests conceived through local stewardship delivering several socio-ecological services. However, the lack of regular monitoring after the implementation of the Miyawaki forest stands posits a question on their effectiveness, thereby deterring the upscaling of such projects in extended areas. In this study, I have conducted vegetational sampling and canopy closure analysis across spatially similar Miyawaki urban forests in Bangalore Urban district (Karnataka, India). This district is a heavily urbanized area, with 30% of the district under the built-up area in the core Bangalore metropolitan region, which is mostly (44%) surrounded by semi-arid and dry sub-humid seasonal croplands. The study was carried out through

(1m*1m) quadrats across an age-spectrum of Miyawaki urban forests- 10 years old, 6-7 years old, and 4 years old- wherein I measured the species diversity, plant metrics (stem count, stem diameters, stem height estimates) and canopy closure to examine the forest performance. It was found that Miyawaki forest's performance in the study region is poor with reduced natural recruitment of non-tree forest species at the forest floor and sub-canopy levels. In terms of survivability, the number of living (adult) species was much higher than the dead ones. Canopy closure in the older forest stands was consistently above 90%- likely an important reason for slow litter degradation and lesser herbaceous recruitment. Further, interviews of a sample set of urban community members (staying near the Miyawaki stands) provided insights into their perceived values of aesthetic qualities and biodiversity values. In addition to its novelty, this study can be practically applied to the debate on the random applicability of Miyawaki urban forests in any ecosystem. This study recommends silvicultural modifications like coppicing, pruning, and maintaining age diversity which when introduced can improve the effectiveness of these pocket forests. Trees in cities add 'green' aesthetic values to urbanscapes but only when maintained rightly, can offer socioecological benefits.

Dominic A. Martin, University of Zurich

"Drivers and consequences of archetypical shifting cultivation transitions"

Shifting cultivation – characterized by a cycle of land clearance, cultivation, and fallowing – represents an important tree-rich land system in many tropical landscapes. It also plays a key role for livelihoods of smallholder farmers, but transitions away from shifting cultivation are increasingly common. So far, our knowledge on the drivers and consequences of such shifting cultivation transitions is incomplete, focusing on certain transitions, drivers, consequences, or regions. Here, we apply an archetype approach, validated through systematically identified literature, to describe pantropical archetypes of shifting cultivation transitions. We then discuss factors favoring and disfavoring each archetype and the socioeconomic and environmental consequences they entail. We find eight archetypes encompassing the transition from shifting cultivation to 1) perennial plantation crops, 2) permanent agroforestry, 3) passively regrowing forest, 4) permanent non-perennial crops, 5) pasture, 6) wood plantation, 6) non-cultivated non-forested land, and 8) actively restored forest (ordered in decreasing prevalence). Higher expected land rents, resulting from increased market access, crop price surges, secure land tenure, and state interventions are the main drivers of archetypical transitions to perennial plantation crops, permanent agroforestry, permanent non-perennial crops, and wood plantation. The prioritization of other activities, both on- and off-farm, favors transitions to passively regrowing forest or non-cultivated non-forested land, depending on plot-level environmental conditions. Active forest restoration is typically implemented through state or NGO interventions. Turning to the consequences of archetypical transitions for biodiversity, the environment, and livelihoods, we find that positive environmental outcomes prevail for transitions to permanent agroforestry, passively regrowing forest, and actively restored forest, while negative environmental outcomes dominate for four typically economically profitable transitions to perennial plantation crops, permanent non-perennial crops, pasture, and wood plantation. Non-income related social-economic outcomes are heterogeneous within all archetypes and highly context dependent. In sum, our archetype analysis shows that shifting cultivation transitions are diverse in themselves, in their drivers, and their consequences; in line with commonly observed system dynamics in social-ecological systems. This is calling for a critical and contextualized appraisal of the continuation of, as well as the transition away from shifting cultivation when designing land system policies.

Esbern Friis-Hansen, Danish Institute for International Studies (DIIS)

"Political ecology of wildfire in Southern Highlands of Tanzania: From fire dependent to fire sensitive landscape"

Using a political ecology lens the paper analyses the socio-economic and political causes and effects of an increase in wildfire associated with Timber Rush in Southern Highlands of Tanzania. An expansion of Non Industrial Private Forestry (NFTF) on village land has introduced a highly fire susceptible element in an otherwise fire dependent landscape. Through qualitative interviews and focus group discussions the chapter examine political ecology of wildfires between 2017-2022, primarily in Njombe Urban district. The chapter discuss how co-existence of conflicting land use practices influence physical characteristics of wildfire, as well as social norms and agency of the community, domestic investors and local government authorities. The paper further explores community practices to prevent, protect and suppress wildfire and concludes that wildfires are fueled by conflicting land use practices and associated social interests and amplified by inadequate policies and institutional mechanisms. It further argues that a new social contract is emerging between local communities of small-scale farmers and a section of non-resident domestic investors that constitutes a new innovative model of community firefighting.

Kendisha Soekardjo Hintz, Technische Universität Dresden

"Factors influencing smallholders' willingness to participate in a forestry cooperative: Insights from Ethiopia"

Value chain studies on Eucalyptus poles stemming from private small-scale woodlots of tree growers in rural areas of Ethiopia highlight the challenges in linking smallholders to a structured market. Democratically-controlled forestry cooperatives can potentially empower smallholders with market intelligence and higher bargaining power, thereby developing the wood-based value chain. However, insights on factors influencing farmers' willingness-to-participate in a forestry cooperative are scanty. Therefore, this research aimed to examine the main factors influencing smallholder tree growers' willingness to participate in a forestry cooperative, with a case study in Chefasine Village, Hawassa Town District, Sidama Region. We applied a mixed-methods approach encompassing 11 key informant interviews, six focus group discussions, direct observation, and semi-structured interviews with 185 tree growers selected through multistage purposive sampling. Descriptive statistics, binary logistic regression analysis and content analysis were employed to analyze the quantitative and qualitative data. Among the interviewees, 73% of them stated to be willing to participate in a forestry cooperative. Their understanding of a forestry cooperative is one that facilitates i) access to loan, training, and market price information; ii) support in woodlot management; and iii) commercialization of tree products in a joint timber yard. Farmers' age group between 25 and 60 as well as dissatisfaction in the revenues acquired from the last woodlot harvest were found to have significant impacts on farmers' willingness to participate in a forestry cooperative. Price dissatisfaction was attributed to the farmers not knowing the market price. We recommend further investigations into viable business models and organizational governance arrangements of a forestry cooperative for smallholders in rural Ethiopia.

Session 5: Biodiversity, Forests and Livelihoods 1

Amy Ickowitz, CIFOR

"How much do mangroves contribute to food security and nutrition in Indonesia?"

While evidence has highlighted the positive contributions of mangroves to fisheries, little is known about how mangroves contribute to the diets of local communities living near them. Indonesia is home to the largest area of mangroves in the world but has been losing these important ecosystems at an alarming rate. Despite impressive economic gains over the last two decades, malnutrition in Indonesia is quite high. More than one third of Indonesian children are stunted which is partly a consequence of poor diets. Fish are rich in protein and micronutrients and are the most widely consumed animal source food in Indonesia, making the relationship between mangroves and fish consumption of great potential importance.

We hypothesize that if mangroves support fisheries, then those households residing near mangroves are more likely to consume fresh fish and other aquatic animals (FOAA) than other coastal households due to the high transaction costs of exchanging these highly perishable foods. We use data from a large nationally representative socio-economic survey from Indonesia and data on mangrove forest cover to investigate this hypothesis.

We integrate data on FOAA consumption with spatial data on mangrove forest density across the entire archipelago for households residing within 30km of the coast. We run a mixed-effects regression model of household FOAA consumption on a range of independent variables including measures of mangrove forest density. We find that coastal households residing in areas near high density mangroves (defined as the top tercile of density), consume 28% more fish than non-mangrove households; while those who live near low and medium density mangroves consume 19% more fish than coastal households who do not live near mangroves.

Our study shows that mangroves substantially contribute to the food security and nutrition of local communities in Indonesia. This highlights the need to take an integrated approach to food security, forestry, and conservation both in policy and in practice. Conserving mangrove habitats should be of interest not only to those interested in biodiversity and climate change, but to all actors concerned with food security and wellbeing of coastal communities.

Eberechukwu Ihemezie, University of Leeds

"Understanding the diversity of values underpinning forest conservation"

Values are the motivational goals that underpin individual and group decisions, attitudes, and behaviors. The values of different stakeholders often influence the success of conservation. However, the specific values that can motivate and empower people to participate in conservation remain poorly understood. Understanding multiple stakeholder perspectives can help untangle the diverse interests and motivating values influencing conservation policies and programs. We use the Q-methodology to capture and describe the viewpoints of multiple stakeholders regarding the values that underpin forest conservation in Nigeria- a country with one of the highest rates of global deforestation. We identify three factors representing values in forest conservation, critically with heterogeneity in the viewpoints held by different stakeholders. The first factor explained 24% of the study variance and identified environmental and management values as essential in forest conservation. This viewpoint was largely held by hierarchical stakeholders, forest experts, and forest staff. The second factor explained 12% of the study variance, identified cultural values, and was predominantly held by forest users. The third factor explained 13% of the study variance, identified economic values, and was mostly held by forest experts

and forest users. Our study shows a diversity of value types held for forest conservation and that there are broad differences between stakeholders regarding the viewpoints they hold. This implies that conservation planners and policy-makers should differentiate value interests that target the specific needs of various stakeholders or focus on consensus values to enhance conservation projects' success. Doing this will enhance the dual purpose of forest conservation in supporting livelihoods and preserving biodiversity. It will also help to address one of the challenges of implementing forest conservation policies and programmes relating to different stakeholders' conflicting values, interests, and goals.

Azin Sadeghi, Thünen Institute of Forestry and University of Göttingen

"Diverse functions of forest income in households' livelihoods and their determinants: a pantropical comparison"

Forest income plays a crucial role in rural livelihoods worldwide. It is often reported that while the poorer households earn the highest relative share of forest income, in absolute terms, it is the better-off households who gain the highest environmental income both for subsistence and sale. Yet, only a limited number of studies further distinguish between different functions of forest income in livelihood (poverty alleviator, safety net or a means of asset accumulation) and little is known about how these functions vary across countries with different forest extent. We investigate how households from different income levels use forest income in their livelihood portfolios with regard to functions of forest income for households (subsistence versus commercial use), the type of forest products they extract and if households' participation in collecting certain forest products depends on their asset endowment. Providing a disaggregated image of contribution of forest income to households' livelihoods across different income groups improves our understanding of the households' forest use strategies. We use a comprehensive dataset from 3400 rural households in forested landscapes of three countries representing different tropical contexts, namely Zambia, Ecuador and the Philippines. The preliminary findings indicate that while in Zambia, households on average source half of their total income from forest resources, in Ecuador and the Philippines forest income contributes a modest share of only 8% to total households' income. In contrast to the Philippines, where earning commercial forest income is extremely rare, in Ecuador and particularly in Zambia some households market the forest products with timber and charcoal being the most profitable forest goods respectively in Ecuador and in Zambia. In the next steps we set out to present a detailed image of contribution of forest income to rural livelihoods by identifying its subsistence or commercial function across different income groups as well as the type of extraction activities households engage in based on their asset endowments. Differentiation between the functions of forest income for households and analyzing the choice of activity they undertake, facilitates the design of future policies to promote more equitable use of forest resources.

Keywords: forest income, households' assets, livelihoods

Lina Moros, Universidad de los Andes

"Temporary Payments for Ecosystem Services Can 'Crowd In' Lab-in-the-field Forest Conservation"

Payments for ecosystem services (PES) programs are proliferating globally and sometimes have significant impacts. Unlike protected areas, PES compensate land users for ecosystem services provision, which raises local acceptance of conservation. Yet some worry that if payments are temporary – as is often the case – local acceptance of conservation can be reduced or 'crowded out' to be lower after PES than before. We conducted lab-in-the-field experiments with payments to 656 farmers in Colombia who

are potential PES participants. We vary payments design (individual versus collective) and removal (partial versus total). We consistently find that conservation is not lower after PES than before, implying 'crowding in' relative to controls.

Session 6: Biodiversity, Forests and Livelihoods 2

Shashi Bhushan, University of Delhi

"Degradation of Forest Resources and its Socio-economic impact on Rural Livelihoods in Kaimur wildlife sanctuary of Bihar, India"

In India, forest and people are inextricably linked since millions of people live adjacent to or within protected areas and harvest forest products (Adhikari, 2008). In last few decades, degradation of forest has been a serious concern for local livelihood and their socio-economic activities depends on them, especially to the lower section of society. This paper attempts to assess the nature of dependence of rural households across various social groups on forest. Also, an additional element that is added to the enquiry is the way degradation of forests leading to scarcity of forest-based resources impacts the patterns of dependence across various social groups. Furthermore, this study also reveals the consequences of forest protection and conservation efforts into the region, made by forest official authorities and local population. This is done through examination of different economic activities carried out by the households that are forest-based on a primary survey near Kaimur wildlife sanctuary in Kaimur district, state of Bihar. Given the occupational division among social groups, the differential nature of dependence of forest resources is important to understand. The general finding indicates that the Scheduled Tribe and Scheduled Caste communities, the most socially and economically deprived sections of the rural society are involved in a significant way in collection of fuel wood, fodder and fruits, both for self-consumption and sale in the market while higher caste group uses fuel wood, fruit and fodder for self-use only. In last three decades, degradation of forest made a direct impact on rural livelihood mediated through the socio-economic structure, resulting in a shift from forest-based occupations to cultivation and manual labour in agricultural and non-agricultural activities. But this transformation of livelihood did not take place universally among all social groups. The higher caste group became involved in cultivation activities by clearing the forest while the Scheduled Caste and schedule tribe mostly became casual labour while staying with forest related activities. In the way of commercialization of forest products, there is need to recognize the differential impacts of forest management policy among various group of users and the role of state could be more effective.

Cristian Vasco, Universidad Central del Ecuador

"Glass half full or half empty? The contribution of cacao traditional agroforestry systems to the income of indigenous peoples in the Ecuadorian Amazon"

The chakra is the traditional agroforestry system of the Kichwa people in the Ecuadorian Amazon. Over time, it has incorporated cash crops (principally cacao) as a way to improve monetary income of indigenous households while preventing them from engaging in unsustainable practices. However, scarce empirical research has been conducted to determine if such a goal has been accomplished. Using data from a household survey (n=330) conducted among the members of three cacao producer associations, we determined that households producing cacao in chakras are poorer and have lower land endowments than other Kichwa populations in the area. Cacao accounts for 42 and 19% of the

agricultural and total income, respectively, reflecting that, indeed, income from cacao is essential for the livelihoods of Kichwa people. Multivariate analysis reveals that income from cacao is positively correlated with landholding size, but negatively correlated with the area in forest, probably reflecting that the need for monetary income encourage indigenous households to expand the area of chakras. The results also show that households having off-farm income and receiving social assistance are less dependent on cacao income. Overall, our findings reflect that -while an important source of monetary income for poor Kichwa households- cacao income alone is not sufficient to meet household needs. Diversifying the basket of products with market value, strengthening research on agroforestry systems, and promoting chakra tourism are proposed as alternatives to increase monetary income and preserving the chakra system.

Anthony Baidoo, IRD-SENS, University of Montpellier Paul-Valery 3; AgroParisTech

"Chinese driven Ghana rosewood trade: actors and access dynamics"

Between 2015 and 2020, the rosewood market in China was estimated at $26 billion. The continued demand for rosewood in China has led to increased and illegal exploitation in many producer countries in Africa. West Africa contributes about 80% of rosewood to global trade. Ghana was ranked second to Nigeria in Africa and fourth in the world among top suppliers of rosewood logs to China by volume. Drawing theoretical insights from access theory and based on empirical research from April to June 2022 in the Upper East, Upper West and Savanna regions of Ghana. We explored how different actors along the rosewood trade chain had access to the resource and the different formal and/or informal network arrangements, which necessitated its trade and sharing of benefits. Our findings reveal that there was no formalized agreement between Ghana and China's rosewood trade as the related domestic market was sporadic and was initiated by a Chinese woman who came to Ghana in search of the rosewood species to trade-in in 2009. The study reveals that different institutions benefited financially from the rosewood trade without recourse to proper procedure and legal framework. The study reveals an embedded system of national and community level arrangements, which enabled access to rosewood and its benefits thereof. This research contributes to the literature on the theory of access with dedicated attention to forest trees and forest livelihoods. It also makes a direct contribution to the access theory by demonstrating how traditional beliefs affect access to forest resources in some parts of Ghana. From a China-Africa relations perspective, this work provides an important contribution to the politics of rosewood trade engineered at the local and national levels with transnational influence. This study provides insight into the socio-political transformations and sustainability challenges induced by the impact of the China-Ghana rosewood economy.

Keywords: Rosewood, access theory, illegal logging, livelihoods, China-Africa

Nita Shashidharan, Ashoka Trust for Research in Ecology and the Environment and Manipal Academy of Higher Education

"Of Bandits, Conservation, and Climate: Changing forest-agricultural livelihood relations in Oorali villages in a Protected Areas in South India."

This paper follows the forest use, agricultural practices, and emergent livelihoods in four Oorali villages in the core area of the Sathyamangalam Tiger Reserve (STR), Tamil Nadu, India between 1990 to 2019. During these thirty years, the Protected Area has transitioned from being an unmanaged forest under varying degrees of bandit control to a wildlife sanctuary, further, a tiger reserve while also experiencing

climate variability. Using oral history narratives and focus group discussions I examined what these changes imply for the livelihoods of the Oorali communities and their relations with forests in two revenue tribal villages and two forest settlements. My study finds that over these decades, rain-fed agriculture continues to be dominantly practiced, but is also the cause of exasperation when combined with crop damages due to wildlife and limited access to irrigation facilities. Minor forest produce collection while is permitted for sustenance, only broom grass (Phoenix sp.) is permitted for sale since declaration of the tiger reserve. Compared to 1990, livestock numbers have declined over the years due to inability to maintain them, financial crisis situations, and restrictions on grazing. Wage labour for other farms, nearby towns, under Mahatma National Rural Employment Guarantee Act scheme, are emergent livelihoods that have further contributed to transform and diversify community livelihood portfolios. Intensity of engagement with livelihood strategies in these villages positioned in rainfall poor regions, with limited transport facilities for work, forest access restrictions, low education, has the approach of coping for income. These changes have differentially influenced the land control and labour dynamics relations of the Oorali communities with the forest and the agricultural fields in the forest settlement and revenue villages. The study brings into focus these changing relations of tribal communities with land over historical trajectories and the need for contextualizing the forest and livelihood debates. Such grassroot studies that target a bottom-up approach to understand local context are especially important given the era of international commitments to climate change mitigation and biodiversity preservation, and increased recognition of the challenges in addressing both conservation and social justice concerns.

Session 7: Data & Methods for Understanding and Promoting Forests & Human Wellbeing 2

Sarah Castle, University of Illinois Urbana-Champaign

“Global forest and tree cover datasets for sustainability policy and environmental analysis”

Global high-resolution forest and tree cover datasets are increasingly important to many researchers studying natural resource and sustainability problems, including monitoring deforestation and reforestation efforts and evaluating the impacts of forest governance decisions. As the number of available datasets grows and the audience relying on these datasets expands to new fields, a clear discussion of the strengths and weaknesses of each dataset and their accuracy across regions is needed. Here, we provide an overview of the best available forest data and guidance for the consumers of these data, both researchers and, ultimately, decisionmakers. To do this, we first provide a review of the currently available global forest cover and change datasets and highlight some considerations when selecting which dataset to use for different applications. Then, we compare the spatial agreement between forest cover datasets and highlight the implications of the discrepancies in selecting appropriate forest datasets for environmental, social, economic, and policy analysis. The results highlight the importance of carefully considering the appropriateness of the forest dataset selection for a given application. There are significant discrepancies between how different datasets define forests, the spatial resolution of the data, and the classification accuracy for different world regions. This has likely led to considerable misuse of these datasets by researchers over time. Given that forests are key for numerous aspects of sustainability, research tracking the status of forests and their relationships with the Sustainable Development Goals, sustainability commitments, and policy interventions targeting forest management are needed. To achieve these objectives, there is an urgent need for this guide on the best available data for forest cover analysis.

Eric Coleman, Florida State University

"Democracy and income inequality moderate the socioeconomic impacts of protected areas"

Many scholars and policymakers promote creating terrestrial protected areas (PAs) as a central tool to offset global carbon emissions and preserve biodiversity. However, the socioeconomic consequences of land preservation remain understudied. Using an Event Study Design, this paper estimates the causal treatment effect of creating PAs on changes in cultivated agriculture land from within PA boundaries. We examine 22,732 protected areas established after 1995 and evaluate temporal changes in land classification in 5-year intervals from 1995 to 2015. We find that protected areas (modestly) reduce the amount of cultivated land over time. Then, using data on country-level income inequality, ethnic fractionalization, and democratic institutions we estimate treatment effect heterogeneity. We find that PAs located in places with more income inequality and less democracy significantly reduce cultivated land, while cultivated land does not significantly change in countries with lower income inequality and more democracy. We do not find significant effects for ethnic fractionalization. The results imply that rural people incur disproportionate burdens from PAs in places where they have less voice in the polity and economy.

Karen Bailey, University of Colorado at Boulder

"A multi-country analysis of vulnerability to climate and land-use change in Africa"

Across Sub-Saharan Africa, smallholder farming and forest dependent communities face significant threats from climate and land-use change. Leveraging data to identifying scale relevant efficient strategies to mitigate these threats is critical for supporting the wellbeing of these vulnerable populations and promoting forest and rural livelihood protections. This need is particularly pronounced in savanna and forest landscapes in Africa, however, the complex regional and local dynamics that influence these livelihoods and landscapes make it challenging to identify strategies and leverage points across contexts.

To overcome this challenge, we developed a multi-scalar modelling approach to investigate relationships between exposure and sensitivity to changing environmental conditions (including changes in precipitation and temperature and changes in forest and tree cover) and adaptive capacity. Using data collected from households in seven countries in southern and east Africa between 2000 and 2018, we identify factors influencing household vulnerability to climate variability and land-cover change. We developed a structural equation model to merge cross sectional data with a focus on different types of capital, natural resource use and management, and adaptive capacity, within the sustainable rural livelihoods framework. We integrate household-level data with regional-scale remotely sensed data on rainy season onset and duration, changes in forest and tree cover and other land-cover change, and long-term temperature variation. With this approach we identify broad scale environmental factors that interact with household-level vulnerabilities to understand vulnerability, sensitivity, and exposure at multiple scales.

We find that increasing household adaptive capacity (via increased social network integration, education, etc.) and decreasing vulnerability to environmental change (via livelihood diversification, use and sustainable management of natural resources, including forest resources) are the most effective strategies for maximizing household wellbeing and supporting forest and environmental. We also find that disparate data from different countries and time frames can be integrated to develop a robust model of livelihoods and wellbeing. Our results allow us to better understand variation in vulnerability and adaptive capacity of forest- and natural resource dependent communities across Africa and provide

a model for future integration of different data sources on forest cover, household resources, and environmental change.

Luke Sanford, Yale School of the Environment

"Using satellite imagery to understand how politics affects whether land titling works in Benin"

Land tenure formalization has been linked to improved economic, social, and natural outcomes across hundreds of studies funded by billions of dollars, but these results vary significantly from study to study. I show that in Benin the positive effects of formal titles exist only when and where there is high trust in government institutions. When trust in the government is low, formal legal titles result in lower agricultural productivity and higher rates of deforestation compared to traditional land tenure arrangements. I leverage the Plan Foncier Ruraux program in Benin which carried out land demarcation and certification in a randomly selected subset of eligible villages to compare the effects of formal land tenure on crop choice, economic development, and land sparing from the end of the demarcation process in 2011 until today. This period spans the 2016 election of Patrice Talon to the presidency, an event that eroded trust in the government in much of the central and northern departments. I use satellite imagery to measure outcomes at the sub-parcel scale each year, focusing on the conversion of natural vegetation to cropland, crop choice between annual and perennial crops, and the built-up area of villages. I find that before the 2016 election the land tenure reform program reduced deforestation and induced farmers to invest more in their land by switching to perennial crops. During this period villages with the reform also grew faster. Since the election of Talon, the northern departments--and especially places that had the largest loss of trust in the government--saw the opposite effect. This work offers two main contributions: first, it shows that satellite imagery can be used to assess the longitudinal effects of land tenure reform programs, opening hundreds of previous studies to further analysis and connecting to the Data and Methods for Understanding and Promoting Forests and Human Wellbeing theme. Second, it demonstrates that political factors, and especially trust in the government, can play an important mediating role in how formal land tenure affects livelihoods and natural ecosystems, connecting to the (Forest) Landscape Restoration: People, Trees, Politics theme.

Session 8: (Forest) Landscape Restoration: People, Trees, Politics 2

Forrest Fleischman, University of Minnesota

"Policy options for just and equitable forest restoration: A synthesis"

The last few years have seen a plethora of new guidelines or criteria for forest restoration, many published either in very high-profile journals or by distinguished groups of scientists, such as the Society for Ecological Restoration or the Kew Gardens. These guidelines offer conflicting advice and ignore many promising avenues for pursuing just and equitable forest restoration. They also take place in a context of global plans and proposals, such as the Bonn Challenge and several Trillion Trees Initiatives, that seek to radically remake global land use, often with little consideration for rural livelihoods or the rights of indigenous and forest dependent people. In this paper I synthesize the various published guidelines, and examine published evidence about successful large-scale forest regrowth. I find that while guidelines are largely in agreement about biological factors such as site planning and preparation, but offer conflicting advice about the appropriate role of economic factors in restoration. Furthermore, while nearly all of

the published guidelines state a need for participation and rights for affected people, they tend to be very vague about how this will happen. This reflects a broader disengagement between forest restoration and forest livelihoods research communities – a parallel analysis of forest restoration research reveals limited engagement with social science and almost none with indigenous and forest dependent communities. Published research on large-scale forest regrowth contrasts sharply with the published guidelines – emphasizing factors rarely mentioned in published guidelines, such as shifts in land tenure, economic incentives, and improvements in rural economic well-being as key factors that facilitate forest regrowth. I conclude that the current scholarly dialogue reflected by these guidelines is poorly suited to guide policy-makers towards effective forest restoration policy, and that this is likely the result of poor engagement across communities studying restoration ecology, land cover change, and forests & livelihoods.

Valentina Robiglio [Presenting for Javier Montoya Zumaeta], Center for International Forestry Research (CIFOR) - World Agroforestry Center (ICRAF)

"Incentives to enable transformational change for sustainable land management across the Peruvian Amazon"

Smallholder farmers have been pointed out as the primary responsible of deforestation and forest degradation across the Peruvian Amazon. One key enabling factor is argued to be poor governance of the State over its forested lands. Incorporated through the 2011 National Forestry Law, the Cessions to Use for Agroforestry Systems (CUSAF) attempts to stimulate the adoption of sustainable land management (SLM) among smallholders who informally settled on more than a million hectares of State-owned forest lands. The policy targets to benefit 123 thousand of these smallholders operating under precarious legal conditions. The assumption is that granting them conditional land rights will enable them to improve their livelihoods while reducing their reliance on deforestation and other unsustainable agricultural practices. However, its implementation lagged behind due to limited capabilities of the public agencies in charge, and perceived low attractiveness of actual incentives that have been already provided into the frame of this policy. Improving the incentive mechanisms is therefore critical to facilitate the uptake of SLM and increase forest and tree cover in the Amazon region. We investigate different underlying assumptions that form the basis for CUSAF to support roll out strategies and redesign of its components. We present results from a survey of 240 households across ten villages in San Martin where a project is implemented to support smallholder families to transition into the CUSAF mechanism. This data highlights the perceptions of the mechanisms and generates insights into decision making factors for farming activities of eligible households. This is complemented with focus group discussions that identify detailed costs and benefits of required land use changes. This mixed method approach allows a detailed analysis of household's readiness for CUSAF and identifies support mechanisms that need to be in place for different household types as well as institutional structures that could support the implementation as they are perceived to be more relevant and trusted. This detailed understanding of drivers of uptake will allow to customize structure and implementation of the CUSAF mechanisms across the whole Amazon and significantly contribute to halt and reverse deforestation.

Harry Fischer, Swedish University of Agricultural Sciences

"Long-term community involvement in forest governance predicts improvements in forest canopy cover and livelihoods from tree plantations"

Countries around the world have undertaken large-scale tree plantation programmes to sequester atmospheric carbon and support the livelihoods of indigenous people and local communities (IPCLs). These efforts have had varied effects, and there is a need for improved knowledge of the governance arrangements that support positive environmental and livelihood impacts. We analyze the impacts of four decades' tree planting in Himachal Pradesh, India, a context with extensive and ongoing government-led planting interventions, high levels of rural forest dependence, and policy mechanisms for decentralized forest management. Using a dataset of remote sensed forest cover change of 430 plantings undertaken since the 1980s and 2400 household socio-economic surveys, our work shows that contexts with long-term local involvement in forest planting and management is associated with greater increase in forest cover and improved likelihood that local households will receive subsistence benefits. We explain these outcomes as the result of how local governance institutions (1) temper the target-driven incentive structure of the forest administration, (2) direct interventions to better account for local needs and landscape conditions, and (3) support long-term local investment in sustainable forest management. Amidst calls for large-scale planetary action for forest restoration, our findings suggest that sustained improvements in environmental and livelihood outcomes require institutional mechanisms that ensure long-term involvement of rural and indigenous populations.

Session 9: Human-Wildlife Interactions

Rajesh Bista, The University of North Carolina at Chapel Hill

"Forest restoration, human-wildlife conflict, and livelihoods impacts: Insights from Rural Communities in Nepal and China"

Forest restoration and conservation have been widely considered important to enhance human well-being, contribute to climate change and adaptation and mitigation, and regain ecological functionality across the degraded or deforested forest landscapes. However, some restoration projects generate negative externalities to the forest-proximate communities, especially in the form of human-wildlife conflict. Successful conservation and forest restoration policies, such as the community forest program in Nepal and the conversion of cropland to forest program (CCFP) in China, have shown an increasing incidence of human-wildlife conflict (esp crop-raiding), as forest habitat improved. Based on a survey of 1,147 households from four different geographic locations (481 HHs in Anhui and 251 in Shanxi from China; 215 in Bhumlu and 200 in Bhanu from Nepal) and 4,058 cropland parcel information, this paper provides a comprehensive insight into the nature and extent of human-wildlife conflict, economic losses from crop-raiding and factors that contribute to it. As the conservation and restoration outcomes in our study sites, forest cover has increased by 9% in China and 16% in Nepal, in the last two decades. Likewise, the majority of the parcel (46% in Nepal, and 19 % in China) experienced some extent of crop-raiding in the last 12 months prior to the household survey. We found that the proximity to community forest and CCFP forest, along with other bio-physical and socio-economic variables were the major factors contributing to crop-raiding. Besides direct economic loss at the household level, we found that crop-raiding had contributed significantly to cropland abandonment, both in China and Nepal. This study also explored policy implications and suggestions for transforming forest conservation governance in both study sites. Failing to address such negative externalities not only offsets the economic benefit from conservation and restoration efforts but also lowers the appeal of future efforts. Thus, conservation programs should incorporate various forms of potential human-environment interactions at the planning and designing phase to achieve the sustainable management of forests and livelihood improvement.

Adrian Treves, University of Wisconsin-Madison

"Protecting carnivores and livestock that share forests, while safe-guarding livelihoods"

Efforts to protect biodiversity sometimes appear to clash with efforts at economic security. A crucible for such clashes emerges when people graze livestock in forested ecosystems containing large carnivores that may prey on domestic animals or threaten human safety. However, the clash appears to be perceived more than actual. Effective non-lethal methods of deterring predators from livestock promise to protect all the animals involved and thereby safeguard both livelihoods and biodiversity. Randomized, controlled trials (RCTs) have been completed on numerous non-lethal methods of predator control in many regions, including the global south. These RCTs have provided strong inference about effectiveness with additional safeguards against selection bias, treatment bias, and publication bias. Since 2016, a dozen systematic reviews and meta-analyses led by scientists from as many countries conclude that non-lethal methods can offer win-win solutions. I describe how collaboration between scientists and livestock owners have advanced this field. Livestock owners invited the scientists in most cases and selected the methods or tailored them to overcome the most common challenges. I summarize four such RCTs by host-country nationals working in Colombia, Chile, Canada and a sovereign tribal nation in Wisconsin. Non-lethal methods hold great promise for forest ecosystems with their high total biodiversity, many species of carnivores across a range of body sizes, and poor, rural human populations raising livestock and crops in and around forests. Systematic reviews show that decades of the alternative of resolving conflicts lethally have not served either the poor or forests well. Given national constitutional provisions that provide for the protection of a healthy environment, non-lethal methods of resolving human conflicts with wildlife may also promote justice for all the individuals involved and for future generations.

