



Fragmentation of Forest Governance in the Asia-Pacific Region

Expert Perceptions from 
China, Malaysia, Indonesia, Nepal and Vietnam

■ Asia-Pacific Network for Sustainable Forest Management
and Rehabilitation (APFNet)



China Forestry Publishing House

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Authors

- Louis Putzel** Asia-Pacific Network for Sustainable Forestry and Rehabilitation (APFNet)
Center for International Forestry Research (CIFOR)
- Wanggi Jaung** Department of Biological Sciences, National University of Singapore, Singapore
- Ben Forrest** Asia-Pacific Network for Sustainable Forest Management and Rehabilitation (APFNet)
- Anna Finke** Asia-Pacific Network for Sustainable Forest Management and Rehabilitation (APFNet)
- Wei Liu** Asia-Pacific Network for Sustainable Forest Management and Rehabilitation (APFNet)
- Peng Peng** Asia-Pacific Network for Sustainable Forest Management and Rehabilitation (APFNet)

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Editors in staff: Xiao Jing, Liu Jialing
China Forestry Publishing House
No.7 Liuhaihutong, Xicheng District,
Beijing, P. R. China, 100009
Website: <http://lycb.forestry.gov.cn/>
Tel: (+86)10-83143577

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Executive summary

Governance of complex systems is not monolithic; it cannot be accomplished by one body or administration or organization. Governance is divided up and coordinated among many structures, arranged more-or-less hierarchically, depending on how decisions are made and authority is shared within a given polity. The parceling out of functions, duties, responsibilities and powers of governance can be termed “fragmentation”. Meanwhile, coordination of functions, nesting of functions and drawing of reporting lines, and the comprehensive apportioning of responsibilities across structures is “integration”. Many national systems of forest governance (and indeed natural resource and environmental governance in general) have experienced various dysfunctional forms of fragmentation. In this case, dysfunction is defined by either an incomplete parceling out of functions and powers — leaving functional lacunae that generate negative social or environmental effects — or an insufficient integration of those functions or powers across the structural network of governance, resulting in inefficiencies, such as overlapping or contradictory mandates among governance bodies. Therefore, while fragmentation of forest governance is not necessarily a negative state, attention to its specific nature and outcomes is important to ensuring that forests are governed in ways that produce social and environmental benefits.

This study traces the emergence of theories of governance fragmentation that ran in parallel to major processes of sociopolitical restructuring that have occurred since the 1970s, often in response to economic movements emanating from dominant economies and the institutions formed post-WWII to promote global coordination of finance, trade, economic development, and eventually broad social and environmental interests. These theories of fragmentation relate to forest governance fragmentation (FGF) as they pertain to the allocation of duties and powers across spatial delineations, sectoral jurisdictions, political or administrative scales, governance functions, governance systems, and higher-level norms and the institutions or regimes that have emerged to forward them. Based on a survey of perceptions of forestry experts and researchers from five Asian economies (China, Indonesia, Malaysia, Nepal and Vietnam), this work attempts to better define the issues of forest governance fragmentation as they relate to real-world outcomes and concerns. Around 120 experts across these economies responded to questions relevant to the qualitative dynamics of FGF defined by political boundaries, land-use designations, forest type classifications: land, natural resource, fiscal and tax sectors; public and private institutions; global, national, local and community scales; political, legislative and enforcement functions; statutory and customary governance systems (including indigenous systems); and a range of normative and institutional interests such as conservation, biodiversity, timber production, carbon mitigation, and socioeconomic development.

The study used the following working definition of FGF derived from an overview from the literature:

The division and allocation among diverse institutions and actors, defined by their respective normative mandates and performing different functions and operating across sectors and scales, of the range of functions associated with decision making over management, use, conservation, and sharing of benefits of forest lands and their products.

Drawing especially from the emerging literature on fragmentation of global climate change and earth systems governance regimes, the survey tested the degree to which experts perceived FGF as associated with actors, institutions and norms. With a good deal of variation among the five economies surveyed, overall results suggest that national forestry programs tend to be relatively well aligned to complementary norms and associated institutions (such as climate change, conservation, community-based development, etc.). On the other hand, results revealed sources of FGF that are likely to entail negative social and economic outcomes, including insufficient integration and communication across sectors (e.g. lands, water, agriculture) and between political scales (national to local). Specifically overall perceptions across all economies suggest relatively high:

- ▣ Synergy between forestry and multiple other environmental and social institutions, including sustainable forest management, climate change mitigation, timber legality in trade, economic development, and rural livelihoods;
- ▣ Synergy between national forest restoration (or FLR) programs and community/smallholder forestry systems;
- ▣ Cooperation across national borders and at regional/global scales under the influence of FLEGT;
- ▣ Alignment of the interests of forestry for the production of ecosystem services with economic interests, even if it reduces revenues from timber;
- ▣ Synergy between climate change mitigation through forest carbon programs and biodiversity conservation interests;
- ▣ Alignment of national land use zoning and definitions of forest type with sustainable forestry outcomes.

On the other hand, there were also relatively consistent perceptions of the following negative FGF dynamics:

- ▣ Lack of coordination and communication between authorities responsible for water, lands, forestry, agriculture, etc., conflicting with environmental interests;
- ▣ Insufficient cooperation among forestry authorities across sub-national political boundaries;
- ▣ Insufficient cooperation between forestry authorities and local/indigenous groups, conflicting with interest in sustainable forest management;
- ▣ Behaviors of private sector companies conflicting with governance of social and environmental outcomes

through implementation of higher standards;

- ▣ Accrual of benefits associated with forest carbon favoring outsiders over local people;
- ▣ Market-based green growth initiatives misaligned with interests of sustainable forest management.

However, it is important to note that results varied significantly across economies, with nuanced interpretations provided in the full text.

Based on the economy-specific results, the authors derived the following recommendations targeting national governments.

▾ Recommendations for China

Although FGF in China may not be as serious a problem as elsewhere, there are areas where integration can be increased. As institutional reforms continue to be implemented and further detailed, efforts should be made to:

- ▣ Increase mechanisms for coordination between forestry and other natural resource sectors, not only at the national scale but at lower government scales and across subnational political boundaries;
- ▣ Identify effective means of including local people (including ethnic minority people) in decision making, such as through building platforms for public participation in monitoring of forestry development;
- ▣ Identify redundancies in institutional resource allocations to free up funds for improved coordination across resource sectors, socioeconomic development programs, and inclusive participatory oversight;
- ▣ Conduct an analysis of the alignments between national finance, taxation and customs institutions with cross-border timber legality norms to design mechanisms reducing the pressure on forest governance systems in other economies.

▾ Recommendations for Indonesia

In Indonesia, coordination across political jurisdictions is highly problematic, and this is likely exacerbated by decentralization policies. In this context, the devolution of authority to non-state actors (NSAs), and in particular private sector actors, comes with risks. To date, there has been insufficient work to align forest governance and rural development, and insufficient effort to include local and indigenous forestry actors in decision making. In this regard, key recommendations for Indonesia include:

- ▣ To establish a framework for community monitoring and oversight of private sector forest industries, including an explicit mechanism for channeling information from the community level to policy makers

and law enforcement;

- To analyze local customary forest management and governance institutions and clarify the particular means through which those institutions can best interface with government functions at all levels.

▾ Recommendations for Malaysia

Although the National Land Council provides a mechanism for national-level policy development and implementation in Malaysia's federal system of government, there is insufficient cooperation and communication between state forestry departments and the federal government and insufficient integration of local customary systems with forest sector governance. Particular recommendations include:

- To reinforce financial oversight of the forestry sector and channel a larger percentage of forestry rents to improve forest management and monitoring incentives at the local level;
- To analyze the potential interfaces between statutory and customary forest governance systems with a view to creating higher-level frameworks in which customary systems can be recognized and protected;
- To sponsor independent research on the degree to which sub-national state-level governments (across sectors and functional divisions including forestry, economic development, and enforcement) are engaged in the oversight and management of the trans-national timber trade, and take appropriate measures to address cross-boundary flows of illegal timber.

▾ Recommendations for Nepal

Overall, responses from Nepal indicated a higher perception of FGF as a problem, though there was less consensus among respondents on the particular fragmentation lines. What does emerge strongly from both the survey data and qualitative responses from Nepal is that the decentralization of forest governance in favor of community forestry was successful in improving forest governance and its outcomes, but incentives for communities to maintain forests may be insufficient. Specific recommendations include:

- To maintain the integrity of decentralized community forestry;
- To identify ways to integrate the system across sectors (ecosystem services, tourism, *etc.*) to diversify income streams and reduce pressures to harvest wood.

▾ Recommendations for Vietnam

While the majority of Vietnam respondents perceived FGF to be a serious problem, there was little

consensus in survey responses as to the relative importance of the most problematic forms of fragmentation. Nonetheless, several key recommendations emerged, include:

- ▣ To increase cooperation to improve governance of forests across both sub-national and international borders;
- ▣ To diversify the economic benefits to forest users beyond access to land and timber resources;
- ▣ To engage rural forest users in identifying alternative activities, followed by providing incentives to develop sectoral diversification.

▣ Overall recommendations

To improve forest governance across sub-national political boundaries, policy makers need to assess the capacity of existing higher scale institutions to increase and/or improve the quality of their coordination activities. These may include both government institutions (such as ministries or departments of forestry, natural resources, lands, planning, economic development) and non-governmental (civil society groups and associations, forest user groups), as long as they transcend the particular boundaries and have both the capacities and incentives to cooperate in governance of forests across boundaries.

In the case of decentralized forest governance systems, there is a need for increased planning and extension capacity at meso-levels of governance; however, at the same time, planners should consider strengthening the mandate of local level institutions, including customary and traditional forest management systems, to avoid creating disincentives to local-level community and smallholder forest management. Although a need for increased governance functions at higher levels may be indicated, local forestry systems are highly sensitive to shifts in power, rights and benefits; therefore, higher level efforts to overcome spatial disconnects in governance likely should focus on increasing connectivity and coordination capacity among local civil forestry groups and allied institutions, and expanding benefit sharing opportunities associated with increasing forest cover and quality.

The following specific approaches are recommended. These include:

- ▣ Landscape approaches to engage stakeholders across sub-national borders and build consensus across sectors. Identify local social networks and higher scale institutions that have the capacity to integrate across borders and sectors.
- ▣ Integration of local/indigenous communities in forestry planning/management and improved sharing of benefits.
- ▣ A cautious approach to devolving forest governance and oversight to the private sector or NSAs. There is

a need for increased oversight (by government/civil society organizations); strengthened regulations and compliance instruments; and empirically supported use of market-based instruments (e.g. certification).

- ▣ Evaluation of benefits and improved benefit sharing mechanisms at local levels to support climate change mitigation and other forest ecosystem services.
- ▣ Market-based green growth ideas cannot be taken for granted. There is a need to start with a home-grown central vision (e.g. an effort to develop environmental citizenship, mechanisms to establish a green economy or the mandate of an ecological civilization) to align values, beliefs and norms across a broad range of actors and institutions.

Introduction

A decade ago, as national forestry agencies in the Asia-Pacific region were struggling to re-conceive and modernize their roles in forest governance, in part in response to the involvement of international organizations (IOs) and the emergence of new global environmental institutions and associated donor priorities, the topic of intra-national governance fragmentation and associated risks appeared in the forest governance discourse (Durst et al., 2008). At the time, the context in which this perceived fragmentation was taking place insufficiently explored and the syndrome are not adequately described. According to Nair (2008), disparate global change processes ranging from new transnational environmental policies to economic liberalization and privatization to land tenure reforms devolving ownership to local communities have caused “fragmentation of the forestry agenda” and loss of clarity among economic and natural resource sectors. In China, Zhang (2008) cites “fragmentation of forestry functions” as a problem characterized by “loss of responsibilities to other fields” and calls for increased authority and a broader mandate for forestry agencies. Similarly in the Philippines, de Rueda (2008) explains that management of forest resources has become fragmented, noting the reassignment of responsibilities for management of certain watersheds to other government sectoral agencies (e.g. oil, energy), the armed forces and universities, and calling on the Department of Environment and Natural Resources to improve its coordination capacity. These observations touch on some of the challenges to forest governance from the perspective of national forestry agencies in the face of significant pressures to adapt to changing social, economic and political contexts, but they do not provide a comprehensive understanding of the syndrome.

A broader discourse addresses the fragmentation of forest governance (FGF) associated with the proliferation of global institutional regimes, in particular those targeting transnational environmental, conservation and climate challenges, as well as the forest sector itself. Driven by different priorities and involving many constellations of political and economic actors, this international forest regime complex (IFRC) operates across many boundaries — geopolitical, sectoral, physical and conceptual — and can disrupt existing governance systems (Glück et al., 2010). Integration, the antidote to disruptive fragmentation, may be achieved through top-down and centralized approaches or through an approach of identifying gaps in governance that can be bridged through “layers” and “patches” identified through “‘bottom-up’ coordination efforts at the national and regional levels” (Howlett et al., 2010), in an attempt to construct new modes of “multi-level governance”. The latter suggests a potential circular problematic, notably the tendency of transnational institutions and actors to directly access domestic policy processes (Bernstein et al., 2010), which can potentially disrupt national or sub-national governance systems, leading to various forms of additional fragmentation at lower scales even as those institutions seek to build governance coherence around their own priorities.

The above contrasting perspectives derive from two compilations of articles. The first, published by the United Nations Food and Agriculture Organization (FAO), is the articulation of a call to national forestry institutions in the Asia-Pacific region to re-define their roles and reform their structures and functions to adapt to changing conditions and global priorities and expectations, including those associated with high-level institutional regimes. In response the articles, most of which represent the perspectives of the targeted institutions, contain various measures of buy-in to global institutional priorities, including decentralization policies, privatization of national forestry resources, devolution of rights and responsibilities to local and community levels, and adoption of global trade-related approaches to forest law enforcement. These perspectives appear to respond to Nair's (2008) intimation that national forestry agencies must transform of their own accord, be driven to change from the outside, or become defunct. The second, published by the International Union of Forestry Research Organizations (IUFRO), describes the complexity and challenges associated with global regimes affecting forest governance, but also tends to legitimate intervention by global or transnational institutions in national and sub-national forest governance towards the integration of global-scale goals.

On balance, but not universally, the use of the term “governance fragmentation” in forestry is associated with negative outcomes, including: lack of oversight and enforcement of laws and policies, lack of coordination in the pursuit of shared goals and priorities, increased corruption and opportunism, an “aimless series of disjointed and counterproductive steps” (Rayner, Buck, and Katila, 2010). Alternative perspectives suggest that fragmentation is an inevitable product of a system seeking to achieve multiple purposes requiring the coverage of many instruments, institutions, and measures; rather than seek to eliminate fragmentation, systems need to adapt to it by developing “more synergistic and cooperative relationships between the components of the governance arrangements” (Rayner, Buck, and Katila, 2010). Biermann (2009) suggests that a high degree of governance fragmentation is a problem in itself as it strains the capacity of under-resourced institutions to achieve adequate representation. Such is the challenge facing the governments of developing economies engaging in transnational environmental governance processes promulgated by many distinct institutions.

The purpose of this study is to re-examine the nature of forest governance fragmentation, recognizing that use of the term is subject to interpretation, as perceived from the national level. To frame the debate, we first traced the precedents of the use of the term, and the context in which governance fragmentation became a broad syndrome of institutional change in the last century. Based on a brief theoretical review, we then developed a framework through which to develop a hypothetical typology of forest governance fragmentation. In the course of these exercises, it became apparent that governance fragmentation is not necessarily unintentional, nor, as it takes many forms, does it necessarily entail negative consequences. Based on a broad typology of fragmentation, we developed a survey tool to bring relevant experts in

five Asia-Pacific economies to identify the origins and forms of fragmentation at the national and sub-national level, and to measure perceptions of the associated effects. Based on a quantitative analysis of the perceptions of 119 experts who responded to the structured portion of the survey, and a summary of their responses to several open-ended questions, we present an overall picture of FGF as it pertains to each economy and a series of recommendations for further research and future policy-making.

↘ What is governance fragmentation?

The term governance fragmentation emerged several decades ago to describe sociological changes associated with major institutional restructuring. During the 1970s and 1980s, the roles and responsibilities defining authority underwent significant shifts between the state and private actors, between institutional scales and parallel or localized systems of authority (e.g. O'Connor, 1990; Tyack and Hansot, 1981; Salganik and Karweit, 1982; Mundell, 1982). Early research on governance fragmentation was linked to the rise of neoliberal economic reform and associated policy change¹. At the same time, globalization and the emergence of an imagined market-oriented “New Economy” promoted a devolution of powers and responsibility for economic development from central to sub-national governments while expanding the transboundary/international collaborative links of the latter to businesses and NGOs (Clement, 1999), potentially causing fragmentation of the roles of the Weberian nation-state, or its mandate and functions, while integrating formerly fragmented “governance” across political borders².

While governance might become fragmented due to poor integration of complex actors, interests, institutions or objectives, governance is also fragmented intentionally with the aim of relinking structures and functions in new arrangements based on perceptions of economic efficiencies, effectiveness in achieving a set of particular goals, or changes in interactions across socioeconomic scales as society and its technologies evolve. At its core, the term “governance” itself is associated with fragmentation of “government” associated with, according to Rhodes (1996), concepts of “the minimal state”, “corporate governance”, “the new public management”, “good governance”, “a socio-cybernetic system”, and “self-

1 In 1990, the subject of governance fragmentation appeared in a book review addressing decentralization and devolution of governance to localities in the federal system in the United States since the 1970s (Weschler, 1990). Valler et al. (2000) refer to a literature characterizing, in the United Kingdom, a new and “fragmented” local governance “extending beyond the formal agencies of local government to include a ‘wide range of other actors, institutional and individual, private and voluntary and public sectors, which are involved in regulating a local economy and society’” (Johnston and Pattie, 1996: 672, quoted in Imrie and Raco, 1999: 45). This fragmentation arose out of central state restructuring targeting “inefficient” local — and especially municipal, urban — government shifting service provision and policy making to a new institutional framework favoring “the market, privatization, competition, deregulation and business involvement” (Valler et al., 2000).

2 For an overview of the precedents and implications of fragmentation of the nation state in the context of transnationalism, see Robinson (1998).

organizing networks”. These terms all variously imply a dispersal of state authority and functions to diverse non-state actors and institutions, and, in the case of “good governance”, grounds for global or transnational intervention in the political and administrative systems of (in particular) developing economies. The result is disintegrative: as the state is increasingly “hollowed out”, it loses capacity to steer policy; institutional complexity creates ambiguity, obscuring accountability; fragmentation of the functions of government reduces state control over implementation.

A leading scholar on governance of common-pool resources, Ostrom (2005), suggests an alternative interpretation of fragmentation. First, she cautions against simplistic dichotomous classifications of institutions into either public or private ones. Then, she describes a form of fragmentation of public government that involves smaller and more diverse units of service provision, and finds that at times they are more effective in providing services than larger, centralized units. Here, Ostrom’s fragmentation is not a disintegration or fracturing of public institutions but an apportioning or distribution of function and authority over more local scales and more numerous service providers. This amounts to what she terms a polycentric theory with “core principles that can be used in the design of effective local institutions when used by informed and interested citizens and public officials”. Along these lines, Hooghe and Marks (2003) recall the invention of a hybrid concept, “fragemegration” (Rosenau, 1997), challenging statist preconceptions of governmental hegemony over governance, in which “there is no up or under, no lower or higher, no dominant class of actor; rather, a wide range of public and private actors who collaborate and compete in shifting coalitions”.

Since the late 2000s, definitions and analyses of fragmentation have accompanied efforts to understand, to inform, and to form institutions at the global scale to address climate change (van Asselt and Zelli, 2013) and more broadly to govern earth systems (Galaz et al., 2012; Pattberg and Widerberg, 2016). By this time, the literature on governance fragmentation had recognized many perspectives on fragmentation (see Table 1 for an overview of some of these). These perspectives are shaped by the analytical scales of interest to different thinkers, as well as by the nature of fragmentation at those various scales. At the local scale, there was the redistribution of responsibilities and powers to more diverse and more local stakeholders of public goods and common-pool resources for the purposes of renewal and efficiency, as suggested by the type of fragmentation suggested by Ostrom (2005), which was characterized by increasing local autonomy, “unlocking human potential”, and building the capacity of “citizens all over the world to participate in local public economies”. At higher political scales, there was a reduction of state capacities associated with the dispersal and disorganization of the roles and functions of government, not only through administrative decentralization to sub-national scales, but also through the devolution of those roles and functions to non-state actors (Rhodes, 1996; Newell et al., 2012). Ongono (2015) suggests that competing interests at the national level in developing economies, such as between pro-environmental and utilitarian ministries, may

Table 1 Diverse perspectives on governance fragmentation relevant to FGF

Fragmentation syndrome	Effect of fragmentation	Sources
Institutional fragmentation of regime complexes	<ul style="list-style-type: none"> ■ Functional overlap and competition among initiatives and norms ■ Unpredictable shifts in allocations of power/authority in governance ■ Increased involvement of non-state actors (NSAs), for better or worse ■ Opportunities for cross-sector collaboration ■ Dominance of a small number of powerful states or actors serving their own interests ■ Local or regional adaptation of approaches to specific components of complex problems (e.g. climate change) 	Pattberg and Widerberg, 2016; Biermann et al., 2009; Orsini, 2013; Newell et al., 2012; Asselt, 2013; Overdevest and Zeitlin, 2012
Mismatches between higher-scale (e.g. global) norms and institutional goals and lower-scale (e.g. local) realities	<ul style="list-style-type: none"> ■ Recentralization at higher scales and increased social inequalities at lower scales 	Dupuits, 2015; Phelps et al., 2010
Conflictual interactions between governance regimes affecting national governance	<ul style="list-style-type: none"> ■ Lack of policy coherence ■ Opportunistic misuse of funds by national governments ■ Unsustainable environmental outcomes 	Ongolo, 2015
Scalar decentralization of governance authority	<ul style="list-style-type: none"> ■ Control over government resources dispersed across jurisdictions ■ Elite capture of forest resources and rents 	Obidzinski and Kusters, 2015
Dispersed responsibility across horizontal sectors (without integration/inclusion of stakeholders at different scales)	<ul style="list-style-type: none"> ■ Reduced accountability ■ Mismatches between policy and intended outcomes due to socio-ecological complexity 	Söderström et al., 2016
Fragmentation of legal and regulatory frameworks	<ul style="list-style-type: none"> ■ Potential, but not inevitable, regulatory chaos ■ Flexibility in selecting the most appropriate policy mechanisms and dissemination of the most successful ones 	Asselt, 2013; Biermann et al., 2009
Proliferation of public and private actors and institutions involved in governance (e.g. multiple certification systems)	<ul style="list-style-type: none"> ■ Conflicts and obstacles to implementation ■ Competition rewards initiatives of those interested in achieving results 	Rametsteiner, 2002
Fragmentation due to overlaps in institutional mandate, productive roles, etc.	<ul style="list-style-type: none"> ■ Overcapacity and inefficiency; wasted resources 	Sande, 2001

Fragmentation syndrome	Effect of fragmentation	Sources
Functional fragmentation of authority, such as lack of integration between legislative/regulatory systems and enforcement	<ul style="list-style-type: none"> ■ Unsustainable resource access ■ Corruption ■ Persecution of less powerful forest users 	Obidzinski and Kusters, 2015; Putzel et al., 2015
Allocation of roles and responsibilities of governance among a wider range of competitive public and private institutions and actors, often at more local scales	<ul style="list-style-type: none"> ■ Specialized rather than general-purpose governance; flexibility rather than durability ■ Empowerment of stakeholders and “unlocked” human potential ■ Innovative approaches to complex problems and better performance 	Hooghe and Marks, 2003; Ostrom, 2005; Engel, 2014

result in a strategic fragmentation of governance approaches associated with different manifestations of the international forest regime complex.

At the global scale, where there is no “government”, governance is determined by conventions among states and by non-state institutions established to define norms and achieve social, economic and environmental goals. As those norms and goals take shape, new governance structures emerge, and existing ones are replaced, or adapted, re-formed and realigned. After World War II, predicated on the normative goal of collective security, the allied powers established the United Nations (UN), replacing the League of Nations (Weiss et al., 2013). The UN’s first order of business was to establish the International Bank for Reconstruction and Development (to become the World Bank) and International Monetary Fund, incorporating norms of open markets and ending economic nationalism. Together with a constellation of allied institutions, including the World Trade Organization, these institutions have subsequently wielded great influence on the economic behavior of states, both directly, through establishing rules of exchange and attaching conditions to loans and financial aids, and indirectly, by influencing the thinking of Western development donors and agencies. This has affected not only the external interactions among economies, but also their internal economic structuring, affecting governance systems throughout the developing world. One of the most significant manifestations of this influence was the promotion of decentralization across the developing world, which became a pervasive norm of international development thinking in the 1990s.

Global environmental institutions proliferated after the 1972 Stockholm Conference on the Human Environment which led to the establishment of the UN Environment Programme, the *Conventions on International Trade in Endangered Species* (CITES) and World Heritage. In 1993, shortly after the 1992 Conference on Environment and Development in Rio de Janeiro, which led to the *Convention on Biodiversity*

(CBD), Brown Weiss (1993) remarked that the international community had become very experienced in environmental negotiations, with almost 900 international legal instruments negotiated in the prior 20 years, but that it had come “to the point that we are concerned today with developing new means for coordinating the negotiation and implementation of related agreements, in particular their administrative, monitoring, and financial provisions”. Enforcing environmental agreements at the international scale was exceedingly difficult due to the boundaries of legal jurisdictions at the global level between sovereign states. The *1987 Montreal Protocol on Substances that Deplete the Ozone Layer* was remarkable in that it was not only ratified by 197 parties but was also successfully implemented through phase-out plans for each ozone-depleting substance (and likely saved life on earth). The success of the “ozone regime” supported the theory that, in the face of a shared threat of existential proportions, a motivated network of institutions, norms and actors could overcome fragmentation across spatio-political geographies, industrial sectors, trade norms and economically divergent stakeholders (Downie, 1995).

Since then, efforts to replicate the success of the ozone regime through the construction of other global environmental regimes, a number of them linked to or overlapping with forestry, have been less successful. The CBD and associated instruments have resulted in a great deal of conservation, but have not reduced multiple threats to biological diversity which continues to decline. The global climate change regime, after twenty-five conferences of the parties since 1995 — and associated negotiations which have snowballed to include meetings of thousands (if not tens of thousands) of stakeholders from most economic, industrial, natural resource, commercial and financial sectors — has not stopped the increase of annual carbon emissions, let alone reduced emissions. Positive feedback between the effects of biodiversity loss (which reduces carbon sequestration potential) and climate change (which causes rapid ecosystem changes such as desertification and warming) exacerbate both trends³.

The failure of the climate change regime to stimulate sufficient collective action at the global level to reduce emissions has led to much discourse on the topic of governance fragmentation. A growing group of researchers studying environmental governance fragmentation perceives it to be increasing, even as earth systems sustaining life are moving towards critical tipping points beyond which recovery may not be possible (CONNECT, n.d.). The majority of literature on fragmentation of climate and earth systems governance centers on understanding the forms, causes and effects of fragmentation, with a view to informing policy in order to build cohesion in regimes. In order to overcome fragmentation, greater alignment, cooperation or synergy is required among institutions, norms and actors at the global level, including those that have the ability to affect policy and practice at national levels and below. This requires overcoming the

³ While the UN’s Millennium Development Goals reported some successes in improving human living conditions (United Nations, 2015), the continued severity of global environmental degradation led to greater specificity and higher emphasis on tackling environmental problems under the Sustainable Development Goals (SDGs).

fragmentation of global missions by national borders (through either collaboration of state governments or the reduction of barriers associated with sovereignty). This literature is informative to global governance in general, and certainly to forestry, given the key functions of forests in climate change mitigation (through carbon sequestration and storage) and adaptation (through provision of ecosystem goods and services). In particular, a number of studies related to the implementation of reducing emissions from deforestation and forest degradation (REDD+), a subset of both climate change and forestry, have relevance to both fragmentation and institutional cohesion. To date, the literature on global efforts to promote forest landscape restoration (FLR) is more focused on promoting landscape approaches incorporating forestry in broader systems, which has relevance to integration.

▾ The “fracture lines” in forest governance fragmentation

Forest governance has been defined as “the set of rules and institutions that control and determine what happens to a nation’s forests and who gains and who gets hurt as a consequence” (Contreras-Hermosilla et al., 2006). Many different groups of actors and institutions are involved in defining those rules and institutions, and they operate across many dimensions: space, sectors, social and political scales, and diverse economic interests, to name but a few. Given this complexity, there are governance shortcomings arising from insufficient coordination among actors and institutions, lack of inclusion of key stakeholders and unequal access to information. These challenges are potential sources of policy failure, leading to unsustainable or illegal forest use, resource conflicts and suboptimal social outcomes (e.g. Barr et al., 2014). Integration, synergy or cooperation across actor groups, institutions and diverse social and environmental objectives are likely a prerequisite to effective governance forests in the context of discontinuity — or fragmentation — of the many structures and processes involved in decision making over forest management and use.

Fragmentation implies a division or divisions among pieces of a whole. In order to characterize fragmentation, therefore, an identification of fragmentation lines across the many dimensions of forest governance is needed. A logical induction based on informed reflection resulted in a list of potential fracture lines along spatial, sectoral, scalar, functional, inter-systemic and normative dimensions of governance (Table 2), explained in the following paragraphs.

Spatial delineations across which governance systems are generally fragmented include political boundaries such as national and sub-national borders — e.g. dividing economies, states, provinces, counties, districts and villages — and land-use zones such as forest, agricultural land, reserve or park land, urban residential land, or industrial zones of various types (see, e.g. Barr et al., 2014). Within land that can be classified as “forest”, sub-categorizations of forest type can also differentiate the identity of governing agencies or

Table 2 Fracture lines within the dimensions of forest governance

Dimension of governance	Examples of potential fracture lines
Spatial delineations	<ul style="list-style-type: none"> ■ Political boundaries ■ Land-use designations ■ Forest type classifications ■ Landholding/ownership
Sectoral jurisdictions	<ul style="list-style-type: none"> ■ Land and natural resource sectors ■ Financial sector and tax authorities ■ Public vs. private; corporate; institutional
Political/administrative scales	<ul style="list-style-type: none"> ■ National to local to community ■ Global to community
Governance functions	<ul style="list-style-type: none"> ■ Political/legislation/enforcement
Governance systems	<ul style="list-style-type: none"> ■ Statutory/customary
Norms, institutions, regimes	<ul style="list-style-type: none"> ■ Conservation, biodiversity, timber production, carbon mitigation, socioeconomic development, <i>etc.</i>

approaches to governing. Patterns of land ownership by state (national or sub-national), community, or private entity can correspond to discontinuous governance over contiguous forested land areas. Sayles and Baggio (2017) refer to this type of spatial fragmentation as a “social-ecological scale mismatch”, and a “wicked sustainability problem”.

The manner in which political boundaries fragment forest governance is fairly obvious. Legislation and enforcement of forestry policies are often national or provincial, such that approaches and outcomes vary across borders. One potential effect of this fragmentation is “leakage” (e.g. Meyfroidt and Lambin, 2009), in which differences in governance across borders result in the migration of forest-related activities to favorable jurisdictions. Potential mitigating mechanisms are transnational/bilateral timber trade agreements, and other conventions and programs that support conservation and sustainable use (Arts et al., 2013; Arts and Visseren-Hamakers, 2012).

At the sub-national level, land use is differentiated across space by zoning, a process to establish rules for land use, management, and conversion from one use to another. Zoning defines the area over which specific policies are implemented. While zoning may cover entire national or sub-national administrative units, zoning often targets “high-priority” areas of interest for specific reasons (Lambin et al., 2014). Use of different systems of classification by planning authorities associated with different sectoral ministries can result in mismatches between identified land uses and realities on the ground (e.g. Swainson, 2016). Within the forest estate, forestry departments further delineate forests according to specific attributes or objectives, such as ecological types (coniferous, deciduous, even-aged or uneven-aged, native, primary,

secondary), uses (production forest or plantations, recreational forests, watershed protection areas, protected areas, *etc.*), associated owners and managers (state forest, timber concessions, community or smallholder forest).

Lands of specific interest targeted by zoning exercises, as mentioned above, often correspond to natural or economic resources placed entirely or partially under the governance portfolio of non-forestry agencies. Sectoral jurisdictions fragment forest governance in ways that transcend spatial boundaries. Many national ministries or departments besides the lead forestry agency may be involved in determining and enforcing rules over forest uses and management. For example, agencies responsible for fish and wildlife, water quality and delivery, or parks and recreation may have jurisdiction over forests. Ellefson et al. (2002) suggest that although this “dispersed responsibility” may have adverse effects, competition between agencies and diversification of the ways citizens interact with government can also generate efficiencies.

Meanwhile, within the forestry sector, forest governance has in some economies become increasingly fragmented between public and private sectors. In a number of post-independence developing economies, corporations linked to former colonial powers obtained rights to public forests through large-scale concessions established to continue industrial exploitation of national timber resources. Later, as national forestry laws increasingly incorporated principles of environmental and social sustainability, these concession models shifted a certain degree of responsibility for forest governance to both national and transnational private companies. A narrative emerged in which market-based mechanisms, such as voluntary timber certification, linked largely to private-sector extractive corporations, came to be seen as institutions of resource governance and environmental management. A significant ideology emerged in which such non-state institutions came to be seen as alternative purveyors of forest governance of equal or superior promise, from an environmental perspective, to that of the state, particularly when corporations align with environmental interests to achieve short term competitive advantages and thereby contribute longer-term collective global goods (e.g. Vogel, 1997). This “California effect” links the globalization of environmental activism to the interests of multinational corporations via the mechanism of non-state market-based mechanisms (Visseren-Hamakers et al., 2013). However, such instruments have lacked breadth as governance institutions due to their common focus on only specific “highly visible” and “symbolic” consumer products (Vogel, 1997).

Across political scales, i.e. the administrative levels of government from the national to subnational (and eventually “local”) levels, forest governance is fragmented for a number of reasons. One reason is that the mandate to work on forestry issues may be underdeveloped at lower scales: for example, a municipal government may have a clear mandate to facilitate agricultural development but no statutory basis for forestry, which resides only at a higher scale (e.g. Kowler et al., 2016; Wright et al., 2016). In such a case, governance of lands at the local scale may tend to reward agricultural development, for example by granting

title to private individuals after they clear land (Putzel et al., 2013), even if national forestry laws would discourage the removal of forest. Another is the interplay between top-down governance and bottom up functions, which do not necessarily match (Hiedanpää et al., 2011).