Etotépé A. Sogbohossou, Senghor University & University of Abomey-Calavi

"Governance change and human-wildlife coexistence in protected areas in West Africa"

Park management worldwide and in Africa in particular face multiple challenges. Anthropogenic threats are worsened by the lack of continuous funding to cover management activities. In West and Central Africa, parks depend on projects and most projects results are wiped out between two projects phases. The new paradigm is the conservation by international NGOs. Several NGOs are indeed taking over protected areas for management in the region through public-private partnerships. Is this effective in improving the biodiversity conservation and local people livelihoods? We assessed the impact of the attribution of Pendjari biosphere reserve, one of the richest protected areas in West Africa, to the NGO African Park Network on human-wildlife conflicts and people perception of these conflicts. Despite local communities have lost some of access to the resources of the protected area, human-wildlife conflicts have increased after the attribution of the protected area to the NGO. On the other side, the change of governance led to an improved management visible through a higher number of rangers and a better trained staff with a positive impact of wildlife populations. Local communities' perceptions of conservation the first years of this change of governance were mixed. Our findings point out the challenges of a change in protected areas governance and the importance of local communities for successful conservation initiatives.

Madhusmita Dash & Saswat Kishore Mishra, Indian Institute of Technology Bhubaneswar

"Assessing Conservation Effectiveness of Community versus Co-Management Approach: Evidence from an Indian Tiger Reserve"

Biodiversity has become an issue of global concern due its rapid reduction worldwide in recent decades. The developing countries have adopted both community-led and co-management approach for sustainable management of natural resources. India passed the Scheduled Tribes and Other Traditional Forest Dwellers Recognition of Forest Rights Act (FRA), 2006 – a historic law that provides rights of forest-dwelling communities to land and other natural resources. However, the implementation of FRA remains dismal even after fifteen years of its existence. This raises an important question: Are there significant differences between the co-administered vis-à-vis the self-initiated community approaches in terms of conservation outcomes? If so, what factors explain these differential outcomes? Based on household surveys, key informant interviews, focus group discussions our study aims to identify and evaluate the types of institutions involved in the management of protected area (PA) resources and examine the institutional factors responsible for differential conservation outcomes in case of the Similipal Tiger Reserve (STR) – a large insurgent-affected PA located in the northern Eastern Ghats, India. Our study uses data collected from 240 households across 12 buffer villages located inside the STR. Local management institutions are described and their impact along with other socio-economic variables on forest conservation outcomes is examined using descriptive statistics and ordered logistic analysis. Our investigation finds that the areas under self-initiated local institutions are significantly better managed as compared to those that are not. However, they often struggled to overcome conflicts between local stakeholders, inconsistent representation, and a lack of basic funding for their operations. While the potential utility of co-management of PA is relatively large, co-management works better when the both stakeholder groups (the local community and the state) have well-defined property rights, spring up adequate institutional capacity, and build mutual trust and communication. We argue that in order to reduce trust deficit that exist between fringe villages and the forest department, more usufruct and ownership rights over resource must be transferred to local community. Further, payment for environmental services (PES) and sharing of revenue from eco-tourism can go a long way to ensure livelihood security and enhance better conservation outcome.

Session 10: Forests and Trees in Locally-led Climate Change Adaptation

Houria Djoudi, CIFOR

"Leveraging the power of forests and trees for adaptation of people and ecosystems"

Forests contribute substantially to climate change mitigation and adaptation and in conserving biodiversity and supporting livelihoods. The role of forests in mitigating climate change through carbon capture and emissions reductions has received considerable attention in recent years, through, for example, REDD+ and the globally driven promotion of Nature-Based Solutions. However, the other side of the coin – how forests and trees can contribute to the resilience and adaptive capacity of people and ecosystems – has been somewhat neglected in climate policy and action. Forests and trees can help reduce the vulnerability of ecosystems and their services to climate change threats as well as improve human resilience by providing income earning opportunities for the most vulnerable and fall-back options or safety nets in times of hardship. They contribute to stabilising local and regional climates, including through regulating water flow and rainfall and providing cooling benefits. They also help limit infectious diseases and lower healthcare costs, while reducing the risk of floods, extreme weather, and

air pollution. These crucial benefits of forests and trees have been neglected in national and global climate policies.

This paper presents a set of principles and strategies for integrating local adaptation practices into climate policy and action and ensuring that vulnerable people are included. It discusses how harnessing the power of trees and forests can contribute to adaptive capacity of ecosystems, people and livelihoods, and create transformative pathways towards resilient and equitable societies.

Ana Pirela-Rios, Universidad EAFIT

"The unintended environmental effect of a climate change adaptation strategy: evidence from the Colombian coffee sector"

This paper analyzes the environmental effects of an adaptation policy intended to protect farmers against extreme weather events. We use the case of the Colombian coffee sector, which was severely affected by ENSO-La Niña extreme rainfall events and subsequent pest-proliferation during 2010-2011. In response, the National Federation of Coffee Growers (NFCG) changed its policy to protect farmers from future weather shocks by conditioning renewal credits to the use of pest-resistant seeds. We exploit the timing of the policy, and a novel dataset that includes the census of coffee plots, their characteristics, production systems, seed variety, among others, from 2005-2014, matched with satellite tree cover data to analyze its environmental effect. We find that conditioning renewal credits on a change in seeds diminishes tree cover on treated coffee growers by 390 squared meters, equivalent to 2% of the average farm size in our sample. If we extend this result to all the treated farms in our sample, the total loss rises to 1,031 hectares (10,318 thousand squared meters). Tree cover is not only important to protect crops from rising temperatures, but also to maintain soil fertility, and control erosion. We calculate that this average loss in tree coverage on treated farms translates to a release of 61,912 tons of carbon.

Antoine Libert, Programa Mexicano del Carbono

"Agroforestry for local resilience: the case of shade-grown coffee in Chiapas, Mexico"

Agroforestry – understood as a form of ecosystem management that combines agriculture, livestock, and forestry – is practised on more than half of the agricultural land of Southeast Asia and Latin America. Agroforestry is no "silver bullet" or magic solution to the challenges of global environmental change and inequity. However, when correctly managed, agroforestry systems can provide crucial ecosystem services and social co-benefits.

In the mountainous region of the Chiapas Sierra Madre, in Mexico, shade-grown coffee systems sustain local livelihoods while creating ecological connectivity between cloudforests in highland Biosphere Reserves and tropical agriculture in the lowlands. A "disappearing refuge for biodiversity", coffee agroforestry systems are managed organically by organized smallholders who commercialize through sustainability certifications.

A recent coffee leaf rust epidemic has generated severe damage in Arabica coffee systems. The mainstream response to this epidemic has led to further undermining local resilience capacities, since a transition toward new coffee varieties and plantation systems has marginalized many smallholders, unable to sustain the investments required for switching from low-input, shade-grown polycultures to shadeless monocultures which depend on external inputs. A strident example of maladaptation, this

promotion of agricultural intensification and ecosystem simplification has significant trade-offs for biodiversity, coffee cup quality, and inequality due to unequal access to credit and finance.

Our research with smallscale cooperatives who defend shade-grown organic coffee in traditional management systems illustrates that locally-led adaptation strategies can provide alternatives to maladaptation. Ignored by government institutes and large private actors, these local strategies have consolidated alternative pathways for smallholders to continue their practices of "conserving by producing and producing by conserving", with recognition in niche markets based on social and ecological responsibility, in a growing trend which includes discussions on deforestation-free commodities and responding to the long-term threat to supplies because of climate change, including reduction of the global area suitable for coffee production, lower quality, and higher prices.

Martin Simonneau, Cool Earth

"Can a basic income for indigenous peoples and local communities (IPLCs) save the rainforest?"

Rainforests are essential carbon sinks. Their preservation is critical to mitigating climate change, protecting terrestrial biodiversity, and supporting the livelihoods of 805 million people around the world. Whilst Indigenous Peoples and Local Communities (IPLCs) comprise less than 5% of the world's population, they manage or have rights to at least 25% of the planet's land surface and protect an estimated 80% of global biodiversity.

To address this goal, several market-based mechanisms, such as REDD+, have been implemented. These strategies are founded on the rationale that putting a price on biodiversity would lead to resource conservation rather than extraction. However, empirical results have demonstrated that these payments for ecosystem services mostly failed to address poverty and environmental destruction.

Despite climate finance totalling record amounts year on year, reaching USD 632 billion in 2019/2020, the historical and contemporaneous contribution of IPLCs to climate mitigation and adaptation has been effectively ignored. Between 2010 - 2020, they received less than 1% of all development funding to address climate change.

Our presentation introduces an alternative approach, providing IPLCs with a basic income (BI) to simultaneously address their marginalisation and rainforest protection. This idea relies on recent research and reports which show that lands managed by indigenous communities have lower rates of deforestation compared to neighbouring territories and other management systems. Successful forest preservation equates primarily to empowering right holders who face difficult socio-economic, political and cultural challenges. Their resilience is the most effective way of reducing the vulnerability of the ecosystems in which they live.

We present a basic income for rainforest protection strategy in the making, developed by the UK-based climate charity Cool Earth and its partners in Peru. We reflect on this experience and discuss its benefits, trade-offs and challenges in terms of addressing marginalisation, greater agency, forest protection and, ultimately, climate change mitigation and adaptation.

Sara Balestri, Catholic University of the Sacred Heart

"Green land deals: climate change mitigation and Large-Scale Land Acquisitions in Sub-Saharan Africa"

The reduction of global greenhouse gasses increasingly envisages initiatives of forest conservation, sustainable forest management, and enhancement of carbon stocks, making room to transnational land deals finalized to carbon sequestration.

These “green” land deals are expected to generate positive externalities, such as the maintenance of ecosystems, the protection of biodiversity and the creation of ecosystem services. Nevertheless, there are many concerns too, including possible impacts on forest-dependent communities, due to a further weakening of their land rights and modification of agricultural systems at the local level. Although carbon sequestration/REDD land deals should target cleared lands with some recognized property rights, the existence of conflicting claims and the weakness of forest people's rights represent a common issue.

I argue that the quality of land-related institutional settings is fundamental to make forest-dependent communities able to benefit from ”green” land deals. This paper provides empirical evidence about the main determinants of “green” land deals in Sub-Saharan Africa (1990-2018), and the role of land-related institutional settings to contribute to their establishment.

Since reliable cross-country data about indigenous and forest peoples' land rights are still sparse and not uniquely coded, I apply two institutional indicators (the transparency and predictable enforceability of land rights, and institutions’ inclusiveness) to measure land rights enforcement for vulnerable groups, including forest-dependent communities.

Preliminary results depict a strong correlation between the land institutional settings and inclusiveness, highlighting that land entitlements are likely to mirror how power is distributed within a society. Further, higher institutional quality and a prior more equitable distribution of power (that is, higher inclusiveness) do both increase the likelihood of carbon sequestration/REDD land deals, making vulnerable groups more likely to enjoy potential benefits from this kind of investments.

Looking for some feedback effects, I found that, while “green” land deals are not able to explain inclusiveness levels, they significantly determine the quality of land institutional settings: thus, a more equitable distribution of power among social groups is a prerequisite to increase the likelihood of carbon sequestration/REDD land deals, whereas these contracts in turn tend to enhance the level of transparency and predictable enforceability of land rights.

Session 11: Energy transitions, bioeconomy, and livelihoods

Rob Bailis, Stockholm Environment Institute – US Center

“Implications of Large-Scale Household Energy Transitions in the Global South”

Nearly 3 billion people, 40% of the world’s population, lack access to clean cooking fuels and technologies. Instead, they rely on fuelwood, charcoal and other minimally processed biomass fuels derived from farms forests and woodlands throughout the Global South. This “traditional bioeconomy” results in exposure to household air pollution (HAP) that causes nearly 4 million premature deaths each year, worsens ambient air quality and contributes to climate change. Unsustainable harvesting of wood fuels can also degrade forests and woodlands. Taken together, these impacts create a set of challenges that have persisted for decades despite thousands of projects, programs, and policies designed to facilitate a transition to cleaner cooking. The global prioritization of clean cooking is reflected in SDG7, which aims to achieve universal “access to affordable, reliable, sustainable and modern energy” by

2030. 600 million people gained access to clean cooking fuels or technologies between 2010 and 2020. However, progress has been heterogenous; in some regions, including sub-Saharan Africa, reliance in wood fuels will continue to grow. Many Low-and-Middle-Income Countries, have set ambitious clean cooking targets hoping to displace fuelwood and charcoal with cooking gas, electricity, or clean biofuels like pellets, ethanol, and biogas. This research analyzes the implications of global cooking fuel transitions on the global climate, public health, land cover, and livelihoods.

Kwadwo Boakye Boadu, Kwame Nkrumah University of Science and Technology

"Sustainable Solid Fuel Production from Bamboo for livelihood support and Climate change adaptation: Evidence from Bamboo Plantation Systems in Ghana"

The Sustainable Development Goal 7 advocates for a substantial increase in the proportion of renewable energy in the global energy mix to reduce the impacts of fossil fuels use on the world's climate system. Consequently, tropical forests are depleted for wood fuel to meet the bio-energy requirement of an ever-increasing global population. About 2.5 billion people in developing countries rely on biomass fuels to meet their cooking energy needs, and the demand is expected to increase to 2.7 billion by 2030 due to population growth and urbanization. Bamboo plantation systems, as "pool" and "sink", play a major role in mitigating climate change, improve food security and income. This paper presents an analysis of the role of plantations of Beema bamboo (a tissue cultured clone from Bambusa vulgaris) and Oxytenanthera abyssinica for sustainable solid fuel production and climate change mitigation and its implication for livelihood support in Ghana. Data was collected from randomly selected solid bamboo fuel producers in Ghana using interview guide to assess the contribution of solid bamboo fuel production to their livelihoods. The quality of the bamboo species for solid fuel production was also assessed through an investigation of their physico-thermal properties. Results from the study revealed that solid bamboo fuel is gradually becoming a preferred choice for household energy generation in urban and rural households in Ghana. This makes their production a major source of livelihood for many communities. Results further revealed that the demand for solid bamboo fuel is increasing with oil, LPG and electricity prices rising. Based on their calorific values (33,241 KJ/kg), solid fuel from bamboo will be suitable for high energy-using applications. Their Particulate Matter and Carbon Monoxide emissions (83.7 ug/m3 and 3 ppm respectively) are lower than the threshold (35000 ug/m3 and 9 ppm respectively) approved by the United States Environmental Protection Agency and are therefore safe for indoor use. There is the need to establish more community bamboo plantations in a comprehensive approach to ensure sustainable biomass fuel provision and livelihood support in developing countries amidst the threatening consequences of climate change and increasing demand for biomass fuel.

Pam Jagger, University of Michigan

"Household Energy Transitions in Rwanda – Will Bioeconomy or Fossil Fuels win Out?"

Greater than 90% of Rwanda's population relies on high polluting biomass fuels including charcoal and fuelwood for cooking. Household air pollution (HAP) from burning biomass fuels is one of the leading causes of premature death in Africa; the production and burning of wood fuels leads to forest degradation and contributes to climate change. We use data from a 1,400-household randomized control trial in Gisenyi, Rwanda's third largest city, to track patterns of adoption, disadoption and use of sustainably produced biomass pellets and Liquified Petroleum Gas (LPG). We observe major transitions from charcoal to biomass pellets (7% of households) and LPG (18% of households) between 2015 and 2019. Use of biomass pellets in the study population dropped dramatically after the sole supplier of

pellets went out of business in early 2020. Pellet users used pellets for the majority of cooking events, while LPG users used LPG mainly for heating water and small cooking tasks. There was virtually no overlap between pellet and LPG using households. Pellet use was highest in among the lowest income quintile (18% vs. 2% for LPG), whereas 24% (vs 5% for pellets) of households in the highest income quintile used LPG. None of the households in our sample completely abandoned charcoal as a cooking fuel; the majority continued to use it for approximately 50% of cooking events, proving evidence that households stack fuels rather than advance up the energy ladder to cleaner fuels. In addition to income being a major determinant of adoption, respondents with higher education levels and access to flush toilets and clean water were more likely to adopt LPG. Our findings suggest that neither biomass pellets nor LPG are a complete clean cooking solution for households in urban Rwanda. Pellets and LPG appeal to very different populations, suggesting that multiple strategies are needed to promote equitable household energy transitions. Further, because households are not fuel switching as they move up the energy ladder future efforts could address the suspension of solid fuel alongside the adoption of clean fuels. The closure of the sole producer of biomass pellets in the region was a major setback for sustained use of a clean biomass cooking fuel. LPG's already robust distribution through petrol stations in urban centers give it a considerable advantage over pellets.

Sabaheta Ramcilovik-Suominen, Natural Resources Institute Finland

"From Pro-Growth and Planetary Limits to Degrowth and Decoloniality: An Emerging Bioeconomy Policy and Research Agenda"

In 2012, the European Commission (EC) introduced the new bio-based economy or bioeconomy policy project, since adopted by about 50 countries. Alongside politicians, various research and other interest groups have promoted the bioeconomy as inevitable, apolitical, and a triple-win strategy for nature, people, and the economy. Recently, bioeconomy is also actively promoted and framed as transformative. Yet what is transformative or even new in the EU bioeconomy policy, and why is it important to critically engage with the concept of bioeconomy, especially but not only in the so-called Global South? To address these questions, we revisit the discursive field of the bioeconomy, outlining two dominant yet opposed visions that focus on economic growth and planetary limits respectively. We term them 'pro-economic growth' and 'pro-planetary limits' bioeconomy visions. Drawing on the literature and our own empirical research in market-based, 'green', 'climate friendly', and 'bio-based' economy policy approaches and initiatives, we highlight the EU bioeconomy's embeddedness in colonial and neo-colonial logics of domination and green extractivism. While our examples are drawn from the Global South they connect and resonate with the wider European bioeconomy project. We argue that the existing EU bioeconomy visions are poorly suited to address multidimensional and intertwined existential and civilisational challenges, including overconsumption, extractivism, and global socioecological inequalities and injustices. Employing the decolonial environmental justice, feminist political ecology and degrowth literature we outline the missing narratives, ideas and logics and their potentials for fundamental and systemic change in and beyond the bioeconomy project. Finally, rather than proposing policy recommendations, we highlight gaps in policy and research that warrant further attention, including: self-reflexivity; historical contextualisation of the EU's role in global environmental governance; silencing and (mis)representation; and reprioritisation of multiple existences and life-supporting practices, together with the relevant epistemologies and ontologies that support them.

Session 12: How Do Forests Contribute to People's Diets across African Countries

Laura Vang Rasmussen, University of Copenhagen

"How Do Forests Contribute to People's Diets Across African Countries?"

Forests can provide rural people with free or affordable nutritious wild foods. Paradoxically, current strategies to improve food and nutrition security continue to promote increasing food production via agricultural intensification, often resulting in forest loss and poorer diets. This panel will re-think these approaches to food and nutrition security. The presenters will be looking closely at how forests support people's diets and what happens to the quality of these diets in Africa when deforestation occurs.

This panel will bring together a) broad-scale studies and local level studies, b) point-in-time analyses, longitudinal studies, and panel-data analyses, and c) studies from both West and East Africa. By bringing together studies that differ in spatial and temporal scale as well as regional focus, we hope to add to the empirical and quantitative knowledge of forest–diet relations.

The first presenter used the Living Standards Measurement Survey panel data from Tanzania and found that deforestation caused a reduction in people's fruit and vegetable consumption, which thus affected the vitamin A adequacy of diets. The second presenter used the Demographic Health Survey from six countries in West Africa and found that in areas with the highest forest cover, the poorest people appeared to have the highest consumption of nutritious food groups. Finally, the last two presenters collected detailed dietary recall data in Tanzania and Malawi to estimate the adequacy of women's diets – specifically focusing on micronutrients that are commonly deficient in sub-Saharan countries (i.e. iron, zinc and vitamin A). Given the level of detail of these data, the presenters were able to move beyond the findings from the broad-scale studies and look specifically at the contribution of forest foods to overall nutrient intake.

Overall, this panel aims to challenge how many countries are prioritising increasing agricultural production - at the expense of forests and biodiversity - to respond to malnutrition. By presenting results from both broad-scale and detailed local-level studies, the presenters will discuss the situations in which findings are sufficient to infer that wild forest foods contribute to dietary quality – and accordingly should be considered in forestry, natural resource, and food and nutrition policies.

Bowy den Braber, University of Copenhagen

"Effects of trees on dietary diversity in the Sahel region of Western Africa"

Forests are often cleared to increase agricultural production and produce more food, but can also provide a diverse range of goods and services to improve dietary quality of people. Poor diets provide a serious health risk and are responsible for more deaths than any other risk globally. Research has shown that forests can improve diets of rural communities in low- and middle-income countries by providing important micronutrients. Despite this progress, much remains unknown about the role of trees outside of forests in determining dietary diversity. Recent advancements in remote sensing have shown unexpectedly large tree counts in arid regions outside forests. Local case studies suggest that trees outside of forests, such trees grown on farms, could have a significant positive impact on people's wellbeing and diets.

We provide evidence for the effect of trees inside and outside of forests on dietary diversity of rural communities in six countries from the Sahel region of Western Africa. In addition we explore how household wealth influences the role of trees. We combine high-resolution tree data and socio-economic survey data from Demographic Health Surveys (DHS) to quantify dietary diversity of rural communities, with a special focus on vitamin A rich fruits and vegetables. We then use a combination of matching analyses and non-linear regression methods to generate quantitative estimates of the impacts of trees on diets across the entire range from bare ground to forests.

We found that, on average, the relationship between trees and diets is not linear and varies significantly per country and food group. However, it appears that across countries in areas with higher tree cover, the poorest people had the highest consumption of vitamin A rich fruits.

These results suggest that goals to improve people's diets require distinct strategies from general poverty alleviation interventions and should pay special attention to the role of trees. Our research adds to the growing body of evidence that trees and forests play an important role in people's diets. Yet, our results also caution against simple win-wins; a multi-faceted approach is required to ensure all people benefit from trees and forests.

Charlotte Hall, University of Copenhagen

"Deforestation reduces dietary quality in Tanzania and Malawi"

Strategies to improve food and nutrition security continue to be centred around agricultural intensification with a focus on staple crops which provide the majority of calories globally, despite the fact that far more people suffer from micronutrient deficiencies than suffer from undernourishment. Little (if any) attention is given to the role of forests in improving people's diets. Yet, a growing body of evidence has consistently found positive associations between living in or near forests and people's dietary quality, particularly in low- and middle-income countries.

Our research explores the impact of deforestation on people's diets in Tanzania and Malawi. We use large-scale panel data from the World Bank's Living Standards Measurement Study to assess changes in food consumption (and thus, dietary quality) over time. For Tanzania, we used a novel modelling approach that combined two-way fixed effects regression analysis with covariate balancing generalized propensity score (CBGPS) weighting which allowed for causal inferences to be made. We found that over a five-year period, deforestation caused a reduction in household fruit and vegetable consumption and thus, vitamin A adequacy of diets. Our analysis showed that this reduction was very likely due to a reduction in people's ability to directly collect and consume nutrient-dense forest foods. For Malawi, preliminary results show substantial declines in fruit and vegetable consumption over the last ten years. We will use mediator/moderator analyses to assess the drivers of these changes, with a specific focus on deforestation and changes in agricultural practices over the study period.

Our research has implications for policy makers in both the agricultural and nutrition sectors. We argue that the role of forests should be better integrated into nutrition and food security policies, particularly given that this might offer 'win-wins' in terms of meeting both nutrition goals as well as conservation and environmental goals.

Emilie Vansant, University of Copenhagen

"From forest to farm: Linking trees in landscapes to dietary quality in rural Malawi"

In low- and middle-income countries (LMICs), agricultural expansion and intensification remain primary strategies to address food insecurity, often at the expense of forests. Yet a growing body of research points to the important role of forests in supporting the diets of rural communities through direct provision of wild foods, or indirectly through income and/or ecosystem services supporting agricultural production. While there is strong evidence of a positive association between forests and diets in this context, little is known about the complex mechanistic pathways linking landscapes and nutrition. Using Malawi as a case study, we examine how diets might be influenced by trees along the farm-forest gradient. In both the dry and rainy seasons, we conducted 515 household surveys in areas with varying degrees of tree cover and access to forest reserves, using the 24-hour dietary recall method to measure women's food consumption. From this data, we assess various measures of dietary quality such as diary diversity, consumption of nutritionally important foods, and micronutrient adequacy. Our preliminary results suggest that while dietary quality may be higher for households in landscapes with higher degrees of tree cover, wild foods from the forest have a relatively minimal contribution to diets. In addition, trees on and around farms might be more important than forests for direct food provision. This study is novel in its level of analysis, moving beyond the forest/non-forest dichotomy in landscape characterization and assessing dietary quality at the micronutrient level. Our findings indicate that landscape biodiversity has a positive effect on dietary quality, and therefore supports the harmonization of environmental and nutrition-oriented programs in LMICs.

Rasmus Skov Olesen, University of Copenhagen

"Untangling the explanatory pathways between forests, people and nutrition. Evidence from East Usambara Mountains, Tanzania"

Access to forests is increasingly acknowledged to be associated with improved dietary quality among rural populations in low- and middle-income countries. In general, four overarching explanations behind this association appear to be found in the scientific literature: 1) Forests give direct provision of wild foods, 2) forest support surrounding agriculture indirectly through various ecosystem services, 3) forests provide income opportunities which in turn can influence food consumption patterns, and 4) forest provide fuelwood for cooking which then affects the type of food that can be consumed. However, little is known about the relative importance of these four explanations, and even less is known about how they affect people's dietary quality. Based on detailed food surveys among 480 respondents in Tanzania, we examined forest-nutrient interlinkages over a timespan of more than 10 year. We assessed the relative importance of the four different explanations by comparing people's dietary quality with acquaintance/consumption of wild foods, connections between forests and agriculture, access to fuelwood and forest-based incomes. The study exemplified how forest-nutrient interlinkages are not to be treated homogenous as all study sites differed in terms of forest type and forest governance. Consequently, the types of forest-nutrient interlinkages were often place specific. However, our preliminary findings show that forests mainly contributed indirectly to local nutrition through a) ecosystem services supporting agricultural food production, and b) access to fuelwood. We also found that the direct provision of wild foods from the forests was nearly non-existing. These findings advance current knowledge emphasising the direct provision of wild foods as the key explanation linking forest and diets. Our results indicate a need to rethink interlinkages between people, forests and nutrition.

Session 13: (Forest) Landscape Restoration: People, Trees, Politics 3

Aurelio Padovezi, University of Padova

"Brazilian Policy Instruments for Socially Innovative Forest and Landscape Restoration"

In 2012, the Brazilian Forest Code underwent reforms that reduced the obligation to protect native vegetation on private lands by 60%, while introduced instruments to support landowners restoring an estimated deficit of 20 million hectares. The complexity and contestations around these instruments resulted in their unsuccessful implementation, after 10 years many were not fully put into practice. Together, the de-regulation and implementation gap slowed down FLR achievements in Brazil, pushing the restoration chain organisations to share knowledge and organise collective actions, finding new ideas and institutional arrangements to overpass the new risks and challenges derived from the reform, thus undertaking Social Innovation (SI) processes. SI are processes and results where people share ideas, and knowledge and take collective actions to overcome common challenges. Typically, large-scale FLR initiatives led by governments or markets have faced difficulties in engaging stakeholders and the needed capital with efficiency, transparency, and responsiveness to restore degraded landscapes and enhance people's wellbeing, the FLR dual goal. Alternatively, organised farmers, women, and youth can leverage a bottom-up FLR process by leading or actively participating in the design, implementation, and evaluation of innovative small-scale social-ecological restoration - pointing to a distinctive approach, the Socially Innovative Forest and Landscape Restoration (SI-FLR). To thrive, SI-FLR initiatives may need to be supported by the government and markets. Applying inductive content analysis of 50 national policy documents from 4 Brazilian policy domains (environment, agriculture, regional development, and science, technology & innovation), we mapped the institutional structures (policy conditions and actors) and related policy instruments (programs and financing) supportive to SI-FLR initiatives. We also identified gaps between policy (written words) and politics (the process of implementation), deriving recommendations on institutional adjustments to foster SI-FLR. We found that policy instruments supportive of SI-FLR should apply a landscape approach, by decentralizing land use design, implementation, and evaluation. Simultaneously, they should encourage experimentation by local dwellers at the landscape level. Our research confirms that institutional framework is essential to leveraging SI-FLR, but needs more political will and support to overcome administrative constraints.

KEYWORDS: Land Use Policy Instruments; Social-Ecological Innovation; Forest and Landscape Restoration; Qualitative Content Analysis; Brazil Politics.

Ida Nadia Djenontin, Penn State University

"Locally-led Forest Landscape Restoration in Central Malawi: Forms, Patterns, and Governance Challenges"

The forest landscape restoration (FLR) drive considers smallholder farmers and resources users (hereafter 'farmers') as key local-level agents of restoration policy implementation, especially in sub-Saharan Africa where these actors' livelihoods depend highly on forest and tree resources. In Malawi, farmers' combined individual and collective actions are essential components of restoration of interlocking agricultural and forested landscapes. However, the specific patterns of farmer-led restoration efforts (nature, configuration, and extent) remain understudied. Moreover, restoration efforts channeled through collective-action land, tree, and forest management faces critical governance

fragmentation with negative institutional externalities that undermine achievement of the integrated governance embodied in FLR's implicit landscape approach.

We analyze the nature of individual restoration activities and examine the governance and institutional challenges in collective restoration across two forest-agricultural landscapes in Central Malawi. We use a mixed-methods approach, combining a 2019 household survey (N=480), 35 focus group discussions, and 37 key informants interviews.

Our research shows that farmers combine two or more land-management practices based on complementarities in achieving specific livelihoods, food security, and ecological goals, and on compatibility in terms of labor and other inputs demand, showing some restoration diversification and intensification patterns. On average, the estimated mean area of farmlands being restored per individual household represented about 54% and 43% of the total household landholdings in the two study areas, respectively. Our research also reveals practical challenges of governance integration and highlights the importance of context-tailored cross-scale institutional arrangements to foster effective landscape-scale resources restoration.

The research illustrates the nature and configuration of locally-led restoration actions shaping FLR from the bottom up and their relative magnitude considering the largely small landholdings. These substantiate farmers' significant efforts and role and their prioritized restoration goals. Our research also offers insights to articulate an integrated governance system to adequately support restoration implementation and generate positive outcomes.

Akwasi Maama, Rescue Missions International

"The politics and fantasies of decentralized forestry: The Modified Taungya System in Ghana"

The Modified Taungya System is a decentralized forest intervention implemented in Ghana as forest governance strategy for grassroot development and forest resource conservation. This article asks how devolution of forest management practices to local level authorities produces responsive and accountable representation, and sustainable forest management under the Modified Taungya System. It focuses on two case studies: Nkawie and Juaso Forest Districts. Then, the paper asks how communities are developing new material and social practices around the Modified Taungya System to rebuild their livelihoods and socio-economic wellbeing. Here, the article focusses on Sunyani Forest District, drawing lessons for the two other cases. The article shows how the creation of representative groups under the Modified Taungya System provides the democratic space necessary for effective representation of community aspirations. However, due to elite capture, the interests of privilege few people are promoted. The state Forestry Commission fails to devolve relevant and discretionary resources to local leaders, and do not follow the prescribed policy processes of the Modified Taungya System. Hence, local leaders are unable to promote responsive and accountable representation. Rural communities continue to show great interest in the Modified Taungya System, but the interest is bias towards gaining access to forest land for cultivation of crops. There is no active engagement of the locals in tree planting, and hence, the Modified Taungya System exists only to promote individual interest of communities. This article shows how 'failed' interventions can gain popular support for rhetoric and individual gains.