The allocation of governance functions and responsibilities across scales has been very dynamic due to decentralization reforms implemented since the 1980s in many developing economies. Where such reforms supported existing local institutions, both enforcement of forestry rules and local livelihoods tended to improve; where reforms required local institutions to adapt to higher level norms while taking on greater responsibility, governance failures occurred (e.g. de Rueda, 2008). While the structure of forestry departments operating across political scales (see Appendix 2) is informative in understanding the degree to which governments seek to integrate forest governance within its own hierarchy, these arrangements fall far short of capturing the influences of forest governance emanating from the multidimensional jurisdictions of other sectors, parallel systems, global regimes, etc..

Across governance functions, such as policy, legislation, law enforcement, etc., forest governance can be highly compartmentalized. Despite clear national laws on timber extraction, for example, the state may fail to monitor the actual activities of extractors, fail to impose penalties for illegal activities, grant exceptions to certain operators, or disproportionately penalize less powerful groups such as poor landowners (Smith et al., 2006; Putzel et al., 2013). The lack of consistency between forestry policy, enforcement and practice is exacerbated when different actor groups are isolated from each other in the national codes and associated institutions that recognize and interact with them (Hiedanpää et al., 2011).

This dynamic may be particularly pronounced when there are mismatches across statutory and customary governance systems. National legal codes recognize to varying degrees rules, practices and institutions used at the local level to govern forest access, ownership and use (Kelly and Peluso, 2015; L. Putzel et al., 2015; Obidzinski and Kusters, 2015). Even when customary law is incorporated in its entirety through recognition in the legal code at a particular scale or within a certain designation, there are likely to be inconsistencies due to overlapping local jurisdictions and mismatches inherent in the many possible delineations used by different groups at different scales. Thus, a customary system may only be considered relevant to “indigenous” groups within territories recognized as indigenous by the state, while neighboring “local people” living in territories not considered indigenous are subject only to the default statutory code.

Different ways of delineating functional space among complementary or competing norms, institutions and regimes have created a kaleidoscope of forest governance patterns across all of the above-mentioned potential fracture lines across which forest governance fragmentation may occur. It is a challenge to describe the potential interactions of interests from global to local scales and across institutions mandated to promote or govern an unbounded set of concerns: conservation, biodiversity, timber production and trade, climate change mitigation, poverty alleviation, local/indigenous land rights, to name but a few.

Integration of governance to achieve complementary goals (e.g. certification integrating forest management, legality verification in trade) can fragment governance in other ways at different scales (e.g. Savilaakso et al., 2016), by shifting responsibility and/or authority from the public to private sector, from higher scale political jurisdictions to resource concessions managed by companies, local community groups, or indigenous federations. The enhancement of governance structures within forestry to strengthen activities around protected areas can reduce the social and economic functions of forests, conflicting with the mandate of traditional sustainable forest management institutions (de Rueda, 2008). The commercialization of forest carbon as a result of climate change mitigation (e.g. REDD+) programs can erode local systems of resource use and forest livelihoods (Visseren-Hamakers et al., 2013). Or, a timber certification system established to promote sustainable forest management can contradict national regulations, such as those promoting silviculture intensification (Savilaakso et al., 2016).

These types of fragmentation among goals and the institutions that support them indicate the need for greater holism in the form of increased integration among forest policy and economic incentives, and more integrated ecosystem or landscape approaches that deliver valued ecosystem services (Hiedanpää et al., 2011). In turn, an enhanced role of national forestry institutions may be needed to balance production and protection and harmonize interests of diverse stakeholders including corporations, communities, and environmental groups (A. de Rueda, 2008). However, it is important to bear in mind that national forestry agencies may be weakened by the overlaps and fissures created by multi-scalar interests in the wide range of norms and regimes intersecting with forestry.

Contextual background

Several global trends in governance, influencing national strategies and adopted to various degrees by national governments, are of particular relevance to understanding the antecedents of forest governance fragmentation over the past several decades. Government forestry departments that once were responsible for designing policy and drafting legislation as well as overseeing extraction and production in the sector have slowed down to adapt to changes in mandate, environmental awareness and technologies; to adapt they have been under increasing pressure to release their hold on forest lands and forest resources, as well as parts of their policy and oversight functions (Tobergte and Curtis, 2013). Depending on the economy, this may involve outsourcing functions or reallocating responsibility and some degree of ownership of forest land and resources to other sectors (e.g. agriculture), local administrations, community groups or private companies. Krott et al. (2014) note a number of trends relevant to the context in which fragmentation occurs. These trends include marketization (through the use of such instruments as forest certification and PES), decentralization (to communities and non-state actors), internationalization (with interactions from scales above and below the level of the state), and “cross-sectoralization” of policies (building horizontal coordination and cross-sector linkages).

First, we focus our attention on decentralization, community-based governance, market-based interventions, and non-state governance. These trends, which inherently contribute to governance fragmentation, have affected global and national discourses and have been associated with significant funding streams. We then turn to several trends presented as holistic solutions or “integrative” approaches, including multi-level governance, and unifying visions (e.g. green economy and eco-civilization).

↘ Decentralization and community-based governance

By the beginning of the last decade, national governments throughout the developing world, with significant support from international development donors, were engaged to some degree in the decentralization of natural resource governance, based on expectations of “increasing the efficiency and equity of development activities and service delivery, and also for promoting local participation and democracy” (Ribot, 2002). Proponents of decentralization believed that local authorities would have “better information about local forests and users” to inform their decisions; in fact, socioecological outcomes have been mixed relative to central government control of the forest sector (Wright et al., 2016). To some degree, sub-optimal outcomes of decentralization in forestry are attributable to incomplete transfers of authority and resources to enable local-level governance, in part due to conflictive approaches by central authorities and insufficient information exchange (Ribot et al., 2006). On the other hand, decentralization of forest governance to

“general-purpose” governments at lower scales, such as from the national forestry ministry to the provincial or district government level, produced beneficial effects (such as reduced deforestation) provided there was a sufficient degree of interaction between government and local forest users (Wright et al., 2016).

Decentralization may or may not denote a devolution of forest governance functions to community groups. The term “community” and references to “community-based” activity (such as community-based conservation, economic development, or natural resource management) proliferated in the 1990s in the conservation and development fields. Communities became the target of institutional action or support, though the definition of community was entirely plastic and context-specific. At times, a community could be a formally recognized village or identity group (such as an indigenous group with criteria for membership). At other times, a community could be a grouping of people that formed spontaneously in response to an opportunity to be involved in some activity promising a benefit of participation. As a unit, community has been problematic due to the many ways that gender, caste, wealth, age, origins and other aspects of social identity divide and intersect with the boundaries between communities (Leach et al., 1999). Depending on the outcomes of the case and the perspective of the observer, a devolution of governance to the community level in pursuit of a normative goal (such as environmental conservation) articulated by a higher level entity such as the national government or a global NGO might be seen as an opportunity for local resource users to contribute efficiently and benefit economically, or as a dilution of the authority and effectiveness of relevant state agencies operating at various political scales.

Nepal’s decentralization of forest governance is often held up as an example of a successful transfer of responsibilities and benefits of forestry to local levels, resulting in more effective forest management and restoration. The nationalization of Nepal’s private forests in 1957 resulted in a wave of deforestation, as landowners rushed to convert forests to agricultural lands to secure their land rights (Ojha et al., 2014; Paudyal et al., 2017; Cronkleton et al., 2017). The resulting environmental crisis resulted in a series of decentralization measures, starting with the devolution of forest administration of state forests to local forestry departments in 1976. However, local use rights were still not a sufficient incentive to restore forests, and local political boundaries did not necessarily match the spatial extent of forests. In 1989 and into the 1990s, the government began a process of decentralization of forest management responsibilities and use rights to community forest user groups, thus ensuring a higher degree of benefit sharing. By 1996, transfer rights were relaxed and use rights expanded; at the same time, the role of the Department of Forestry was redefined to govern both community forestry and remaining territorial forest lands (Keshav Raj Kanel and Acharya, 2008). Today, approximately 2.8 million households or 40% of the population belong to community forest user groups managing about one third of the economy’s forest estate (Paudyal et al., 2017).

In contrast to the decentralization of forest governance in Nepal, which responded to an environmental crisis and involved systematic efforts of participatory decision making and a rational division of rights,

responsibilities and benefits, Indonesia's experience of decentralization was less orderly. In response to separatist movements and associated power struggles and resource conflicts, the central government sought to reduce tensions by transferring governance functions, without sufficient attention to stakeholder interests and institutional capacities (Smith et al., 2003). As a result, to this day, there is a lack of cohesion in forestry at lower governance scales with little interaction across boundaries and many isolated organizations operating at provincial levels (Gallemore et al., 2015). Recently, however, the Indonesian government has made two important decisions, the results of which are still to be seen. In 2013, the Constitutional Court recognized customary communities as holders of territorial rights, resulting in a likely devolution of rights to former state forests on those lands (with a potential area of 30-40 million ha) (Kelly and Peluso, 2015). In 2015, the central government reclassified some 84 million ha in forest management units (FMUs) under regional government supervision. The FMU system is on its surface a decentralization of forest governance, and may facilitate alignments of forestry with higher-level norms and institutions such as REDD+ (Kim et al., 2016); it also adds a new layer of bureaucracy affecting existing forest users that may actually recentralize government control and weaken community forest management systems (Sahide et al., 2016).

In Malaysia's federal system, forest governance conforms to a form of constitutional "non-centralization" in which state governments bear responsibility for forests, but legislate in conformity with national forestry policy. Ownership of forestlands generally belongs to the states and *de jure* community ownership is relatively rare. States work with the central government to develop sustainable forest management criteria, and the central government, supported by international NGOs, provides technical support (Olowu 2001; Contreras-Hermosilla et al., 2006). According to Chee and Lim (2014), the nature of Malaysia's federated state system has been a source of fragmented governance due to inconsistent allocation of responsibilities between the national and state governments and the historical predominance of economic considerations and associated institutions over sustainability. According to M.A. Muda, on the other hand, in Malaysia's activities related to REDD+, landscape approaches offer some potential to reduce fragmentation, presumably through both integrated governance and land-use planning⁴.

In China and Vietnam, patterns of decentralization are somewhat different in that long-term ownership of the majority of forest lands remains with the central government, and rules and regulations governing management and use are maintained and enforced from the central government. Decentralization is largely administrative, with provincial and local authorities implementing spatial and management planning and monitoring according to specific regulations issued from above. At the same time, over the past 20 years, both economies have allocated a significant area of forestlands to rural households and communities under production contracts and forest restoration programs (Tan, 2008; K. Zhang and Putzel, 2016). In Vietnam, the

4 M. A. Muda, personal communication, May 29, 2018.

1993 Land Law and successive modifications allocated land rights to households and private organizations; in 2004, the state legally recognized communities as recipients of land and land use rights. These land rights reforms were an important basis for implementation of widespread reforestation programs, including the Five Million Hectare Reforestation Program (5MHRP) (F. Clement and Amezaga, 2009; Dermawan et al., 2013).

In China, processes of forest land tenure reform and reforestation have gone hand in hand. Successive steps to decollectivize land and forest tenure since the 1980s⁵ until now have increasingly transferred land management and use rights to smallholders (both individuals and groups) and private enterprises, supporting afforestation and forest management with significant cash subsidies, such as those used to support the Conversion of Cropland to Forest Program (CCFP) (Cronkleton et al., 2017; J. Liu et al., 2017; P. Liu et al., 2016; Xu et al., 2006). In addition to such incentives, the state exercises policies such as harvest quotas, certification, and forest classifications affecting forest management on collective as well as smallholder forest holdings⁶.

While these processes involve transfers of functions to lower scales, they are less easy to characterize as either decentralization of governance, as most policy formulation is carried out by central ministries and agencies, or as community-based forest management, as the administrative structures involved are generally village- or town-level state institutions reporting through a highly structured governmental system (Gutiérrez Rodríguez et al., 2015; K. Zhang and Putzel, 2016). In Vietnam, even though forest use rights are devolved to households, communities and private companies, forestry practices are governed through management contracts and oversight by local forestry departments (Putzel et al., 2012).

▾ Non-state or “hybrid” governance and market-based approaches

While decentralization generally sought to “push down” the responsibilities, tasks and benefits of forest governance to lower political and administrative levels, there was a concurrent trend to “push out” authority and oversight to private sector and non-state actors. Lambin et al. (2014) suggest that “with international trade and the growing market concentration of transnational corporations, the relative power of governments to manage resource production decisions, compared with private actors,

5 In China, changes in policies and plans are at times formulated based on innovations tested at a lower level. Such was the case of the de-collectivization of land tenure, which was first tested at the county level in Anhui Province and subsequently spread from county to county and to other provinces; it was only after the central government observed increases in productivity associated with the new model of land tenure that an order was formulated and issued from the highest authority to begin across-the-board reallocation of collective agricultural land holdings to individual households through the household responsibility system (Lin, 1987), which was the model for forestland allocation.

6 D. Liang, personal communication, May 20, 2018.

decreases.” Markets for forest products, in particular timber, became a leverage point through which to influence national governments’ forestry policy, linking trade terms to agreements on forest legislation and enforcement. Alternatively, international environmental NGOs promoted the wresting of power from forestry departments and relocating responsibility within corporations willing to commit to higher environmental standards and third-party monitoring (such as forest certification). In productive industries reliant on natural resources from forests and tree crops, “public-private partnerships” or “community-company partnerships” became a frequent target of NGOs and global donors, often combined with commitments to corporate social responsibility standards (Mayers and Vermeulen, 2012).

“Non-state governance” may refer to one of two types of governance. The first pertains to systems or institutions of governance that have not been codified in the legal statutes of a state, such as governance by informal, traditional and/or community institutions in a customary system (Benson, 1999). This definition of “non-state” might also be interpreted as “pre-state”, in other words denoting a form of governance that has not yet been recognized or integrated into the state apparatus. The second refers to substitutive governance by non-governmental actors such as private sector companies or NGOs (e.g. Hayes and Knox-Hayes, 2014; Cashore and Stone, 2012; Bernstein et al., 2010). In this case, limitations to public sector capacity or will to govern a particular sector (e.g. land use), or negative externalities or costs associated with public sector governance, result in the devolution of governance functions to private sector or non-governmental institutions, sometimes in synergistic “hybrid” relationships with public institutions (Lambin et al., 2014).

One example of such an arrangement is the devolution of governance authority from the Forest Department in Sarawak, Malaysia, to the Sarawak Forestry Corporation. Following an assessment of deforestation by the International Tropical Timber Organization (ITTO) resulting in a recommendation to increase the size of the department, the state government incorporated a private company into which forest management responsibilities would then be vested. According to Chan (2008), this government-owned, private company “enabled the state government to ‘cut through red tape’ and enhance efficiency [offering an] example of an innovative institutional restructuring that is taking place in the sector as a result of pressures to improve performance within strict financial constraints.” Over the past ten years, there have been few studies on the outcomes of this experiment. It has been suggested that the private management of public forests in Malaysia, and particularly in Sarawak which is highly forest dependent, may result in conflicts of interest as incentives to sustainably manage forests, which produce over 20% of the state’s external income, are weighed against political interests in maintaining jobs, financial flows, and government revenues (Gonigle and Takeda, 2012).

In Indonesia, a number of private sector forestry corporations have increasingly shown a tendency to take on governance roles by signing on zero-deforestation commitments. These include Asia Pulp and Paper and Asia Pacific Resources International Holdings, two of the world’s largest producers of pulp and paper. While

these commitments indicate an engagement to limit supplies to sustainably sourced timber not obtained through forest conversion, they have encountered resistance from the government due to the opportunity cost of forgoing productive land uses and the potential negative effects on smallholder livelihoods and smaller companies (Pirard et al., 2015).

Third-party forest certification schemes such as Forest Stewardship Council (FSC) certification [and national versions such as the Malaysian Timber Certification Council (MTCC) certification] may improve the potential to ensure better governance by private sector companies, by setting standards and criteria for sustainable forest management and monitoring and reporting of activities and impacts. These arrangements may also help to close governance gaps in case negotiations between state and federal systems fail⁷. The limitation, however, is the will and capacity of private sector companies, particularly in developing/tropical economies to adopt certification, which is a costly tool unless there is sufficient market demand for certified forest products (B Cashore et al., 2007; Jaung et al., 2016). In addition, not all certification systems are considered credible: the MTCC, for example, because it did not guarantee legality nor protect customary rights, lost market shares and therefore some of its influence over corporate behavior (Wong, 2009).

One takeaway from the past performance of private sector forest governance is that it does not work in isolation from supportive public policy frameworks and institutional oversight that increases standards and provides a competitive incentive to encourage adoption (B. Cashore et al., 2007). Furthermore, such supportive frameworks need to be designed to adapt to both the interests and capacities of the relevant private sector governance actors, while balancing the interests of other stakeholders, such as local producers and forest dependent people, who may have experienced a history of loss due to the past activities of the same corporations now committing to take on leadership roles in corporate social and environmental responsibility (Pirard et al., 2015).

↘ Multi-level governance

The fragmentation of governance systems — associated with decentralization from central to more local scales, with devolution of functions from state to non-state institutions, or to communities representing potentially highly dynamic social groupings — has generated highly complex governance configurations. Governance of socio-ecological systems may require multi-level governance systems to manage that complexity. The above-mentioned trends all have in common histories of intentional intervention — by global development agencies and donors, national governments, norm-based institutions — targeting the reconfiguration of governance systems to reassign powers and responsibilities across scales, sectors and

7 M. A. Muda, personal communication, May 29, 2018.

social groups. The role of external or higher-level actors may not be sufficiently explicit. As Leach et al. (1999) observed, “intervening agencies, whether government or nongovernment, are also actors within this complex nexus of multilayered institutional dynamics” and agencies may need help to “reflect critically on the ways they become embroiled, wittingly or unwittingly, in the struggles of other actors”. This is important because, while it is likely that multi-level systems are required to govern complex socio-ecological systems, it is also likely, according to Gregorio and Prasti (2015) that “such systems must evolve rather than springing from design”; in fact, however, when an international institution (e.g. REDD+) interfaces with multiple governance levels, powerful organizations can dominate cross-level connections.

In Nepal, Ohja (2011) uses the Federation of Community Forestry User Groups (FECOFUN) as an example of multi-level governance, which emerged as growing numbers of CFUG leaders took part in meetings to develop the community forestry sector. With NGO support, participants in various types of exchanges established a representative committee and established an office in the capital. This office continued to expand the FECOFUN network through more civil society connections and eventually earned support from the Ford Foundation. Over time, the group became an advocate for community rights and began to take political action, opposing several government efforts to implement forest legal reforms that the group did not see as beneficial to CFUG interests. Eventually, the group began to see the expanding expectations of NGO partners and donors as an increasing challenge, as funding became increasingly attached to priorities imposed from the outside, such that the core functions the group had been founded to fulfill began to deteriorate. The institution in effect experienced fragmentation due to a growing number of conflictive norms.

Indeed, there is the potential that global organizations will seek to play a governance role within a sovereign nation, on the basis that “direct access” to sub-national processes, including political process affecting the use of natural resources, has high potential to achieve impact effect (Bernstein et al., 2010). China and Vietnam have developed relatively robust systems to ensure outside interventions reach their target and do not exceed their mandate (Tan, 2008). For example, the Vietnam Forest Sector Support Partnership was created to coordinate funds and balance objectives of foreign actors and donor investment into Vietnam’s forestry sector. This ensures that efforts involving multiple institutions, including global and regional agencies and donors, are aligned with Vietnam’s Forestry and Development Strategy⁸. Increasingly, the strategy in China is to ensure not only that global organizations pursuing normative mandates within China are not only accompanied and supervised by a relevant ministry cooperation department as well as local partners, but that the personnel are also closely connected to Chinese governmental institutions. In this way, even if activities are “multi-level”, they are also closely linked to the machinery of the central government and its scalar hierarchy.

⁸ See, e.g. FSSP Meeting — Working together in Vietnam. ICRAF website, <http://www.worldagroforestry.org/news/fssp-meeting-working-together-vietnam>, accessed 15 March 2018.

↳ Unifying visions

How might governance systems evolve to match the complexity of socio-ecological systems, avoiding inefficiencies and mismatches associated with design purposed around the agendas and interests of powerful actors, operating from above or without and seeking influence at multiple scales? Nair (2008) exhorts forestry agencies to accept and adapt to interventions promoting norms and interests emanating from outside; other authors of the same special journal issue highlight dangers of fragmentation and suggest a need to protect or renew the mandate of national forestry institutions. Bernstein et al. (2010) cite “direct access to the domestic policy process” by international forestry organizations and institutions as one of four viable pathways of influence of global forest governance at the domestic level. Direct access might involve, at its most intrusive, the creation of new civil society organizations within a sovereign polity, or, arguably less intrusively, supporting the power of the state to enforce its own laws. The same authors also cite “international norms and discourse” as a pathway to influence domestic governance, strategies for which “depend on the moral vulnerability of the target state”. The latter, while still apparently interventionist in intent, is more compatible with theories of behavioral change in social movements as diverse actors sharing compatible values, beliefs and norms achieve cooperation (Stern, 2000).

In recent years, the term “landscape” has become increasingly common in environment and development fields to define a unit of land producing multiple ecosystem goods and services of interest to multiple communities within and outside of the landscape. The boundaries of a landscape might correspond to a political boundary, the limits of a watershed, a rural economic production zone linked to an urban center, or any number of such layers of interest that might be mapped, depending on the interests of the entity defining the landscape. However, adoption of an approach that reorients governance across many scales, sectors, and functions, incorporating numerous stakeholder groups, requires a unifying vision that promotes integration. It is possible that such a unifying vision would arise from an increase in environmental awareness resulting in altered behavior of individuals (Stern, 2000). Globally, neoliberally-oriented institutions have promoted the vision of a “green economy”, which assumes the possibility of reorienting capitalist systems to incorporate environmental costs and benefits (e.g. Corson et al., 2015; Wanner, 2015), which is well aligned to (and might promise remedies to the pitfalls of) the assignment of forest governance functions to non-state actors. The central government of China, meanwhile, has mandated and codified the pursuit of an even broader normative shift to an “ecological civilization”, which is now incorporated in the national five-year plan as a guiding principle for all social and economic development. This approach is agnostic to market-based thinking, but is broad enough to encompass the market if the state-driven approach to the evolution of collective norms proves effective.

Methodology: assessing perceptions of FGF in five Asian economies

▾ Theoretical framework

Our attention to the topic of fragmentation of forest governance followed a number of mentions characterizing fragmentation as a deleterious syndrome featuring such negative outcomes as erosion of authority and oversight capacity (L. Zhang, 2008), loss of focus and coordination (Nair, 2008), dispersal of responsibility to “other” sectors and actors (de Rueda, 2008), instability and increased opportunism and corruption (Frye and Shleifer, 1996 cited in Smith et al., 2003; Smith et al., 2003). On the other hand, recent characterizations of fragmentation, in particular as it relates to global regimes (e.g. the climate regime) seeking integration across scales, have relied on scholarship depicting fragmentation itself as a neutral arrangement among actors, institutions, and norms towards which approaches to achieve certain goals may be positive (synergistic or cooperative) or negative (conflictive) (Biermann et al., 2009). As mentioned, Ostrom (2005) suggests a fragmentation that amounts to an apportioning of functions across institutions. Thus fragmentation of governance can be seen as a division of tasks and roles across different entities in a system, and not necessarily a disintegration of the system itself.

As a static state, therefore, the fragmentation of a system of governance can be considered simply as the structure of the system as it is described in pieces or sections, and the characterization of that fragmentation as either positive or negative would require an understanding of its effects. These effects would depend on the success or failure of synergistic, cooperative or conflictive approaches, reflecting both the qualities of those approaches in relation to the form and magnitude of fragmentation they encounter. The dynamic process of fragmentation may be perceived differently, depending on the perspective of the observer and that observer’s experience of change. In hindsight, early mentions of governance fragmentation that began to appear in the latter decades of the last century were associated with intentional processes of reform associated with neoliberal theories of organizational efficiency. Functions of the state were devolved to local levels through decentralization reforms. State functions were opened up to broader networks of actors, such that certain aspects of governance were privatized or reassigned to new agencies and institutions. At the same time, new linkages were created between national or global institutions and local governance structures, including both local government and non-governmental institutions, as well as institutions that often lacked statutory definition such as “communities” or “landscapes”.

Biermann et al. (2009) describe global governance as a “patchwork of international institutions that are different in their character (organizations, regimes, and implicit norms), their constituencies (public and private), their spatial scope (from bilateral to global), and their subject matter (from specific policy fields

to universal concerns)”. Their typology of fragmentation (Table 3) identifies three major types: synergistic, cooperative, and conflictive.

Table 3 Typology of fragmentation of governance architectures

	Synergistic	Cooperative	Conflictive
Institutional integration	One core institution, with other institutions being closely integrated	Core institutions with other institutions that are loosely integrated	Different, largely unrelated institutions
Norm conflicts	Core norms of institutions are integrated	Core norms are not conflicting	Core norms conflict
Actor constellations	All relevant actors support the same institutions	Some actors remain outside main institutions, but maintain cooperation	Major actors support different institutions

Source: Biermann et al., 2009

As suggested by Biermann’s (2009) typology, governance fragmentation is defined by divisions, which may be the source of, but do not necessarily result in, a lack of cohesion or integration of decision making. This is in line with Ostrom’s (2005) suggestion that fragmentation can be defined as an apportioning of roles and responsibilities across structures rather than a disintegration of structures that inevitably interrupts the accomplishment of particular functions.

Characterizing forest governance fragmentation across multiple economies and scales, given the many potential dimensions and scales of analysis suggested by the typology presented in the previous section, though potentially interesting from the perspective of pattern analysis, would in our opinion be of little use from a practical perspective. Assuming that all forest governance is fragmented in a number of basic ways, this study assesses the perceived degree and effects of forest governance fragmentation among actors, institutions, and norms at a number of scales from the perspective of participants in and close observers of forest governance from five Asian economies. Prior to introducing our methods and results, we present a brief contextual background.

For the purposes of this study, we adopted the following working definition of fragmentation in forest governance: the division and allocation among diverse institutions and actors, defined by their respective normative mandates and performing different functions and operating across sectors and scales, of the range of functions associated with decision making over management, use, conservation, and sharing of benefits of forest lands and their products.

Our analysis of fragmentation considered mechanisms and degrees of institutional integration, norm conflicts, and interactions among diverse actor groups. Using this definition, we avoided subscribing to a predetermined qualification of fragmentation as positive or negative, to pre-emptively ascribe fragmentation of forest governance to any particular policy impulse or political movement. We referred to

forms of fragmentation as either synergistic/cooperative (positive) or conflictive (negative). We considered synergy to be a state of alignment applicable to norms and institutions (in the sense of normative practices), cooperation to be a form of joint action among actors (including state and non-state organizations and individuals), and conflict to be a state of contradiction or interference among norms, institutions and actors.

▾ Data collection: survey of forestry experts

A survey instrument based on the above theoretical framework and the identified fracture lines was developed to assess expert perception of FGF.

The survey questionnaire consisted of thirty-two structured questions and two open-ended questions. The first set of questions characterized the respondents in terms of economy of focus, background discipline, programmatic areas of expertise, years of experience, and gender. The next 24 questions (Table 4) were designed to assess perceptions using a Likert scale, in which respondents were asked to indicate their degree of agreement or disagreement with a series of statements (S1-S24, or “24 fragmentation statements”) about forest governance in the economy with which they were familiar.

Respondents were asked the next question (which we will refer to as the “overall fragmentation” question) to indicate whether forest governance fragmentation was or was not “a serious problem” in the specified economy. Prior to the overall fragmentation question, the word “fragmentation” did not occur in the survey to prevent creating a preconception among respondents that might affect their responses. Finally, respondents were asked two open-ended questions to provide their opinion as to ① the causes and ② the effects of forest governance fragmentation in the specified economy.

Statements S1 to S24 were written in three sets of eight. Following Biermann et al.’s (2009) typology of fragmentation of governance architectures, the first set (S1-S8) presented statements related to fragmentation of relationships among actors in forest governance; the second set (S9-S17) among institutions; the third set (S18-S24) among norms. Questions alternated between a positive and a negative framing of the statements, with the intention of preventing a bias in responses should all questions be seen as “positive” or “negative” (Roszkowski and Soven, 2010). The statements framed in positive terms correspond to synergistic or cooperative types of fragmentation, while the statements framed in negative terms to conflictive types of fragmentation, as presented in Biermann et al.’s (2009) typology.

Table 4 List of 24 statements designed to assess perceptions of forestry experts on FGF

No.	Fragmentation type	Fragmentation character	Fragmentation category	Statements
1 (+)	Actor-based	Cooperative or conflictive	Scalar	In this economy, the coordination of forest policy, management, and enforcement between national and local forestry authorities is coherent and effective
2 (-)	Actor-based	Conflictive	Sectoral	National environmental programs in this economy suffer from lack of coordination and communication between authorities responsible for water, lands, forestry, agriculture, <i>etc.</i>
3 (+)	Actor-based	Cooperative or conflictive	Sectoral	In this economy, planning and implementation of forestry work is facilitated by collaboration with institutions responsible for socioeconomic development and rural welfare
4 (-)	Actor-based	Cooperative or conflictive	Scalar	National forest policies and programs are complicated by interventions of global organizations and NGOs, making forest governance less efficient or effective
5 (+)	Actor-based	Conflictive	Sectoral	Governance of the forest sector in this economy has been improved greatly due to the efforts of private companies to implement higher environmental and social standards
6 (-)	Actor-based	Conflictive	Inter-systemic	Insufficient effort by national/local forestry authorities to work with local or indigenous communities negatively affects forest management in this economy
7 (+)	Actor-based	Cooperative or conflictive	Functional	Environmentally sustainable forestry and forest production are well supported by national finance institutions and tax authorities
8 (-)	Actor-based	Cooperative or conflictive	Functional	Local law enforcement officials enable environmentally and socially damaging forest activities, or unjustly persecute forest users who have legitimate rights
9 (+)	Institution-based	Synergistic or cooperative	Normative	National forestry policies provide a comprehensive framework to ensure progress in sustainable forest management, climate change mitigation, timber legality in trade, economic development, and rural livelihoods
10 (-)	Institution-based	Synergistic, cooperative or conflictive	Scalar	In attempting to satisfy global organizations or donors, the national forestry sector neglects important national environmental or economic priorities
11 (+)	Institution-based	Synergistic or cooperative	Inter-systemic	Current national forest restoration (or FLR) programs strengthen communities and smallholder of forestry systems

(continued)

No.	Fragmentation type	Fragmentation character	Fragmentation category	Statements
12 (-)	Institution-based	Conflictive	Sectoral	In this economy, the development of initiatives for market-based green growth do not effectively support sustainable forest management
13 (-)	Institution-based	Synergistic, cooperative or conflictive	Normative	Programs designed to promote forest law enforcement, governance and trade (FLEGT) reduce the profitability of the forestry sector
14 (-)	Institution-based	Synergistic, cooperative or conflictive	Normative	National investments to implement FLR do not support the implementation of REDD+
15 (+)	Institution-based	Synergistic or cooperative	Scalar	FLEGT and related timber legality programs improve cross-border cooperation and improve forest management regionally and worldwide
16 (+)	Institution-based	Synergistic, cooperative or conflictive	Inter-systemic	Customary or traditional forestry systems are well integrated in national forest policies and laws
17 (+)	Norm-based	Synergistic	Normative	Managing forests to deliver water and soil ecosystem services, instead of timber, is bringing greater benefits to the economy
18 (-)	Norm-based	Synergistic or conflictive	Normative	In this economy, local people suffer economic hardships due to the implementation of national biodiversity conservation programs
19 (+)	Norm-based	Synergistic	Normative	The use of forests to mitigate climate change through carbon capture has benefited biodiversity in this economy
20 (-)	Norm-based	Conflictive	Scalar	The economic benefits of forest carbon are captured by outsiders and do not benefit local people
21 (+)	Norm-based	Synergistic or conflictive	Inter-systemic	In this economy, forest conservation and restoration programs have been designed to strengthen local rights to land and natural resources
22 (-)	Norm-based	Synergistic or conflictive	Scalar	Decentralization of forest governance has reduced environmental protection and caused over-extraction of forest products and natural resources
23 (+)	Norm-based	Synergistic	Spatial	National land use and forest type classifications support the successful implementation of sustainable forest management
24 (-)	Norm-based	Conflictive	Spatial	The ability of forestry authorities to govern forest regions is diminished by lack of communication and joint planning across political boundaries (e.g. provincial, county, or district boundaries)

(+) and (-) indicate statement directions.

Online survey

Between December 2017 and February 2018, APFNet conducted a survey of forestry experts in China, Indonesia, Malaysia, Nepal and Vietnam.

The survey was administered online using SurveyMonkey (SurveyMonkey, n.d.). A separate survey was prepared for each economy, with identical questions except for the name of the economy in the title of the survey and text of some of the questions as necessary, to avoid the possibility of respondents calling on experience working in forestry in more than one economy. The authors distributed the link to a list of forestry experts provided by the Center for International Forestry Research (CIFOR) and APFNet staff. When initial responses were low, the authors requested help from colleagues and acquaintances to provide further contacts and sent the invitation again until reaching the minimum of 20 completed questionnaires per economy. A total of 136 responses were received, of which 119 completed at least one full set of responses to the three sets of 1-24 fragmentation statements. The remaining seven responses were discarded.

The resulting sample of experts (Table 5) was relatively well distributed across economies. 34% of respondents had more than twenty years of experience in their field, 11% had five or less years of experience, with the remainder distributed relatively evenly between 6 and 20 years. 42% of respondents

Table 5 Breakdown of respondents by economy, years of forestry-related experience, institution type, primary discipline, topics of expertise and gender

	Items	Number	Percentage (%)
Economy of expertise	China	24	20
	Indonesia	25	21
	Malaysia	25	21
	Nepal	20	17
	Vietnam	25	21
Years of forestry-related experience	1-5	13	11
	6-10	23	19
	11-15	20	17
	16-20	22	19
	>20	40	34
Institution type	Government department (forestry or related)	50	42
	University or research institution	48	40
	Other	21	18
Primary discipline	Economics, finance, business, timber industry	9	8
	Natural sciences, ecology, forest management	75	63
	Policy, law, governance*	25	21
	Social sciences, rural development, human geography	10	8

(continued)

	Items	Number	Percentage (%)
Topics of expertise	Sustainable forest management	85	71
	Forest landscape restoration	43	36
	Conservation	41	34
	REDD+	36	30
	Land use/cover change	33	28
	Forest ecosystem services	32	27
	Payment for ecosystem services	22	18
	Timber production/trade	17	14
	FLEGT	15	13
	Forest certification	15	13
	Timber legality	12	10
	Community/social forestry/tenure	9	8
	Voluntary carbon markets	4	3
	Other	3	3
Gender	Male	88	74
	Female	30	25
	Other	1	1

*Includes “climate change” and “biomass/bioenergy”.

were associated with a governmental department related to forestry; 40% were forestry-related researchers or university affiliates, and the remainder belonged to various non-state affiliated forestry institutions. The great majority (63%) of respondents identified themselves as primarily focused on natural sciences, ecology or forest management, followed by specialists in forest policy, law, or governance (21%). Respondents could identify more than one primary area of expertise. The most common area identified was sustainable forest management (SFM) at 71%, forest landscape restoration (FLR) at 36%, conservation at 34%, and REDD+ at 30%. Close to 3/4 of respondents identified themselves as men, and 1/4 as women.