Aruna Kainyande, Institute of International Forestry and Forest Products, Technische Universität Dresden

“Contributions of plantation forest companies: Insights from Sub-Saharan Africa”

Forest plantation companies have been recognized as leading providers of socio-economic development and investments in rural communities. Their contribution transcends livelihood support for the locals to a broader scale in addressing climatic challenges through forest landscape restoration efforts. This study provides insights into the contribution of forest plantation companies toward the socio-economic development of rural communities and their potential to promote capacity development in these communities to build resilience for climate action through sustainable tree growing practices. Our study compares two independent cases from two Sub-Saharan countries to highlight how plantation forest companies promote socio-economic development in the rural communities of Sierra Leone and improve farmers’ silvicultural treatments through an out-grower scheme in Uganda. Semi-structured interviews were conducted in Sierra Leone (n=125) and Uganda (n= 80), followed by key informant interviews with five officials from the plantation forest companies in both countries to complement the data collected.

The forest plantation company in Sierra Leone was found to contribute immensely to the socio-economic development of the communities. However, the contribution was mainly in income (salary and land lease payments), fuelwood, employment, and capacity building. The employment contribution was ranked as the highest in order of importance, followed by income, fuelwood, and capacity building. The results further revealed that purchasing food items was the primary form of utilization of the lease income by 77% of the households, followed by household building projects (33%), distribution among the family relatives (19.3%), and payment of school fees (17%).

The results from Uganda revealed that smallholder farmers belonging to an out-grower scheme benefitted from training on improved silvicultural practices conducted by the plantation company. The result further reinforces the substantial contribution of plantation forest companies to building the capacity of local farmers to embark on sustainable tree-growing practices. Our findings also indicate that the need to access training, good quality planting materials, and credits drive the farmers to participate in an out-grower scheme.

Our results suggest the need to leverage the potential contribution of plantation forest companies as key players in the forest landscape restoration agenda to balance social, ecological, and economic demands.

Chi Bui, University of Helsinki

“Restoration of Vietnamese Forest Landscapes through the lens of different stakeholders”

Since first being coined in 2000, forest landscape restoration (hereafter FLR) holds promise for regaining ecological functionality in deforested and degraded landscapes while addressing numerous wicked problems, such as climate change, biodiversity loss, and persistent food insecurity. However, there remains a dearth of empirical evidence of the influences of this approach on socio-economic and political outcomes, particularly the intertwined link between FLR and smallholder livelihoods in the Global South. Although Vietnam is often regarded as a prominent example in the tropics for reversing forest loss through the government-led engagement of smallholders in large-scale reforestation projects, the rapid expansion of plantation forests as an unanticipated consequence of these initiatives has been criticised by many scientists for generating limited environmental services and, more importantly, jeopardising forest ecosystems if not adequately managed.

Two major issues are identified in drawing a complete picture of the development of FLR in Vietnam, starting from a lack of systematic documentation of the restoration initiatives led by international

development agencies and NGOs. Furthermore, FLR is a relatively new concept, and its meaning is often understood in very different ways by Vietnamese stakeholders. With an ambition to increase the global understanding of FLR dynamics in the tropics, this study aims to provide a comprehensive background on the evolution of forest restoration paradigms toward FLR in Vietnam and characterise the perceptions and perspectives of different stakeholders on FLR. A combination of qualitative and quantitative methods, including literature review, thematic analysis, content analysis, and inferential statistics, is applied to address three research objectives. Firstly, the development of laws, policies, regulations and initiatives related to forest and forest landscape restoration in Vietnam in the past 30 years is mapped. Secondly, different stakeholders' perceptions and perspectives on FLR (i.e. governmental agencies, international development agencies and NGOs, scientific communities, and farmers' organisations) are determined. Thirdly, the driving forces and constraining factors behind the participation of smallholders in FLR are compared and quantified. In addition to laying a solid foundation for further studies on FLR in Vietnam, this study provides critical insights for policymakers to design solutions that accommodate the multiple interests of different stakeholders.

Valentina Robiglio [presenting for Ricardo Vargas], CIFOR-ICRAF

"Knowledge, attitudes and perceptions in the implementation of sustainable land management practices at the forest-farm interface in Peru"

Under exacerbating climate and environmental crises, wider adoption of agroforestry and sustainable land management practices (SLM) at tropical forest margin is considered strategic to reduce pressure on forest, revert land degradation and improve farmers livelihoods. Evidence on household level determinants of agroforestry adoption is growing and points to the interplay between family assets with contextual conditions, including biophysical, socio economic and institutional aspects that make managing trees on farm valuable. These makes that scaling needs to embrace the fine scale variation of local conditions and target heterogeneity of farmers livelihoods profiles. Recent evidence has shown that knowledge and perceptions about certain practices further influences the interest of farmers for implementing them. This is relevant when designing extension service interventions.

This study was conducted within the framework of a project in the Peruvian Amazon that focuses on building the enabling framework for the national and subnational governments of Peru to enforce the agroforestry concession policy by piloting different models of extension services and knowledge generation processes that aim to support farmers in their transition to sustainable land use management and forest conservation.

We use primary data from 1070 smallholder families potential beneficiaries agroforestry concession granting schemes to assess their knowledge attitudes and perceptions towards 3 SLM practices: agroforestry, small scale forestry and other land management interventions; and their actual implementation and tested their relationship through and econometric model that also includes other household level variables.

Our results support the idea that it is necessary to focus on KAP to achieve behavioral changes in farmers. These results can help policy makers and practitioners to develop interventions that support knowledge generation and related changes in attitudes and perceptions as a strategic element to accelerate adoption.

Gabriela Russo Lopes, CEDLA / University of Amsterdam

“Dimensions of Transformation: Individual, Community and Political Changes in the Brazilian Amazon”

Many authors have defined transformation in varied ways. Early social scientists focus on changes in socioeconomic institutions (e.g., Polanyi), self-transformations in individual practices (e.g., Gramsci), and the interaction between personal experiences and institutional settings (e.g., Giddens). Recent environmental analyses build on these definitions to carve the concept of transformations towards sustainability, meaning the fundamental changes in society that allow for less degrading and more sustainable production and consumption systems. In this paper, we analyse the evolution of this concept and contribute to this debate with empirical analysis from the Brazilian Amazon. Based on context-sensitive and empirically grounded methods – including an online survey, two rounds of interviews and fieldwork observations – in the contrasting states of Acre and Mato Grosso, we analyse the processes on the ground to conceptualize transformations as a multidimensional interplay between the individual, communal and governmental dimensions. Transformations have key characteristics shared by both regions: they happen gradually, are mainly triggered by immaterial processes and are hard (although not impossible) to be unmade. Nevertheless, distinctive pathways (e.g., bottom-up, top-down, niche projects) are shaped by the directions of these changes between different dimensions, which are often opposed and contradictory. Hence, we posit that transformations towards sustainability are comprised of smaller positive changes that, when coinciding with similar processes in other dimensions, lead to a fundamentally altered state from which is difficult to come back from. This conceptualization offers key insights to the analyses of empirical landscape transformations in other forested regions around the globe.

Margherita Lala, University of Leeds

“Landscape Restoration and smallholder farmers’ narratives of agricultural transformation: a view from the Northern Kilombero Valley”

Smallholders have been recognised as key actors in global narratives of restoration. This work aims to understand how tree restoration ambitions and interventions are related to smallholder farmers’ perception of agricultural transformation in the Northern Kilombero Valley.

Within the valley, there is increasing competition for land and natural resources between agricultural industry, conservation organizations and local people. The Kilombero Sugar Company (KSC) is planning to build a new mill to double sugarcane production, promoting agricultural commercialisation while tree planting activities have been led by Non-Governmental Organisations (NGOs). Our research explores (1) smallholders’ narratives about their future aspirations for farms and the role of trees within them and (2) how these narratives interact with restoration and agricultural development.

To answer our two objectives, we conducted nine participatory workshops in 2021 with 85 smallholders from 7 villages. A local artist drew visualisations of smallholders’ ideal farms. Farmers’ narratives revolved around livelihood diversification and a fairer distribution of resources (farm ownership and expansion). Trees typically featured as an additional income-generating activity to enhance livelihoods, usually desired as small plantations or border planting of commercial multi-purpose species. However, there were concerns of trees attracting wild animals and that shade would reduce crop yields, risking safety and livelihoods.

This is the first evidence to our knowledge, of how smallholders perceive agricultural transformation and tree restoration on their farms in relation to the future of their livelihoods. We demonstrate the diversity of tree restoration and farming ideals as shown through narratives and artist visualisations and

contribute to increasing the voice of smallholders who have been, and do feel underrepresented in policy and project planning within the landscape.

National policies and regulations about trees and riparian restoration only partially consider smallholders' aspirations and their current practices. These findings provide insight into how the realities on agricultural transformation and associated policies play out on the ground for local farmers, and influence smallholder perceptions for tree restoration and their implementation.

Session 14: Biodiversity, Forests and Livelihoods 3

Léna Prouchet, University of Exeter

"Adapting productive projects to local contexts to ensure sustainable positive impact on forests and livelihoods"

Economic poverty has been considered a key source of deforestation in tropical regions. To address this challenge, several conservation organisations design and implement productive projects in these areas. However, these projects tend to not be adapted to local cultures and lifestyles and locals seldom continue their activity once the organisation has withdrawn. Therefore, they mostly fail to achieve their social and environmental objectives.

This research focuses on a partnership between a conservation NGO and an indigenous village in the Peruvian Amazon, the Awajun, around cacao growing and marketing. The objective was to understand how external organisations could modify their approach to allow local forest communities to generate an income in a culturally adapted and sustainable manner.

We spent three months in an Awajun village and interviewed cacao farmers, community leaders, local NGO staff as well as representatives from organisations developing similar productive projects in the area. We analysed the result using thematic analysis. Our research finds that, despite not being a traditional crop, cacao has become the main - and often only – option to obtain cash for most inhabitants in the region. In fact, the sustainability challenge relates to farming practices. While organisations tend to promote an intensive monocultural system to maximise and secure farmers' income, indigenous farmers traditionally mix various crops and trees in the same area. Most locals see cacao culture as a means to respond to ad hoc needs and do not wish to dedicate a substantial amount of their time to their cacao chakras (fields).

This research deepens our understanding of cross-cultural collaborations in conservation contexts and the challenges raised by such interactions. It interrogates the materialisation of self-determined development. Finally, the study provides recommendations on the adaptation of income generation projects to local contexts, and how they can become more community-led.

Only projects in line with local culture and aspirations are likely to achieve long-term impact. As indigenous peoples have been demonstrated to be the best guardians of tropical forests and their biodiversity, the redesign of productive projects is critical to ensure that economic development does not go hand in hand with forest destruction.

Michael Ansong, Kwame Nkrumah University of Science and Technology

“Implication of over exploitation of African Rosewood (Pterocarpus erinaceus) on rural livelihoods in Ghana”

In Ghana, rosewood naturally occurs in the arid and semi-arid regions in the north of the country where the majority of the households are considered vulnerable due to limited opportunities to expand or improve their resources bases. Although there is a ban on the harvesting of rosewood in the country, stocks of the species are typically decreasing mainly through illegal logging. Unfortunately, there is not much information on how the exploitation of the species is affecting rural households particularly, how their income and agricultural products are impacted. To contribute to bridging this information gap, the current study surveyed 157 households from five communities in the Wa East District to determine 1) the direct uses and benefits of rosewood to the local communities, 2) examined the perceived impact of harvesting of rosewood on livelihood and 3) assessed how the local people are adapting to the effects of the harvesting of the species. A mixed-method approach using open and closed-ended questionnaires was used for the study. The result from the study shows that rosewood use by rural communities is confined within limits and is sustainable, which is different from the unsustainable exploitation of the species for international markets. Most of the respondents (81.5%) only use the tree for domestic purposes rather than commercial purposes with the wood and the leaves being the major part used. The majority indicated that cover of the species has reduced over the past five years and this has negatively impacted their income. The reduction was also reported to have resulted in a reduction in crop production, change in rainfall pattern, scarcity of fuelwood and wood for roofing houses, scarcity in fodder for feeding animals, reduced soil fertility and increased disputes among community members. Respondents indicated that they are adapting to the situation by now using and relying on different tree species such as the shea and mango trees as substitutes for the rosewood. This information is important to help safeguard rural livelihood and support the formulation of policy to help the effective conservation of the species.

O. Ravaka Andriamiahaja, Centre for Development and Environment, Switzerland

“The Multiple Facets of Crop Booms: A typology of actor participation in land governance”

Crop booms are one of the main drivers of natural resources degradation and biodiversity erosion. Most developing countries and international organizations face trade-offs between attracting investors to increase economic value of land and its contribution to the development of the countries, conserving the natural resources of the countries, and ensuring local land-related livelihoods. Crop booms deserve a better understanding in order to support adequate policy designs for biodiversity conservation, economic development, and livelihood support for crop boom losers mainly during crop bust. However, the existing body of literature misses the important nuances in what appear to be variegated and complex processes of actor participation in the different governance components and processes. The objective of this paper is to present a diversity of actor participation in the different components of crop boom governance in Laos, Madagascar, and Myanmar. Based on intensive empirical research in the three countries and using a conceptual framework based on actor participation in land governance of crop booms, the results show that there are different types of crop booms according to actor participation in the governance components. Crop booms imply differences in actors governing the boom and the supply chain, in tenure security of the land, in land acquisition processes as well as in terms of the drivers of the boom and the bust of the crop. Further, actors participate in one or several of components. The impacts of these crop booms affect ecosystem service supply in forest frontiers countries, as well as local livelihoods and human well-being. Understanding (characteristics of) actors’ participation advance our knowledge on land governance. Further, it has strategic implications for

reshaping responses in negotiation, regulation and coordination of crop booms or land use policy in general. Countries' government or other decision-makers should be able to differentiate land investments or to balance the tradeoffs. Actions could be fostered towards reaching sustainable development goals, or other specific goals in land governance and land management.

Adelina Chandra, Environmental Policy Lab, ETH Zurich

"The spatial and functional fit of zero-deforestation governance mechanisms in the Indonesian palm oil sector"

Increasing land demand for the production of many agricultural commodities poses a threat to deforestation and land degradation in the tropics. In response towards increasing public scrutiny, various corporate zero-deforestation commitments have been implemented through, inter alia, NDPE policies, jurisdictional, landscape projects, and the sourcing of certified products, signaling a company's intention to eliminate deforestation from its supply chain. Given that the implementation of such initiatives is unclear in practice, it raises a question on how different types of initiatives are likely to address the deforestation and socio-economic risk on the ground. This paper addresses this research gap by focusing on Indonesia, the world's leading palm oil producer. We map commodity-driven deforestation risk as well as vulnerable rural areas in a spatially explicit way, compare these with the spatial reach of various ZDC implementation mechanisms, such as jurisdictional, and landscape initiatives, supply chain policies, and certification. Despite increasing efforts to implement corporate zero-deforestation initiatives, the spatial extent of such initiatives is not well distributed in Indonesia. We highlight the importance of recognizing the geographical extent of deforestation risk and vulnerable rural distribution patterns in the ZDC implementation mechanisms to ensure ecological and socio-economic objectives are realized.

James Reed, CIFOR

"Co-producing theory of change to operationalize integrated landscape approaches"

Integrated landscape approaches that engage diverse stakeholder groups in landscape governance are increasingly promoted to address linked social-ecological challenges in tropical landscapes. Recent research suggests that a transdisciplinary approach to landscape management can help identify common research needs, enhance knowledge co-production, guide evidence-based policy development and harmonize cross-sectorial integration. Meanwhile, guiding principles for landscape approaches suggest that identifying common concerns and negotiating a process of change are fundamental to implementation and evaluation efforts. As such, the use of decision support tools such as theory of change models that build ordered sequences of actions towards a desired, and agreed, future state are increasingly advocated. However, the application of the theory of change concept to integrated landscape approaches is limited thus far, particularly within the scientific literature. Here we address this gap by applying the principles of landscape approaches and knowledge co-production to co-produce a theory of change to address current unsustainable landscape management and associated conflicts in the Kalomo Hills Local Forest Reserve No. P.13 (KFR13) of Zambia. The participatory process engaged a diverse range of stakeholders including village head people, local and international researchers, district councilors, and civil society representatives amongst others. Several pathways, actions, and interventions were developed around the themes of deforestation, biodiversity and wildlife conservation, socio-economic development, access rights and law enforcement. To make the theory of change actionable, participants identified a need for enhanced cross-sector and multi-level

communication, capacity development, and improved governance; while a lack of commitment towards coordinated knowledge exchange and access to information along with poor policy formulation and weak enforcement of rules were among potential impediments to action. Use of theory of change can both inform evidence-based policy design (by revealing place-based challenges and proposing solutions) and support policy mechanisms that promote integration between state and non-state actors (by clarifying actor rights, roles, and responsibilities). Co-developing a theory of change for integrated landscape management is inherently context-specific, but the process and outcomes of this study should hold relevance across a range of contexts faced with sustainability challenges related to reconciling both conservation and development objectives.

Torsten Krause, Centre for Sustainability Studies, Lund University

"The loss of tropical forest fauna and traditional ecological knowledge – its relevance for the SDGs and forest conservation"

The disappearance of forest fauna due to hunting and habitat alteration in tropical forest ecosystems jeopardizes the achievement of numerous Sustainable Development Goals (SDGs). While deforestation is a major driver of tropical biodiversity loss, remaining intact forest ecosystems face a slow degradation due to unsustainable levels of hunting of forest fauna. In this presentation we present insights on how tropical defaunation affects four specific SDGs nutrition and zero hunger (SDG 2), good health and well-being (SDG 3), climate action (SDG 13), and life on land (SDG 15). We present findings from ongoing field research in indigenous communities in the Colombian Amazon region where we conducted interviews and collected ethnographic data on hunting behaviours, local norms and traditional ecological knowledge about forest fauna. We highlight the need to engage with local forest resource users in order to understand and strengthen local institutions and norms closely linked to traditional ecological knowledge that regulate hunting. While indigenous territories are known for their forest conservation benefit, little attention has been paid to how local institutions and norms affect the sustainability of hunting and fauna extraction. Despite the increasing rhetorical commitments of the international community, there is a great need to paying more attention to tropical defaunation and traditional ecological knowledge in light of the accelerating and interconnected crises of the loss of biocultural diversity and climate change. To fill this gap, we discuss a range of options on how to study defaunation in future transdisciplinary and collaborative research and the potential to address the ongoing tropical defaunation crisis, including but not limited to recent insights from policy, conservation management, and development practice.

Session 15: Data & Methods for Understanding and Promoting Forests & Human Wellbeing 3

Sarah Wilson, School of Environment, University of Victoria

"Restoring our future: Lessons from flagship restoration projects around the world"

Restoring ecosystems has never been more important, or more in demand. Nations across the globe have committed to restoring millions of hectares for climate, biodiversity, water, and other benefits. But to date, many initiatives still fail to meet their objectives. Each restoration project offers lessons that can help guide future work. In this talk, we present the results of an initiative to rigorously document some of the world's most impactful restoration projects as a part of the Restor platform. Twenty cases were

selected from hundreds based on their longevity, track record of success, and potential to inspire projects elsewhere. They represent pioneering efforts that have shown successful ecological and socioeconomic outcomes and potential for scaling. Each case study was researched, verified, and updated in a systematized format by an independent group of researchers, including practitioner interviews. Results suggest that meaningful engagement with communities can come in a variety of forms, but is essential to restoration success across a wide range of contexts - in almost every case, the main challenges were political and social, rather than technical or ecological. Cases represent a range of different restoration types and geographic contexts, but even with this variation several key themes stood out as important for informing future restoration work. First, crises can be a tipping point for people to begin restoring ecosystems, provided that restoration can mean a way forward. Second, demonstration sites are often essential for bringing people on-board, and are more powerful when people can see restoration in contexts and from people similar to theirs. Third, capacity building and local participation in planning and implementation are critical for success and for scaling up. Fourth, consistent, long-term funding over time spans where restoration can produce meaningful results is critical but very challenging, and current metrics of 'success' - such as number of trees planted - reflect and perpetuate this problem. Emphasis on pre-restoration engagement and post-restoration support - the front and back ends of implementation - was critical to the success of all flagship cases, and should be a priority for donors and governments moving forward.

Mohammad Farrae, University of Notre Dame

"Forest Proximate People In Poverty in Pakistan"

Forests and trees (outside of forests) are increasingly seen as important allies in addressing critical global challenges. According to a recent study conducted for the FAO (Food and Agriculture Organization), some 3.27 billion rural people (95% of the world's rural population) lived within 5 km of a forest in 2019. However, further detail on the people living in and near forests,

including their living standards and other poverty indicators for them, remains lacking. to get the number of forest proximate people in poverty, it is possible to apply fractional ratios at coarser scales to get estimates at national or regional scales. However, in order to have policy-relevant data, the estimates need to be at finer, high-resolution scales (e.g, at 1 km square or district levels) or at district/village levels.

With a better understanding of the relationship between forests and the people that live close to them, especially at high resolutions, policymakers can identify targeted approaches for livelihood and forestry improvement outcome projects. While data on forest proximate people is available, high-resolution data on poverty is not available yet for all countries. Firstly, by zooming in to Pakistan (poverty data for the country is available at high resolutions) a process of desk research will be completed to further develop a methodology to calculate forest proximate people in poverty. These estimates will be generated by combining high-resolution gridded forest proximate people maps along with high-resolution poverty maps (using preexisting survey and remote sensing data). By using various combinations of definitions and sources of forest maps along with poverty maps, the methodology will be refined and shared with experts to gather feedback.

The refined methodology can later assist researchers to generate "forest proximate people in poverty" estimates for the country or region of their interest. As the availability of poverty data grows globally, these methodologies can also be used to generate global-level estimates.

Lucas Alencar, Federal University of Pernambuco

"Forest-proximate people in a changing tropical dry forest"

Forest-proximate people (FPP) are key environmental actors yet many live in multidimensional poverty, and struggle to achieve fundamental rights including education, health, and food security. Accurate insights into the size, spatial distribution and dynamics of forest-proximate populations are critical to understanding environmental change, and making FPP and their vulnerabilities visible to governments and other sustainable development stakeholders. Likewise, 'seeing' FPP initially requires reliable mapping of the forests in which they live in and around. Existing research has only assessed FPP population dynamics and linkages with forest change in humid tropical forests. This is problematic given many inhabitants of tropical dry forests experience long-term, deep vulnerabilities and state neglect. We engage with FPP estimates and population~environment dynamics in the Caatinga, a dry forest in Northeast Brazil. Using Mapbiomas land cover data and WorldPop population estimates, we evaluated variation in FPP and forest cover from 2006 to 2017 by sampling 6193 * 5km-radius landscapes. We assessed 92.8% of landscapes as constituting dry forest, defined as ≥20% native vegetation cover (including patchy scrub). We extrapolate our counting to non-surveyed areas and estimate 8.9 million FPP living in Caatinga by 2017, an 8.1% increase from 2006. Of the forested landscapes, over half (54.9%) experienced net forest regrowth. Intriguingly, most (62.4%) regrowth landscapes also experienced human population growth, counter to Forest Transition Theory's expectation. Nonetheless, 45% of the landscapes classified as forest in 2006 experienced net deforestation, which mostly occurred in conjunction with human population growth, perhaps indicative of 'populist' deforestation colonization frontiers. However, in 32.6% of the 'deforesting' landscapes we also see population decline, suggestive of so-called capitalist frontiers in which land consolidation and agricultural mechanization may be dispossessing smallholders. By quantifying and identifying the dynamics of FPP in the Caatinga, we have highlighted the size of the challenge, but also facilitated the process towards sustainable development of the region without leaving no one behind. We stress that more efforts to identify forests in other drylands should be done to redress the invisibility of FPP and to promote more targeted policies to improve their well-being.

Mulia Nurhasan, Center for International Forestry Research (CIFOR)

"Contribution of Mangroves to Food Security and Nutrition of Women in fisher-households in Java, Indonesia"

The contribution of mangrove to climate change mitigation and biodiversity conservation are better known than their roles in providing food security and nutrition for local communities. Indonesia is the home of nearly a quarter of the world's mangroves (3.4 million ha) and has reportedly lost 40% of its mangrove cover to boost food production. Mangrove ecosystems are important nurseries for aquatic animals consumed by local communities. Fish and other aquatic animals (OAA) contain high and diverse micronutrients needed for child growth and women of reproductive age. Consumption of fish has been associated with better nutritional status. In a highly biodiverse country where almost 30% of the children are undernourished, harmonizing biodiversity conservation and food security and nutrition objectives is crucial. Our study assesses the food security and nutrition benefit of conserving and restoring mangroves for local communities.

This study focuses on two sites in Java (Banyuwangi and Demak) where mangrove has been degraded due to human activities, and restoration efforts have been taking place over the last 20 years. We conducted a dietary survey to assess women's consumption of aquatic animals in 619 mangrove-fisher

households from February-March 2022. Our preliminary findings show that in the last one week, fish and OAA were consumed by 92 and 74% of respondents, respectively. Of those, almost 70% of respondents obtained the fish and OAA they consumed from their own catch. Additionally, almost 60% of respondents obtained the fish and OAA they consumed from the surrounding mangrove areas (including coastal, nearshore, deltas, bay, and riverine). In total, the study recorded about sixty species of fish consumed by the respondents in the last one week in each site, while on average, respondents consumed three species of fish and one species of OAA in a week.

Our preliminary findings suggest that aquatic animals from mangroves contribute substantially to the food security and nutrition of the local communities in Banyuwangi and Demak. Considering the important role of fish and OAA in reducing malnutrition, conservation and restoration of mangroves should also be considered as securing nutritious food for local communities.

Caroline Sarorato Silva França, Chalmers University of Technology

"A species-specific approach for tracing Brazilian timber origins and associated illegality risks across the supply-chain"

The rise in global demand for agricultural and forest commodities have created unparalleled pressure on forests, leading to a loss of carbon, biodiversity, ecosystems services, and livelihoods. While the role of commodity production in driving deforestation has been a topic of intense debate, this connection is still largely unexplored for forest degradation. As forest degradation rival deforestation—in area, environmental and livelihood impacts—understanding its drivers is key to forging effective policy responses. Timber extraction is the largest direct anthropogenic driver of forest degradation in the tropics, but due to much of logging being informal and illicit, timber supply-chains are insufficiently mapped. Here we present a species-specific approach to tracing Brazilian timber from localities of production to consumption, quantifying sources of illegality risk across the supply chain. Based on data from the Brazilian timber licensing and crediting systems, we develop an actor-level, environmentally extended input-output model of timber originating from Brazilian native forests, which allows us to quantify the prevalence of different practices for laundering illegal timber. We focus on high-value ipê from the Amazon state of Pará, a leading producer of timber and contested forest frontier. We drew on a decade of logging permits and timber transportation data – Document of Forest Origin – to estimate sources of illegality risk associated with (i) timber entering legal supply-chains without a valid logging permit, (ii) overstated ipê yields in logging permits, and (iii) discrepancies where supply-chain actors sell more timber product than they receive, all indicators of documented practices for laundering illegal timber. Preliminary findings show that less than one fourth of all ipê volume entering supply-chains between 2009-2019 is free of any illegality risks. Despite data limitations, this study puts forward an approach that can be refined and leveraged to monitor entry-points for illegally logged timber and can contribute to increased transparency and accountability in Brazilian timber supply chains. While legality is not a proxy for sustainability or fairness in the use of forest resources, the pervasiveness of illegal logging operations can undermine the legal apparatus and affect forest-dependent livelihoods far beyond those directly involved in the timber industry.

Mairon G. Bastos Lima, Stockholm Environment Institute

"A Restorative Bioeconomy: Enhancing Nature's Contributions to Historically Disadvantaged People in the Brazilian Amazon"

As it becomes clear that conventional bioeconomies based on large-scale agribusiness risk hampering marginalized actors even further, novel proposals for a sustainable bioeconomy transition have come to the table. In the Brazilian Amazon, for one, an emblematic agenda for a bioeconomy of "standing forests and flowing rivers" has been gaining momentum as an approach to stop deforestation, valorize biodiversity, and promote local economic development. However, it is unclear how socially inclusive even such novel bioeconomy agendas will be. Here, we draw from the emerging framework of Nature's Contributions to People (NCPs) as well as from notions of Just Transition to explore a critical and inclusive approach to bioeconomy promotion. We draw from literature on bioeconomy, sustainable forest livelihoods, as well as from key-informant interviews with multiple stakeholders in the Brazilian Amazon. First, using the NCPs framework, we elaborate on which contributions a bioeconomy of standing forests for the Amazon is on its way to help safeguard, while exposing those that remain in peril. Second, we debate the question of "nature's contributions to whom?" as a critique to the NCPs framework. Finally, and in a more propositional spirit, we put forth the notion of a restorative bioeconomy. That draws both from ecosystem restoration (to amplify nature's contributions) as well as from restorative justice (to direct such contributions at the stakeholders who have suffered disproportionately and arguably need the most). We put this forth as an avenue for further research, while sketching concrete pathways in the Brazilian Amazon case as a pilot.

Rattiya Lippe, Thuenen Institute of Forestry

"Shedding lights on forestry-related informal employment and its determinants"

Forests continue to be a vital source of employment, generating income and sustenance for millions of people, especially in rural areas across the globe. Having a decent and secure job is one of the sustainable pathways to eradicating poverty, boosting forestry workers' well-being and promoting sustainable forest management activities. Notwithstanding, the persistence of informality in the forestry sector may exacerbate decent work deficits, inter alia, poor and unsafe working conditions and lack of access to social protection. Understanding informality in the forestry sector and its determinants can positively impact policy strategies to secure decent work as a necessary condition for enhancing sustainable employment quality. Accordingly, the present study contributes to the existing debate by examining econometrically aggregate-level determinants of forestry-related informal employment, building on available country data extracted from various statistical sources. The sample used in our analyses covers a total of 70 developing countries in Africa, the Americas and Asia during the period 2008-2020, representing approximately 30 per cent of the global forest area. The share of informally employed persons in total forestry-related employment is used as a proxy indicator pertaining to informality in the sector. Results from our econometric panel analysis reveal that the share of informal forestry-related employment in the analysed countries is positively associated with economic recession and deforestation rates. Our analysis further shows that fostering education and forest certification compliance, along with ratifications by labour conventions such as freedom of associations and collective bargaining rights, can lead to a lower share of informality in the forestry sector. Since the number of countries with available statistics on informal employment is limited, our cross-country panel analysis provides model-based evidence and an improved understanding of forestry-related informal employment. Expanding temporal and spatial coverage of disaggregate employment data will allow exploring further patterns of informality in the forestry sector across regions and on a global scale.

Davide Pettenella (Presenting for Aynur Mammadova, Padova University) FSC International

“Returning back to nature. Forest-based care as a pathway to shifting values and uses of forests”

Human societies, economies and cultures are embedded in Nature – we depend on nature for sustenance and well-being and our actions affect environment significantly. Negative changes in environmental conditions and ecological integrity deeply impact human health and well-being and accentuate social and economic inequalities, leading to hardship of individuals and communities. Other challenges of modern societies also affect human health and well-being: rural outmigration, loss of social ties and place-based identities, increased urbanization, technology addiction, rise of non-communicable diseases such as anxiety and depression. Given the human-environment interdependence, referring to Nature and ecosystems to address these challenges is becoming of paramount importance. There is a growing recognition that exposure, contact, interaction and connection with natural environments have positive benefits on human health and well-being. In this sense, embeddedness in nature, kinship (also with non-human entities), conviviality, sense of place, spirituality, aesthetics, beauty and care become important keywords when discussing human well-being and quality of life. In the search for approaches that focus on relational values of Nature and interconnection between Nature and people, Forest-based care has emerged. We refer to Forest-based care as all organised interventions in forest areas that embed aspects of healthcare, rehabilitation, disease prevention, social inclusion, wellness and relaxation, education, spirit and inspiration, employment and livelihoods. In this research, we employ qualitative data collection methods, mainly literature review supported by in-depth interviews with selected case studies. Using a deductive synthesis, we integrate research results of an international Erasmus+ Knowledge Alliance project - Green4C. We first describe the scientific theory and evidence that forms the basis for forest-based care. We then discuss how forest-based care translates into practice, introducing the typology of activities through examples from European countries. We also discuss the elements of innovation brought by these case studies and initiatives, and their ability to transform human attitudes towards Nature and bring in a paradigm shift. We conclude that forest-based care can offer innovative tools both for developing Nature and human resilience in the face of modern day environmental and societal challenges, motivating a socially and environmentally responsible, as well as economically viable, active management of forest areas.

Session 16: Forests, Security and Social Differentiation in a World in Flux

Andrew Simons, Fordham University

“More Than a Safety Net: Ethiopia's flagship public works program increases tree cover”

Reducing poverty while addressing climate change and restoring terrestrial ecosystems are critical challenges at the core of the United Nations Sustainable Development Goals. More than one billion people worldwide receive cash or in-kind transfers from social protection programs. In lower-income countries, these transfers are often conditioned on participation in labor-intensive public works to rehabilitate local infrastructure or natural resources. However, despite their popularity, the environmental impacts of public works programs remain largely undocumented.

We quantify the impact on tree cover of Ethiopia's Productive Safety Net Program (PSNP), one of the world's largest and longest-running public works programs. The purpose of the PSNP is to relieve poverty and food insecurity through cash or in-kind transfers in exchange for labor on public works designed to build sustainable community assets that increase communities' resilience to shocks. The

community-chosen public works projects focus on soil and water conservation activities like terracing, embankments, gully check dams, water-infiltration trenches, and especially reforestation.

We use satellite-based data of tree cover combined with difference-in-differences and inverse probability treatment weighting methodologies to quantify the change in tree cover attributable to the PSNP. We find that the PSNP increased tree cover by 3.8% between 2005 and 2019, with larger increases in less densely populated areas and on steep-sloped terrain. Our estimates suggest that the positive impact of tree cover alone (through carbon storage) could offset as much as 49% (depending on assumptions used) of the administrative costs of the program. Our findings show that public works programs can have sizable environmental benefits and should be embedded in benefit-cost calculations to avoid under-investing in beneficial programs.

This work is important to the scholarly sustainability science community in that it is an example of a design-based causal inference strategy to empirically evaluate a large sustainability intervention. For the donor and development community, this work shows that large social assistance programs can attain both social and environmental aims. Because increasing tree cover is considered an important strategy to mitigate global warming, Ethiopia's experience suggests a win-win potential for social safety net programs designed with an environmental component.

Winy Vasquez, University of British Columbia

"Food Security in the Amazon: A Look at the Food Security and Nutrition of the Asháninka Peoples Living Inside a Protected Area"

For much of human history, forests have been helping to sustain healthy and nutritious diets directly through the provisioning of wildfoods and indirectly through ecosystem services like pollination, water regulation and soil stabilization, to name a few. The UN has declared the "right to food" to be an inalienable human right yet there are cases around the world where this right isn't being respected. One of the places in which this "right to food" is most contested is inside of protected areas (PAs) where, at their most stringent, human use is often seen as detrimental to nature. In Peru, however, there are PAs that allow for the resident community to hunt and harvest within the border of the PA and these PAs, therefore have the potential to serve as an example of how to ameliorate biodiversity conservation with food security. My research will take a mixed-methods approach to assess the nutritional status of the Asháninka Indigenous Peoples who reside within the Protected Forest San Matias San Carlos, which is located in the lowland central Amazon region of Peru. This research will also investigate the level of rights and access the community has as well as further investigate the linkages between the forest and the community's food security, nutrition, and overall wellbeing. This cross-sectional study will employ household interviews, questionnaires, child anthropometric measurements and participant observation to answer five research questions over the course of two field seasons, starting in July of 2022. While this research is in the data collection stage, I anticipate that some preliminary findings could be presented by October, which can showcase what the Asháninka food system looks like and how the community interacts with their natural surroundings. Using a community participatory approach, I aim to get a deeper understanding of the Indigenous community's food system in order to better inform food and nutrition related policies. By supporting Indigenous food systems through food policies that are grounded in rights-based approaches, it will be possible to support self-sustaining cultural practices that lead to healthy and sustainable diets that are supported by and thus safeguard local biodiversity.

Eliza Zhunusova, Thünen Institute of Forestry

“How does rural in-migration affect forest clearing and smallholder land use in tropical forest frontiers? Evidence from the Zambian Miombo woodlands”

One of the main sources of increasing population pressure in forested landscapes of Zambia is in-migration from other rural areas and, to a limited extent, from urban areas. Rural-rural migration in Zambia is mainly driven by the villagers’ search for new agricultural land with productive soils and abundant rainfalls and by environmental degradation and limited employment options in the villages of origin. At the same time, urban-rural migration is a result of widespread unemployment and poor living conditions in the cities. Past research is not clear about the specific mechanisms behind the processes through which migration impacts natural resources in the migrant-receiving locations or on possibilities for conservation and sustainable development arising from these processes. This paper examines the relationship between rural in-migration, which in this study comprises both rural-rural and urban-rural migration, and land use change in the forested landscapes. We use a comprehensive cross-sectional dataset of 1123 households living in or near the Miombo woodlands in the Copperbelt, Eastern, and North-Western (NWP) provinces in Zambia to analyse the contribution of different factors on forest clearing into cropland by farm households, with the focus on the impact of in-migration. A multivariate tobit model was used to explain forest cleared at the household level by simultaneously estimating two equations, one for explaining forest cleared at the household level, and another explaining the area under annual crops. Main reasons for moving reported by the households are related to the availability of agricultural land, natural resources or fertile soils. Preliminary regression results show that being an in-migrant household is associated with 28% more forest area cleared for crop production during the last 5 years and with 8% increase in area cultivated with annual crops, i.e. not all of the area that was cleared is cultivated by crops. Our results add to limited available evidence on quantitative impacts of in-migration on forest clearing and land use in Zambia at the micro scale and highlight the importance of migration being included in future forest conservation policies as well as land use scenarios.

Rijal Ramdani, University of Eastern Finland

“Collaborative everyday adaptation to deal with peatland fires: Case study in the east coast of Sumatra, Indonesia”

Due to the uncertain situation of climate change, multi-level actors such as civil society, private sector, national and sub-national government institutions as well as individuals are expected to have an adaptive capacity to face their vulnerability. This study analyses how the local community has used the collaborative approach as a strategical pathway in their everyday activities to adapt to the peatland fires and their vulnerability in situations where the fires impact their everyday lives. The research has been undertaken on the east coast of Sumatra, Indonesia, where the challenge of annual peatland fires has increased in the last 15 years. The research finding shows that the case study community conducted collaborative everyday adaptation through structural arrangements, co-creation of knowledge, and resource sharing in three stages, 1) anticipatory, 2) preparedness, and 3) response, through constructing canal blocks, conducting fire patrols and fighting fires, which enabled the community to reduce potential damage due to climate vulnerability. However, we argue that in order to support everyday adaptation, collaborative governance is needed to support building capability to act and not just concentrate capacities and activities to act.

Ingrid Stjernquist, Dept of Physical Geography

“How women forest owners can unpack embedded barriers for a transition to sustainable forestry”

The Sweden forest sector has traditionally been dominated by men in spite of 38% of forest owners being women. The forest market has focused on large scale pulp and papers industry and the infrastructure has been built around this resource demand. New demands on Swedish forests due to climate change and biodiversity degradation call for a more sustainable forest management. However, the embedded dynamic of traditional industry related infrastructure as well as a one issue focus, e.g. a tunnel vision syndrome, on biomass for the established forest industry is likely to lead to transition failures towards a biobased economy. Official views on multifunctional forest management have largely highlighted tourism and recreation possibilities, placing women in traditional service roles and gender norms.

The gender imbalance within the Swedish forest sector has resulted in the establishment of six local and national women owner's networks working for equality in forest management and sustainable forestry.

Funded by the Swedish Gender Equality Agency, six women forest owner networks analysed, using focus groups, the drivers for a gender balance and sustainability forestry, and on how to unpack barrier for a multifunctional forest management. Network representatives discussed cooperation goals and benefits for a transition towards sustainable and multifunctional forestry. Results shows that women have a key role in adapting forest management to climate change and environmental challenges; and to unpack the embedded barriers through a systems perspective on future high-quality products. There is a need to: 1/ use women's more diverse and innovative forest management as role models 2/ increase women's influence in the democratic processes affecting forest policy development and, 3/ create learning and educational networks to improve women's decision-making capacity.

Gender research during the last decades have identified women as more innovative and inclined to change current norms (Andersson & Lidestav 2016). However, effort of the Swedish Forest Agency and industry to include gender perspectives have been framed within existing norms. To make a sustainability transition possible more gender-oriented, bottom-up perspectives will be needed.

Aayushi Malhotra, BITS-PILANI

"Fighting from the Margins: Locating Pastoral Communities on the Contours of Forest Rights Act (2006) In India"

Many nomadic, semi-nomadic and agro-pastoral communities represent pastoralism in India. These culturally rich communities inhabit the most strenuous ecological zones of the country and mostly remain marginalised in socio-ecological terms. One of the major reasons attributed to this marginalization is the lack of land rights and shrinking common resources including forests and grasslands. This deprivation is indirectly a consequence of peripatetic dispositions involved in pastoralism that restrict people from dwelling at one permanent place and hence, disable them from securing permanent land rights.

Although recognition of pastoral land rights has recurrently been a global concern, it remains at the periphery in the Indian context. A legislation titled 'Scheduled Tribes and Other Traditional Forest Dwellers, Recognition of Forest Rights Act (2006)' emerged as a hope in this direction almost a decade ago. This act professed to undo the historical injustice caused to the forest-dwelling and other dependent communities including pastoralists, by legally providing them with the land usage rights and acknowledging their dependencies on the forest resources. However, it has been observed that the pastoral communities across the country have mostly remained out of the purview of its provisions up till now. Thus, in this paper, we aim to discuss the Recognition of Forest Rights Act (RoFR) at length, in special relation to the Indian pastoral communities. Unpacking the skewed understanding and

implementation of the act at official levels, we question the disproportionate attention given to the forest-dwelling, agriculture-practising populations while the pastoral interests continue to remain overlooked.

Mette Olwig, Roskilde University

"Seeing the Forest Landscape for the Trees: Carbon Sequestration and Tree Planting"

Narratives are an integral part of human society and play a key role in simplifying complexity through familiar storylines, thereby facilitating action in the face of challenges. But the narratives that become prevailing are not necessarily the ones that lead to the most effective or equitable solutions. This paper analyzes how narratives may promote problematic forms of forestry in the name of climate change adaptation and mitigation.

Environmental narratives typically comprise stereotypical characters like victims, villains, and heroes. This is especially apparent in relation to the Global South – since colonization local peoples' presumed uncivilized practices (e.g. agroforestry and forest grazing) have been blamed for environmental destruction (e.g. forest degradation), casting them as unwitting villains. This provides a rationale for "heroic" aid interventions while effectively devaluing local understandings of environmental problems and possible solutions. The complexity of climate change is often oversimplified to concern merely an excess of CO2. This leads to interventions that focus on carbon sequestration and reduced carbon emissions through (CO2 absorbing) forestry. These initiatives, furthermore, such as the UN initiative, Reduced Emissions for Deforestation and Forest Degradation (REDD+), often concern forestry in the Global South and include external actors facilitating tree planting. Translating climate change mitigation and forest landscape restoration into a matter of trees and tree planting, primarily in the Global South, is often unquestioned by stakeholders partly because environmental crisis requires swift action.

This paper synthesizes findings from three collaborative mixed-method research projects in Tanzania and Ghana that investigated different types of external interventions focused on tree planting. Examining the rationales behind, and the consequences of, these interventions, the paper shows that a dominant simplified narrative of trees as CO2 absorbing, and therefore good for the environment, may lead to more trees but not necessarily improve the environment or the people's socioeconomic conditions, quite the opposite. Tree planting is only beneficial if the complex role of trees in the socioeconomic and ecological landscape is sufficiently considered.

Thu Thuy Pham, Center for International Forestry Research (CIFOR)

"How Payment for Forest Environmental Services and its benefit sharing mechanism can better enhance gender equity in Vietnam?"

This paper investigates the role of Payment for Forest Environmental Services (PFES) in addressing Covid-19 impacts, particularly on women, in Son La and Thua Thien Hue provinces, Vietnam. We conducted in-depth interviews with 33 key informants, surveyed 239 households and held 29 focus group discussions with 366 male and female participants in both PFES and non-PFES sites across the two provinces. The Covid-19 pandemic has had significant impacts on ethnic minority women in two study sites. These impacts include reduced incomes, increased family pressures and workloads, limited access to natural resources for agriculture production activities and impacts on mental health. During Covid-19, payments from the PFES programme serve as the main source of income for helping villagers meet their

daily needs The impacts of PFES and its ability to support local people and women in the context of Covid-19 depend on how benefit sharing mechanism was organised, amounts paid (which are often linked to the area of forest they manage), when they are paid (i.e., whether payments are made on time or when villagers need them), and how benefits and payments are shared between stakeholders. Our paper shows potential of PFES in enhancing gender equality.

Session 17: Social Justice in the Forest: Rights, Power, and Collaboration 1

Maria Brockhaus, University of Helsinki

"Infrastructures of inequality in the development of forest and forestland in Malaysia and Cameroon"

Tropical forests and forestlands are being claimed for a myriad of interconnected global, national and local interests. On the ground, plantations for timber, biomass resources, and the production of commodities such as rubber and oil palm are physical structures representing these interests. Here, government authorities, private sector actors, conservationists, communities, environmental defenders and other members of civil society execute their agency and negotiate divergent interests. Yet, there are persistent power imbalances among these actors, shaped by politics and institutions and often to the disadvantage of local people and environments, resulting in intersecting 'infra-structures of inequality' related to geographies, gender, class, ethnicity and age. We take a historical comparative approach to examine infrastructures of inequality in two cases from Kribi, Cameroon and Sabah, Malaysia. Both regions are extensively deforested for plantations, often under the guise of green development or green recovery plans, and rife with conflicts relating to customary rights over forest and land. Building on critical reviews of policies and media, and interviews with diverse actors, we ask: who – and whose society – benefit from forests and development of forestlands? What are the mechanisms and infrastructures that create inequality? Our initial findings show that trade and investment patterns and discursive practices are intertwined with the establishment and persistence of plantations since colonial times, and that flows of material, finance and information/ideas connect certain actors, institutions and limiting plantation ideals. In addition, there are trade-offs among the different and often conflicting objectives across levels of governance. With this research, we aim to contribute to an emerging body of literature by Tania Li, Anna Tsing, Donna Haraway and others on inequality infrastructures and the plantationocene approach to advance understanding of inequality and social justice in forests. We do so mainly through a critical analysis of discursive practices, incentive structures and power relations within the larger forest and land use arena. We argue that we need this understanding to tackle one of the most fundamental questions for social-environmental justice in the forest: what are enabling conditions that can help to break and transform long-standing institutional infra-structures towards more just and equitable futures?

Jesica Murcia Lopez, Centre for Environmental and Climate Science, Lund University ('Best Student Lightning Talk or Poster' award winner)

"Land conflicts, cattle, and the biodiversity of the tropical forests of the Colombian Amazon"

For the last 5 years, the Colombian Amazon has experienced a significant increase in forest loss created by cattle ranching, identified as a key driver of deforestation and degradation, specifically in the agriculture-forest frontier in the northwest of the region. The purpose of our research is to highlight the

urgent need to protect biological in parallel with securing livelihoods in the buffer zone of the National Natural Park Chiribiquete "The Maloca of the Jaguar", also a UNESCO site in the Colombian Amazon. Since 2016, when the Revolutionary Armed Forces of Colombia and the national government signed the peace accord after almost 60 years of conflict, this territory has been affected massively by huge clear cuts of the jungle composed of tropical forests that are rich in life, including animals, plants, water, and more than 75,000 cave drawings from 20,000 BCE that were made by indigenous communities. The overall aim is to understand and analyze the mechanisms behind land transformation caused by extensive cattle ranching in protected areas. Our study finds the use of qualitative system mapping and in particular, causal loop diagrams (CLDs) as an approach to understanding the dynamics of land use change, deforestation problems triggered by cattle ranching, and food security risks in the Colombian Amazon, to identify possible solutions to tackle sustainable land management in relevant land use policymaking.

Ashwin Ravikumar, Amherst College

"Payments for Ecosystem Services disrupting Indigenous institutions: the case of Peru's Ampiyacu-Apayacu watershed"

Payments for ecosystem services have become a dominant policy for addressing tropical deforestation. Political ecologists, degrowth scholars, and Indigenous activists have critiqued these approaches on the grounds that they can disrupt local conservation systems rather than empowering Indigenous and forest-dwelling communities. Meanwhile, Indigenous groups have developed positive alternatives to 'green growth,' including buen vivir (good living) in Latin America. In Peru, the National Forest Conservation Program (NFCP) serves as the state's flagship initiative to address tropical deforestation in Indigenous communities by paying communities for demonstrated reductions in deforestation, so long as they invest those funds according to an agreed up on management plan. We analyzed how the NFCP has interacted with quality-of-life plans, Indigenous planning tools rooted in buen vivir. Our findings suggest that the NFCP has eroded local systems for conservation, including the minga, an Amazonian tradition of mutual aid and shared labor for subsistence livelihoods, pushing communities to replace these systems with commodity production and employer-employee relationships. We argue that instead of imposing onerous conditions and steering communities towards evermore commodity production, conservation initiatives should support the implementation of quality-of-life plans. We suggest that climate justice organizers, political ecologists, and degrowth scholars explore and advocate for such initiatives.

Debbie Pierce, University of British Columbia

"The impact of land ownership, deforestation and conflict in the Colombian Amazon from 2000 to 2020 on the wellbeing of rural women"

This research will seek to understand the linkages between land ownership, deforestation and conflict on the livelihoods of women in the Colombian Amazon. Colombia contains 10% of the Amazon forest and 14% of the world's biodiversity, but it also experienced one of the 20th century's longest-standing civil conflicts. Land management and policy, and particularly the unequal distribution of land, has been a source of contention for decades and is considered a key factor in much of the violence in Colombia. There is increasing recognition of the importance of secure land tenure for reducing deforestation and addressing forest-dependent community well-being. Much is still unknown about how communities, and especially women, in this region manage their land and forest resources and how their land use

decisions have changed in the wake of the conflict. I plan to determine how land use and ownership has changed since the 2016 Colombian peace agreement, and the implications of these changes for the livelihoods of women living in the Colombian Amazon. I will use a mixed-methods approach, utilizing both econometric models and participatory interviews. My research aims to answer the following questions: (1) Has land and forest tenure in the departments of Guaviare and Caqueta changed from 2000-2020, and if so, what events have caused these changes? (2) How do self-identifying indigenous and non-indigenous women in Colombia rely on land and forest resources? Has this changed since the passage of the peace accord in 2016? Do any barriers exist for communities to use their land and forest resources to the extent that they would choose? (3) How can well-being be conceptualized and measured? Is the well-being of women impacted by changes in land tenure or deforestation? The findings of this research will help inform the ongoing implementation of the peace deal in the Amazon region, particularly in terms of land policy, environmental management, and equitable gender considerations.

Sumana Datta, Ambedkar University, Delhi

"Social inclusion and the grey areas: a case study of the REDD+ project in India"

In the past decade, many scholars assert that REDD+ strengthens social inclusion through forest dwellers' economic and political empowerment, while the critiques label REDD+ as the latest mechanism to alienate local people and agencies. In the current paper, I draw on qualitative research on India's first REDD+ project in Meghalaya (India) and highlight evidence suggesting a socially inclusive approach and several grey areas in the institution of REDD+.

The East Khasi Hills project has brought together an estimated 15,000 ha of forests spread over 27,000 ha of the geographical area managed formerly by ten traditional institutions. This coming together paved the way for adopting a landscape approach for the management of forests and climate change mitigation. The isolated local institutions are federated with equal representation from each hamlet/village to manage the project, further operating with a network of cluster and village level working committees. Moreover, forest patches formerly under multiple tenurial systems (community, clans and private) have been merged, and rights over carbon benefits have been handed over to the Federation. Aside from the inclusive landscape approach, the male-dominated traditional institution has become comparatively more inclusive with the formal inclusion of women representatives at the cluster and village level committees. However, these committees function as community-based organisations, while the Federation is registered as an NGO. Therefore, the latter is informally related to the former without formal accountability. Hence, the nature and functioning of the Federation are the grey areas in an inclusive institutional structure and decision-making.

The Khasi REDD+ project has also developed comprehensive linkages with technical experts, foundations and carbon brokers at national and international levels, another grey area in the narrative of inclusive REDD+. While establishing these linkages is critical to receiving financial support, verification, certification and sale of carbon credits, they create prospects for a monopoly of power, especially where there is a lack of dynamic grassroots leaders. Moreover, such a global network is bound to change the nature of community governance based on local knowledge and wisdom, leading to eco-colonialism. My paper addresses two themes – landscape restoration and social justice in the Forests.

Tessa Minter, Institute Cultural Anthropology and Development Sociology, Leiden University

“Towards Fair Forestry. Key insights from a Special Issue on the social impacts of logging in Latin America, Central Africa, Southeast Asia and the Pacific”

Global demand for tropical timber remains high and is projected to further increase. Despite the growing importance of both plantation and smallholder forestry, much of this timber is and will continue to be sourced from concessions in natural forests. These concessions tend to be inhabited or surrounded by forest-dependent peoples, many of whom belong to politically and economically marginalized communities. Knowing how logging operations affect these communities is key to achieving fair forestry: logging that is just, equitable, and socially sustainable.

To what extent do forest-dependent communities gain from logging operations? What are the adverse impacts? And how are the benefits and burdens of logging locally distributed? These questions are central to a Special Issue of International Forestry Review that will be published this fall and to which we are co-editors. In this introductory paper we present key-insights from the ten contributions to the Special Issue.

The collection of papers shows that overall, local communities benefit much less from logging operations than both companies and governments suggest, whether this concerns royalty payments, employment, or non-monetary benefits. This is because, firstly, logging companies poorly fulfill the social obligations which they hold towards communities. Secondly, elite capture causes the limited benefits that do accrue to be highly unevenly distributed locally. At the same time, the adverse impacts on subsistence livelihoods are multiple, and grievance and compensation mechanisms to offset these are unsatisfactory. Equally important are the fractioning impacts that many logging operations have on local communities. These arise from discord over logging agreements, growing (gendered) inequities, alcohol and drug abuse, and sexual exploitation.

Weak governance, lack of transparency and accountability, gender-inequality and poor design and implementation of participation procedures partially explain for the unfavorable social impacts of logging. However, only if the underlying power-imbalances that characterize the relationships between logging companies, governments, political (predominantly male) elites and local interest groups are tackled, can we achieve fair forestry. In this ‘new era of international commitments’, we conclude that importers and end-consumers of tropical timber must play a much firmer role in acknowledging and addressing the social injustices that are associated with logging operations.

Suman Attiwilli, Ashoka Trust for Research in Ecology and Environment (ATREE)

“Who benefits from wild meats and fish? A socially disaggregated analysis of wild animal consumption across diverse rural environments in the Global South”

Meat from wild animals and fish is recognized as an important source of nutrition and income for millions of poor rural communities in many parts of the tropics. Most work so far has focused on the environmental impacts or livelihood benefits of harvesting, but not how the resultant food is distributed to different kinds of consumers. The direct contribution of wild meat for nutrition of poor people depends crucially on its distribution and eventual consumption. We analysed how site-level economic, ecological and geographic factors as well as household wealth and livelihood affect the probability of recent consumption of wild meat and fish in ~ 2000 households across 40 rural settlements in Colombia, Peru, Malawi, Mozambique and Kenya. We also examined how this is correlated to consumption of meat from domestic animals. We found variation between and within sites in consumption of wild meat and fish, with higher probability of consumption in remote areas with greater forest cover. Household income did not affect consumption of terrestrial wild animals, but was positively associated with

consumption of fish and domestic animals. Harvesters (fishers/hunters) were more likely to consume wild animals and fish. Domestic meat consumption was positively associated with consumption of both wild animals and fish. Overall, our results showing social differentiation in consumption of wild animals and fish at regional and local levels can help to inform policies for food security of communities and conservation of wildlife. For example, since we found wild animals' meat to be positively associated with domestic meat while showing no association with income, its consumption appears inelastic with income. Market-based policies to reduce wild meat consumption are thus unlikely to work; hence regulation is necessary for conservation. However, for regulation to be just, it needs to recognise the increased importance of wild meat in more remote (and likely poorer) areas and particularly within harvesting households. The results may be interpreted within the broader context wherein the role of biodiversity and wild ecosystems in complementing and supporting agricultural production, providing sustainable food security, and thus contributing to eradication of hunger (SDG 2) is being increasingly recognised.

Dillip Pattanaik & Dr Nigamananda Swain, Orissa State Volunteers and Social Workers Association

"Forest based livelihoods among the tribal women groups: Hope, opportunities and challenges - Case from Sindurtaila Village in Odisha"

Forest makes a crucial contribution to its inhabitants by providing livelihoods, income opportunity, green air, clean water, safe food, biodiversity conservation, and nature and natural resource management. As per the FAO reports, 2015, forests provide subsistence and income opportunity for more than 1.6 billion people, including about 60 million tribal (indigenous communities). The local communities who are living near the forest area and are living inside forest are depending upon the minor forest produce for their sustainable livelihood. The role of tribal women in her family is very crucial and they are the bread owner of their family. Women collects minor forest produces. The forest products are used for self-use and as well as for commercial use. While selling the forest produce to middlemens, they get significantly less amount. Looking at the issue, OSVSWA started an intervention during 2010 in a cluster of tribal villages of Odisha by building their capacity, providing adequate support for value addition, training and market linkage and creating local made infrastructures to ease the marketing of produces. This successful implementation of OSVSWA has led a remarkable achievement where the tribal women are self depandentant, maintain a dignified life. My paper will provide more information about the intervention and the achievments.

Sunday Sessions

Session 18: Forests and Livelihoods in a COVID-changed World

Fritz Kleinschroth, ETH Zurich

"Global evidence for the importance of urban forests since the COVID-19 pandemic"

COVID-19 lockdowns and subsequent travel and work restrictions have caused widespread discussions on the benefits and limits in availability of trees and green spaces in and near residential areas (urban forests). It has been reported from many cities around the world that the use of urban forests was

critically affected by the COVID-19 pandemic (COVID), including decreased uses due to access restrictions during lockdown periods and increased uses afterwards. We present the results of an ongoing evidence synthesis on the changes in use of urban forests and their perceived importance to residents since the start of COVID to determine the consequences of these changes for future sustainable cities. We screened and analyzed peer-reviewed and gray literature published in English, German, French, Spanish, Portuguese and Chinese and followed Google search trends for terms related to activities in urban forests. We expect a strong increase in perceived importance of urban forests since the start of COVID, which is indicated by Google search trends that show increased interest for recreational activities in urban greenspaces as well as the use of home gardens since the first lockdowns. Evidence on tracked increases in usage of urban forests before and after COVID is, however, only available for short time periods and biased towards communities in Europe and North America to whom urban forests are easily accessible. The shift towards temporarily and potentially continuously higher demand for urban forests has important implications for the future development of urban green infrastructure as a pathway towards healthy, sustainable and resilient cities. The direct demand by people who visit green areas and grow food in home gardens, as well as the indirect demand for green views from windows during strict lockdowns are high. COVID has led to a process of reconsidering thresholds for the provision of green space per capita to better factor in risks such as a pandemic and the equity in access to urban forests in general. Our results provide a strong justification for higher efforts in urban greening and in improving the accessibility of formal and informal urban forests.

Luke Parry, Lancaster University

"Forest citizenship for disaster resilience: learning from COVID-19"

Citizenship from below, a process through which marginalized peoples self-organize to claim recognition and rights, is crucial to disaster recovery, resilience, societal renewal, and is reportedly being drawn upon in responses to COVID-19. Brazilian Amazonia provides an arena to examine how marginalized people - disproportionately affected by COVID-19 - are using citizenship to mitigate the pandemic's negative societal effects, supporting a bounce forward to greater resilience in the post-pandemic world. We present a multi-disciplinary Brazil-UK-US project seeking to understand and enhance forest peoples' collective action and transformational change in strengthening disaster resilience. First, we propose a two-step conceptualization of forest citizenship (FC) – drawing on Somers (2008) and Arendt (1948/1979) - involving: (i) demands that individuals and groups are recognised by different state and/or multilateral institutions and socially included, in order that they can claim rights, (ii) the claiming of bundles of rights associated with environmental citizenship in Brazil, since the 1988 constitution. Accordingly, we define FC as political processes through which Amazonian forest peoples have demanded recognition and claimed rights. This normative conceptualization of FC is intended to be legible to institutions, nation-states and international law. Second, we explore how the relative intensity of FC in particular locations can be qualified and quantified. We examine which practices might reflect FC and what are suitable proxies for quantifying them in Brazilian Amazonia. This guides our variable choice for Principal Components Analysis to refine a municipality-scale FC intensity score. Candidate metrics include forest-related territories (e.g. sustainable use reserves); forest-proximate populations; forest dependency (e.g. economic importance of non-timber forest products); cultural change (e.g. musical preferences); rural dispossession (e.g. farmland distributional change). We present measures of construct-validity and distinct sub-dimensions. Our results demonstrate spatial patterning in the distribution of FC intensity across Amazonia, and enable us to quantify the linkages between FC and resilience at municipality scales. Our work will allow us to: examine the relationship between FC and

COVID-19 vulnerability; assess whether FC has increased societal mitigation of COVID-19; and make inferences about the importance of FC in building resilience to future shocks.

Hannah Legatzke, University of Minnesota

"When the tourists stop coming: Livelihood contributions from tourism and resilience during the pandemic in Guatemala's Maya Biosphere Reserve"

Policymakers have promoted tourism as an alternative livelihood strategy in forest communities for decades, with mixed success at delivering localized socioeconomic benefits. The COVID-19 pandemic has both highlighted inequities in the tourism sector and offered opportunities to reset the industry for sustainability, making studies of the local livelihood impacts of tourism imperative.

The Guatemalan Maya Biosphere Reserve (MBR) forms an important case study for understanding how to increase livelihood resilience in forest communities in the context of the pandemic. The checkerboard of tourism management strategies in the area, ranging from conventional mass-tourism practices of tourists visiting government-managed national parks to local community-managed enterprises leading tourists on forest treks, make it an optimal location to compare the livelihood impacts of pandemic-related park closures and declines in tourism among gateway towns to national parks.

During eight months of mixed-methods research in the MBR in 2021-2022, we conducted 134 livelihood surveys with heads of household in three gateways towns to the most-visited national parks within the Reserve, each town with a different level of community-management over tourism. Our study finds that the town with the greatest level of community authority had the greatest levels of local participation in tourism, but lower employment in government positions within the nearest national park. Across the three communities, the pandemic did not produce clear shifts in the substitution of certain livelihood activities for others, but households relied on diversified livelihood portfolios and most commonly reported seeking personal gifts or loans to cover emergency needs for cash.

These findings underscore the importance of livelihood diversification strategies for forest communities' resilience to shocks like the closure of national parks during the pandemic and suggest that explicit mechanisms for community-participation in tourism are important for livelihood benefits from tourism to accrue locally. Existing land tenure regimes and social networks contextualize individual communities' responses to COVID-19 related livelihood shocks, even within geographic areas with similar forest conditions.

Tourism remains an important livelihood activity for forest communities even in a COVID- altered world, and the decentralization of tourism-management authority has important implications for if and how tourism affects local community livelihoods.

Sajad Ghanbari, University of Tabriz

"The role of forests and pastures in combating the economic vulnerability of rural forest communities during the corona outbreak"

The prevalence of Corona disease as one of the most critical infectious diseases has increased the risks of food security in different parts of the world. Local communities, especially in rural areas, are highly dependent on natural resource-based ecosystem service strategies to manage global food security and meet livelihood needs. Forests and pastures can also provide goods and services that are sold or

consumed directly as part of natural resources. Identifying livelihood patterns can suggest several potential strategies for maintaining a livelihood in the face of sudden shocks such as corona. The main purpose of this study is to focus on identifying the dependency of rural communities to forests and rangelands during the corona outbreak and how to deal with and adapt to the economic damage of this disease through ecosystem-based services. The research method of this research is descriptive survey and data will be collected through field studies using a questionnaire. To complete the questionnaire, first the villages will be selected by pre-study and randomly. The results showed that livestock (67%) and agriculture (67%) were the main activities of local respondents. The average annual household income of the studied households was 1023 million Rials during the COVID-19 crisis. The average income diversity index for all sample households was 1.09. Income of local communities from forests and pastures were mostly from medicinal plants, fruits, fodder and mushrooms. The share of forests and pastures in the total household income of all interviewees was 1.43% and 2.84%, respectively. According to the results, 77.6% of respondents stated that they use natural resources including forests (63%) and pastures (67%). Forage collection (44.6%), medicinal plants (42.2%) and forest fruits (29.3%) were the three most important forest products that were mentioned among local respondents in Arasbaran forests. Given the global nature of the Corona crisis, identifying ecosystem-based strategies, especially forests and pastures, can inform rural communities in other parts of the country and the world. This study helps managers and planners assess the vulnerability of local communities and identify ways out of the crisis.