Statistical analyses

All statistical analyses and most graphical representations were conducted using a trial version of the software JMP⁹, with the assistance of Microsoft Excel for some tabulation of data and graphs.

Comparison of mean responses

The means of all responses to each of the 24 fragmentation statements were compared using a Student’s

⁹ JMP®, Version 14. SAS Institute Inc., Cary, NC, 1989-2007.

T-test of all pairs so as to order questions in terms of their degree of difference. Responses yielding a mean closer to 1 corresponded to agreement with positive and disagreement with negative statements. Responses yielding a mean closer to 5 corresponded to agreement with negative and disagreement with positive responses. Scoring of the degree of difference corresponds to the number of statements with which a given response is significantly different at the 99% confidence level (to increase the robustness of results, an alpha level of 0.01 was used for this analysis).

We did this analysis with data from all economies together to assess the overall perceptions of the entire sample, and then repeated the procedure with the economy of respondents as a dependent variable to identify significant variations among responses by economy, explained below.

Addressing response bias

As previously mentioned, the 24 fragmentation statements used to assess respondent perceptions using a Likert scale were framed alternately in positive and negative terms. While this approach was taken with an expectation of reducing bias in the responses, the inverse proved to be true: on preliminary inspection of the data, a consistent and significant difference between responses to positively-framed questions and negatively framed questions was discovered (Table 6). While the degree of this variance varied by economy of respondents' expertise, the direction of the variance was consistent among all economies. Respondents tended to agree more with questions framed positively, and to disagree with questions framed negatively.

We then separately performed an analysis of variance (ANOVA) of responses divided by positive and negative statements (associated data is appended as Appendix 1).

In our analysis of responses comparing reactions by economy, we proceeded statement by statement, which meant that there would be no comparison of responses between positive and negative statements.

Table 6 Mean of (unstandardized) responses to 24 fragmentation statements by negative or positive framing

Economy	Negative framing	Positive framing	P-value	Difference (positive-negative)
All economies	2.936	2.494	<0.0001*	- 0.443
China	2.788	2.470	<0.0001*	- 0.318
Indonesia	3.267	2.545	<0.0001*	- 0.722
Malaysia	2.637	2.315	<0.0001*	- 0.321
Nepal	2.992	2.852	0.0863	- 0.139
Vietnam	3.000	2.337	<0.0001*	- 0.663

However, there was still the probability that responses by economy would reflect the differential bias associated with a more positive leaning tendency (e.g. Indonesia) to a more normal distribution (Nepal).

▾ Analysis of results by fragmentation type and economy

We analyzed responses by the types of forest governance fragmentation identified as actor-based, institution-based, and norm-based. We used radar diagrams to illustrate the relative positive or negative perceptions of governance fragmentation by economy of respondents' expertise, labeling results (A, B, or C) to indicate whether or not differences among responses by economy were significant. These correspond to the results of a Student's T-test, in which the means of economy pairs not connected by the same letter were found to be significantly different at the 99% level ($p < 0.01$). Mean responses less than the neutral value (3) were considered to indicate a "positive" perception in relation to the character of fragmentation associated with the fragmentation lines described in the respective statement; mean responses greater than the neutral value (3) are considered to indicate a "negative" overall perception, not taking into account the response bias mentioned above.

▾ Consensus analysis

To improve our ability to discuss results comparatively across economies, we conducted a consensus analysis (after Tastle and Wierman, 2007; Tastle et al., 2005), resulting in a standard measure of consensus in responses to each statement and by economy.

We then tabulated responses to all questions by economy in sequence and assigned a value from 1 to 4, corresponding to quartile 1 (comprising the six most positive reactions to the set of 24 statements to quartile 4 (comprising the six most negative reactions), *etc.* We then associated the consensus data by, similarly, ranking consensus in responses to each question by economy and assigning a value from 1 to 5, corresponding to the lowest to the highest degrees of consensus, respectively. In this way, we were able to visually examine the data and identify statements that showed high degrees of commonality vs. divergence supported by the measure of consensus.

Results

Responses to the overall fragmentation question

In order to assess whether the overall survey design was successful in capturing information on the relationship between fragmentation of forest governance and perceptions about many different aspects of forest governance as expressed in Statements 1-24, we reviewed overall responses and made several comparisons.

90% of respondents answered the question “Is forest governance fragmentation a serious problem?” (which we will call the “overall fragmentation question”). 50.5% of respondents considered forest governance fragmentation to be a serious problem in their economy of expertise; 39.2% did not, and the remaining 10.3% had no opinion or did not know (Figure 1).

Of a possible total of 2,856 responses by 119 respondents to the 24 fragmentation statements, the survey generated 2,735 responses, or a 96% response rate.

There was a clear correspondence between the overall fragmentation question and the aggregate of responses to the 24 fragmentation statements. Of respondents who considered forest governance fragmentation to be a serious problem, 34.0% scored on the “negative” scale, i.e. ranking 4 or 5, indicating agreement or strong agreement with statements worded in negative terms and disagreement or strong disagreement with statements worded in positive terms; and 42.3% scored on the “positive” scale, i.e. ranking 1 or 2. Of respondents who did not consider forest governance fragmentation to be a serious problem, 38.0% scored on the negative scale (4-5) and 60.4% scored on the positive scale (1-2) (Figure 2).

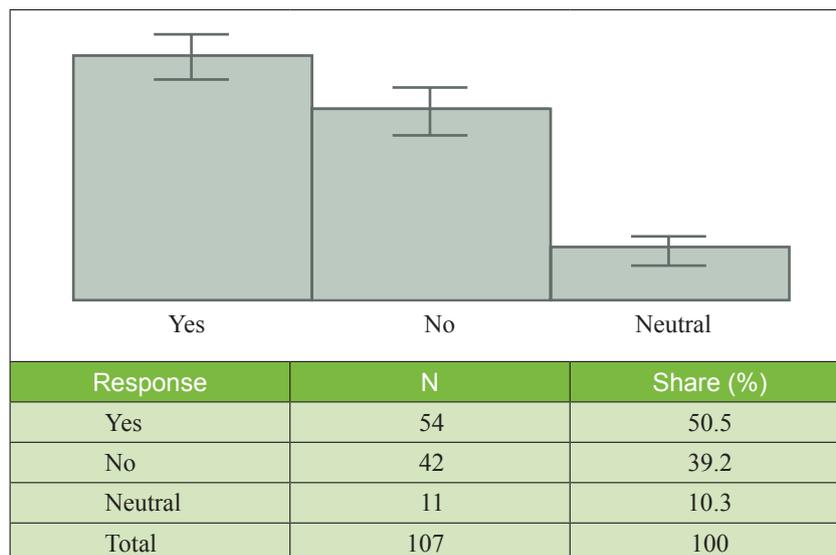


Figure 1 Responses to the question “Is forest governance fragmentation a serious problem?” in respondents’ economy of expertise

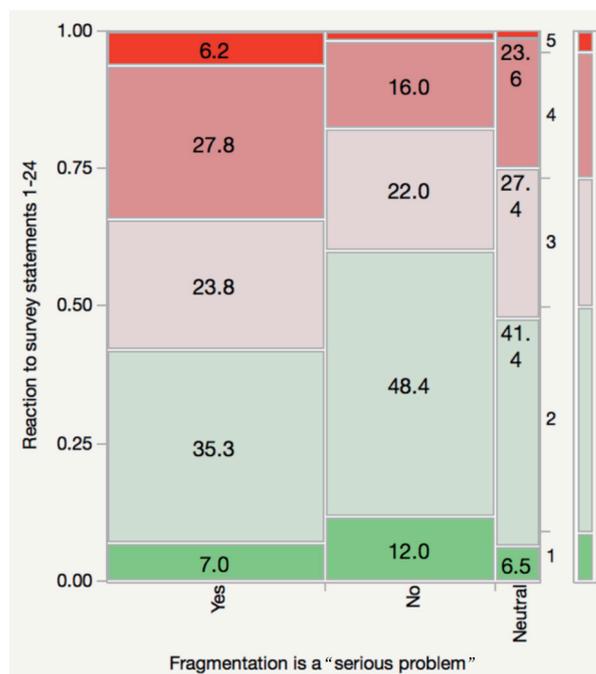


Figure 2 Correspondence of the aggregate responses to the overall fragmentation question. 1=strong agreement with positive statements or strong disagreement with negative statements; 5 = strong agreement with negative statements or strong disagreement with positive statements.

A second comparison assessed the breakdown of responses to the overall fragmentation question by economy and institution, and found significant variation in both cases (Figure 3). The majority of respondents from Indonesia (95.2%), Nepal (60.0%), and Vietnam (57.1%) considered forest governance fragmentation to be a serious problem; the majority from China (65.2%) and Malaysia (72.7%) did not consider it to be a serious problem. Among institution types, the majority of respondents (53.7%) associated with government departments did not consider forest governance fragmentation to be a serious problem, compared to a nearly equal number of respondents working with universities research institutions who did consider forest governance fragmentation to be a serious problem. A 65.0% majority of members of other institutions (including national and international NGOs and companies) also considered the fragmentation syndrome a serious problem.

The above results reveal several things about the data we obtained through our survey. First, there was an overall relationship between the perception of all respondents regarding whether or not forest governance fragmentation is a serious problem in their economy of expertise. Second, there were large variations by economy, institutional affiliation, and gender in terms of whether or not respondents considered FGF to be a serious problem. Only 26.1% and 18.2% of respondents with expertise in China and Malaysia, respectively, considered FGF to be a serious problem, compared with Nepal (60.0%) and Vietnam (57.1%) and Indonesia

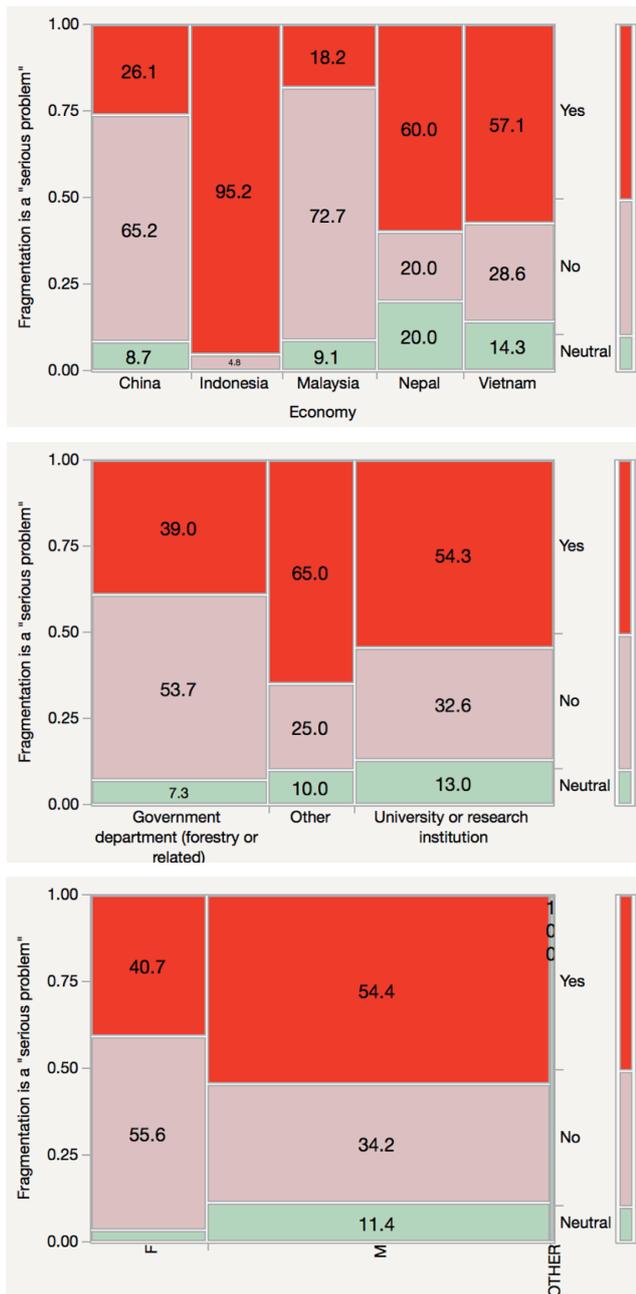


Figure 3 Results of the overall fragmentation question analysis by economy, institution, and gender. The width of each column corresponds to the number of respondents in the category.

(95.2%). A higher proportion of university affiliates or researchers (54.3%) than government affiliated respondents (39.0%) saw FGF as a serious problem. Finally, men (54.4%) were more likely than women (40.7%) to view FGF as a serious problem.

Comparison of overall results

Based on a comparison of the means of all possible pairs of responses to the 24 fragmentation statements, we assigned responses to four quartiles representing the following intervals:

- ▶ Quartile 1 – more positive to the most positive;
- ▶ Quartile 2 – median to more positive;
- ▶ Quartile 3 – median to more negative;
- ▶ Quartile 4 – more negative to the most negative.

where a positive assignment was determined by the relative levels of agreement with positively-framed questions and disagreement with negatively-framed questions, and a negative assignment was determined by the relative levels of agreement with negatively framed questions and disagreement with positively-framed questions (Table 7 and Figure 4).

Overall, the most positive mean reactions across all respondent categories were associated with statements 9 (2.04), 11 (2.29), 15 (2.36), 17 (2.34), 19 (2.33), and 23 (2.31). These results potentially indicate that the majority of respondents hold the following positive perceptions as to the character of FGF across institutional and normative lines:

- ▶ Synergy between forestry and multiple other environmental and social institutions, including sustainable forest management, climate change

Table 7 Table summarizing the mean responses to Statements 1-24, classing degrees of positive vs. negative perception, identifying relevant fragmentation lines, categories, and character. The latter is defined by the nature of fragmentation lines and associated mean perception.

No.	Frag. type	Mean	Percep.	Pairs no.	Fragmentation lines	Frag. category	Frag. Character
1 (+)	Actor-based	2.44	+	13	National and local forest governance actors	Scalar	Coop. or conflict
2 (-)	Actor-based	3.34	--	20	Forestry and non-forestry sector actors	Sectoral	Conflict
3 (+)	Actor-based	2.64	+	14	Forestry and socioecon/rural development actors	Sectoral	Coop. or Conflict
4 (-)	Actor-based	2.76	-	14	National forestry and global actors	Scalar	Coop. or Conflict
5 (+)	Actor-based	3.12	--	15	Forestry and private actors	Sectoral	Conflict
6 (-)	Actor-based	3.17	--	16	Forestry and local/indi. community actors	Inter-systemic	Conflict
7 (+)	Actor-based	2.94	-	14	Forestry and finance/tax authorities	Functional	Coop. or Conflict
8 (-)	Actor-based	2.89	-	13	Forest users and law enforcement actors	Functional	Coop. or Conflict
9 (+)	Institution-based	2.04	++	23	Multiple environmental and social institutions	Normative	Syn or Coop.
10 (-)	Institution-based	2.71	-	14	Forestry and global institutions	Scalar	Syn, Coop. or Conflict
11 (+)	Institution-based	2.29	++	16	National and community/smallholder forestry institutions	Inter-systemic	Syn or Coop.
12 (-)	Institution-based	3.03	--	16	Forestry and market-based institutions	Sectoral	Conflict
13 (-)	Institution-based	2.92	-	14	Forest economics and legality institutions	Normative	Syn, Coop. or Conflict
14 (-)	Institution-based	2.54	+	11	Two forestry institutions (FLR and REDD+)	Normative	Syn, Coop. or Conflict
15 (+)	Institution-based	2.36	++	15	Across national borders (FLEGT)	Scalar	Syn or Coop.
16 (+)	Institution-based	2.61	+	14	National forestry and customary/traditional institutions	Inter-systemic	Syn, Coop. or Conflict
17 (+)	Norm-based	2.34	++	16	Ecosystem service and economic norms	Normative	Syn
18 (-)	Norm-based	2.64	+	14	Conservation and socioeconomic norms	Normative	Syn or Conflict
19 (+)	Norm-based	2.33	++	16	Conservation and climate change norms	Normative	Syn
20 (-)	Norm-based	3.05	--	16	Climate change and socioeconomic norms	Scalar	Conflict

(continued)

No.	Frag. type	Mean	Percep.	Pairs no.	Fragmentation lines	Frag. category	Frag. Character
21 (+)	Norm-based	2.44	+	13	Forest environmental norms and local land/ resource rights	Inter-systemic	Syn or Conflict
22 (-)	Norm-based	2.83	-	13	Decentralization and forestry norms	Scalar	Syn or Conflict
23 (+)	Norm-based	2.31	++	16	Forestry and land use/spatial planning norms	Spatial	Syn
24 (-)	Norm-based	3.34	--	20	Forestry and geopolitical norms (sub-national borders)	Spatial	Conflict

Note: “Percep.”, or perception indicator is based on the quartile to which the respective mean of responses corresponds. Quartile 1 (++) = more to the most positive; Quartile 2 (+) = median to more positive; Quartile 3 (-) = median to more negative; Quartile 4 = more to the most negative. “Pairs no.” indicates the number of other statements to which responses to the current statement was significantly different to the 99% level ($\alpha = 0.01$) in a Student’s T-test in comparison with the mean responses of all pairs.