Session 19: (Forest) Landscape Restoration: People, Trees, Politics 4

Sri Lestari, National Research and Innovation Agency of Indonesia

“Smallholder perceptions on peatland restoration activities: Case of South Sumatra, Indonesia”

Peatlands in South Sumatra have been degraded and threatened due to illegal logging, drainage, agricultural activities, recurrent fires and land conversion. The total area of peatland in South Sumatra is about 1,287 thousand hectares. Meanwhile approximately 70.3% of them are categorized as degraded peatland. The Government of Indonesia through Peatland Restoration Agency (PRA) has implemented 3R strategy to restore peatland conditions, including Rewetting, Revegetation, and Revitalization. This study aims to examine smallholder perceptions on peatland restoration activities and identifies factors affecting community willingness to accept and participate in the program. Field survey and deep interview to the key stakeholders in the community was conducted to collect data and information. Moreover, descriptive qualitative method was applied to analyze the data. Our results showed that most of the community lacks understanding about the restoration program implemented in their area. Few people are aware about the program, and only limited of them are involved in the restoration activities organized by PRA. Communities will be more involved in PRA activities if they obtain more detailed information about these activities or are invited to be involved in the program. They also stated that they would be actively involved in these activities if it provided benefits for them. The villagers support the construction of canal blocks near their land, as long as it does not affect the production of their staple crop and can play a role in reducing the danger of fires in their land. Communities who hesitant to accept block canal construction in their area are due to a fear that blocking canals will submerge their land, thereby reducing production. These results also indicate that the government must understand the conditions and desires of the community before implementing the program. Socialization of activities and programs to all community members is very important. Thus, the

eagerness of the community to support and be involved in peat restoration activities will be higher and the government can achieve the program goals as expected.

Tyler Carney, University of Florida, School of Forest, Fisheries, and Geomatics Sciences

"Fanning the Flames of Cooperation: A Collective Action Approach to Prescribed Fire Agreements"

Prescribed fire is a management tool that is of particular importance in longleaf pine (LLP; Pinus palustris) savanna. These ecosystems have lost a significant portion of their historic range in the Southeast United States, a major forestry hub, due to a myriad of factors such as fire suppression and land conversion. In addition to maintaining ecosystem health and function, prescribed fire is also used to mitigate wildfire risks by reducing fuel loads. Despite these benefits, there are numerous challenges to implementing prescribed fire. Such challenges include access to equipment, access to labor, knowledge barriers, certification requirements, concerns of liability, and perceptions of fire among the general public. Memorandums of Understanding (MOUs) and other collaborative agreements are one tool that public agencies, nongovernmental organizations, and private entities utilize to help facilitate and optimize the use of prescribed fire. Our study employs thematic analysis of agreements (N=21) through the framework of collective action theory. We identified six emergent themes: 1) agreements as a way to optimize prescribed fire use and wildfire prevention, 2) different regulations and requirements depending on which agencies are involved, 3) agreements exist as an acknowledgement of the need for and benefits of collective action, 4) MOUs have little impact on liability, 5) trust and reciprocity through MOUs, and 6) MOUs delegate authority and roles under specific contexts. These agreements permit the free flow of labor, equipment, and knowledge in order to bypass bureaucracy between different agencies in order to engage in landscape restoration. These different agencies may have shared goals but may have difficult achieving these goals alone. Collective action theory was chosen because the agreements address the management of public goods and common pool resources. Our analysis suggests that the use of collaborative agreements has an influence on the implementation of prescribed fire as a management tool. Prescribed fire is paramount to the successful management of LLP ecosystems and the provisioning of ecosystem services. Without the use of prescribed fire, the risk of wildfire increases posing increased risk to both human and ecosystem health, having social, economic, and ecological ramifications.

Rayna Benzeev, University of California Berkeley

"Spatial distribution and drivers of forest restoration reversals and successes in the Atlantic Forest of Brazil"

Forest restoration is one of the most effective strategies to capture carbon and counteract the emissions causing global climate change. Despite their great promise and opportunity, many forest restoration projects to date have failed to achieve their stated objectives, particularly for the long term. This project aims to determine the drivers of short-term versus long-term restoration, with a focus on the Atlantic Forest of Brazil—one of the leading regions for tropical forest restoration initiatives. Focusing on restoration reversals—restored forests that were later deforested (within 5-10 years)—and restoration successes—restored forests that remained forested for the long term (a minimum of 10 years), this research will examine the long-term outcomes of forest restoration efforts at the local scale. By conducting biome- and property-scale geospatial analyses of restoration from 1985 to 2020, this research will determine the spatial hotspots of forest restoration reversals and successes. These hotspots will be used to identify six landscape-scale case study sites. In each site, semi-structured key

informant interviews, surveys, and focus groups will be conducted to determine the drivers of restoration outcomes. The interpretation of the patterns of geospatial analysis will be enriched by a better understanding of the underlying processes (i.e., political ecological, socio-environmental, and economic drivers) of forest restoration. By providing feedback on the monitoring of forest restoration goals, this research will provide recommendations to improve the longevity of forest restoration efforts, with implications for forest-based climate solutions across the globe.

Johan Oldekop, Global Development Institute, The University of Manchester

"Sustainable Forest Transitions: Forest Gains and Poverty Alleviation in Low- and Middle-Income Countries"

Halting and reversing forest loss is crucial for climate change mitigation and biodiversity conservation and is receiving increasing academic, policy, and media interest. Scholars have devoted much attention to deforestation, yet our knowledge of processes driving the reverse phenomenon – forest gains—and its effect on poverty and wellbeing remain limited. Here, we review the relationships between forest gains and poverty alleviation. We highlight conceptual, methodological and data limitations that have hampered understanding of how drivers of transitions from deforestation to forest gain (forest transitions) contribute to joint forest gains and improvements in rural poverty and wellbeing. First, drivers of forest transitions are often studied in isolation. We thus know little about the relative importance of concurrent drivers, how drivers interact, how effects of similar drivers differ within and between countries, or how effects accumulate at local, national, and international scales. Second, links between forest transitions and rural poverty remain largely untested. Changes in rural livelihoods, poverty and wellbeing are often considered drivers of forest transitions but not outcomes of forest transition processes. This gap also highlights the importance of considering feedback between the outcomes and drivers of forest gains. Third, our ability to address these two gaps has been hampered by low-powered statistical analyses of forest transitions. Most quantitative analyses of forest transitions have relied on some form of statistical regression or basic correlations. These analyses tend to be constrained by small sample sizes and a lack of data availability—particularly socioeconomic data—that has prevented them from accurately describing socioeconomic contexts or controlling for factors that might themselves act as forest transitions drivers. As part of our review, we develop a new analytical framework to better understand linkages between drivers of forest transitions and their impacts on forests, and rural livelihoods. We argue that to develop a new theory of "Sustainable Forest Transitions", scholars need to better integrate existing socioeconomic and environmental datasets to generate a more nuanced understanding of how drivers of forest transitions influence rural livelihoods, poverty, and wellbeing.

Session 20: Gender and Forests in a World in Flux

Francois Questiaux, University of Copenhagen

"One woman at a time? Social differentiation among women shea nut collectors in West Africa"

Collected by rural women in West Africa, the international demand for shea kernels has increased by more than 500% over the last 20 years. While these nuts, usually processed into shea butter, have been present in the local economy and diet of West Africa for ages, the current market boom led to the

emergence of multiple international actors trading nuts worldwide. This bears implications for the millions collectors, who usually gather nuts from open-access trees, found everywhere in fields, fallows and the bush. As the competition for access to shea trees increases, social differentiation among shea collectors appear, unveiling the many socioeconomic factors determining the ability of a woman to derive an income from nuts from her financial capital or her labour. The data was collected from in-person and remote photovoice interviews with shea collectors in Burkina Faso and Ghana. I explore the link between social differentiation among the collectors and their subjectivities and individual experiences. I analyse how the market boom triggers or contributes to patterns of exploitation between women collecting nuts and discuss the implications on communities of the large nut trading firms and their market expansion. This paper aims to show with qualitative data the wide socioeconomic diversity within a large group of individuals often perceived as uniformly poor and marginalized. Drawing from feminist political ecology and human geography, it stresses the need to understand local social dynamics and interactions between people of a same group. Furthermore, by highlighting that the market boom has benefitted only a handful of women, relying on the cheap labour-power of a much larger population of other shea collectors, it challenges the individualist approach of neo-liberal feminism. With this contribution, I wish to bring nuances and highlights the various intersections together with gender to take into account when studying local dynamics and access to resources. As competition for shea trees increases, this paper highlights the role of agroforestry parklands in the livelihood of marginalized population, the power dynamics determining access to trees within these marginalized groups, and the gendered and intersectional consequences of a market boom on local communities.

Jennifer Zavaleta Cheek, South Dakota State University

"Wild foods contribute to higher dietary diversity in India"

Wild foods, from forests and common lands, contribute to food and nutrition security. Previous studies have established correlations between forests and dietary diversity, but here we use matching, a rigorous, quasi-experimental method, to show how wild food consumption leads to increased dietary diversity. We collected 24-hour recall data from 570 households each month from November 2016 to November 2017 in India. We found that wild foods contributed positively to diets, especially in June and July when consumption of wild foods was highest. Women that ate wild foods had higher average dietary diversity scores (12 and 15% higher in June and July, respectively) as well as higher rates of consumption of dark green leafy vegetables than women who did not eat wild foods. Since wild foods can significantly improve diets, access to wild foods is critical.

Jenny Friman, University of Gothenburg

"Gendered complexity in community forest management implementation in Burkina Faso"

Enticed by the contrasting environmental conditions of two forested areas in Tonogo village, Burkina Faso, this presentation will focus on the implementation processes of community forest management (CFM). More specifically, it will address the gendered dynamics, resource struggles and power relations of CFM implementation processes, and how interrelates to forest change. During the last decades, CFM has been a widely adopted approach to forestry globally. With shifting forms, the intention is that local communities can and should be the ones managing the forests in their proximity. Yet, as research has shown, the promises of CFM have not always been fulfilled on the ground. Deforestation and unjust distribution of benefits are some of the counter-productive outcomes CFM has shown to lead to. This study adds to this body of literature through exploring the gendered dynamics and institutional

processes of implementation and how this matter for how outcomes are formed. The study is based on extensive qualitative fieldwork in 2014-2015 and mainly draws on data collected from semi-structured interviews and structured observations. The study draws from feminist political ecology and critical institutionalism to show how the CFM implementation processes in Tonogo re-surfaced old land conflicts and re-enforced patriarchal power relations. The study specifically show how the CFM become arranged and re-enforced through worldviews and customary authorities, which in turn play out through the ability to access the forest resources that are vital for household's ability to provide for themselves. Moreover, how a failed implementation process continues to shape and re-arrange management and forest use relations long after the project withdrawal. The study shows how historical conflicts, gendered forest practices, and local power relations shape the CFM implementation processes and outcomes. For development and forestry management projects, such findings point to the importance of considering the historical trajectories of conflict and power relations before initiating implementation. Furthermore, the study points to that forest conservation and community management cannot be an end-point in itself if it does not take into account how resource needs in the community will be met.

Session 21: Data & Methods for Understanding and Promoting Forests & Human Wellbeing 4

Carlos Muñoz Brenes & Samantha Cheng, Conservation International

"Evidence on the links between natural climate solutions and climate change mitigation outcomes in subtropical and tropical terrestrial regions? Results from a systematic map protocol"

Natural climate solutions (NCS)—actions in agricultural, forestry, and other land use (AFOLU) sectors to conserve, restore, and modify natural and modified ecosystems to increase carbon storage or avoid greenhouse gas (GHG) emissions. NCS can potentially capture or avoid emissions of at least 11 Gt (gigatons) of carbon dioxide equivalent a year, or one third of the emissions reductions needed to meet the Paris Climate Agreement goals by 2030. NCS also provide co-impacts such as improved productivity and livelihoods from sustainable natural resource management, protection of locally and culturally important natural areas, and climate adaptation benefits. NCS are increasingly regarded as important for climate change mitigation, while contributing to global conservation efforts, wellbeing, and sustainable development goals. Attention on implementing interventions of NCS pathways to address climate change has grown—however, clear understanding of which types of NCS pathways have undergone substantial study versus those that require additional evidence is still lacking. We conduct a systematic map to collate and describe the current state, distribution, and methods used for evidence on NCS linked to climate change mitigation outcomes and co-impacts in tropical and sub-tropical terrestrial ecosystems (forests, grasslands, mangroves, agricultural areas). Our systematic map guidelines, following an a priori protocol with detailed methods, including a comprehensive search strategy, screening of articles and coding of key data from 30,000+ articles. Here we summarize trends in the evidence base, assess gaps in knowledge, and provide insights for policy, practice, and research. Most of the evidence base is focused on forest and agricultural ecosystems using non-experimental and quasi-experimental designs. The evidence base is concentrated in the protect and manage pathways, with only 11% of articles examined more than one climate change mitigation outcome. The evidence base is focused on the links between protection, natural resource management, and trees in agricultural lands. Very few articles report costs associated with NCS. We recommend more focus on NCS co-impacts, the use of robust methods to assess behavior change across all NCS pathways, and social outcomes,

particularly non-economic outcomes. Our results inform program and policy design and highlight critical knowledge gaps for future evaluation, research, and syntheses.

Dikshya Devkota (presenting for Christoph Wildburger), International Union of Forest Research Organizations

"The Global Forest Expert Panels (GFEP) Programme: Science-policy mechanism for informed decision making"

The Global Forest Expert Panels (GFEP) Programme is a mechanism for effectively communicating and promoting scientific information and expertise to governments and intergovernmental policy processes related to forests and trees. The core of the Programme is objective and independent scientific assessments of key issues of high concern, supporting more informed decision-making at the international, regional, and global levels.

Since its inception in 2006, GFEP has completed numerous assessment reports and policy briefs highlighting the interlinkages of forests with various topics, including climate change, food security, timber trade, water, and poverty. These assessments are conducted by interdisciplinary and diverse Expert Panels of internationally renowned scientists and undergo rigorous peer review.

All previous GFEP reports have received considerable media attention and have significant impacts on international policies. The outcomes of GFEP assessments serve as background information for discussions, briefing documents for negotiators, and guidance for strategic policy development. They also serve as information sources for scientists and teaching materials. The outcomes of the GFEP reports have consistently informed policy discourse around the forests and related issues, notably at the various sessions of the United Nations Forum on Forests (UNFF) and the UN High-Level Political Forum on Sustainable Development (UN HLPF).

In this presentation, the GFEP Programme will be presented as an approach to understanding and promoting forest science, with an example of our ongoing assessment of Forests and Human Health. The presentation will first provide an overview of the GFEP Programme, the reports completed so far, and highlight a few impacts that we have had in the science-policy interface. Finally, the emerging findings of the ongoing assessment on Forests and Human Health will be presented as an example of the initiative.

Dagm Abate, University of Gondar

"An Ecological-Economic Approach to Assess Impacts of the Expansion of Eucalyptus Plantations in Agroforest Landscapes of Northern Ethiopia"

The conversion of fertile croplands to Eucalyptus woodlots in Ethiopian highlands, due to its business attractiveness to smallholders, raises concerns related to food production, water resources, carbon and other ecosystem services. This study was therefore designed to examine land allocation and plantation management decisions. Our emphasis was on the analysis of tradeoffs between the economic gains obtained from harvesting Eucalyptus timber and food production, carbon and water use. For that purpose, we considered a 1987 ha agroforest landscape in the Amhara region, Northern Ethiopia. With a planning horizon covering nine one-year periods, we developed and used nine Model I single objective linear programming (LP) models, and analyzed tradeoffs between objectives (e.g., land expectation value (LEV), Carbon, volume of ending inventory (VolEI), crop production and water use) using an LP-based Pareto frontier approach. The study revealed that the objective of maximizing the total economic

gain from the sale of Eucalyptus wood poles favored a complete conversion of the available cropland into Eucalyptus woodlots. To meet the minimum annual crop production/consumption/requirements of households in the study area, the land under Eucalyptus should be limited to 1772 ha, with a sequestration potential of 1.5 to 1.57 × 107 kg yr−1 of carbon in the aboveground biomass. However, this land cover limit should be decreased to 921 ha so as to limit the total annual water use (for biomass production) below the amount available from rainfall (11,000 m3 ha−1 yr−1). Moreover, the study highlighted that maximizing the harvested wood volume or LEV would come at the cost of a decreased aboveground carbon stock and volume of ending inventory and higher total water use. It also provided alternative optimal Pareto-front points, among which decision makers will be able to select their preferred targets. The current study also showed the potential for the application of Pareto frontier approaches to support the development of effective ecological/economic management strategies and the design of land use policies in an Ethiopian context.

Anastasia Yang, University of Edinburgh

"Addressing problems of temporal and spatial scale in landscape research: implications for research and practice"

With the rise in research and practice of adopting a landscape approach, understanding the social and ecological dimensions and considering scale is a necessary challenge. Scalar issues have been addressed to varying extents in the existing literature focusing on theory and concepts related to the respective disciplines, social or ecological sciences, or to the systems themselves. Less attention has been applied on how to address these issues in empirical research at the interface between social and ecological dimensions, especially relevant for landscape related approaches. This is the aim of the article. As a synthesis paper, it aims to review how scale mismatches occur in the course of ecological and social research, their consequences, and how they can be pre-empted and resolved. These objectives will be achieved by drawing on the existing literature and on evidence from case studies that adopted a landscape based research approach. The findings of this paper highlight that failing to account for inter-scalar connections in landscape based research will have implications for the reliability and interpretability of any results which may consequently impede efficient landscape approaches in practice. Using socio-ecological systems and panarchy frameworks can assist in guiding research design to incorporate scale and provide the analytical means to address complex systems. Further highlighting the importance of interdisciplinary methodologies, it is found essential to include both quantitative and qualitative data collection and a staggered approach to address scale mismatches.

Session 22: Forest Governance and Livelihoods

Samuel Levy, New York University

"The livelihood and environmental impacts of incomplete supply chain policy implementation in the Brazilian cattle sector"

Spillovers of deforestation activities to untargeted actors and regions have the potential to greatly reduce the effectiveness of zero-deforestation supply chain commitments (ZDCs). Likewise, such spillovers create the potential of augmenting livelihood outcomes for marginalized groups. While understanding of the direct impacts of supply chain policies has increased, the degree to which

deforestation “leakage” occurs remains unclear due to methodological challenges and limited data availability. Focusing on the beef cattle sector, the largest driver of tropical deforestation globally, we use newly assembled temporally and spatially explicit property-level data on cattle sales and deforestation for the Brazilian state of Pará to better understand the processes leading to low ZDC effectiveness and local leakage, as well as the potential livelihood affects this might have. We find that incomplete adoption of ZDCs among cattle buyers allows producers to avoid ZDC policies and continue deforesting, accounting for 74% (450,273 ha) of the deforestation detected in our study. Yet laundering, whereby indirect suppliers to ZDC companies to whom ZDCs are not yet implemented continue to deforest and sell through “clean” direct suppliers is also linked to 96,311 ha of deforestation. This laundering appears to drive policy leakage, as direct suppliers of ZDC companies are significantly more likely to switch to an indirect ZDC supplier role after deforesting than direct ZDC suppliers who do not deforest. We find that these indirect suppliers linked to leakage processes are more likely to be small, more marginal producers, far from urban centers. These results suggest that enforcing ZDC requirements among indirect suppliers is critical to meet the direct goals of supply chain policies, yet will likely have negative livelihood impacts. Therefore, measures that seek to close leakage pathways and increase ZDC effectiveness should also include inclusive measures for the more marginal producers that would be disproportionately affected by these policies.

Martin Persson (presenting for Florence Pendrill), Chalmers University of Technology

“Disentangling the Numbers Behind Agriculture-Driven Tropical Deforestation”

With renewed international commitments to halt tropical deforestation, a clear understanding of the different ways in which agriculture drives deforestation is essential for designing effective policy responses. To address this need, we provide a critical review of the literature on pan-tropical agriculture-driven deforestation and synthesize the best available evidence to quantify dominant agricultural land-use changes relating to deforestation. We also consider the policy implications of this assessment, especially for burgeoning demand-side and supply-chain interventions seeking to address deforestation.

There are currently only a handful of pan-tropical estimates of agriculture-driven deforestation. While these studies agree that agriculture is the dominant land use following forest clearing, their estimates of pan-tropical rates of agriculture-driven deforestation vary greatly, from 4.3–9.6 Mha/y. We argue that this apparent uncertainty can be disentangled by distinguishing between three different ways in which agriculture contributes to deforestation: while (i) the overwhelming majority (90–99%) of all tropical deforestation occurs in landscapes where agriculture is the dominant driver of forest loss, (ii) only ~45–65% of deforested land became productive pastures or cropland. Multiple lines of evidence show that (iii) the remainder of deforestation driven by agriculture does not result in the expansion of productive agricultural land but result from speculative clearing, short-lived and abandoned agriculture, agriculture-related infrastructure, and agriculture-related fires spreading to adjacent forests.

These results highlight that while public and private demand-side policies promoting deforestation-free international supply-chains have a critical role to play, their ability to reduce deforestation is fundamentally limited. First, because one-third to half of the deforestation linked with agriculture does not result in actively-managed agricultural land. Second, since the majority—approximately three-quarters—of the expansion of agriculture into forests is driven by domestic demand in producer countries. Decoupling agriculture from deforestation is therefore more likely to be achieved through a transformative approach whereby international measures foster concerted policy action in deforestation-risk areas on rural development and territorial governance.

This review also points to three key areas where a stronger evidence base would advance global efforts to curb agriculture-driven deforestation, including deforestation trends, commodity-specific land-use dynamics, and data from dry forests and across Africa.

Peter Schlyter, Blekinge Institute of Technology

"Will ongoing societal sustainability transitions pose a threat to the sustainability of local forest livelihoods?"

Climate change impact on forestry has to a large extent focused on change in tree species and biodiversity. However, climate change impacts on forest livelihoods is likely to be major and more profound than only species change effects. Environmental objectives as well as current laws, regulations and practices affecting the forestry, biodiversity conservation, technologies, standards and spatial planning governance all reflect historical experiences (incl. past climate). Therfore they will, to varying degrees and depending on time horizon, be poorly suited in new climate contexts. The forest sector's adaptation to new climates will be challenging as actors have to adapt, not only to a ongoingly changing climate, but also to other types of concurrent, non-forestry sector, changes in markets, political objectives and societal demands, many of which will be driven directly or indirectly by climate change.

The societal need to mitigate and adapt to climate change in conjunction with the ongoing wider sustainability transition will lead to increased uncertainty with regard to decision contexts, cascading and unexpected impacts on forest livelihoods as an effect of poor coordination as well as conflicts between the action taken within stove-piped bureaucracies and sectors.

We show that an improved understanding through a holistic thinking, including systems linkages and feedbacks between different objectives and policies will be needed in order to reduce stakeholder uncertainty and optimise societal sustainability transition outcomes, while providing social, environmental and economic sustainability at the local level for forest owners' livelihoods.

Lukas Giessen, TU Dresden

"Institutions, interests and power: Towards an explanatory forest governance framework"

Forest governance has emerged as an important concept in multiple fields, including international forest and development cooperation, national and international forest politics and policy deliberations as well as applied and scientific research on forests around the globe. The use of the term in academic works stretches from the mere mention of the term to coarse attempts of defining it, to fully developed frameworks. Often, however, the concept remains underdeveloped, vague or at the level of a favourable buzz word. It is often also unclear if the concept is used in prescriptive, normative ways, e.g. as good governance, or in analytical, explanatory traditions. Due to such remaining ambiguities, the concept's potential for systematically guiding analytical explanatory research, however, has not been fully realized, yet.

In comprehensively conceptualising forest governance as societal steering, this contribution aims to develop an analytical forest governance framework for inspiring future analytical research. It does so by drawing on the role actors and institutions play in causing forest outcomes. In particular, this framework combines the independent variables (i) Formal institutions including public policy as well as informal institutions understood as sets of norms and rules; (ii) Relevant actors' formal and informal interests as

well as their power capabilities to pursue those interests for explaining (iii) forest outcomes as the intended and unintended effects of either of those variables on forests.

The contribution closes with (i) elaborating how such a quite broad framework can bring added analytical value across multiple social science perspectives and disciplines especially for implementation questions, (ii) how it can build an interdisciplinary bridge between technical and social sciences, and (iii) illustrating – based on the author's research programme - how also focused empirical research perspectives can contribute to our understanding of the broad ways in which forests are governed.

Session 23: Capturing the impacts of conservation and development interventions on relational values and human wellbeing in the forested tropics

Rachel Carmenta, University of East Anglia, School of International Development and Tyndall Centre for Climate Change Research

"Using place-based well-being perspectives to measure the impact of conservation interventions along a land sharing, sparing gradient"

Environment-facing interventions impact the distribution, use of and access of natural resources and have important implications for all dimensions (material, relational, quality of life) of human wellbeing. Yet impact metrics routinely surpass the non-material impacts which may be particularly salient in rural contexts where small-scale farmers depend directly on the forest landscape and biodiversity. Further, little is known about the comparative performance of distinct interventions on place-based understandings of human wellbeing. We address this knowledge gap, adopting a perceptions-based impact evaluation within communities across four intervention types representing the land sparing (single sector), sharing (integrated) gradient: intensified industrial soy production (n 60 HHs), protected area (n 70), extractive reserve (n 70) and a national forest (n 70) in Pará in the Brazilian Amazon. We collected data using the Global Person Generated Index (GPGI) with household heads (n 270) in 8 communities (2 per intervention type). Focus group discussions (n 8) solicited residents' perceptions of impact pathways. Our findings highlight the important contribution of relational (e.g. productive land, good relationships and the ability to organize) and subjective (e.g. contentment and happiness) dimensions to HWB and support calls to expand conventional impact appraisals to better capture these less tangible constituents of well-being. Further, we show that single sector and integrated approaches generate 'polarized impact footprints' in which integrated approaches achieve i) more impact, which is ii) more often positive, and iii) locally relevant. Relational constituents of wellbeing are salient locally, but are not generally impacted by interventions, and point towards the potential of rights-based conservation and activities that empower rural smallholders to remain in their communities whilst flourishing.

Clara Léonie Diebold, Wyss Academy for Nature at the University of Bern

"Mixed impacts of protected areas on human wellbeing in north-eastern Madagascar"

Tropical forest landscapes support human well-being in myriad ways. Due to their rich biodiversity and large carbon stocks, they are at the centre of global conservation efforts, while also playing a key role in the livelihoods of local people, both as a material and socio-cultural base.

With one of the world's highest poverty rates, and its status as biodiversity hotspot, north-eastern Madagascar exemplifies such challenges of sustainable development in the area of tension between local socio-economic development and international claims for nature conservation. Several protected areas have been established in the region, which contribute to the protection of remaining primary forests, but also challenge local people's agricultural land use strategies and well-being.

Through structured interviews conducted in four villages, we assessed households' satisfaction – and changes thereof – with locally relevant well-being components, mapping responses through Nussbaum's Central Capabilities approach. We also investigated the cultural significance of key natural resources beyond the material benefits they provide. Our study finds that human capabilities are interconnected and mutually interdependent, with relational values linking many of them. While households generally perceived a positive influence of protected areas, those most reliant on forest land and products held a more negative view of conservation interventions.

These findings highlight the need for – and the difficulties of – addressing the multiple dimensions of human well-being in the design, implementation, and evaluation of conservation and development interventions. They also stress the need to pay particular attention to the (often hidden) cultural benefits local populations derive from the interactions with the natural resources they rely on. In view of the largely northern-driven international commitment to expand nature protection through area-based targets, this is of utmost importance in order to avoid detrimental effects on local people's well-being, which will eventually undermine any conservation effort.

Elizabeth Linda Yuliani, Center for International Forestry Research (CIFOR)

"Relational Values of Forests in Two Sulawesi Upland Villages: Value-Conflicts with the External Programmes"

Rapid decline of biodiversity and ecosystems globally have affected 1.6 billion rural people whose livelihoods directly and indirectly depend on forests. To halt the loss of forests and other natural ecosystems whilst simultaneously supporting the livelihoods of the rural people, various external programs have been implemented, such as market-based (e.g. Payment for Ecosystem Services/PES) and rights-based approaches (e.g. Community-Based Conservation/CBC and Community Forest Management/CFM). However the rapid loss of biodiversity and ecosystems continues, and local communities participation does not always correspond with incentive or rights. This suggest the needs on better explanation of the local communities' motivation in nature stewardship. We conducted a study of local communities in two villages in Sulawesi who have voluntarily maintained forests but showed resistance to participate in Social Forestry programme. The study was aimed to identify the motivation and its underlying reasons of these preferences, guided by two research questions: (i) how did the local people value the forests in their landscape?; and, ii) how did those values interact with the external-driven Social Forestry programme? We applied the Relational Values framework to understand a community's relations with the forest (or its elements) and land, and identified points of value divergence. Data collection involved in-depth semi-structured interviews, Focus Group Discussions (FGDs) framed by the principles of Appreciative Inquiry, participant observation, and land use/land cover change analysis. Our findings show that the people valued their forests in relation to their identity, ancestors' heritage, sense of place and spiritual values. We also identified the points of value divergence and their underlying reasons of resistance towards externally-driven forestry programs. This study also contributes to the broader literatures of values and provide empirical evidence of the importance of relational values frameworks in understanding the motivation and behavior of nature stewardship, and in the evaluation of value-conflicts.

Session 24: Tracking Funding for Forests and Livelihoods

Siyu Qin, Humboldt University of Berlin

"Learning from three decades of international conservation funding in South America's major deforestation frontiers"

International conservation funding to the tropics has increased over the last decades to address the growing impacts of deforestation on biodiversity, carbon emission, and local livelihoods. However, it remains unclear how these goals, together with the concerns of threats and cost have shaped funding allocation, particularly at sub-national level. To fill the knowledge gap, our work mapped and explained conservation funding in the major deforestation frontiers of South America. These tropical forest ecosystems host a high level of biodiversity and a large amount of carbon, and are home to many Indigenous peoples and local communities; yet they have also experienced fast expanding deforestation and varied levels of attention from international conservation donors. Based on around 30 years (1975-2013) of international conservation funding records, we mapped the spatial and thematic distribution of funding from different donors, and used the Bayesian multilevel model to assess the effects on funding level from conservation goals (biodiversity, carbon, livelihoods, etc.), threat level, and costs. We found that international conservation funding followed the major global conservation targets – biodiversity and carbon – and charismatic ecosystems. The supports for locally relevant concerns such as water and livelihood, and for drier ecosystems, are relatively sparse. Beyond globally relevant conservation goals, socioecological linkages between the donating and receiving regions also shaped funding allocation decisions. Our analysis helped identify the key gaps of data, interest, and recognition to be addressed to better match funding with needs. The results would also encourage specific public donors to reflect on their revealed biases to better coordinate efforts, and support recipients in navigating, shaping, and leveraging the donor preferences to meet local conservation needs. By revealing the existing preferences of major conservation donors, we identified opportunities and challenges for international support for tropical forests and their residents.

Aoife Bennett, CIFOR and Oxford University

"A new era of international commitments to Amazonian forest conservation on Indigenous Territories: A 40-year interdisciplinary analysis of deforestation, reforestation and international fund flows to ever evolving indigenous people in Peru"

There is broad acceptance that Indigenous Community Lands (ICLs) can be effective entities in the global effort to tackle deforestation and climate change. However, empirical evidence has not always been consistent in demonstrating this. Furthermore, analyses are often short-term, and use only large-scale Earth Observation methodologies. This article explores deforestation and reforestation dynamics over 415,749 hectares of 25 titled ICLs in the Peruvian Amazon over forty years at three scales: total area, regions, and communities. We use a multi-method approach linking remote sensing with ground verification, and qualitative historical political ecology work with indigenous communities. We find that overall accumulated deforestation was low at 5%, but that when reforestation is considered, net deforestation was only 3.5%. At the community level deforestation and afforestation dynamics are complex, except for one period that indicates a macro driver in the region. Our work with communities highlights that categorizing them and their lands as inherently pro-environment or not is unhelpful for

determining international committments to fund flows to ICLs for environmental or development purposes. Furthermore, results suggest inadequate accounting for forest regeneration on titled ICLs, which strongly supports the titling of ICLs for pro-environmental outcomes, and we engage in a novel way with the debate on exclusion. Our study challenges the notion that presenting stakeholders with accumulated forest loss values is helpful in tropical areas where forests and people are dynamic and regenerative.

Katia Nakamura, University of Notre Dame

"The Impact of Protected Area Funding on Human Development in The Peruvian Amazon"

Protected areas (PAs) are the most prominent conservation tool worldwide with considerable evidence showing their effectiveness in protecting forests and improving social outcomes. However, many PAs do not perform at their highest potential due to inadequate access to financial resources. Understanding where and under what circumstances additional financial resources made the most difference will inform effective future funding allocation. This research quantifies the impacts of PA funding on human development within districts in the Peruvian Amazon. We used matching and post-matching spatial regression adjustment to reduce biases in estimating impacts on the human development index and income. Our study finds a positive and statistically significant average marginal treatment effect with small effect size, with no moderating factors. Individual districts with more PA funding had less deforestation and showed fewer negative social effects. This research contributes to the literature by creating quantitative evidence that PA funding contributed to human development, potentially through income and ecosystem services. The results evidence the importance of considering Peru's geographic and social diversity and its history to understand the dynamics of the effects of conservation investments on social change, even when the moderating effects were not statistically significant. The findings offer preliminary supportive information to decision-makers and may improve future funding allocations to achieve social and environmental goals relating to PAs.

Cristina Chiarella, Université Catholique de Louvain

"Impacts of large-scale forestry investments on neighboring small-scale agriculture in northern Mozambique"

Forestry plantations can potentially foster rural development and mitigate serious environmental threats such as land degradation and climate change, but their impacts on neighboring peoples' livelihood strategies are ambiguous. Tree plantations may provide employment to the locals, facilitate market access, and have spillover effects on agricultural productivity. Yet, they also risk displacing smallholders, either through direct acquisitions or by inducing higher land prices. This phenomenon is particularly important in Mozambique, where a national strategy aims to establish one million hectares of forests by 2030, focusing on Miombo ecoregions in the provinces of Niassa, Cabo Delgado, Nampula and Zambezia (referred to as northern Mozambique). This paper evaluates the causal effects of large-scale forestry investments in northern Mozambique on smallholders' welfare, focusing on their cultivated land area, crop productivity, and employment. We take advantage of innovative remote sensing techniques to distinguish tree plantations from natural vegetation, generating a census of forestry plantations and their expansion trajectories from 2001 to 2017. We combine this information with data from two georeferenced nationally-representative agricultural surveys administered in 2007 and 2020. Collectively, these datasets allow us to evaluate the long-term effects of forestry plantations

in a 14-year horizon. Using regression discontinuity design as our identification strategy and a difference-in-difference approach, we construct an index to capture how households are affected by forestry plantations, by incorporating the distance from households to the plantations, land area of the plantations in the surroundings of each farmer, and the duration of farmers' exposure to plantations (where exposure is defined as being located within a 20-km buffer zone). We conduct sensitivity analysis by changing the radius of the buffer zone and explore heterogeneous impacts linked to the type and size of the plantations, and their proximity to former state farms. This study contributes to improved understanding of local dynamics resulting from forestry investments, which have critical implications for better planning towards sustainable land uses.

Laura Sauls, George Mason University

"Redefining Rights-based Conservation through Philanthropy: The Ford Foundation in Mesoamerica"

Scholars having increasingly called for "opening up the black box" of philanthropic decision-making in conservation, especially given mounting support by foundations for nature-based solutions and biodiversity (Gruby et al. 2021). Toward this end, this study examines the role of one philanthropic donor in shifting its theory of change and actual practice related to poverty, land rights, and conservation. Drawing on our work for and with the Ford Foundation in Mexico and Central America, as well as with their grantees and partnered foundations in this region, we reflect on: 1) the call by researchers to better characterize and explain the theoretical role of philanthropy in environmental governance (Betsill et al. 2021); and 2) lessons for operationalizing conservation and climate finance that adequately recognize and respect Indigenous Peoples and local communities (IPLCs). Pairing analysis of funding data and a review of Ford Foundation public documents with interviews of current and former Ford Foundation program officers, representatives of other foundations, and grantees from the region, this study traces the emergence of and shift in key Ford Foundation conservation strategies from 2000 to 2020. We find that during this period, the Ford Foundation tripled their direct funding to IPLCs in the Mexico and Central America region and increasingly supported international action to enhance the visibility and amplify the voices of these groups. This shift represents a concerted effort by individual program officers, a growing incorporation of human rights and environmental concerns within the Foundation, and this established foundation's response to a shifting philanthropic landscape. In light of major new pledges for forest-based climate and conservation, the Ford Foundation experience in MCA may provide valuable lessons for community-oriented and IPLC inclusive practices going forward.

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Session 25: Biodiversity, Forests, Livelihoods

Gabriela Demarchi, INRAE, CIFOR

"Beyond reducing deforestation: the impacts of conservation programs on the livelihoods of rural households"

REDD+, which stands for Reducing Emissions from Deforestation and forest Degradation, has emerged as a promising nature-based solution for climate change (CC) mitigation. Understanding why REDD+ pilot initiatives succeed or fail is essential for designing upscale cost-effective programs in the future. Forest conservation projects are likely to have important consequences for local populations, nevertheless, most evaluations of REDD+ local initiatives focus on environmental impacts and do not provide evidence of the collateral effects of the programs on other land-use activities or socioeconomic outcomes. There is thus a need for rigorous assessments of the impacts of such conservation initiatives beyond forest outcomes. In this study, we carry out a comprehensive evaluation to assess the impact of a pilot REDD+ project located in the Brazilian Amazon, whose objective was to reduce deforestation by improving local agricultural systems. The smallholders benefited from the program through a mixed approach of Payments for Environmental Services (PES) and Integrated Conservation and Development Project (ICDP). Based on available literature, project documentation, survey, and remotely sensed data, we evaluate the impact of this REDD+ local program on environmental outcomes, agricultural practices, and livelihood indicators. We use matching and panel data collected from a sample of farm holders both enrolled and not enrolled in the program to estimate counterfactuals for the outcomes of interest. Our main findings suggest that the decrease in deforestation has occurred mainly at the expense of the slowdown in the expansion of pasture areas and on cattle ranching intensification. Furthermore, our results indicate that the program had a positive impact on farmers' incomes and on alternative livelihood production activities that require less area for production than extensive livestock farming and slash-and-burn agriculture, the two main drivers of deforestation in the study region. Finally, the development of low-impact activities under the project are not significant in the short term, while they appear to have a lasting impact. Altogether, these results suggest that local REDD+ programs that combine PES with support to farmers for the adoption of alternative activities can be effective in the fight against CC without jeopardizing the livelihood of local populations.

Gladman Thondhlana, Department of Environmental Science, Rhodes University

"A review of 'benefits' in co-managed forests in South Africa"

Co-management of forests is an established conservation model in South Africa, and is premised on the concept of benefit sharing. However, the concept of benefits is seldom defined, enshrouded in ambiguity and in turn, poorly understood. Though benefits extend beyond tangible ones, there is no systematic assessment of benefits in the literature. Using three bibliographic databases (Scopus, Web of Science, and EBSCOHost) to search for peer-reviewed literature, this scoping review examines the current state of research and conceptual insights on benefits in South African co-managed forests. Although most of the reviewed papers identified benefits (e.g., fuelwood, cash income, job creation), the benefits are rarely quantified, and there is a lack of analytical depth of these benefits. In particular, non-material benefits (e.g., relational values and cultural identity) of forests received limited attention yet they are equally important for some communities. Overall, the review notes that the literature on co-management of forests in South Africa lacks detailed quantification and analysis of benefits, the benefits context is poorly understood, and there is a lack of clarity on the distinction between tangible

and non-tangible, and desired and realistic benefits. The paper argues that pivoting co-management agreements on the tangible benefits of forests is important but insufficient to address relational aspects of forest conservation. Non-tangible benefits of forests are equally important to consider, especially in contexts with a history of displacement of local communities for protected area establishment.

Terry Sunderland, University of British Columbia

"Forests sustaining agriculture: New evidence of the role of forests and trees in food production"

Agricultural expansion remains the greatest driver of forest loss globally. Yet, forests and agriculture are inextricably interlinked in myriad ways. Current discourses on agricultural intensification often overlook the ecosystems' contributions for food production and livelihoods. Although some preliminary work has been undertaken on enhancing on-farm provisioning of ecosystems services, the ecological and socio-economic value of forests and trees in terms of their contribution to proximate agricultural production and livelihoods in the wider landscape is poorly understood and rarely integrated into land use planning and sustainable agricultural management practices. Research is also required to assess the complementarity and resilience of different crops and trees to climatic fluctuations at a landscape scale and how to better manage these landscapes under different socio-ecological contexts. Therefore, it is vital to expand our understanding of the contribution of forests and trees in supporting agriculture and livelihoods in multifunctional landscapes. In doing so, we can further develop methods to manage landscapes in an integrated and inclusive way that consider biodiversity conservation, sustainable forest management, agricultural production, wellbeing and food and nutritional security. This presentation, linked to the FLARE Working Group on the topic, will present new evidence of the critical roles that forests and trees play in agricultural production, particularly in the tropics, and identify a way forward for combining forests and agriculture in an integrated food systems approach at the landscape scale.

Yibeltal Asnakew, University of Gondar

"Analyzing Households' Dependency on Non-timber Forest Products, Poverty Alleviation Potential, and Socioeconomic Drivers: Evidence from Metema and Quara Districts in the Dry Forests of Amhara Region, Ethiopia"

Examining the household's dependence on non-timber forest products (NTFPs) and analyzing their determinants has significance for policy decisions. Therefore, this study examines the contribution of NTFPs to rural livelihoods, its potential in poverty alleviation, and socioeconomic drivers of households' collection of NTFPs. The study is based on primary data collected by using a structured questionnaire survey of 450 randomly selected households in Metema and Quara districts of Amhara region, Ethiopia along with key informant interviews, focus group discussion with residents, and from government offices. We adopted an income accounting model for apportioning components of total income for finding income from NTFPs and applied the Tobit regression model for our analysis and found that households are considerably dependent on NTFPs. Income from NTFPs accounts for 23.1% of the total household income. However, the level and pattern of reliance on these forest products vary across different socioeconomic groups. Income from NTFPs also helps 20% of the households to remain above the poverty line. Moreover, the study shows that age, household size, landholding, cooperative membership, per capita income, and access to extension service influence households' dependence on NTFPs. Thus, we suggest that any policy intervention in dry forest areas should be planned without destructing the forest ecosystem.

Valerie Hagger, The University of Queensland

"Drivers of global mangrove loss and gain in social ecological systems"

Mangrove forests store high amounts of carbon, protect communities from storms, and support fisheries. Human activities in the coastal zone have driven widespread mangrove declines, however in some areas, expansion of mangroves have occurred. Identifying socioeconomic conditions associated with decreasing losses and increasing gains is important but challenging, since mangroves exist in complex social-ecological systems. The impact of national governance and conservation policies to improve mangrove conservation at the landscape-scale has not been assessed to date, nor have the interactions with local economic pressures and biophysical drivers. We find globally that socioeconomic drivers of loss can also be drivers of gain, and that drivers have changed over 20 years. The effects of economic growth appear to have reversed, shifting from negatively impacting mangroves in the first decade to enabling mangrove expansion in the second decade. Importantly, we find that community forestry is promoting mangrove expansion. An analysis of outliers revealed areas with high loss associated with conversion to agriculture and aquaculture often occurring in protected areas. Across mangrove holding countries, sustainable development, community forestry, and co-management of protected areas are promising strategies to reverse mangrove losses, increasing the capacity of mangroves to support human-livelihoods and combat climate change.

Session 26: Social Justice in the Forest: Rights, Power, and Collaboration 2

Alizée Ville, University of Helsinki

"Forestry science in the Congo Basin: co-production of scientific knowledge and commercial forestry practices"

Over the past centuries, the Congo Basin Forest has successively been expected to provide wood products, carbon sinks, and economic growth, in apparent limitless proportions, to those involved in its forestry sector. Meanwhile, inhabitants of the region seem to be reduced to a source of opportunity (labor) or threat (drivers of deforestation) in the scientific and policy literature: these framings have crucial implications for both sustainability and equity.

We examine how scientific knowledge production has evolved as commercial interests have shifted across time, investigating these framings through a critical review of literature. We carry out a review of scientific articles, national forest strategies and commercial trade agreements, travel journals and colonial archives, from 1876 to present, retrieved from online databases and physical archives, with a focus on Cameroon and DRC.

Drawing from political economy, we look for the agents, commodities and commercial practices which link institutional European commercial interests to scientific research agendas, examining how forestry practices and trade flows are legitimized, and how commercial interests in turn inform research inquiries. Our preliminary findings point to a historical co-production of knowledge embedded with commercial forestry practices, which still prevail today.

Because forestry commodity production and trade has been linked to deforestation (Henders et al, 2015; Karstensen et al, 2013), this work contributes to advancing critical thinking about resource use

and appropriation. We end with a discussion about how these framings have evolved over time, and how science and commercial practices have shaped and legitimized the structure of benefit sharing. This presentation would fit well within the meeting theme “Social Justice in the Forest: Rights, Power, and Collaboration”, as this article discusses the implications of scientific knowledge production on the co-production of narratives around contemporary forest use, in the Congo Basin but also abroad.

Anne Larson, CIFOR-ICRAF

“What is forest tenure (in)security? Insights from participatory prospective analysis”

Over the past two decades, growing recognition of forest-based Indigenous peoples and local communities (IPLCs) sparked forest tenure reforms to formalize IPLC rights to forests and forest lands in the interest of both social justice and forest sustainability. Nevertheless, tenure security, an intended objective of such reforms, has received less attention, despite being integral to the life and livelihoods of IPLCs and important for forests. Formal rights - a title, certificate or contract - is often used as an inadequate proxy for security, though the need to understand peoples’ perception of security has been increasingly recognized. But understanding perceptions of tenure (in)security raises the challenge of unpacking what people mean when they say they perceive tenure to be secure or insecure. This article is based on experiences in three countries using Participatory Prospective Analysis (PPA), a multi-stakeholder foresight scenario-building method, to explore those meanings. It draws on results from a series workshops implemented in Indonesia, Peru and Uganda in 2015 and 2016 primarily at subnational level, with 177 government officials, practitioners and members of community level organizations involved in forest tenure reforms. Four women-only workshops (three subnational and one national) were organized in Peru and Uganda with an additional 87 participants. The results demonstrate the immense depth and complexity of tenure security and insecurity perceptions and the interplay of multiple factors driving toward and away from desirable futures. The method also demonstrates the benefits of PPA for bringing together different perspectives and promoting mutual understanding without reducing complexity. The article contributes to efforts to find common ground not only around how tenure (in)security is defined but also how it is being assessed; and points to the need to embrace more holistic approaches to understand rights, power and collaboration for social justice in forest landscapes.

Lisa Naughton, University of Wisconsin – Madison

“Does formalizing artisanal gold mining mitigate environmental impacts? Deforestation evidence from the Peruvian Amazon”

A global surge in ‘artisanal’, small-scale mining (ASM) threatens biodiverse tropical forests and exposes residents to dangerous levels of mercury. Millions of people engage in ASM, many of them the world’s poorest. In response, governments and development agencies are investing millions (USD) on ASM formalization; registering concessions and demarcating extraction zones to promote regulatory adherence and direct mining away from ecologically sensitive areas. We examine patterns of mining-related deforestation associated with formalization efforts in a gold-rich region of the Peruvian Amazon. In Part 1 - We track changes 2001-2014 when agencies: (a) issued 1701 provisional titles and (b) tried to restrict mining to a >5000 km2 ‘corridor’. We use fixed-effect regression models and matching methods to control for gold price, geology, and accessibility. Mining increased dramatically during this period, clearing ~40 000 ha of forest. After the mining corridor was declared and enforcement increased, new mining sites were opened more frequently within titled areas and inside the corridor than elsewhere.

However, mining also increased in protected area buffer zones and native communities, and the proportion of mining area occurring outside the corridor grew, concentrated in a few hotspots. Interviews (n = 47) revealed that the hoped-for regulatory adherence failed to materialize because miners who were issued provisional titles started operations without complying with attendant environmental rules. Miners resented the slow, costly process but many sought titles to bolster territorial claims, avoid policing, obtain credit and recruit paying 'guest' miners who generally ignored regulations. In Part 2- we share insights from follow-up field interviews in July 2022. High gold prices, and COVID-related economic hardships appear to have accelerated ASM's expansion into forests. But the formalization protocol has been streamlined and better financed allowing >200 miners to obtain full legal rights (out of 10,000's). Our observations confirm that without adequate enforcement, interagency coordination, and attention to competing land claims, formalizing ASM may accelerate ecological destruction.

Dipika Adhikari, The Australian National University

"In the Forest of Asymmetric Power: Indigenous people's struggle for resource rights in India"

Despite growing recognition for a rights-based approach in forest governance for socially just and ecologically sustainable outcomes, Indigenous people around the world continue to grapple with many challenges in retrieval of their customary resource rights. The passing of the Forest Rights Act in 2006 in India was meant to resolve historical injustices by recognising Indigenous people's rights, but limited acknowledgement of rights themselves, abysmal implementation by state agents, and entrenched power asymmetries continue to stifle social justice for India's Indigenous communities. With this background, I explore whether and how Western scholarly argument in favour of a more decentralized forest governance, with state and non-state actors located at multiple levels of the jurisdictional scale, could be applied in a Global South context. I draw empirical material from the study of Van Rajis, a small forest-dwelling tribal group living in the foothills of the Himalayas in Northern India. I triangulate multiple mixed methods with a qualitative approach to provide insights into cross-scale power configuration influencing actions and outcomes for Indigenous resource rights. I argue that these cross-scale actors have different interests, goals and powers, and their conjunction might lead to outcomes that variously allow or stifle Indigenous people's resource rights. I discuss how forest tenure regimes are complex yet negotiable, and how power flows both ways, but asymmetrically. While varied goals and vested interests at all levels of governance greatly hinder Indigenous entitlements, continuing efforts by local-level pressure groups and the community's internalisation of their ethnic social identity to retrieve customary resource rights create countervailing power to restrain absolute State control over forests. The study builds on prior and current research and ongoing debates on natural resource governance from political ecology, environmental politics, and social justice perspectives.

Eric Mensah Kumeh, Natural Resources Institute Finland

"Jobless landscapes: An analytical lens for contesting coercive land redistribution in rural Africa"

Contrary to their promise of creating green jobs, many private tree plantation projects have become a tool for legitimising the privatisation of communal land rights, resulting in dispossession, poverty, and inequality across multiple agrarian communities in Africa. Tree plantation projects thrive from sporadic consultations where companies spew multiple promises to capture the desire and interest of local communities. However, because land enclosure requires one-time consent, stakeholders, especially local communities seldomly involved by despotic traditional leaders in land deals, are often left helpless

and unable to redeem their communal lands when such promises are broken. Building on Michael Levien's Regimes of Dispossession, we argue that jobless landscapes can become a useful analytical and advocacy tool for actors seeking to right dispossession caused by multiple tree plantation projects. Given that dispossession is a social relation of coercive redistribution, we conceive jobless landscapes as a promissory discourse that invokes and legitimises coercive social relations of redistribution to tackle poverty and inequality in agrarian communities. The strength of the concept lies in its ability to leverage the instrumentality of joblessness and precarity in agrarian communities to carve open private property relations to new forms of deliberative governance that achieve a balance regarding decent job creation as a promise used to legitimise dispossession in the first place. We demonstrate the potential of jobless landscapes by reflecting on a case study in central Ghana, where we dwell on data from ethnography in host communities and interviews with proponents and a company implementing a large-scale private tree plantation project in central Ghana. The lessons drawn from the case provide entry points for rethinking land rights in multiple local communities drowning in tree plantations but starving for land and decent employment opportunities in several developing countries.

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George Iordachescu, The University of Sheffield

"Forest Crime, Violence and Vulnerability in the Carpathian Mountains"

Illegal logging grew to epic proportions in Romania within a few decades since the collapse of state socialism in 1989. As international pressure mounted, national rage against illegal logging escalated, transforming into a forest crisis narrative with far-reaching implications for mountain communities dependent on forests and their livelihoods. The criminalisation of forest wrongdoers soared, especially since Romania became an EU member state in 2007. Yet, the complex entanglements between illegal logging, criminalisation, violence and local livelihoods remain poorly understood. In this study, we draw on ethnographic examples from communities for which illegal logging was an everyday reality, on media investigations and on a range of interviews with forestry and conservation actors to bring into focus the different types of violence generated by the escalation of criminalisation. We argue that classic approaches to tackling crime with legal repertoires, coercive and punitive in nature, which increase criminalisation, had been productive of insidious and overt forms of violence. Tough-on-crime measures prove to create ripe conditions for advancing rural inequalities, marginalisation of already disenfranchised rural populations, and a local culture of secrecy, fear and anger, ultimately facilitating the rise of recombinant forms of violence. These arguments contribute to illuminating the twisted consequences of the worldwide current criminalisation turn, and of the increased use of tough-on-crime policies in the global efforts to curb biodiversity loss.

Jazmín Gonzales Tovar, Oregon State University

"'Visibilization' of informal community forest enterprises: Making the diversity and effects of local institutions visible to policy-makers and practitioners"

Although forest-dependent people have long managed forests for subsistence, recently community and small-scale forestry enterprises (CSFE) are emerging and being promoted as a sustainable development strategy. However, the effectiveness and equity of CSFE-related regulations and programs are limited as

they often ignore, underestimate, or misunderstand the existence, diversity, and importance of informal norms and practices, which exist at the community/local level and deeply shape how local populations access, manage, and monitor forests, commercialize forest products, and/or distribute benefits. This research develops a comprehensive and critical understanding of varied informal, non-conventional, traditional and/or customary systems utilized in CSFEs in the largest Amazonian region of Peru: Loreto. We look at different types of CSFEs in diverse Indigenous communities located along two distinct river basins to examine (i) the diversity of informal norms and practices, (ii) the benefits and impacts of informal systems for forest conservation and for communities and women's wellbeing, and (iii) how informal systems interact with formal ones. To do so, we use a decolonizing approach (e.g., Indigenous leaders and graduate students from Loreto involved as co-researchers) and mixed methods (e.g., spatial analysis and different questionnaires for different types of informants). Our findings uncover a wide variety of forest products, both timber and non-timber, and of CSFEs, beyond those more widely promoted or studied. Importantly, we reveal that CSFEs – even when managed under official/formal projects – use a rich diversity of informal practices and norms, especially for forest tenure, commercialization, and benefit distribution. We also problematize the idea of informal practices as inherently negative, showing that some informal systems (e.g., traditional knowledge-based, context-specific, and/or socially conscious) can have positive effects for sustainability, local economies, and women's empowerment. The more accurate and inclusive depictions of existing informal institutions that we developed can help CSFE-related initiatives better recognize, enhance, and build on communities' social and cultural capital when addressing challenges and proposing solutions. Overall, our findings contribute to make informal systems visible for governmental agencies and practitioners investing in CSFEs and better inform their efforts, improving effectiveness and equity. Results are relevant for Peru and the Amazon region as a whole.

Juan Pablo Sarmiento Barletti, CIFOR-ICRAF

"A place at the table is not enough: landscape management multi-stakeholder platforms from the perspective of IPLCs"

Researchers have long agreed that fixing the challenges surrounding the way forests and resources are used and managed requires collaboration. Multi-stakeholder forums (or platforms, initiatives, and processes; MSFs) tend to be idealized as imagined spaces for collaboration among equals, based on the idea that 'we're all in this together'. That simplified notion is an obstacle to meaningful change. For collaboration to provide an opportunity for change, it must assure historically underrepresented voices are heard. Yet, our previous research found that MSF organizers think that simply inviting people to the table assures equity and voice when it only glosses over differences and thus does not foster change. To address this challenge, we examined the perspectives of a seldomly studied constituency in MSFs – Indigenous Peoples and local communities (IPLCs). This presentation draws on a study of 11 subnational MSFs that sought to support sustainable forest landscape management in Brazil, Ethiopia, Indonesia and Peru. Our cases focused on specific subnational landscapes; had at least one government and one non-governmental actor; were not one-off events; and had been running for at least one year. Semi-structured open-ended interviews were conducted with 236 forum participants and organizers, including 50 IPLC actors, to engage with their perspectives regarding the potential of MSFs to provide voice, empowerment, and an opportunity for change in their specific contexts. Our results suggest that, despite overall optimism regarding MSFs, IPLC representatives were more skeptical than other participants about MSFs' potential to empower, assure voice, and prevent those with more power from dominating dialogue and decision making. IPLC respondents were likelier to think collective action is a better option and understood their participation in MSFs within a wider political strategy. We will close

by presenting concrete actions that forum organizers can take to facilitate equity and accountability, beyond the use of good facilitation tools – that is, how to move from a place at the table to a voice at the table. The need to work together to face environmental challenges will continue to grow and our results, built on our engagement with IPLCs, will propose actionable pathways to support change.

Jude Kimengsi, Technische Universität Dresden

"An actor-centred power analysis of forestland resources: Comparative evidence and institutional implications in the Greater South and the Western Highlands of Cameroon"

Sub-Saharan African communities significantly depend on forestland and linked natural resources for their sustenance. This dependence validates the unending process of power exercise by actors in their quest to gain control over such resources. The actor-centred power analytical approach has been employed to uncover such dynamics. However, harmful convictions linked to the exercise of power by different actor groups remain relatively less understood in Cameroon – an ethnically diverse country in sub-Saharan Africa. To bridge this knowledge gap, this paper comparatively analyses the power and harmful convictions around forestland resources in two agro-ecologically and socio-culturally distinct zones - the Greater South Region and the Western Highland Region of Cameroon. Specifically, it (1) analyses the role of harmful convictions in steering unequal access to forestland and linked natural resources, (2) explores power manifestations among different typology of actors, and (3) discusses their forestland-linked institutional implications. Qualitative data derived from eight communities in both regions informed this study: focus group discussions (28), key informant interviews (44) and expert interviews (19). The analysis revealed that ethnic-based and elitism-based harmful convictions drive forestland resource access in the greater south, while gender-based and religious-based harmful convictions are more recurrent in the Western Highlands. Secondly, while elitism-based actors exercise power through coercion in the greater south, this category of actors draws more from incentives in the Western Highlands. Gender interested actors in the western highlands also employ coercion while religious and political actors employ (dis)incentives and dominant information, respectively, in their quest for forestland control. Thirdly, gender-based and ethnic-based actors significantly drive harmful convictions around forestland and linked natural resources. Finally, the complicity of some traditional authorities fosters the dominance of state-driven institutions, over community-based ones. Besides providing fresh insights from an actor centred perspective, the results suggest the need for a jelled institutional arrangement to mitigate power asymmetry.

Paul Thung, Brunel University London ('Best Student Oral Presentation' award winner)

"The practice of representing reduced emissions: REDD+ as a regime of visibility in a social forestry project in West Kalimantan, Indonesia"

This presentation is about the social, physical, and imaginative work with which Village Forest managers represented people-forest relations to international audiences. Based on 3 short ethnographic research visits, adding up to two months of fieldwork in 2020, combined with an analysis of project reports, media outputs, and social-scientific research articles, I document the various practices which made carbon emission reductions visible. To draw in carbon finance, the managers set up what I call a regime of visibility, which involved participatory exercises, community meetings, forest patrols, analysis of satellite imagery, and the production of maps, charts, and other project documents. In line with international discourse that positions rural human communities as the most sustainable and legitimate environmental managers, local people were represented as active, consenting participants to the Village

Forest. I further analyse the various contradictions and difficulties that this regime of visibility ran into. Forest patrols and satellite imagery revealed continued forest clearance within Village Forest boundaries, jeopardizing future funding. I show how, in response, Village Forest managers fell back on long-standing narratives of backwardness. To stabilise the image of a homogenous community of environmental managers, the Village Forest imposed a hierarchy of deservingness on that same community, creating new divisions between villagers with environmental awareness, and villagers who have the wrong mindset.

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Paula López, National Agrarian University (UNALM, Perú)/ Oregon State University (U.S.)

"Informal and formal institutional interactions: the case of community and small-scale timber enterprises in the Ampiyacu river basin, Peru"

Governmental and non-governmental actors are heavily promoting community and small-scale enterprises (CSFEs) for local peoples to commercialize timber forest products, and encouraging their compliance with official laws, policies, and programs. Nevertheless, researchers and practitioners often overlook how laws or governmental programs interact with communities' (lesser-known) informal ways to manage their timber resources, and how such interactions shape the opportunities and challenges of CSFEs. Evidence shows that interactions between informal and formal rules deeply influence forest tenure, management, monitoring, and markets associated with timber forest products, shape legal restrictions and access rights, and can limit the success of CSFEs. This study critically examines the interaction between informal institutions and formal forest management systems within CSFEs, specifically looking at land tenure systems, forest management practices and monitoring, and market systems for timber forest products. This case study conducted under a qualitative approach is based on semi-structured interviews with different types of informants in the Ampiyacu basin in the Peruvian Amazon. Despite timber being one of the most regulated forest resources under the Peruvian regulatory framework, our results describe different informal practices exercised within the Indigenous communities and associated with subsistence activities, as well as show multiple forms of interactions between formal and informal systems. Data suggest that formal and informal systems often compete, especially when laws are not appropriate to the local context and needs. In such cases, local (informal) authorities often substitute governmental (formal) authorities. Also, formal rules, which tend to be general, are occasionally complemented by informal norms, which provide details on specific ways how communities use and manage the forest. Finally, sometimes communities accommodate formal and informal rules, for instance in the context of forest monitoring systems. Our findings contribute to closing the knowledge gap concerning the role of informal institutions in policymaking and management of timber forest products. We seek to contribute to the reduction of existing asymmetries that constrain Indigenous communities from taking advantage of their own timber forest resources. This research is relevant not only for Peru but also for other countries that seek to promote successful CSFEs within a socially just environment.

Pyi Soe Aung, WWF Myanmar

"Conflicts, Constitutionality and the future of Community-led Conservation in Myanmar"

Community-led conservation was considered as one of the most promising strategies to achieve effective conservation and reduce people-park conflicts in Myanmar. However, the military coup in 2021 has changed the political context and restricted the civic space for community participation in conservation. It is therefore important to explore how existing community-led conservation initiatives have changed in response to recent political conflicts to ensure the resilience and sustainability of future community-led initiatives. To fill this knowledge gap, we conducted telephone interviews in 22 protected areas to evaluate the status of community-led conservations after the 2021 military coup. Based on the survey results, we identified three protected areas that continue community-led conservations after the military coup and conducted in-depth analysis. We applied the constitutionality approach to understand how local communities have responded to the political changes and what factors have influenced their willingness to continue conservation activities despite the increasing conflicts across the country. The survey results show that most of the community-led conservation initiatives have stopped after the military coup, mainly due to the disruption of trust between park authorities and communities, lack of continued supports from outside catalyzing agents, and limited time and resources to invest in conservation in order to cope with livelihood challenges. Results from the three case studies also indicate that the willingness of community members to continue conservation initiatives are strongly influenced by three factors such as the importance of natural resources for local livelihoods, the presence of strong informal institutions for collective actions, and the continued supports from outside catalyzing agents. Our findings suggest that promoting sustainable natural resource-based livelihoods, strengthening existing informal institutions and establishing long-term supports from outside catalyzing agents play critical roles to enhance the resilience of community-led conservation against the unexpected changes in political context and lack of higher-level state recognition.

Rachel Tome Valencia Hamilton, Independent researcher

“Transforming Land Use Governance: ‘Thinking outside the target’ towards an equity-based approach”

A confluence of concerns about tropical forest loss, global warming and social inequality drive calls to transform land use governance, yet there is widespread contestation about what must be transformed, by whom, and how. Drawing on collective observations from in-depth research in diverse tropical forest environments, we argue for an equity-based understanding of transformation that reveals how unequal power distorts both the ends and the means of global governance. We also assert the importance of the concept of equity in counteracting inequities, structural biases and entrenched colonialities in the formulation and pursuit of environmental strategies. There is growing policy focus on ambitious, quantitative global targets, such as ‘net zero emissions’ or ‘zero deforestation’, and complex social goals, such as ‘good governance’ and the ‘rule of law’, external surveillance and control over remote landscapes, with little evidence that this delivers promised results. The appeal of target-setting lies in its seeming ability to catalyse ambitious action and hold powerful actors to account. However, the escalation of targets for land is disconnected from targeted tropical geographies, lacks accountability to socially diverse knowledge and priorities, and is readily appropriated by powerful actors at multiple scales. Drawing on a comparative analysis of findings from five case-study ‘vignettes’ in Indonesia, Ghana, Peru, and Brazil, we apply an equity lens to explore how international efforts to reform land use governance can reinforce state and corporate control over resources at the expense of local access. In light of these results, we emphasize the necessity of radical, equity informed transformations at every level of environmental governance and policy making in order to escape the severe limitations imposed by our present structures and approaches and effectively meet the multiple, compounding challenges

facing the planet. We argue that case study research is critical not only to unpack the local consequences of pursuing global targets, but also to make visible alternative efforts to achieve more equitable transformations.