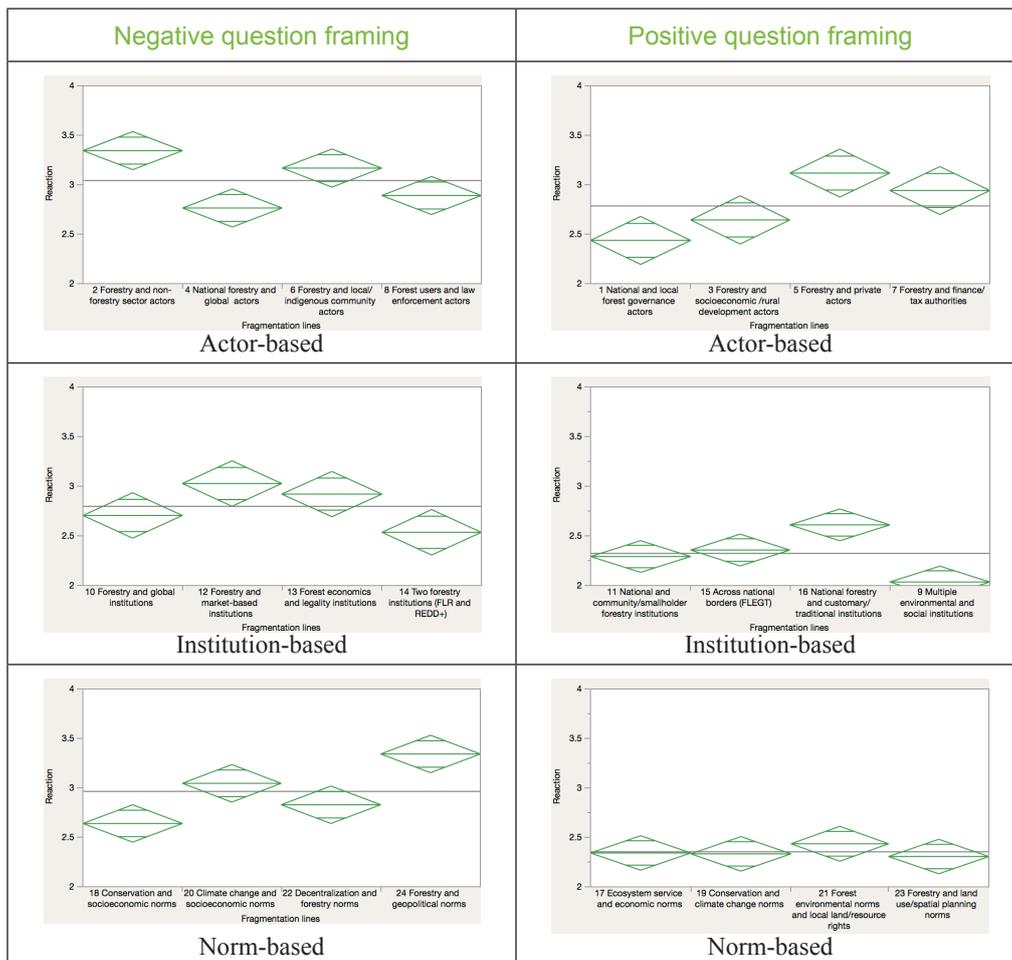


Figure 4 Graphic representation of mean responses to Statements 1-24 across all respondents. Associated data is appended (Appendix 1).

mitigation, timber legality in trade, economic development, and rural livelihoods;

- ▣ Synergy between national forest restoration (or FLR) programs and community/smallholder forestry systems;
- ▣ Cooperation across national borders and at regional/global scales under the influence of FLEGT;
- ▣ Alignment of the interests of forestry for the production of ecosystem services with economic interests, even if it reduces revenues from timber;
- ▣ Synergy between climate change mitigation through forest carbon programs and biodiversity conservation interests;
- ▣ Alignment of national land use zoning and definitions of forest type with sustainable forestry outcomes.

The most negative mean reactions were associated with statements 2 (3.34), 24 (3.34), 6 (3.17), 5 (3.12), 20 (3.05), and 12 (3.03). These results, although close to the hypothetical neutral line of responses (3), are comparatively more negative. We consider that, in comparison with the positive statements above, these statements represent perceptions among the majority of respondents of more conflictive characteristics associated with FGF, as follows:

- ▣ Lack of coordination and communication between authorities responsible for water, lands, forestry, agriculture, *etc.*, conflicting with environmental interests;
- ▣ Insufficient cooperation among forestry authorities across sub-national political boundaries;
- ▣ Insufficient cooperation between forestry authorities and local/indigenous groups, conflicting with interest in sustainable forest management;
- ▣ The behavior of private sector companies conflicting with governance of social and environmental outcomes through implementation of higher standards;
- ▣ Accrual of benefits associated with forest carbon favoring outsiders over local people;
- ▣ Market-based green growth initiatives misaligned with interests of sustainable forest management.

While these overall results are informative, given the high variability of responses and to put them in the specific contexts of each economy from which survey participants were recruited, the following section will first present results of a consensus analysis followed by a question-by-question analysis of responses by economy.

▾ Analysis of results by statement and economy

This section presents results of reactions to survey statements 1-24, statement by statement, comparing the

relative perceptions of respondents by economy, and indicating significant differences. Results of responses to actor-based statements (1-8), institution-based statements (9-16), and norm-based statements (17-24) are depicted as radar diagrams in Figures 5, 6, and 7, respectively.

Actor-based fragmentation lines by economy (Figure 5).

Interestingly, reactions to **Statement 1** (“In surveyed economy, the coordination of forest policy, management, and enforcement between national and local forestry authorities is coherent and effective”) were only partially aligned with those to the decentralization statement (S-22). Indonesia and Nepal perceptions were on average close to neutral (3.08 and 2.75), China and Vietnam somewhat positive (2.25 and 2.28, respectively), and Malaysia significantly more positive (1.88).

As noted above, overall perceptions of the effect on forest governance of separate natural resources and land jurisdictions, as assessed by responses to **Statement 2** (“National environmental programs in this economy suffer from lack of coordination and communication between authorities responsible for water, lands, forestry, agriculture, etc.”) ranked among the most negative, albeit with low consensus among all respondents. Broken down by economy, mean reactions from Nepal respondents were most negative (3.85), followed by Vietnam (3.56), Indonesia (3.48), and China (3.33), with no significant difference among the four economies. The mean of perceptions from Malaysia was most positive (2.60), and significantly different from the others.

No significant difference by economy of respondents was found in reactions to **Statement 3**, assessing the degree of collaboration across socioeconomic/rural development and forestry sectors. Results ranged from somewhat positive (Vietnam, Indonesia, Malaysia) towards neutral (China, Nepal). Consensus among respondents, particularly from Malaysia and Nepal, was relatively low.

Respondents from Nepal and Indonesia (3.20 and 3.12) were more likely to view interventions by IOs/NGOs as disruptive to national policies and programs (**Statement 4**, “National forest policies and programs are complicated by interventions of global organizations and NGOs, making forest governance less efficient or effective”) compared with reactions from Malaysia and Vietnam (2.48 and 2.76, respectively). China respondents’ mean reaction was significantly more positive (2.33).

Perceptions associated with private sector governance, as assessed by the mean of reactions to **Statement 5** (“Governance of the forest sector in this economy has improved greatly due to the efforts of private companies to implement higher environmental and social standards”) also ranked relatively high on the negative scale, again with Nepal respondents’ mean perceptions significantly more negative (3.95), followed by China (3.25), with Malaysia, Indonesia, and Vietnam not significantly different from one another and closer to neutral (2.96, 2.92 and 2.68, respectively).

Perceptions of the degree of cooperation between forestry authorities and local/indigenous groups assessed

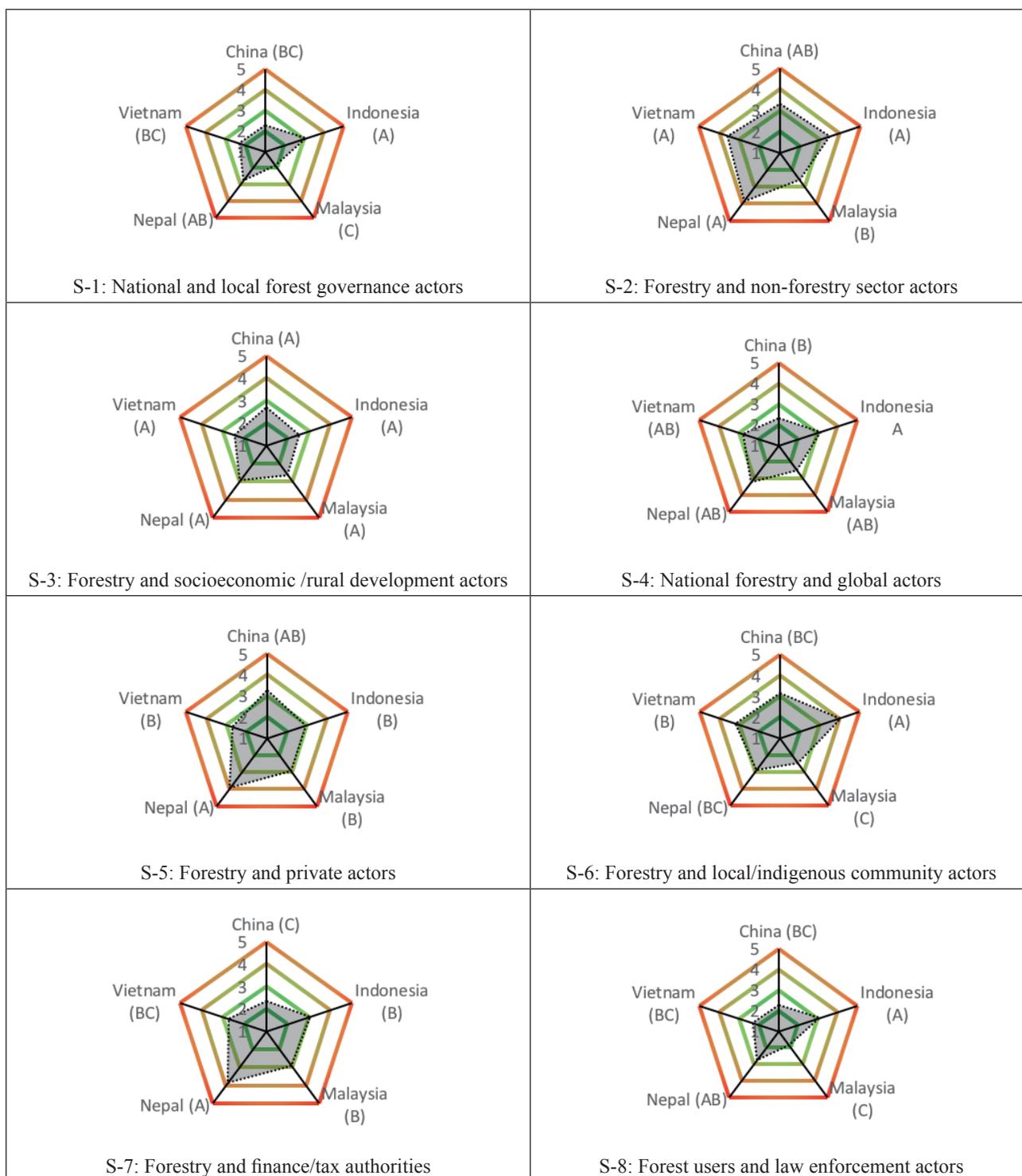


Figure 5 Radar diagrams based on the mean of responses, by economy, to statements 1-8, relevant to lines of fragmentation among groups of actors in forest governance. The means of responses by economies not connected by one or more letters (A, B, or C placed after the name), were significantly different in a Student's T-test.

via **Statement 6** (“Insufficient effort by national/local forestry authorities to work with local or indigenous communities negatively affects forest management in this economy”) varied significantly. Mean responses from Malaysia and Nepal ranged from somewhat positive towards neutral (2.48 and 2.90, respectively). From China and Vietnam, mean responses were negative (3.17 and 3.20, respectively). Responses from Indonesia were significantly more negative (4.04), with much higher consensus among respondents as compared with the rest.

Perceived effects of governance fragmentation between forestry and the financial sector and taxation authorities, assessed by reactions to **Statement 7** (“Environmentally sustainable forestry and forest production are well supported by national finance institutions and tax authorities”) were also significantly more negative among Nepal respondents (3.85) and closer to neutral among respondents from Indonesia (3.04), Malaysia (2.92). Vietnam (2.72) and China (2.33) responses were more positive, the mean China response being significantly distinct from the other four.

Meanwhile, alignment between core functions of forestry and law enforcement, as assessed by **Statement 8** (“Local law enforcement officials enable environmentally and socially damaging forest activities, or unjustly persecute forest users who have legitimate rights”) was perceived on average as relatively positive in Malaysia (2.36) and China (2.66), close to neutral in Vietnam (3.04) and Nepal (3.05) and somewhat negative in Indonesia (3.36). However, consensus in Malaysia and China responses was low, indicating some disagreement among respondents.

Institution-based fragmentation lines by economy (Figure 6)

Reactions to **Statement 9**, as noted above, averaged as most positive among all survey responses. The statement, “National forestry policies provide a comprehensive framework to ensure progress in sustainable forest management, climate change mitigation, timber legality in trade, economic development, and rural livelihoods” assesses the perception of the general alignment between forestry policy and range of allied desirable social and environmental norms. The mean response of Malaysia respondents was significantly most positive (1.57), followed by China (2.00), Vietnam (2.05), Indonesia (2.17) and Nepal (2.45). Overall, consensus among respondents on this point was relatively high, though substantially lower in the case of Nepal.

Statement 10 tests fragmentation effects associated with international-national interactions, in terms of how national forestry agencies act in relation to outside expectations (S-10, “In attempting to satisfy global organizations or donors, the national forestry sector neglects important national environmental or economic priorities”). Malaysia’s mean response was significantly more positive (1.91) than that of Vietnam, Nepal, and Indonesia (3.32, 3.15, 2.92). The reaction from China’s respondents was somewhat positive (2.29). In addition, consensus among responses from Malaysia and China were relatively higher.

Statement 11 assessed perceptions of the effects of national forest restoration programs at the local scale,

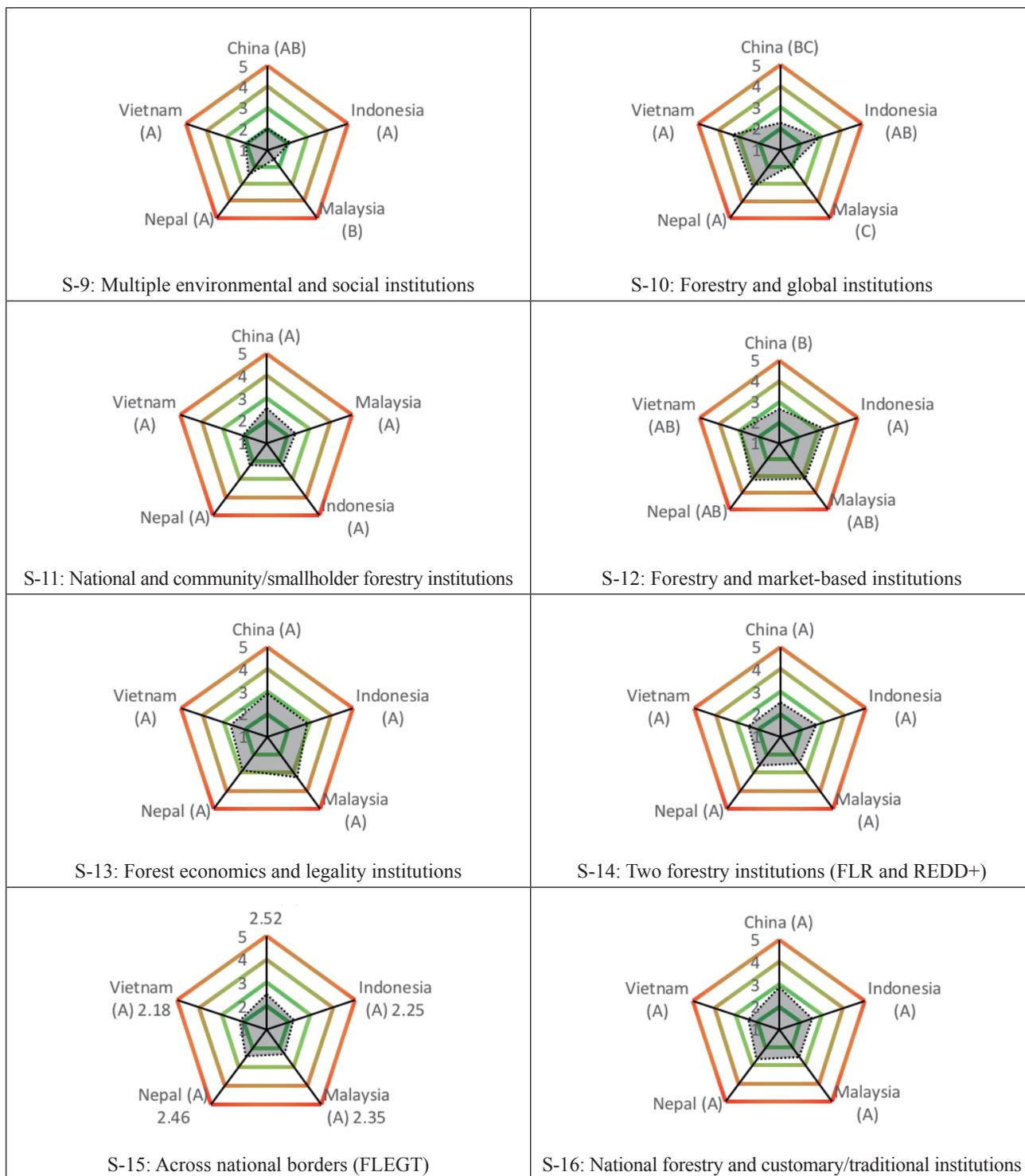


Figure 6 Radar diagrams based on the mean of responses, by economy, to Statements 9-17, relevant to lines of fragmentation among institutions affecting forest governance. The means of responses by economies not connected by one or more letters (A, B, or C placed after the name), were significantly different in a Student's T-test.

i.e. on community or smallholder systems. Responses indicate a generally positive perception, with no significant difference in mean responses by economy.