Richard Mbatu, University of South Florida

"Rural Community Agency in Cameroon: Interactions with Forest Policies and the REDD+ Climate Change Regime"

Community forestry around the world has demonstrated its potential for implementing the Reducing Emissions from Deforestation and Degradation (REDD+) climate change program. Secure tenure rights and access to rule-making are known as contributing to successful community forestry outcomes, but the effects of different aspects of rural 'community agency' are not well established. We investigate, concerning forest governance and conflicts, relationships between aspects of rural community agency under the REDD+ climate change program in two forest communities – the villages of Fabe and Mosongiseli – near the southern portion of the Korup National Park in Cameroon. Using data from a survey instrument and interviews we analyze, using "agency theory", the concept of rural community agency according to dimensions of attitudes, understandings and empowerment in the two communities, in relation to forest governance and conflicts under REDD+. Our findings indicate a variety of power relations (e.g. on the communities' use and management rights of their lands) and existential threats of conflicts within the communities (e.g. violation of the communities' free, prior, and informed consent). The results also show that both communities share many of the patterns of diversity and integration to a similar extent. Although there is no definitive distinction between the two communities, the findings suggest that some differences exist in their degree of integration. Understanding and describing the nature of the power relations and threats of conflicts comprises an important component to begin an appreciation for the communities' user group characteristics as these relate to the REDD+ program when implemented. The implication of this study is that threats of conflicts may increase when villagers' perception of the potential costs of losing their lands to REDD+ is formed by their experiences from current restrictions on the use and management rights of their lands.

Sailaja Nandigama, Birla Institute of Technology and Science (BITS), Pilani, Rajasthan

"Whose forest is it anyway? Revisiting the Forest Rights Act's implementation in Telangana"

There are several contentious issues that put the fate of the forest lands of Telangana at risk of destruction. Some of these include the conflicts between the Forest department officials and the forest dwelling communities. Forest rights Act (hereafter, FRA) declared by the Indian government in 2006 to undo the historical injustice done to these forest dependent communities is at the centre of these conflicts. Ministry of Tribal Affairs (MoTA) is assigned the responsibility of spearheading the FRA implementation across Indian states with the help of the local Forest departments and the Revenue departments. However, the concerns among the forest dependent communities on the dilution of the powers of MoTA and an increasing influence of the forest departments are on the rise in the recent years.

In this paper qualitative insights collected during the last 4 to 5 years have been utilized along with selected secondary literature to revisit the FRA implementation and its impacts on the livelihoods of the forest dependent communities of Telangana. This paper shows that the growing concerns of the forest dependent communities about the Forest officials hampering their forest-based livelihoods are only

doubling due to the ever-increasing clout of the Forest departments in the recent years. Several incidents of violent conflict between the forest guards and the local communities, both fighting for their rightful place in the forests have been recorded across the state of Telangana in the past few years. Also, in Telangana, there is an active coupling of the populist schemes such as the Rythu bandhu (friend to the farmer- which involves the state government giving away the cash handouts to the forest land title holders) and the FRA implementation. This led to the forest department officials to increase their security measures to protect the remaining forest lands in Telangana and to prevent their forced conversion. This paper concludes that between the Forest department's control over the remaining forest lands and the ever-increasing livelihood insecurities of the forest dependent communities, the implementation of the FRA intervention for better management of the Telangana forests needs renewed focus from MoTA.

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Mark Hirons, University of Oxford

"Landscape approaches: New forms of inclusion or exclusion? The case of climate smart cocoa in Ghana"

'Landscape approaches' are promoted as mechanisms for governing forest and agricultural production in ways that de-colonize global relations and empower local communities, while also facilitating international trade in 'green' commodities. Ghana is a pioneer of landscape approaches, which currently form part of the country's core architecture for 1) receiving forest carbon payments under Reducing Emissions from Deforestation and Degradation (REDD+) and 2) generating 'climate smart' and 'deforestation free' cocoa for European and other international markets. This approach is based on the creation of multi-stakeholder 'landscape governance' bodies that involve international actors, but are rooted in legally recognized, community-based executive committees who govern Hot Spot Intervention Areas (HIAs).

Our research examines the political ecology of how actors, organizations, and sectors frame and engage with the HIA system. Drawing on in-depth stakeholders interviews, and participant observation of HIA processes at multiple scales, we find tensions and contradictions among actor networks. While some actors focus on aligning HIA community-based governance structures with the needs of externally-driven socio-technical regimes, including REDD+ and 'green' certification, others focus on a slower process of ground up community engagement to achieve more radical ('niche') local empowerment. Yet regardless of the priorities of individual actors and organizations, competition and lack of coordination among different state, NGO and corporate actors jostling for project funding and state recognition creates more time and space for local agency and resistance. It remains an open question, however, whether Europe and other external actors will recognize the emergent structures and priorities of community-based HIA governance, or occlude them entirely with the growing suite of international rules, standards and procedures for 'green' trade.

Sandip Chand, IIT Kharagpur

"Does Forest Rights Act Promote Both Local Livelihood and Forest Conservation? Empirical Evidence from West Bengal"

Rights-Based Approaches (RBAs) have been seen as an effective policy tool for reconciling promotion of both conservation and livelihood goals. The Scheduled Tribes and Other Traditional Forest Dwellers (Recognition of Rights on Forest) Act (FRA), 2006 was a landmark Act, passed in the Indian Parliament that transferred the rights over forest land to the local forest dwellers in order to achieve conservation and livelihood goals. This paper aims to examine whether either the objectives of the FRA - promotion of local livelihood and conservation of forests – have been fulfilled, or one objective is achieved at the expense of the other. The study is based on primary data collected from 300 FRA beneficiary households from the Indian state of West Bengal. Both quantitative and qualitative techniques have been employed to analyse the data. The classification of forest land use pattern shows that a major share of forest lands allotted to beneficiary households under FRA is found to be used for growing crops and grazing cattle, followed by homestead and forests. Focus group discussion with beneficiary households reveals that most of the forest lands allotted to them were cleared for cultivation and/or grazing before 2006. In addition, growing population pressure and an urge to improve economic condition in a short time has compelled beneficiary households to allocate forest land for growing crops and livestock in order to secure livelihood security. Moreover, lack of financial support and extension services from forest department prevent beneficiary households to undertake any further investment in their mostly barren forest lands. Hence, it appears that promotion of livelihood security is given more importance at the expense of forest conservation. It is found that only 21% respondents are aware about their rights over forest land under the FRA and all the respondents are unaware about their responsibilities to protect the wild life, forest and biodiversity as mentioned in the FRA. Hence, mere assignment of property rights over forest land may not result in better conservation outcome. Provision of financial support along with technical know-how is essential for undertaking conservation investment in forest lands.

Vitor Martins Dias, University of Notre Dame

“Global Environmental Change, Local Social Problems: Mobilizing for Climate Justice in a Microcosm of the Anthropocene”

I contribute to the scholarship at the intersection of social and climate justice by examining how social actors frame and process disputes in the course of collective action for better environmental governance practices. The climate justice literature focuses on the conditions for mobilization against climate change. At the same time, scholars interested in law and social movements assess how meaning-making processes help explain distinct instances of legal and political mobilization against social-ecological problems. Using original ethnographic, geospatial, and archival data collected during fifteen months of fieldwork, I bring together these bodies of research to analyze contrasting patterns of flood governance in two cities in the urbanized forest that constitutes Brazil’s Amazon today. While legal and political actors perceive floods as a matter of natural disasters in the municipality of Belém, their counterparts recognize and address these ecological hazards as issues of law and public policy in Paragominas. Disentangling these processes offers one of the first insights into how framing climate and social problems as legal and political matters may either perpetuate rights violations or promote social change through new governance practices in both rural and urban areas of the world’s largest tropical rainforest.

Session 30: Forest Commons: New thinking, Evidence, and Practice

Emmanuel Katongole, University of Notre Dame

"Addressing the dual cry of the earth and cry of the poor: A case of Bethany Land Institute and Church Land in Uganda"

Bethany Land Institute (BLI) forms leaders who are committed and equipped to transform rural communities in Uganda using Church Land through an integrated approach ("integral ecology") that fights poverty, cares for creation, and advances human dignity. BLI envisions flourishing rural communities setting a new standard for sustainable creation care, food production and economic wellbeing. BLI's goal is to inspire similar models that can revitalize rural livelihoods and protect nature in Uganda and beyond.

Uganda is home to over 45 million people, with 74% of the population living in rural areas. Uganda has a land area of 93,065mi², and 15.2% is forest cover. Most of Uganda's forests are surrounded by rural communities which derive 59% of their livelihood from agriculture and 23% of their income from forest products. With such a big rural population drawing 23% of their livelihood from forests, two obvious problems are bound to happen: deforestation and land related violence. Bethany Land Institute was founded among other things to help prevent this from happening using the vast Church land.

This mission is realized through three key programs of the Bethany Land Institute: 1) Mary's Farm: A sustainable farm that conducts educational and mentorship programs in sustainable practices of land use and food production. 2) Lazarus' trees: A 160-acre forest, which serves as a catalyst for a major countrywide reforestation effort and an education base for a new ecological consciousness. 3) Martha's Market: The business arm of BLI including a Savings and Credit Cooperative Organization (SACCO), which serves as the engine for ongoing economic entrepreneurship of the BLI caretakers and the rural community.

This is a project in progress and much more data is yet to be collected for a proper impact evaluation. The authors are in the process of formulating a tool to capture and study the long-term effect of such a program. The data from this type of work will inform policy makers about formulating an ideal model for environmental conservation coupled with human economic development – a perfect prototype for forests and livelihoods.

Reem Hajjar, Oregon State University

"Community Forests as an Innovative Approach to Promoting Rural Prosperity in the United States"

Globally, community forestry, where forests are primarily governed and managed by local forest users, has been promoted over the past 40 years as a way to provide local socioeconomic and environmental benefits. However, little is known of the mechanisms by which they produce these benefits in the United States owing to a paucity of research, despite their growth in numbers over the past decade. We use a mixed methods approach involving a nationwide survey of community forests (CFs) followed by 20 in-depth case studies to (1) inventory and characterize CFs across the U.S. to better understand their governance structures, objectives and sources of income; (2) catalog social and economic benefits and costs of CFs and analyze how benefits and costs are distributed across the community; and (3) examine the socioeconomic and institutional factors and conditions that lead to positive outcomes. Results from the survey indicate a number of typologies of CFs exist across the U.S., occurring on private, public, and Tribal lands, and with varying governing structures and community participation. While more than two thirds of surveyed CFs harvest timber, all CFs have multiple ecosystem services management objectives, with a strong emphasis on recreation opportunities and ecosystem restoration. Case study fieldwork (to

take place in summer 2022) will further examine procedural and distributional equity across the communities, and how these are shaped by various governance structures. Findings are expected to inform decision making, policy design, and project implementation related to community forests as an innovative approach to enhancing the sustainability of forest resources in the U.S., and promoting rural prosperity in forest communities.

Bijendra Basnyat, Institute of Forestry, Nepal

"Talukdar Returns: Changing Paradigms of Community Forestry Governance in the Hills of Nepal"

Nepal's community forestry is one of the highly successful decentralized forest management practices, which received worldwide recognition for restoring degraded forests and enchaining community participation. Though several scholars raised concerns over the governance issues, such as elite capture, social justice, and expanding bureaucratic control in the community forestry of Nepal, how management practices are changing in the context of forest rural people interface remains elusive. This paper explores the current forest management practices, focusing on changes in decision-making positions: compliance with forest products harvesting and distribution procedures of their operational rule, and governance practice. The study conducted field observation and rapid survey of 101 forest user groups, interacted with 300 local communities and consulted with the 15 forest officials from the three mid-hill districts of Nepal.

Nearly two-thirds of leaders in vital positions of the user groups were repeated for two consecutive periods, with local political parties appointing the leaders. Though community forestry was promoted as a self-regulating community institution for meeting the subsistence need of the forest products of the people, few individuals are now controlling valuable forest resources while subsistence products were open access. This practice resembles the old "Talukdar system", where a Talukdar is a political appointee, allows the local community to collect subsistence forest products throughout the year, and demands voluntary annual labor for unrestricted access while regulating timber harvesting. The relevancy of the present management practices of community forestry seems questionable due to changing agrarian-based economy in the hills of Nepal, where local communities' dependency is declining; the farming system is changing rapidly, high youth migration from villages; active engagement of local political parties in electing leaders, and declining interests of the people. All of this support the revival of the traditional institutions, where forests are controlled by few individuals with the stage of indirect engagement in the processes. There is a need to revisit the community forestry principles in the present context with priority on market-based mechanisms while ensuring the active engagement of the local community. Otherwise, the old institutions like the "Talukdar system" would expand soon.

Anamika Das, Ashoka Trust for Research in Ecology and Environment (ATREE), Bangalore

"How do biotic common pool resources affect rural poverty and inequality? A multi-country comparison exploring the influence of social-ecological context and tenure regimes"

Degradation of biotic common-pool resources (CPRs) such as forests, fallow lands, pastures, rivers, lakes, wetlands and oceans is commonly thought to impact poorer and marginalised people more as they act as a safety net for them. However, benefitting from such resources requires a range of access mechanisms, with the result that benefits may be captured by elites, reinforcing inequality. This paper draws on data from nine low and medium-income countries of Africa, Asia and Latin America to explore how household assets and entitlements affect how CPRs exacerbate inequality (through processes of

elite capture) or mitigate inequality and poverty (by maintaining a safety net and income opportunities for poor or marginalised people). We examine these relationships across a range of development, connectivity, ecological 'pristineness', and resource tenure contexts.

Our study confirms that CPR continues to be an important income source for the rural poor. On average, households below the World Bank's international poverty line of $1.90 derive 25% of their household income from CPR. We further observe a strong positive correlation between absolute CPR income derived by households and total household income in the sites with larger and richer CPRs, indicating elite capture. The multi-level regression analysis of the factors determining household income from CPRs shows that households better endowed with labour and productive assets are likely to derive higher income from CPRs. Among other factors that affect income from CPR, female-headed households and those endowed with non-land based income are likely to derive less income from CPRs. Households in settlements with larger accessible CPR are likely to derive higher income from such resources.

We further analyse the effects of CPR income on income inequality using Gini-decomposition analysis. CPR income increases inequality when the resource is open access and extraction of such resource involves capital intensive methods. However, the converse is true if the extraction of resources from CPR is labour intensive and its access is regulated by the community or state.

Session 31: Learning from doing: Lessons from implementing integrated landscape approaches

James Reed, CIFOR

"Learning from doing: Lessons from implementing integrated landscape approaches"

Integrated landscape approaches (ILAs) are increasingly promoted to address inter-related challenges of poverty, biodiversity loss, and climate change within social-ecological systems. Integration has become a core component of recent global environmental policy (i.e., U.N. Decade on Ecosystem Restoration, post-2020 GBF, UNFCCC, SDGs), and 'integrated' projects now attract the majority of conservation funding. However, while integrated approaches have become more widespread, evaluation and evidence of effectiveness remains nascent, and an understanding of trade-offs is limited. This is particularly the case within tropical landscape governance, where some actors will be left out of negotiations while others will choose not to engage, notions of success will differ across groups and individuals, and outcomes that are satisfactory for all are highly unlikely, particularly within short timeframes.

This session will highlight experiences from ongoing ILA implementation and illustrate some of the challenges associated with implementation, monitoring, and evaluation. We will share case study examples from Ghana, Indonesia, and Zambia that consider a range of questions related to effective implementation of integrated landscape approaches that attempt to improve sustainable and equitable land-use. For example, what is the contribution of local knowledge? How to best manage cross-scale dynamics? Do multi-stakeholder platforms encourage equity in governance? How do power and perceptions influence landscape outcomes? We will showcase the tools and techniques that can be applied to overcome persistent implementation challenges highlighting the need for integrated approaches to more explicitly address issues related to power, gender, equity, and conflict. Finally, we will emphasize the need for such approaches to recognize the value of process indicators over outcome objectives before concluding with concrete recommendations for improved implementation efforts.

Eric Rega Christophe Bayala, University of Amsterdam

"Stakeholder perceptions on landscape governance in northern Ghana: A Q-study to identify entry points for integrated landscape approaches"

In a landscape, perceptions influence people's actions and behaviour towards natural resource use. Improving landscape governance therefore requires understanding the different concerns of stakeholders and organisations operating within the landscape. This paper analyses the perceptions of local stakeholders regarding the landscape governance system. We apply Q-methodology to identify common concern entry points for the implementation of an integrated landscape approach in the Western Wildlife Corridor (WWC) in northern Ghana. To this end, individual interviews and focus groups were conducted with the local communities of three Community Resource Management Areas (CREMAs) and organisations operating in the area. The study enabled the categorisation of stakeholders and the identification of common concern entry points regarding landscape challenges, governance issues, and potential solutions. We argue that consensus among stakeholders regarding these challenges and solutions could constitute the basis for initiating a multi-stakeholder process in the area and foster the emergence of an integrated landscape approach in the WWC landscape. The authors argue that the livelihoods of local people need support to reduce pressures on natural resources and highlight the importance of strengthening the functioning of local CREMAs management bodies through technical, logistical and financial support. Implementing a participatory monitoring and evaluation mechanism is critical in this regard.

Keywords: Perceptions, common concern entry point, landscape approach, Q-method, CREMA, Ghana

Malaika Pauline Yanou, University of Amsterdam

"How do knowledge holders identify, visualise, and spatialise local knowledge and practices that contribute to natural resource management in Kalomo District?"

The contribution of local and traditional knowledge to improving social-ecological systems has gained increasing attention in academia, policy-making, and civil society over the last decade. For example, the United Nations' Declaration on the Rights of Indigenous Peoples and the Convention on Biological Diversity, have helped to elevate recognition and protection of local and traditional knowledge for sustainable development. However, there are still important knowledge gaps, in particular related to the contribution of local and traditional knowledge to sustainable landscape management and how to best engage local communities in decision-making processes.

This is particularly the case for the Tonga people of Zambia, in Kalomo District. Hence, we aim to synthesize existing Tonga local knowledge (luzibo lwakokuno) practices that contribute to conservation and sustainable landscape management as well as engage in the implementation of integrated landscape approaches in Kalomo District, Zambia.

Combining walking interviews with walking photovoice and focus group discussion in three villages within Kalomo District, we observed that communities still use local knowledge to manage natural resource management, such as land, forests, water, cattle, and sacred places. Women are especially important knowledge holders for land management, agriculture practices and trees conservation. Youth are also important local knowledge holders, acknowledging the importance of inter-generational knowledge transfer for managing natural resources. Our results also show that local knowledge is

already integrated with what is called ‘external knowledge’ (e.g., government, NGOs) and people use luzibo kusangana (integrated knowledge) when local knowledge is deemed insufficient to fulfil their needs, mainly regarding crop cultivation, water, and cattle management. In some cases, we found that ‘external knowledges’ shared for helping communities are local practices that have been already existed for decades, e.g., manure practice.

We conclude that there is the need for further research to better understand the role of contextualized local knowledge and which local practices contribute to sustainable natural resource management. Doing so can inform the development of evidence-based policy that incorporates local knowledge and ensures local voices are properly integrated within decision-making processes.

Freddie Siangulube, CIFOR

“Negotiated governance in a contested landscape: what can we learn from multi-stakeholder platforms for landscape approach implementation?”

Addressing trade-offs among conflicting interests in landscape governance remains a crucial challenge. Multi-stakeholder platforms (MSPs) that are being promoted as a form of negotiated governance to help reconcile competing land uses and identify common concerns require practices that overcome inequities in participatory planning. This is particularly the case in contested landscapes where many stakeholders lack negotiation capacity. The political ecology of negotiations was investigated by examining processes and practices of two MSPs in Zambia's Kalomo District. Using participatory mapping, we observed and documented discourses and processes aimed at reconciling competing land uses. We found that in both MSPs, community mapping of desired landscape scenarios potentially triggered a process to simultaneously co-develop a framework for identifying common concerns as well as providing leads on actionable priorities. Prior to mapping, the process of identifying problems, allocating land, and agreeing on land use priorities initiated a negotiation process of trade-offs and synergies involving pastureland, forestry, and agriculture. We found that stakeholders in one MSP ultimately reached a compromise on a draft land-use map, which was widely regarded as a potential tool for further negotiations with the district land-use planners. The other MSP was unable to create a common map due to deep-seated social-cultural issues. The disparity between the two, illustrates that MSPs’ potential for negotiations must be understood in context of environmental histories of a place and within the constraints of place-based institutions rather than being too generalized. In this paper, we illustrate two issues: first, sometimes the same institutions that negotiations are designed to facilitate, occasionally, are tools that engender resistance to successful negotiation outcomes from some participants. Second, MSPs need to be inclusive, foster legitimacy and collaborative process. We propose that MSPs in the research region evolve from "mere consultations" to "innovative participatory forums" that encourage stakeholders to genuinely engage in processes to negotiate alternative outcomes. We contend that such an approach is likely to contribute to the implementation of landscapes approaches.

Alida O’Connor, University of British Columbia

“Understanding cross-scale dynamics to inform integrated landscape approaches: Evidence from Kalomo District, Zambia”

There is growing recognition global challenges such as biodiversity loss, climate change, food insecurity, and poverty are interconnected issues. This signals the need for a shift from conventional sectorial

management to integrated solutions, and integrated landscape approaches (ILAs) are an opportunity in this regard. ILAs are broadly defined as long-term participatory processes for reconciling competing land uses for improved socioeconomic and environmental outcomes. ILAs are predicated on the assumption collaboration across scales, sectors, and diverse social groups can and will occur to achieve more equitable and sustainable landscape governance. Yet, there is little evidence showing if, how, and when collaborative governance occurs. This study explores the constraints and opportunities of collaborative landscape governance in Kalomo District, Zambia. Kalomo is located in Zambia's Southern Province and is comprised of three Chiefdoms. In recent years, Kalomo has undergone significant land cover change and rapid deforestation for land uses such as charcoal and tobacco production, infrastructure development, and agriculture expansion driven by a growing population. Kalomo Hills Forest Reserve, critical for soil and water conservation, has faced ongoing encroachment and deforestation. The multifunctionality of this landscape and mounting pressures from population growth make Kalomo an ideal case study for operationalizing an ILA. Semi-structured interviews and focus group discussions were conducted at the community scale across three Chiefdoms, and at the district level with institutional representatives. Semi-structured interviews were designed to understand land-use priorities and perceptions of power and decision-making authority across stakeholder groups. Focus group discussions were used to explore perceptions of collaboration. Preliminary results from three months of fieldwork (April-July 2022) provide important insight into the political ecological forces (such as power, scale, and other social constructs) that shape existing governance structures in Kalomo. These findings are critical for understanding the process of collaboration expected to underpin ILAs.

Moira Moeliono, CIFOR

"Puzzling out the Landscape: integrated watershed management in Kapuas Hulu"

Landscape governance is a multi-dimensional puzzle consisting of multiple layers, multiple stakeholders each with their own interests and needs, forced within a legal framework that itself is composed of many layers. The puzzle is messy in that different configurations are possible. To find the optimum configuration, multistakeholder platforms (MSPs) are increasingly considered a necessary tool. In Kapuas Hulu, Kalimantan, one such MSP was convened to accommodate these multiple needs and develop collaborative management plan for the Danau Sentarum watershed area. This paper describes the tools and strategies to put the pieces of the puzzle together, and highlights lessons learned from the process, the connections and disconnections among the stakeholders, adaptive learning, and whether the common vision developed can and will survive its operationalization.

Mirjam Ros-Tonen, University of Amsterdam

"Accommodating power and inclusivity in integrated landscape approaches: what can we learn from political ecology?"

Rural people whose livelihoods depend on tropical forests must cope with dynamics that rapidly change their landscapes. Integrated landscape approaches (ILAs) aim to holistically address such dynamics and associated threats to forests, biodiversity, food security and climate resilience. ILAs embark on multi-level, cross-sectoral and multi-stakeholder processes around common concern entry points to achieve negotiated outcomes on trade-offs between conflicting land uses and conservation and development aims. So far, the debate on landscape approaches has mainly centred on the characteristics and design principles of such approaches. While scholars and practitioners increasingly acknowledge power imbalances as a challenge to achieving such negotiated outcomes, how to deal with such power

imbalances and ensure the inclusivity of ILAs receives much less attention. Based on a literature review and examples from practice, this paper explores how political ecology can be made functional for the operationalisation and implementation of ILAs. We found that political ecology can provide insights into the politics and framing of human-nature interactions and the diverging interests, power imbalances and inequalities in resource access and decision-making at the landscape level but is poor in providing a policy-relevant counter-narrative. We argue that a political-ecological analysis of discourses, diverging interests, and power imbalances in a landscape is a necessary first step towards implementing a landscape approach. Only then can ILAs contribute to inclusive landscape governance in contexts characterised by poverty, inequality and power disparities.

Keywords: Landscape approaches, Political ecology, Discourses, Power imbalances, Diverging interests, Inclusive development

Session 32: Data & Methods for Understanding and Promoting Forests & Human Wellbeing 5

Geoff Wells, Stockholm Resilience Centre

"Putting people in plots – opportunities, challenges and lessons learned from integrating social-ecological monitoring into an ecological plot network"

Long-term, social-ecological data are crucial for measuring and monitoring of forest and woodland ecosystems to meet international commitments to achieve biodiversity and sustainable development targets. Great opportunity for such monitoring exists through the many widely distributed networks of ecological plots that take long-term tree-by-tree measurements in forests. Yet few of these networks include human dimensions. Unlike explicitly social-ecological data generation efforts (e.g. IFRI, PEN, PROFOR), networks of forest plots are usually heavily ecological in their origin and design. Where this has occurred, it is usually limited to basic information on human disturbance, with little detailed plot-level information on social-ecological context, species harvesting and use, resource rights and governance—all key moderators of change in forest systems. Human-environment dimensions are particularly relevant in African woodlands which are disturbance-driven systems and "lived in" landscapes. Here ecology needs to be understood in the context of social processes.

Through SEOSAW (a socio-ecological observatory for studying African woodlands), we are developing a process for transforming existing networks from 'ecological' into 'social-ecological'. Building on learning from existing social-ecological data collection initiatives in forests, we are undertaking a novel process of using existing information and rapid field data generation to integrate a social-ecological component into an existing ecological plot database. In this talk we describe our efforts to develop a set of standardised companion social protocols to the existing ecological protocols to capture the fine-scale, shifting context of natural resource use, management and governance that affects and is affected by woodland structure and composition. We present our initial findings based on implementing pilot surveys in Tanzanian, Namibian and Angolan plots. Although this holistic approach is conceptually and practically challenging, our efforts will contribute to collecting integrated, regional to continental scale, social-ecological data. We also reflect on the opportunities, challenges, and lessons learned in integrating social data with ecological plots for other plot networks with the aim of motivating plot networks to consider the human component of ecosystems.

Victoria Maguire-Rajpaul, University of Oxford, University of Cambridge, and Anglia Ruskin University

"Implementing zero deforestation international commitments risk entrenching old hegemonies in Côte d'Ivoire and Ghana: a multiple environmentality analysis"

Cocoa – the primary ingredient of chocolate – thrives in the understory of tropical forests. Accordingly, chocolate corporations have depended on tropical forests and drawn on low-cost labour in the tropics to cultivate cocoa. Smallholders in Côte d'Ivoire and Ghana supply over 60% of global cocoa to the $120bn chocolate industry. More than a century of extensive cultivation of cocoa and other agro-commodities has contributed to widespread deforestation in Côte d'Ivoire and Ghana, with at least 80% of West Africa's original rainforest extent now an agriculture-forest mosaic. Like colonialists and multilateral banks before them, foreign chocolate corporations – in this new era of international commitments – attempt to govern the behaviour of smallholders in Ivorian and Ghanaian forests via a recent proliferation of 'climate-smart' cocoa (CSC) schemes. The presented article examines if anything is new and different about contemporary promises of 'zero deforestation' and 'climate smart' for the governance of cocoa and forests. To do this, Fletcher's 'multiple environmentalities' framework is applied and temporally extended to classify the various techniques by which smallholder behaviour has been steered throughout the history of cocoa and forest governance, comparing the cases of Côte d'Ivoire and Ghana by drawing on interviews with 200 smallholders and documentary analysis.

Individuals change their behaviour towards the environment for multiple reasons. The multiple environmentalities framework parses diverse 'techniques of government' used to shape subjects' behaviour, including: sovereign (imposing laws), disciplinary (internalising norms), neoliberal (constructing material incentives), and liberation (emancipatory self-rule). We show that across all eras and in both countries – despite divergent political economies – smallholder behaviour and their livelihood options have been predominantly governed by neoliberal and sovereign governmentalities, whose legitimacy has increasingly relied on reframing smallholders as environmental subjects. We demonstrate how smallholder voices remain marginalised in international zero-deforestation commitments and argue that corporate-led CSC promises and their implementation build upon and re-employ past sovereign powers (e.g., threatening to evict smallholders from protected forests), thus entrenching long-standing power asymmetries and overlooking critical differences between countries. A noteworthy challenge is that cocoa's cross-border corporate governance schemes ignore, and thereby risk inflaming, Ivorian violence and ethno-religious strife.

Matthieu Stigler, Eidgenössische Technische Hochschule Zürich (ETHZ)

"Are supply-chain deforestation initiatives effective? The effects of zero-deforestation commitments in Indonesia's palm oil sector"

Expansion of palm oil in Indonesia has acted both as a large source of national income and a major driver of deforestation. Over the last decade, dozens of palm oil companies have adopted commitments to eliminate deforestation from their supply chains. Measuring the effectiveness of supply chain initiatives to reduce deforestation is key for understanding their contribution to forest conservation and rural livelihoods. Previous evidence is mixed, and analysis is further complicated by the complexity of the palm oil supply chain, where links between companies with deforestation commitments and upstream plantations are hard to establish. This is particularly the case for smallholder farmers, whose exposure to supply chain commitments is largely unknown.

In this paper, we study how exposure to zero-deforestation commitments (ZDC) can reduce deforestation in the palm oil industry in Indonesia. We match data on supply chain linkages with a

database of corporate ZDC stringency and quality. This allows us to analyse the complexity and temporal dynamics of the supply chain, and to construct a measure of ZDC exposure at a fine spatial scale. Combining these data with satellite measures of forest loss, we use econometric methods to analyse how exposure to ZDCs affects deforestation. Finally, building on a novel dataset mapping plantation types, we study how those dynamics differ between smallholder and industrial oil palm plantations. This research represents the first effort to assess the effectiveness of palm oil companies' zero-deforestation commitments based on an in-depth analysis of supply chain linkages from smallholders to large companies.

Laura Moro, Uppsala University

"Land-use change affects habitat availability through time for tropical trees"

Land-use change presents major threats to biodiversity with impacts typically outpacing those from climate change. Consequences of land-use change can, however, be cryptic and delayed, and can be particularly severe for islands and biodiversity hotspots, including tropical forests. In many tropical regions, abandonment of agricultural lands is leading to gains of naturally-regenerated forests. In Puerto Rico, for example, forest cover dramatically increased from ~6% in the early 1900's up to ~55% today. We quantified the impacts of land-use change on the area and configuration of suitable habitat patches for 566 native tree species in Puerto Rico to understand how land-use dynamics have affected their current geographic distributions and population sizes.

We built species distribution models (SDMs) for all native tree species in Puerto Rico (N=566) based on current geographic distribution and abiotic conditions. We then combined SDMs with available data on land-use change (based on historical aerial photos from the 1930s, 1950s, and 1970s, combined with more recent satellite imagery) to estimate habitat availability through time. We used Plot based data from the Forest Inventory and Analysis (FIA) Program of the US Forest Service to estimate current population sizes and forest cover. Our results provide species-specific information on (i) the areal extent (km2) of climatically suitable habitat at different time points, (ii) fragmentation indices of suitable habitat at different time points and (iii) species responses to land-use change according to their life history strategies and phenotypic traits.

As habitat availability changed, we observed both gains and losses across different species in the amount and configuration of suitable habitat according to the different types of land uses, the rate of forest clearance and gain. Species-specific responses varied according to the degree of fragmentation, as well as species' life-history strategies and phenotypic traits. As land use is dynamic in many tropical regions, a deeper understanding of species and populations' response to this disturbance is of vital importance at both a local and global scale.

Samantha Cheng, WWF

"Elinor: Enabling the gathering, storing, and use of data and knowledge on governance and management for area-based conservation"

Environmental governance and management are critical for shaping conservation outcomes and ensuring that associated processes and outcomes are equitable and just. The academic literature on environmental governance and the tools, methods, and approaches designed to operationalize these concepts underscore the importance and need for using data on governance and management to

support informed and collaborative conservation decision-making. Yet, often conservation leaders, managers, and practitioners lack sufficient capacity to collect, manage, and use governance and management data to inform decision-making. Here, we introduce Elinor, a new tool and data system designed to facilitate the storing, sharing, and use of data on shared measures for equitable management and governance globally. We explain the process of co-designing the tool and data system, the information it collects and stores, and the flexible pathways through which data can be generated - through participatory assessments and/or practitioner perceptions. The Elinor tool and data system holds promise for bringing data and information on environmental management and governance to the forefront of conservation decision-making given its capacity to streamlines data collection, storage, visualization, and use. The flexible pathways for data collection can lower the barriers to use, and increase the likelihood that more users will adopt the tool and data system for tracking management and governance which can contribute to a global dataset on equitable management and governance. Elinor is not without challenges: The specific indicators that can best track management and governance may change over time, which could disrupt the capacity to collect time-series data. The flexible approach to data collection and broad nature of the tool may make it difficult to make robust conclusions on the status and trends in governance and management. And finally, the sustainable funding models for monitoring platforms such as Elinor are currently weak and require further thought and development. In a post-2020 world, countries around the world need flexible systems that can help governments, non-governmental organizations, and citizens measure and track the equitable and effective governance of area-based conservation: We hope Elinor can help fill this gap.

Session 33: (Forest) Landscape Restoration: People, Trees, Politics 5

Davide Pettenella (Presenting for Marion Karmann), FSC International

“Making FSC work: Enabling conditions for responsible community-based tropical forest management and restoration”

FSC certification was for long regarded as a “timber certification tool”. In fact, FSC is about quality assurance of responsible forest stewardship, and it offers through its multi-stakeholder engagement approaches much more than just certificates. In response to its members’ request, FSC has worked in recent years on better options for smallholdings and forest managing communities (CMF); on gender-responsive approaches in forestry; and works in partnerships to develop a global framework for restoration.

A basic consideration is that forests, which generate an income for the custodians are less likely to be converted to other land use. Certificates help consumers to make informed choices, to support responsible foresters in giving preference to certified products. The certificates confirm that a forest is being managed to ‘preserves biological diversity and benefits the lives of local people and workers, while sustaining economic viability’, according to FSC’s mandate.

FSC has set itself high goals:

- Currently around 7 % of the total forests managed according to FSC rules are smallholder and CMFs. FSC aims at doubling the area owned/managed by these constituents within the next 5 years.

- People who formally manage forests tend to be male and tend to come from privileged urban backgrounds. To achieve its mandate, FSC needs to work towards a situation in which all forest

managers can contribute to fulfil FSC's mission, regardless of their gender, ethnicity, socio-economic or any other status.

- FSC intends to reach out far beyond the 10% of set-asides for conservation and/or restoration included in each of the certified entities. FSC's goal is to provide on short term restoration verification claims within the scope of FSC's current system, and to set by 2026 the stage for a 'proof-of-concept' that generates momentum for the global restoration agenda.

I will show that with FSC's multi-stakeholder engagement we already implemented tools to meet these goals, such as the Community and Family Forests Program and the Ecosystem Services procedure. Other tools are in development, such as the Strategic Framework on Diversity and Gender, and the Restoration Toolbox.

I call researchers to monitor FSC's processes, and to evaluate FSC's progress towards these goals.

Patrick Waeber, ETH Zurich

"Rural livelihood strategies in times of change"

In the Alaotra, one of the main rice and inland fish production areas in Madagascar, growing anthropogenic pressure is having negative impacts on biodiversity and the natural ecosystems. To strike a possible balance of biodiversity values with the growing need for agricultural products and other ecosystem services, the understanding of livelihood needs, the main resource users' attitudes towards and perception of life, livelihood, and lemurs become essential.

We used participatory-based modeling approach to facilitate collective action in the field of natural resources management. It is based on an inductive process of creating conceptual models from field evidence and statements from key stakeholders. It involves restitution to knowledge providers in the form of interactive haptic tabletop Role Playing Games (RPGs) having the same structure as the conceptual models developed. In an RPG approach, human "players" bring to the model their own judgment, values, beliefs, and objectives. The process is iterated in a cycle of field work-modeling-simulation-field work again, where the models created are merely boundary objects facilitating collective and interdisciplinary thought. With the active participation of more than 100 local resource users, mainly farmers and fishers, we developed a model, RPG, to better understand livelihood strategies. Three main traits emerged. Specialist, Traditionalist, and Opportunists. Results showed that Specialist and Traditionalist livelihood strategies were the most resilient better coping with disturbances and change.

Resource users are confronted with stresses and shocks impacting all aspects of their lives and affecting their five capital stocks (financial, human, natural, physical, social). The coping and reactive adaptation strategies currently implemented by resource users in the Alaotra region are insufficient to sustain their asset base considering the high levels of resource dependency and inability of a large portion of participants to prepare for the unexpected. Although proactive adaptation measures such as improved infrastructure and education are needed, these seem unlikely to be put in place by authorities due to the country's current political and economic situation, making farmers' prospects even more grim when considering the fast pace of changes that are taking place.

Felipe Jordán, University of California, Santa Barbara

"Forestry plantations and the demise of rural livelihoods"

As part of global targets to reforest the world, many developing countries have made ambitious commitments to rapidly expand the area of plantation forests. In many cases, these commitments have been motivated by a desire to encourage rural economic development and improve living standards for marginalized, rural communities. However, evidence of the economic impacts of plantation forests are scarce---obtaining causal evidence on how plantations affect rural communities is challenging, as plantations typically expand into regions where returns to investments are expected to be higher. This paper helps fill this gap by exploiting quasi-experimental variation underpinning the expansion of forestry plantations in Chile. In 1974, a program began selectively subsidizing forestry plantations, leading to a differential pattern of expansion of forestry plantations on subsidy-eligible land vis-à-vis land that was not eligible. We exploit this differential pattern by instrumenting the fraction of forestry plantation in a given location with the interaction of the fraction of subsidy-eligible land and distance to pulp mills built before 1974. We find that, by 2014, forestry plantations had led to a decline in the share of grasslands and native vegetation, land uses that had traditionally supported rural populations. This transformation of rural land use was associated with a dramatic shift in local labor markets---plantation expansion drove a sharp decline in rural populations, as well as a decline in labor market participation and an increase in unemployment. Although some rural inhabitants were able to migrate away from labor markets that had been weakened by plantation forestry, we provide evidence suggesting that more culturally and economically vulnerable groups faced high frictions that prevented their out-migration. In aggregate, Chile's plantation forests appear not to have delivered the rural, economic gains that motivate many public policies supporting plantation expansion.

Jeanine Rhemtulla, University of British Columbia

"Assessing the early social and ecological outcomes of national reforestation initiatives in Ecuador and Mexico"

Over the past decade, motivated by the New York Declaration on Forests, the Bonn Challenge, and the UN Decade on Ecosystem Restoration, countries around the world have made ambitious pledges to reforest degraded landscapes. How are these national initiatives being implemented, and what are their early social and ecological outcomes? We examined these questions in Ecuador, which implemented its first National Reforestation Plan from 2014-2017 at a cost of $40 million USD, and in Mexico, which is now planting trees across ~1M hectares in partnership with ~500,000 families under its national Sembrando Vida program. We interviewed program managers and implementers in Ecuador in 2017 and again in 2022 to qualitatively assess outcomes of the first reforestation plan, lessons learned, and changes implemented in the second national plan (2019-2030). For Mexico, we used municipality-level data to quantitatively assess spatial patterns of program implementation to analyze how well the program is meeting its social and ecological goals in terms of assisting marginalized households and targeting deforested and other ecologically prioritized lands. We found that governance was a key challenge to achieving long-term persistence of reforested areas in Ecuador, but that program design has shifted to attempt to address these issues in the second national plan. Early outcomes of Sembrando Vida are mixed, with better attention to social than ecological goals. Finally, we also found that initiatives in both countries are not as well connected as they could be to the global academic discourse on restoration. Although there has been skepticism of the potential for success of large reforestation initiatives, there is also much opportunity to leverage current global interest and funding to achieve desired outcomes. Learning from early outcomes is key to our conceptual understanding of

how and whether reforestation programs can meet multiple goals, and practically for informing and improving program design in countries around the world.

Alberto Garcia, University of California, Santa Barbara

"Targeting with non-compliance in Chilean payments for native reforestation"

Widespread reforestation has become an important part of global efforts to address the intertwined challenges posed by climate change, biodiversity loss, and rural poverty. In response to concerns that plantations of exotic species may undermine objectives of increased carbon storage, biodiversity, and community involvement, some policies have sought to reforest with native species. Payments for reforestation is one policy design likely to play an increased role as countries aim to scale up their reforestation efforts. We evaluate land cover impacts of a Chilean federal program that pays landowners to reforest their property with native species and prioritizes program co-benefits such as the engagement of smallholders, indigenous peoples, and rural communities. One major factor influencing the overall impact of the program is low follow-through by awarded participants. Panel data for program beneficiaries and comparable unawarded properties allow us to control for fixed differences and time trends affecting both groups using difference-in-differences methods that avoid concerns surrounding heterogeneous treatment effects. In this context, we find that while landowners provided additional vegetation cover when projects are completed, members of prioritized groups suffered from the lowest levels of follow-through, undermining true win-wins. Further, while properties receiving extension services were more likely to follow-through, members of socially prioritized groups were less likely to receive this assistance. This paper provides some of the first causal estimates of the impact for payments for native reforestation and highlights key differences in targeting in payments for reforestation in contrast to avoided deforestation. While paying landowners who would have provided forest even in the absence of payments may be less of a concern in the reforestation case, program effectiveness relies on the ability of landowners to complete incentivized activities. In line with international commitments, payments for reforestation are likely to play a role in scaling up reforestation efforts across the globe, and while they have potential to provide both environmental and social development benefits, the careful design of these programs is critical to ensure that the potential is met.

Session 34: Beyond the Forest Edge: Trees on Farms and in Cities 2

Margret Köthke, Thünen Institute of Forestry

"Is there an evidence base to assess the alleged benefits of agroforestry?"

Agroforestry is often seen as a panacea that offers multiple environmental, economic, and social benefits. The validity of generalized statements on agroforestry outcomes however is doubtful since the evidence base is unclear.

In practice a wide diversity of existing agroforestry practices, outcome indicators, and geographical locations is given. Accordingly, research provides a variety of individual findings and case studies on specific outcomes of individual agroforestry practices in specific sites. The overall picture of available scientific evidence on agroforestry outcomes, however, remains opaque.

For this study, we created an evidence review map for clarifying whether and in which areas the research landscape allows conclusions to draw on potential benefits or drawbacks of agroforestry compared to other land uses. Based on a systematic literature search and screening from 2,164 articles, we identified a final set of 64 systematic review articles that summarize ecological, economic, or social outcomes of at least one agroforestry practice compared to a control. We critically appraised the identified articles and mapped their thematic and geographical coverage to identify density and research gaps in the evidence base.

Such a comprehensive and comprehensible overview of research on agroforestry outcomes was not been available before. It provides easy access to and comparison of densely researched topics, such as environmental effects related to climate change, water, biodiversity, soil and pest/ disease control, as well as for productivity aspects of individual agrisilvicultural practices. It also shows research gaps, such as for individual silvopastoral and agrosilvopastoral practices, and for social outcomes of all agroforestry types.

The results of the evidence mapping highlight further research needs, but also urge for caution in making generalized statements about the benefits of agroforestry.

Sam Harrison, University of Edinburgh

"Exploring the spatially varying patterns of agroforestry adoption"

The adoption or maintenance of trees on farms can have a range of benefits to people and the environment including for biodiversity and carbon sequestration. In order to promote and develop these practices, we need to understand the factors that influence the adoption of trees on farms. Socioeconomic characteristics affect whether farmers adopt agroforestry and biophysical characteristics also control the trees people keep on their farms. The literature explores the factors affecting agroforestry adoption in smaller-scale case studies. However, across available case studies, the significance, direction of the relationship, and strength of the factors is not consistent. We can therefore not extrapolate lessons on agroforestry adoption from case studies across a region or nation. Using Uganda as a case study, the spatial patterns of socioeconomic and biophysical factors affecting agroforestry adoption are explored. Using a combination of household survey data, census information and Earth observation data, the relationships between adoption factors and aboveground biomass on farms is tested. Random forest regression modelling was used in each lower-level administrative unit to explore how the relationship changes across the country. The results showed that the relationship between aboveground biomass on farms and socioeconomic characteristics like household wealth, household head demographics and education levels changes in significance and strength across the country. Biophysical factors are also important throughout the country. The reasons behind the spatial variation are discussed. These results provide a better understanding of how the adoption of agroforestry varies across a country, allowing more informed promotion of trees on farms.

Mette Olwig, Roskilde University

"Cocoa Farms, Trees and Climate Change: The Biophysical and Socioeconomic Opportunities and Challenges of Agroforestry"

Cocoa is not only the key ingredient in chocolate, it is also an important cash crop providing a livelihood to millions of farmers. Cocoa trees are particularly sensitive to drought and high temperatures, and

cocoa cultivation is therefore predicted to decrease substantially due to climate change, with dire consequences for farmers' livelihood. In Ghana, cocoa farms were effectively agroforestry systems until full-sun systems were encouraged by the government after a dramatic drop in cocoa output in the early 1980s. Today, there is a push to reintroduce agroforestry practices because research is generally positive regarding their potential to increase farms' resilience to climate change while providing additional and more stable income, enhancing biodiversity, supporting healthy ecosystems and countering deforestation. Nevertheless, cocoa agroforestry research often investigates solely the health of cocoa, the export crop. This study moves beyond this narrow focus to examine the complex of plant species and their environmental and societal attributes, as well as the social and institutional context within which agroforestry practices are introduced.

This paper is based on research conducted as part of the project Climate Smart Cocoa Systems for Ghana, which included field observations, interviews and discussions, 402 household surveys and 20 focused group discussions conducted from February to May 2019 in 12 cocoa communities across the Ashanti, Ahafo, Western, and Western North Regions, literature reviews, and on-farm study experiments. Overall, our study substantiates claims that agroforestry can address climate change impacts in the cocoa sector. Yet, the study also provides important specific, as well as overall, recommendations for policy and practice. It shows that integrating shade trees into cocoa farming systems requires both socioeconomic knowledge of institutional factors, such as land and tree use rights, and biophysical knowledge of, for example, crops and the types and densities of trees that, when combined, minimize nutrient competition, manage pests and diseases, and enhance yields of cocoa as well as timber, fruits and firewood. Importantly, this knowledge of socioeconomic and biophysical factors needs to be place-specific as local dynamics vary even between the 12 cocoa communities studied as part of this research project.

Kate Talano [presenting for Niwaeli E Kimambo], Middlebury College

"Whose woods are these? Anatomy of a woodlot boom in western Uganda"

Conservation practitioners and scholars have long been concerned with the tradeoffs between slowing landcover change and safe-guarding livelihoods of local people. This balance grows yet more complex as, increasingly frequently, landowners and managers are not local people. In Western Uganda, there is a notable shift in land cover toward woodlots of fast-going trees. The shift has occurred alongside strong markets for timber, firewood, and electric poles, and has tended to replace smallholder agriculture and wetlands. We investigated the extent to which woodlot boom has been driven by non-local "absentee" / investor owners. Between 2017 and 2019, we conducted a complete census of 400 woodlots in a 3-mile case study area, mapping the woodlots with a GPS and surveying the owners. We found that 20% of the landscape is now in woodlots and over a third of them had been planted within 5 years. Non-local owners were responsible for over half of extant woodlots, and though their woodlots were not significantly different in size than those owned by community members, non-locals were more likely to plant woodlots in upland sites that community members would prefer to use for other purposes, and much more likely to plant the fast-growing varieties of Eucalyptus with highest water draws. The majority of the non-local owners were Ugandan nationals living in more urban areas. The extent to which the woodlot boom represents financial investments of outsiders has implications for both the conservation and poverty alleviation outcomes associated with this landcover change.

Natsuho Fujisawa, Wageningen University & Kyoto University

"Food consumption habits as a key element for land management: a case study from agroforestry frontier in Chiapas, Mexico"

Forest-landscape has worked as a source of different foods and has much potential to enhance food security which is one of the crucial issues in rural areas.

In the agroforestry frontier, farmers combine various land uses for different purposes. Farmers often obtain their food not only from croplands but also from such diversified land patches. Daily food consumption of local residences has complex interactions with such landscape management, although little attention has been paid to the role of food consumption on land use management.

This study aimed to reveal how local daily food consumption interacts with livelihood activities and influences land management. We combined seasonal patterns on food consumption, livelihood activities, and production by making calendars with both women and men in households in the rural agroforestry frontier in Chiapas, Mexico. We conducted interviews, food surveys, and field visits to know each menu's cultural context that they consumed daily or on special occasions.

We showed that each dish contains various ingredients connected to various food production and also to off-farm works. We also found that some key food cultures enabled local people to use the resources from different land patches efficiently.

For sustainable food systems, much research related to forest management has been focused on the nutritious potential of minor food obtained from forests. In addition to it, it is essential to recognize that the local food culture influences resource uses and plays a crucial role in determining land management.

Finally, centering food consumption as a research approach can involve different family members in the discussion to visualize the connection to forest landscapes, not only the one who engages in food production most. Also, connecting daily food consumption and livelihood activities provides a basis for discussion with local people to improve their food system and land management.

Session 35: Biodiversity, Forests and Livelihoods 4

Grayson Shanley [Presenting for Jessica L'Roe], Middlebury College

"Characterizing variability in forest dependent households across multiple landscapes in Africa"

Many rural households in the African humid tropics depend directly on forest products for their livelihoods. Empirical information about which households are most dependent can inform equitable and sensitive forest management policies. We use data from 15,614 households' surveys conducted by the Wildlife Conservation Society around 6 protected forests in Central Africa and Madagascar to assess overall predictors of forest dependence and the way they can vary with context. We find that overall, indigenous and poorer households collect natural resources significantly more frequently and are more likely to practice forest-based livelihoods, while newly arrived households are significantly less engaged with forest-based resources. These patterns vary with landscape context; for example, indigeneity is most important around protected areas in the Congo Basin relative to landscapes in Nigeria and Madagascar. Meanwhile, patterns of dependence also vary within landscapes for particular forest resources: the profile for households most heavily engaged in bushmeat harvest is very different from those who most frequently collect firewood. Results from this study add to the rich and growing

literature on forest dependence by using data collected with a consistent methodology in regions with relatively low availability of large-scale social data to better understand which patterns of forest dependent households remain generally consistent and how relationships vary with context.

Amanda Martvall, Chalmers University of Technology

"Herbal medicine promotion as part of a bioeconomy strategy for the Amazon: A reality check on Brazil's experience"

Herbal medicine production and use have long been recognized as key to many forest-based livelihoods, and it is now experiencing growing momentum under an emerging bioeconomy paradigm. Medicinal plants have provided humankind with curative treatments for millennia, and they can play a critical role in the creation of new drugs while promoting local value-chain development. Biodiversity and traditional knowledge valorization can be particularly vital for forest regions – such as the Amazon – lacking sustainable economic alternatives to logging, poaching, or forest clearing for large-scale agriculture. However, while those potentials have long been heralded and start to enjoy renewed interest, a reality check on challenges, risks and opportunities may be in order. To study the promotion of herbal medicines as a sustainable development strategy, we have chosen Brazil as a case, an emerging country with a megadiverse flora and rich cultural diversity. We have focused mainly on the Amazon region and the implementation of Brazil's Living Pharmacies (Farmácias Vivas) program, an ongoing policy to integrate state-approved herbal medicines into the public healthcare system. Besides reviewing the relevant literature in English and Portuguese, we have carried out two months of fieldwork between the country's North and Southeast Regions in early 2022. During that period, we conducted 21 interviews with Brazilian key informants, mainly in the Amazon region, including stakeholders from local communities, local experts in academia and industry, and representatives of environmental organizations. We also visited eight different local initiatives for herbal medicine bio-based value chains in the Amazon. Our findings suggest that important challenges have been overlooked despite this sector's promises, including difficulty meeting stringent regulatory requirements, scant financial support, lack of legal or business expertise in local communities, and irregular plant material supplies. There is also limited social acceptance of herbal medicines in Brazil, where they are commonly associated with Indigenous or Afro-Brazilian religious practices. Addressing such social and techno-economic barriers is critical for broader herbal medicine promotion. We conclude with various lessons from Brazil's Living Pharmacies experience that may be of value also to other biodiversity-rich countries seeking to use it to promote livelihoods and bio-based development.

Ning Zhang, Zhejiang University

"Exploring local livelihood and forest management in protected area: a case study of Qianjiangyuan National Park"

Conservation easement, an institutional tool of natural resources and ecological environment protection, has been employed and studies in many countries. The practices in China have just started, and have shown special social-economic and ecological characteristics. Specifically, it involves usually a large group of local people, and government plays essential role in designing and transferring the property rights of resources, active participation of local people is lack. In general, it does not differentiate fundamentally from traditional ecological compensation paradigm. Existing studies mainly concentrate on the way how it implemented while its social-ecological impacts remain unclear and understudied. This study aims to estimate the impacts of conservation easement on local households'

livelihood, rural society and ecology based on case study from Qianjiangyuan National Park, one of the first pilot project of forest conservation easement in China. We found that conservation easements had negative impacts on the income of farmers who were originally engaged in forestry work on the short term. At the meantime, locals farmers are increasingly engaged in non-agricultural activities, and the ecology of forests was improved. Based on this, this paper further explores the possible policy innovations and tools to better facilitate the practice of conservation easement as an institutional tool to protect land and natural resource in China.

Dietmar Stoian, CIFOR-IRAF

"Economic viability of community forest enterprises as key determinant for forest conservation and livelihoods development in the Maya Biosphere Reserve, Guatemala"

Community forestry plays a crucial role in the conservation of tropical biodiversity and the livelihoods of forest-dependent people. Scientific debate and policy dialogue have focused on forest tenure and use rights while economic and business aspects of community forestry have received less attention. We show the importance of such aspects based on an in-depth study of community forest enterprises (CFEs) operating forest concessions in the Maya Biosphere Reserve (MBR) in Petén, Guatemala.

Since 1994, 12 community forest concessions have been granted to as many CFEs on about 400,000 ha in the MBR. Today, nine of these concessions with a total area of 352,089 ha are active. They combine protected and production forests on 44% and 56% of their concession area, respectively. The concessions vary in terms of area (12,218–83,558 ha), share of production forest (8,823–44,833 ha), and availability of precious woods like mahogany. All CFEs have machinery and equipment for logging and wood processing, selling sawn wood as principal product with a certificate from the Forest Stewardship Council.

We studied logging and milling operations of the nine active CFEs over the period 2012-2020, with emphasis on the volumes and species extracted, the value of processed wood, and the income generated by more than 1,000 CFE members. Our study shows a total value of US$38,6 million generated, with a mean annual value of US$4.3 million. Forest income contributes significantly to the livelihoods of CFE members (38% of total household income), followed by petty trade and other activities.

The case of the community forest concessions in Guatemala shows that, in addition to legal access to forest resources, the economic viability of CFEs is critical to ensure forest conservation and livelihoods development. In the nine active concessions, forest income has allowed CFE members to move out of poverty while at the same time conserving the forest. In contrast, the three inactive concessions were not sufficiently endowed with precious woods and, hence, could not sustain economically viable CFEs. Our findings are relevant at global scale as community forestry is gaining momentum while associated CFE development is still in its infancy.

Bernardo Peredo, Former Honorary Research Associate at the Environmental Change Institute, Oxford University

"Indigenous ecotourism in forest areas: Opportunities for biodiversity conservation, forests and sustainable livelihoods of indigenous communities in the Amazon?"

For more than three decades, ecotourism has sought to address environmental and social issues as a way to reconcile biodiversity and forest conversation with development goals. In recent years, community-based tourism, ecotourism specialists and environmental conservation NGOs, among others, have tried to help local and Indigenous communities develop their own projects and initiatives in both Indigenous territories and buffer zones to protected areas. Since the 2000s, many Indigenous communities have also started to organize themselves in order to run their own ecotourism programs with environmental and livelihoods goals, including forest conservation.

Scholars have suggested that Indigenous ecotourism in Latin America started in Ecuador, which has a wide range of ecotourism initiatives throughout the country and with the advent of community-owned projects, particularly in the Amazon, then similar projects were replicated in other countries in the region. Yet these efforts have not always generated sustainable results or achieved environmental or social goals. The impact of community-based ecotourism is also contingent upon the community's involvement in the development and management of activities, as well as their access to and the comprehensiveness of benefits.

This study examined three well-known ecotourism initiatives in the Amazon: Kapawi, located in the Achuar territory of Pastaza Province in Ecuador; San Miguel del Bala, located in the Madidi National Park and the Tacana Indigenous Territory in the Bolivian Amazon, and Posada Amazonas in the Peruvian Amazon. All of them are recognised as pioneers in ecotourism.

The presentation examines the origins, evolution, lessons learned, dynamics, and perspectives of such indigenous tourism projects located in forests areas. It also analyses how these initiatives are addressing social, economic and environmental challenges in the indigenous communities where they are being developed. This study used data collected from fieldwork funded by Oxford University in the three countries, including participant observation research, interviews, surveys, and economic analysis to illustrate the lessons learned and challenges faced, including the pandemic. The findings are presented to inform existing and new Indigenous tourism ventures, policy considerations, and future research related to how Indigenous communities can harness social entrepreneurship to address biodiversity conservation, forest management and livelihoods.

Workshop Session #1

Building a FLARE forest landscape restoration community, Johan Oldekop – University of Manchester

Halting and reversing forest loss is essential for biodiversity conservation and climate change mitigation. Indeed, 2021 marks the start of the UN Decade on ecosystem restoration and international agendas have pledged to restore 350 million hectares of forests globally. Over the past two decades, scholars have focused on identifying which forest ecosystems and regions need to be protected and how they should be restored. However, the social dimensions of forest restorations are poorly understood and conceptual frameworks linking forest governance, livelihoods and restoration remain under-developed. This three hour workshop will build on this year's "(Forest) Landscape Restoration: People, Trees, Politics" theme and will bring together elements of the FLARE community working on forest landscape restoration to synthesise knowledge from this year's presentations with the view to: (i) build an interdisciplinary working group of scholars and practitioners researching empirical, conceptual, and practical solutions to forest landscape restoration problems; (ii) develop a special issue based on forest landscape restoration-related papers presented at FLARE 22; and (iii) explore potential synergies for future collaborative research projects and proposals on key forest landscape restoration issues,

including the political economy and political ecology of forest landscape restoration and the evaluation of forest landscape restoration initiatives and interventions.

Learning tools for more inclusive participatory processes, Juan Pablo Sarmiento Barletti, Anne M. Larson, Iliana Monterroso and Kristen Evans – CIFOR-ICRAF

Virtually all major efforts to address global problems regarding land and resource use call for some kind of multi-stakeholder forum, platform or process (MSFs). MSFs have been linked to more sustainable and resilient outcomes, more effective multi-level and multi-sector governance, more equitable and beneficial outcomes for local populations, and more productive research engagement. However, uncritical optimism towards the planning and implementation of the multi-stakeholder paradigm, supported by the lack of evidence-based lessons, is unhelpful. In fact, in CIFOR-ICRAF's global comparative research (https://www.cifor-icraf.org/gcs/research-themes/multilevel-governance/multi-stakeholder-forums/) we found that forum organizers often think that simply inviting people to the table assures equity and voice when it only glosses over differences and thus does not foster the transformative changes promised by collaboration. Responding to these findings and to requests by research participants for tools that support equity in MSFs, we developed a series of complementary monitoring and learning tools (https://www.cifor.org/toolboxes/tools-for-managing-landscapes-inclusively/).

This workshop will engage with challenges of equity and social inclusion in the processes and outcomes of MSFs through two components. The first will start with a brief presentation of the workshop's aims and a synthesis of the key findings of CIFOR's comparative study on equity and social inclusion in MSFs, which will set the frame for an open discussion between participants on their different experiences/lessons to support equity and inclusiveness in forums. The second component will showcase the implementation methods and development of two complementary learning tools to support equity and inclusiveness in MSFs developed by CIFOR-ICRAF in collaboration with local partners in Africa, Asia and Latin America. The first, 'How are we doing?', was developed with MSF participants to be implemented by themselves as a reflexive and adaptive learning tool. The second, 'Getting it right', is a tool based on research with different MSF proponents and participants to support forum organizers in setting up inclusive spaces. Participants will learn how to use both tools and how to adapt them to different contexts.

As a conclusion, we will invite participants to set up a research and practice network engaging with multi-stakeholder forums, platforms, and initiatives for future collaboration and research dissemination.

Workshop Session #2

Beyond Land Rights: Linking livelihood and tenure security to advance community self-determination, Kendi Borona & David Kroeker-Maus, Rights and Resources Initiative

There is now widespread recognition within the scientific community of the higher incidence of biodiversity and lower rates of deforestation in territories where Indigenous Peoples, Afro-Descendant Peoples and Local Communities, and have secure land tenure rights. Concomitantly, the last year has witnessed renewed commitments from donors to strengthen community land and forest tenure as part of so-called Nature Based Solutions; however, it is also now well recognized that formalized land rights

are not a panacea to the complex injustices of poverty and exploitative models of development. The struggle for land rights is inter-generational and at times indeterminate, while livelihood needs are a matter of basic everyday survival. Hence, there is a need to further nuance the link between secure community land rights and improved livelihoods capacities, as well as to promote collective action that links emerging research to policy advocacy and implementation at national and international levels.

It is against this backdrop that the RRI Coalition has been examining strategies for engagement with forest-dependent communities that extend beyond gaining legal recognition of land and resource tenure rights, and to advance livelihood security as an element of tenure security. This workshop will present the status of a bottom-up research agenda being developed through an ongoing dialogue with our Coalition of 150+ highly diverse organizations across the Global South and will outline streams of engagement and analytical approaches related to collective rights, tenure security and livelihoods. Through this workshop we will present the methodological approaches and considerations used to develop this new research agenda and key findings from our engagement with rightsholders. This will be followed by a facilitated dialogue with guiding questions and interactive group discussion to further explore interactions between research, advocacy and implementation, as well as to refine specific indicators. This workshop will provide an opportunity for participants to contribute to an emerging agenda, including research, to advance the livelihoods dimensions of tenure security.

Forests Sustaining Agriculture Working Group: Developing a new paradigm of integrating forests and trees and food production, Terry Sunderland – University of British Columbia

Agriculture remains the greatest driver of forest loss globally. Yet, forests and agriculture are inextricably interlinked in myriad ways. Current discourses on agricultural intensification often overlook the contribution of natural ecosystems for food production and livelihoods. Although some preliminary work has been undertaken on enhancing on-farm provisioning of ecosystem services, the ecological and socio-economic value of forests and trees in terms of their contribution to proximate agricultural production and livelihoods in the wider landscape is poorly understood and rarely integrated into land use planning and sustainable agricultural management practices. Research is also required to assess the complementarity and resilience of different crops and trees to climatic fluctuations at a landscape scale and how to better manage these landscapes under different socio-ecological contexts. Therefore, it is vital to expand our understanding of the contribution of forests and trees in supporting agriculture and livelihoods in multifunctional landscapes. In doing so, we can further develop methods to manage landscapes in an integrated and inclusive way that consider biodiversity conservation, sustainable forest management, agricultural production, wellbeing and food and nutritional security. This workshop, bringing together members of the FLARE Working Group on the topic (https://www.forestlivelihoods.org/working-groups/forests-sustaining-agriculture-the-contribution-of-forest-based-ecosystem-services-to-agricultural-production/) will review recently-generated evidence of the critical roles that forests and trees play in agricultural production, particularly in the tropics, and identify a way forward for combining forests and agriculture in an integrated food systems approach at the landscape scale. An anticipated output from this workshop will be a working paper outlining what a future research programme on this topic would represent and a detailed roadmap for policy engagement in on-going international processes such as CoP27, the Global Landscapes Forum, among others.