Perceptions of the effect of the “sustainability” sector on forest governance, as assessed by responses to **Statement 12** (“In this economy, the development of initiatives for market-based green growth do not effectively support sustainable forest management”) ranged from somewhat positive among respondents with expertise on China and Vietnam (2.63 and 2.90) to negative among Indonesia, Nepal, and Malaysia respondents (3.29, 3.20 and 3.14, respectively). The difference among the extremes (mean responses on China and Indonesia) was significant.

The mean perception of Malaysia respondents to **Statement 13**, assessing the alignment between a timber legality institution (FLEGT) and the role of forestry as a profit center was somewhat negative (3.26) compared with neutral to positive responses from respondents on the other four economies.

The general perception among respondents of all five economies on the alignment among institutions of forest landscape restoration and REDD+ (**Statement 14**) was somewhat positive (2.45-2.67) and not significantly different (i.e. they are aligned in that investment in one does not negatively impact the other).

Responses to **Statement 15**, on average, indicate a potential positive effect of FLEGT on forest governance cohesion across national borders and at regional and/or global scales, at least in terms of addressing the illegal timber trade and its associated impacts on forest management.

Perceptions of the degree to which customary/traditional forestry systems are integrated in national policies and laws (assessed by reactions to **Statement 16**) tended to be somewhat positive (2.41-2.88), with no significant difference among respondents with expertise on specific economies.

Norm-based fragmentation lines by economy (Figure 7)

Statement 17, pertaining to relative economic benefit of forests as a source of ecosystem services (water, soil) vs. natural resources (timber), generated positive mean responses (2.04 – 2.27) in all cases except Nepal, which generated a somewhat negative and significantly different response (3.30), with relatively higher consensus among respondents.

Mean perceptions on the alignment of biodiversity conservation and social welfare norms, as assessed through reactions to **Statement 18** (“In this economy, local people suffer economic hardships due to the implementation of national biodiversity conservation programs”) ranged from positive (Malaysia: 2.09) towards neutral (Vietnam: 2.90).

Alignment between norms of climate change mitigation and biodiversity conservation (**Statement 19**) similarly ranged from positive (China: 2.00) to neutral, with the Nepal mean response significantly different at 2.95.

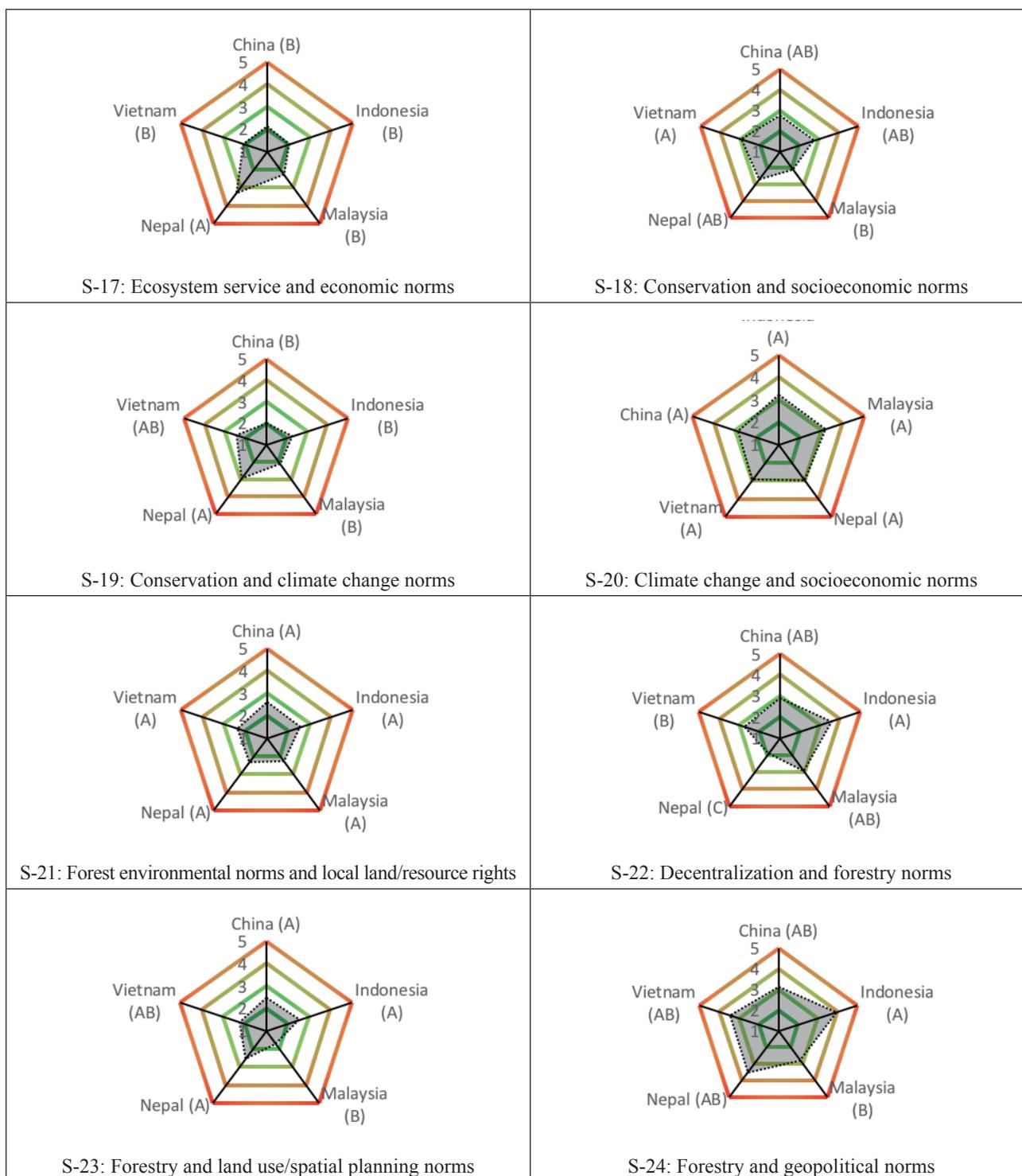


Figure 7 Radar diagrams based on the mean of responses, by economy, to Statements 17-24, relevant to lines of fragmentation among norms affecting forest governance. The means of responses by economies not connected by one or more letters (A, B, or C placed after the name), were significantly different in a Student's T-test.

Responses to **Statement 20**, pertaining to benefit sharing associated with carbon programs among locals and outsiders, were closely distributed around the neutral point, with no significant difference among responses by economy.

Among responses from all economies, perceptions of the effect of national forestry programs on local land/resource rights (**Statement 21**) were somewhat positive (2.29 to 2.58). It is not certain that this relates to integration of customary/traditional systems with statutory systems of governance; rather, responses may relate more to the role of forestry programs in bringing rights systems in line with statutory systems.

Analyzed in the aggregate among economies, the question of the effects of decentralization as assessed by **Statement 22** (“*Decentralization of forest governance has reduced environmental protection and caused over-extraction of forest products and natural resources*”) did not stand out as a polarizing indicator of fragmentation effects. However, when broken down by economy, the results diverge: the perception among Nepal respondents of decentralization policies relationship with sustainability indicators was significantly more positive (at 1.90) than Vietnam (2.73), China (2.88), Malaysia (2.95), while the average perception of Indonesia respondents was significantly negative compared to all the others (3.57).

Mean perceptions of the effects of governance fragmentation associated with land use and forest type designations, indicated by responses to **Statement 23** (worded as “*National land use and forest type classifications support the successful implementation of sustainable forest management*”) all fell in the positive range (<3), with responses from Malaysia significantly more positive than China, Indonesia, and Nepal.

As noted previously, the mean of responses to **Statement 24**, designed to assess the perceived effects of governance fragmentation across political boundaries (worded as: “*The ability of forestry authorities to govern forest regions is diminished by lack of communication and joint planning across political boundaries (e.g. provincial, county, or district boundaries)*”) was among the highest on the negative scale, in the quartile associated with negative to most negative perceptions. By economy of respondents’ expertise, responses on forest governance in Indonesia averaged the most negative (3.91), followed by Nepal (3.50), Vietnam (3.41) and China (3.13). The mean of perceptions on Malaysia were slightly positive (2.77), and very significantly different from perceptions on Indonesia, where consensus among respondents was high compared to the rest.

↳ Consensus analysis

The results of the consensus analysis among responses by economy and by institutional affiliation revealed patterns of agreement and disagreement that are likely to reflect differences in the national context as revealed through the perceptions of national experts. To uncover these differences and organize the analysis, we compared the level of consensus of respondents for each economy and for government and research affiliations with the overall level of consensus of all respondents. By economy, responses from

China showed the highest degree of consensus, followed by Vietnam, Malaysia, Indonesia, and Nepal. Across economies, there was higher consensus among researchers than among government affiliated respondents (Table 8).

Table 8 Results of consensus analysis of all responses (the overall consensus) and the difference in consensus by economy and by institutional affiliation to the overall consensus. Darker green cells indicate higher consensus; darker red cells, lower consensus.

Consensus Level		Difference of consensus in responses by economy and by institutional affiliation vs. all responses						
		Economy					Institutional affiliation	
Statement	All responses (%)	China (%)	Indonesia (%)	Malaysia (%)	Nepal (%)	Vietnam (%)	Government (%)	Research (%)
9	78	8	0	1	-19	4	4	-3
19	74	19	3	-2	2	3	0	1
14	73	4	-4	2	-6	4	0	1
15	73	-2	-5	7	-5	5	5	0
20	72	-4	1	0	-5	7	-6	2
11	71	-2	6	1	-5	3	5	0
23	71	0	-9	11	-5	10	10	-3
12	70	5	-6	-7	2	6	-6	1
13	66	11	-5	5	-6	-6	-1	3
21	65	1	-9	7	3	2	8	-4
16	64	0	-6	6	1	4	3	-1
3	64	6	5	-1	-7	1	4	3
8	63	-1	5	-4	10	6	-7	7
4	63	14	1	5	-7	2	-4	3
1	63	9	-1	13	2	4	11	-4
5	62	-1	6	6	6	3	5	-3
24	62	7	21	-11	2	7	-2	0
18	62	-1	5	2	-8	14	-3	-1
7	59	7	2	2	14	6	2	3
6	59	5	25	1	1	9	0	1
17	59	7	5	4	13	4	2	0
10	59	21	5	14	-4	5	-3	3
22	57	12	5	-4	17	7	-5	5
2	56	11	7	-1	1	5	1	0
All	61	5	-1	1	-3	3	-2	2

Summary of qualitative results by economy

China

According to the majority of survey participants, forest governance fragmentation in China was not widely perceived to be a serious problem. Responses supporting this perspective included reference to *China's Forest Law* and associated regulations for implementation, which define forest rights, utilization, and monitoring of forests and their resources and guide planning of forestry development at the national, provincial and sub-provincial scales. Meanwhile, the consistency of forestry policy and its implementation has been supported by the installation of a single forestry agency. The State Forestry and Grassland Administration (SFGA), despite several changes in name¹⁰, has operated continuously since the founding of the current government system nearly 70 years ago. Directions from the top, such as the establishment of harvest quotas, determine practices on the ground, e.g. harvested volumes. In addition, an agency specialized in integration, the National Development and Reform Commission (NDRC), coordinates policies and implementation across sectoral authorities.

Several sources of FGF were nonetheless mentioned. First, the forest sector in China is mainly governed by SFGA and sub-national forestry departments; forest policies do not always sufficiently incorporate the interests of other stakeholder groups such as communities, private sector actors, urban residents and NGOs. There are limited mechanisms for stakeholder participation affecting forest policies, institutions, financing, and operations. For example, there is no platform for public participation to monitor progress in forestry development.

Experts mentioned sectoral and scalar conflicts, e.g. among agencies for forestry, environment and agriculture, both in legislation and practice. Other national ministries and sector authorities at lower political scales as well as local governments have influence over the management and conservation of forests but do not necessarily coordinate with SFGA and forestry departments. Forestry has less influence on natural resource decisions and is at times deprioritized in favor of development of other sectors. In addition to lack of strong communications and coordination between forestry authorities and other government agencies, such as agriculture agencies, there are overlapping and conflicting responsibilities affecting the forestry sector.

Survey respondents who identified FGF as a problem (whether or not serious), indicated some negative

¹⁰ As of 2018, following a set of State Council Institutional Reforms, the mandate (and name) of the State Forestry Administration (SFA) was expanded to become the State Forestry and Grassland Administration (SFGA). At the same time, SFGA was relocated from its position directly answerable to the State Council to a position subordinate to the Ministry of Natural Resources. Some functions of the former SFA were removed and transferred to other ministries, while other functions, in particular those related to conservation were consolidated and integrated under the new administration (D. Liang, personal communication, May 20, 2018).

FGF outcomes including ineffective implementation of forestry projects, inefficient allocation of financial resources, high costs and sub-optimal economic gains, encroachment on forests, and environmental damages. Lack of integration between scales can result in over-exploitation of forests at the local level for short-term gain.

Indonesia

Over 95% of Indonesia's surveyed respondents considered FGF to be a serious problem, manifested in poor integration across sectors, political scales, land use designations and actors. Whereas, according to one respondent, integration, cohesion and consistency are required to address complexity in governing the forestry sector, others cited the persistence of overlapping or competing interests, and lack of clarity on where authority is vested among ministries and governance scales. According to one respondent,

"[The] primary issue is the lack of mutual accountability between local level governance systems inside and outside the forest bubble. Forestry remains a separate 'kingdom' with fiercely guarded territorial boundaries. Currently the integrative SDG agenda provides some new opportunities to link forests to local governments, but not enough is done yet at that interface."

FGF reduces accountability and effective implementation of public policy, increasing confusion and complicating or impeding problem solving and establishment of targets. The causes of FGF cited by Indonesia respondents are numerous. These included:

- ❑ Lack of coordination among sectors and actors at different scales

According to one expert, there are overlapping responsibilities between ministries or agencies including Forestry Agency, the National Land Agency and regional governments; between state and non-state as well as national and international forest governance. Another cited separate governance of forests and agricultural land uses.

- ❑ Policies of centralization, decentralization and recentralization implemented in rapid succession, resulting in power struggles and confusion over sector objectives

These power struggles, one expert pointed out, involve various parties, all seeking to gain authority over forest management, with the end of directing economic returns either to the benefit of specific business interests or regional economies. Another cited unwillingness on the part of the central government to trust and devolve authority to local governments and communities. Two responses suggested that the development objectives of central and local government were different, with the former interested in conservation and moving towards green growth while the latter remains concerned with current economic interests. In contrast, another perspective suggested central government policies between 1980 and 2014 prioritized corporate extractive industries (timber and mining) at the expense of local people's interests.

- ❑ Mismatches between policy/regulations and forest sector objectives, as well as weak law enforcement due to overlapping rules

One related cause mentioned is a lack of integrity among decision makers, leading to conflicts of interest.

- ❑ Lack of harmonized forest mapping at different government scales, resulting in inconsistent designation of forest management units (FMUs)

Associated with the above causes, respondents cited the following effects of FGF in Indonesia:

- ❑ A wide range of environmental and ecological consequences associated with deforestation and land degradation. Along these lines, one respondent stated that FGF prevents the “effective management of gradients for multifunctionality” and results in single use forest designations that do not match ground realities.
- ❑ Poor economic outcomes: slow development of the forest sector and increased income disparities.
- ❑ Decreased rule of law, including corruption, illegal logging and forest encroachment.
- ❑ Increased conflict (including over land tenure and resource access) and decreased trust among forest users on the ground.

The reduced capacity of local communities to obtain forest rights due to FGF, according to one respondent, contributes to conflicts with outsiders, or according to another, between local/indigenous communities and the government or each other. In the words of another respondent, “[i]t is difficult for local communities to pursue and gain their rights (e.g. to gain formal recognition of rights) due to long, complicated procedures, multi-level bureaucracies and jurisdictions, as well as strict conditions/requirements.”; more generally, “overlapping or competing interests and authorities between ministries or between different government levels sometimes lead to conflicting policies, leading to conflicts between actors on the ground.”

Malaysia

In stark contrast to Indonesia, only 18% of Malaysia’s respondents considered FGF to be a serious problem. In summary, respondents stated that Malaysia has a “clear structure, procedures, acts and regulations related to forestry” and “current institutional arrangements provide good forest governance”. Land and forests are under state (not federal) jurisdiction, however the National Land Council chaired by the Deputy Prime Minister serves as a common forum, in which [Federal] policy decisions must be agreed by all members. Federal and state authorities “always cooperate together in order to ensure the forest management and practices fulfill the sustainable of forest management (SFM) requirements [and are] ecologically appropriate, economically viable and socially acceptable”. One respondent claimed that outside state forestry departments, “external actor group[s] in forest governance [do] not exist”.

Still, a couple of responses recognized that FGF, though not a serious problem, does exist, citing causes including:

- ▣ Lack of cooperation between federal and state governments;
- ▣ The involvement of many stakeholders with varying interests in forests, land and the environment;
- ▣ Conflicting land uses among forestry, plantation production systems and agriculture, resulting in forest conversion;
- ▣ Economic drivers, such as greed;
- ▣ Weak enforcement and insufficient communication;
- ▣ Lack of clarity regarding indigenous land and forest rights.

They also mentioned some effects of these sources of fragmentation including policy failures, increased bureaucracy and decreased compliance to forest policies and laws, including non-compliance by states to federal government policies, and illegal logging, as well as a range of negative environmental/ecological and livelihood outcomes.

Nepal

The majority (60%) of Nepal's respondents considered FGF to be a serious problem, and 20% were neutral.

Although one respondent considered that there is good coordination between stakeholders (except at times between civil society organizations and the government around use rights), another pointed to a lack of integrated planning across sectors. Yet another saw a lack of formal coordination not only among government institutions, but within forestry itself.

There is an apparent mismatch between conservation and forestry as a productive enterprise, with one respondent stating that “governance fragmentation especially between Department of National Parks and Wildlife Conservation and Forest Department has produced serious complications in many places” and that “established community rights are stripped and curtailed in some of the conservation areas”.

FGF resulting in mismatches between policy, administration of forestry and forest management by local communities was summed up by one respondent as follows:

“Forest governance is currently divided into the national level that formulates policy and the district level forest offices whose role is to implement those policies. District-level forest offices (DFO) are under-staffed and many of the foresters working there are busy fulfilling administrative duties and hence cannot provide local forest user groups much help in terms of forest management. DFO also lack funds to do any innovative initiative on their own. So in many cases, forest policies are there and they are great but there is a lack of implementation, especially those related to social goals of inclusion and poverty reduction.

More recent government policies have also taken back many of the user rights given to community forest user groups, citing timber smuggling, so the latter is not able to have much leeway (power) to do much. In reality, even within existing restrictive policy, forest officials and community forestry user group (CFUG) committee members and private timber contractors have come together to smuggle timber to the detriment of majority of the forest users.”

This perspective points to recent efforts by the central government to recentralize control over forestry, which had been largely devolved to CFUGs. The following comment suggests that in a decentralized management system, insufficient rights to use forest resources reduces motivation to sustainably manage forests:

“At the earlier stage of community forest management, it [FGF] was not [a] serious issue because all the governance units including community and government institutions were focus[ed] on restoration of the barren land and conservation.”

However, the context is now changing, as the potential productivity of restored forests increases:

“Government agencies have [a] protection-oriented mind set with minimum rights of utilisation to the communities. If communities could not get much benefits from the forests then their motivation in forest management goes down and nobody takes care of the forests leading to degradation and ultimately deforestation.”

The above general comments suggest that, in Nepal, FGF is caused by a shift in government policies that first promoted forest restoration through devolution of use rights to communities, then began to infringe on those use rights when forests became productive. Other causes of FGF cited include:

- ▶ Prioritization of non-forest sectors (e.g. infrastructure, hydropower) over forestry and the environment;
- ▶ Forest policy not aligned with economic interests (of government employees, CFUGs);
- ▶ Bureaucratic tendencies of government agencies;
- ▶ Politicization of forestry by civil society organizations (e.g. FECOFUN);
- ▶ Ineffective inclusion of the private sector (in forest management), and insufficient attention to the role of private contractors in managing community forests.

Respondents cited the following FGF effects:

- ▶ Negative environmental and ecological effects (due to misalignment of socioeconomic and environmental interests);
- ▶ Sub-optimal economic benefits to communities and the national economy; inefficient outcomes in costs and benefits of forest policy, planning, implementation and management;

- ▣ Increased illegal timber trade and corruption;
- ▣ Abuse of authority and misappropriation of community funds, elite capture, increased economic inequality;
- ▣ Damage to image and social life of foresters and forest user committees;
- ▣ Potential demotivation of future forest managers.

While these perspectives represent a range of respondents, a more optimistic view of forest governance in Nepal posits that, since new scientific forest management guidelines were introduced in 2013, the area of well-managed community, collaborative and government forests has increased, with more sectoral competitiveness, transparency, and technical competence (I. Poudel, personal communication, May 20, 2018).

Vietnam

The majority (57%) of Vietnam's respondents considered FGF to be a serious problem, and 14% were neutral.

Respondents who did not consider FGF to be a serious problem perceived forest governance in Vietnam to be “comprehensive” or “well performed” between scales, from the central government to local authorities. However, a contrasting view was that national policies are “not well understood or implemented” at lower political scales, and that incentives operating at different scales are not well matched.

Another respondent suggested that FGF was related to low transparency, corruption, and insufficient participation of non-state actors including NGOs, CBOs and communities in policy making, enforcement and monitoring.

This perspective is far from unanimous: according to L.V. Cuong (personal communication, May 23, 2018), there are mechanisms that favor transparency and public oversight. Notably, these include a law requiring public consultation on new laws or policies, which are posted online and discussed in stakeholder meetings with civil society and local government.

In contrast to respondents of all other economies, two Vietnam respondents considered that FGF between Vietnam and neighboring economies (e.g. Laos and Cambodia) is a problem, manifested on one hand in illegal hunting, logging and trade, and in economic pressures outside Vietnam on the other hand. There may be progress in these areas, however, as the boundary provinces in Vietnam and Laos pursue commitments to address illegal logging and illicit trade (L.V. Cuong, personal communication, May 23, 2018).

Stated causes of FGF in Vietnam included:

- ▣ Problems associated with governance across sectoral institutions, as exemplified by lack of cohesion

between forest management by the Ministry of Agriculture and Rural Development (MARD) and land use management by the Ministry of Natural Resources and Environment (MONRE);

- ▣ Problems associated with coordination and implementation at different governance scales, e.g. due to lack of communication and consultation between the national and local levels and capacity differences between government officials and local actors to deal with complicated and overlapping policies;
- ▣ Mismatches between policies for forest protection and management and policies providing economic incentives to local forest managers;
- ▣ Lack of integration between legislation and mechanisms for enforcement;
- ▣ Complexity of forest classifications and pressures on forests due to competing land uses.

FGF in Vietnam, according to survey responses, resulted in:

- ▣ A range of negative or sub-optimal environmental/ecological outcomes, including deforestation and the reduced extent and quality of natural forest; reduced provision of ecosystem services (biodiversity, soil, water);
- ▣ Unclear use rights and obligations (and FGF between natural forest and other forest types)¹¹;
- ▣ Weak forest governance and law enforcement, corruption;
- ▣ Inequitable or restricted access to forest resources, resulting in persistent poverty, especially in forest dependent ethnic minority communities.

11 According to L.V. Cuong (personal communication, May 23, 2018), it is likely that this problem pertains particularly to natural forest; in the case of production, forest use rights and obligations of forest managers are relatively clear. Unclear rights over natural forest make use rights hard to be implemented.

Discussions

The purpose of this study was not to determine whether or not forest governance is fragmented or to what degree, but to identify the main lines of fragmentation and assess expert perceptions to determine whether they are likely to be associated with cooperative/synergistic or conflictive outcomes. Forest governance involves multiple actors and institutions, and is aligned with multiple social, economic, and environmental norms; we therefore began with the assumption that it is highly fragmented. A function of a governance system is, in itself, to build synergy, cohesion and cooperation across these multiple dimensions. For this reason, the statements to which respondents to this study were asked to respond related to the perceived effects associated with a series of hypothetical fragmentation lines.

Overall, we found that there were a greater number of responses indicating negative perceptions associated with fragmentation along the lines of actor groups as opposed to institutions or norms. Within these categories, however, there are many fine-grained distinctions, and a great deal of variability in perceptions among respondents from the different economies. Bias associated with cultural predispositions affecting degrees of positivity in reporting perceptions, or in the selection of informants, can make comparisons among groups difficult. To facilitate discussion, we reorganized our findings to put responses from experts on China, Indonesia, Malaysia, Nepal and Vietnam at the same scale, each set ranked according to its own internal order and relativized using data on consensus within each subset (Figure 8).

We hypothesized that fragmentation lines and their effects were likely to be associated with various spatial, scalar, sectoral, functional, inter-systemic, and normative dimensions. Within the set of 1-24 statements organized into three primary types (actors, institutions, and norms), we also incorporated indicators relevant to these dimensions. Responses indicate a number of interesting perceptions related to these indicators (summarized in Table 9). In reviewing them in reference to the context of the economies addressed in this study, the many relationships emerge not only across fragmentation lines, but also between and among the above-mentioned dimensions.

↘ Spatio-scalar dynamics at the sub-national level

Forests are social-ecological systems, distributed over space delimited by geomorphic and ecological conditions, but governed by political institutions often delimited by very different physical boundaries and economically linked to markets both adjacent and remote. When the boundaries of an ecological system, such as a forest, do not match political boundaries, integrated forest governance can be achieved either through coordinated administration at a higher political scale or through cooperative decision making facilitated by institutional networks and relationships among actors across political boundaries within

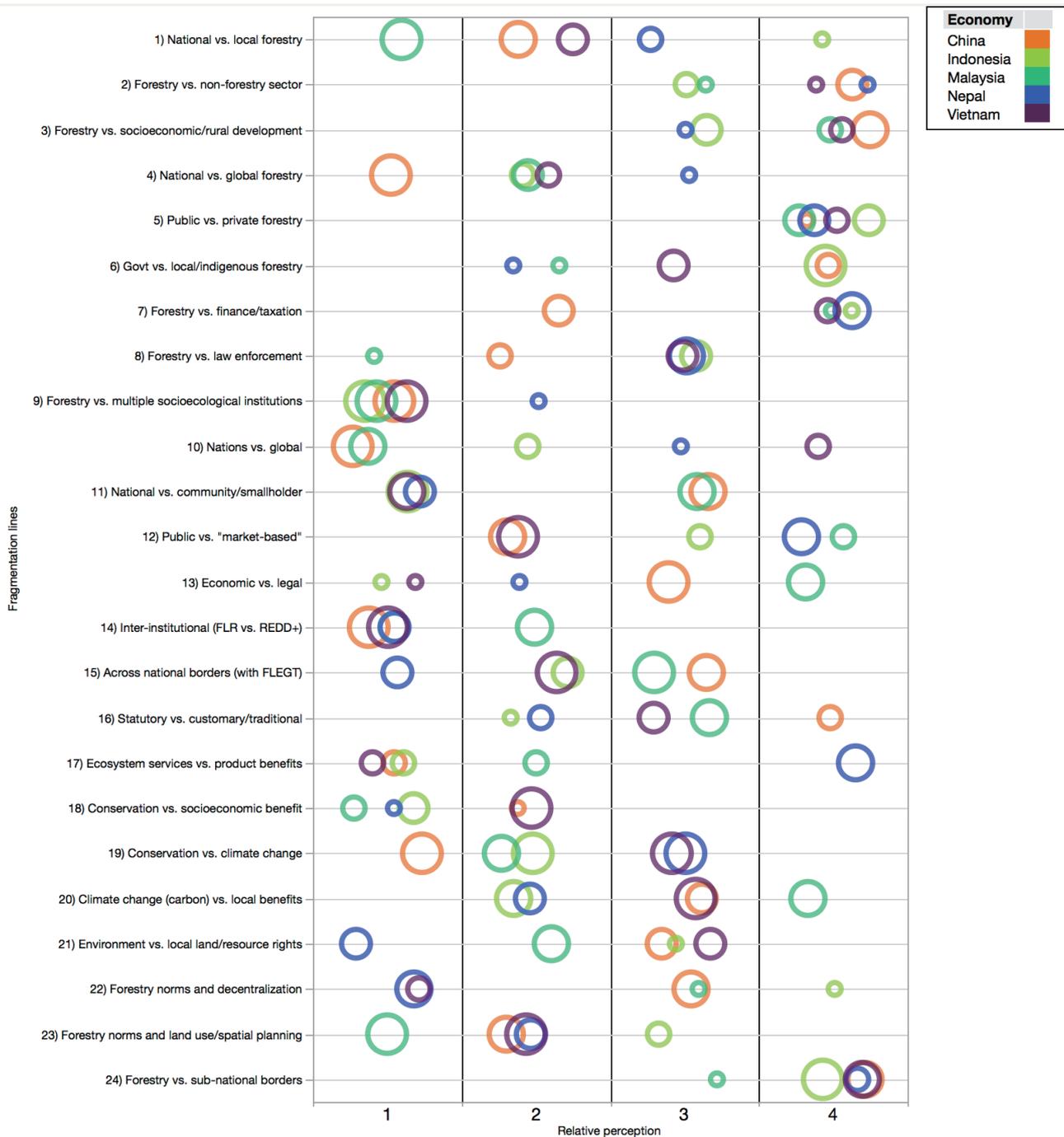


Figure 8 Illustration of the variability in perceptions related to fragmentation of forest governance using combined Likert scale data, i.e. the mean of responses by respondents from five Asian economies, and consensus data for each question by economy. To overcome a bias associated with reactions to statements written with either a positive or negative framing, responses by each economy were organized in sequence and sorted into four quartiles (1 = very positive; 2 = positive to neutral; 3 = neutral to negative; 4 = negative to very negative). These values are shown as intervals on the vertical axis. Consensus data was divided from 1-5 with 1 (low consensus) corresponding to the smallest circle, and 5 (high consensus) as the largest circle. The location of each circle on the horizontal axes does not indicate a value; circles belong to one quartile (1, 2, 3 or 4) and are jittered so as not to coincide graphically.

Table 9 Interpretation of results based on relative perceptions and degrees of consensus internal to each economy, compared across all economies.

Dimensions of forest governance fragmentation	Indications based on assessed perceptions	Degree of consensus
Spatial	Sub-national political boundaries perceived as a source of conflictive fragmentation (S-24)	High (China, Indonesia, Vietnam)
	National land-use designations/forest type classifications largely perceived in synergy with forestry norms (except Indonesia) (S-23)	High (Malaysia, Vietnam, China)
	Synergy between legality policies (FLEGT) and cross border forest governance seen as high (most Nepal respondents), somewhat high in Vietnam and Indonesia; lower in China and Malaysia) (S15)	Mostly high
Scalar	Decentralization policies and forestry norms appears highly synergistic from Nepal and Vietnam responses, and neutral (China, Malaysia) to very conflictive (Indonesia) (S-22)	Medium high (Nepal, China), rest medium to low
	Relationship between national and local forest governance actors from very cooperative (Malaysia) to very conflictive (Indonesia) (S-1)	High (Malaysia, China), low (Indonesia)
	Cooperation between National forestry and global actors, from high in China to neutral in Nepal (S-4)	High (China)
	Synergy with forestry and global institutions from high (Malaysia and China), to low (Vietnam) (S-10)	High (China), Medium High (Malaysia)
Sectoral	Conflictive fragmentation between forestry and institutions responsible for other natural resource sectors (S-2)	Medium (China); Low (Malaysia, Indonesia, Nepal, Vietnam)
	Lack of synergy/cooperation with private sector on sustainable forest management (S-5)	Medium (Indonesia, Malaysia, Nepal, Vietnam)
	Mixed perceptions on forest governance and market-based institutions (China and Vietnam perceptions indicate potential cooperation; Malaysia, Nepal and Indonesia, mostly conflictive) (S12)	High (Vietnam), Medium high (China, Nepal)
	Mostly high indication of synergy between forestry and socioeconomic /rural development sector, lower among Indonesia and Nepal respondents (S-3)	Medium high (China), rest medium to low
Functional	Relationship between forest users and law enforcement actors tends towards conflictive, less so in China and Malaysia (S-8)	Medium (Nepal, Vietnam, Indonesia); lower in China/Malaysia
	The relationship between forestry and finance/tax authorities (S-7) somewhat cooperative in China, otherwise conflictive	Medium high (China, Nepal, Vietnam)

Dimensions of forest governance fragmentation	Indications based on assessed perceptions	Degree of consensus
Intersystemic	Cooperation between forestry and local/indigenous community actors mostly conflictive (China, Indonesia) to neutral in Vietnam, more cooperative in Malaysia and Nepal (S-6)	High (Indonesia)
	Majority perception of high synergy between national and community/smallholder forestry institutions in Indonesia, Nepal, Vietnam; lower synergy in China, Malaysia (S-11)	Medium high
	Perception of conflictive relationship between national forestry and customary/traditional institutions in China, less so in Malaysia and Vietnam (S-16)	Medium and mixed
	High synergy between forest environmental norms and local land/resource rights (Nepal), intermediate to low in Malaysia, Vietnam, China and Indonesia (S-21)	High or medium high (Nepal, Malaysia, China, Vietnam)
Normative	High synergy between forestry and multiple allied environmental and social institutions, relatively high skepticism from Nepal respondents (S-9)	High (except Nepal)
	High synergy between conservation and socioeconomic norms, especially Nepal, Indonesia and Malaysia (S-18)	Medium to low
	High synergy between conservation and climate change norms (carbon forestry) especially in China, somewhat in Vietnam and Malaysia (S-19)	All high
	Conflictive relationship between forest economics (profits from the sector) and legality institutions such as FLEGT, particularly in Malaysia and China (S-13)	High (Malaysia, China)
	Perceived conflictive relationship between ecosystem service and economic benefits of timber in Nepal, compared with perceived synergy in China, Vietnam, and Indonesia (S-17)	High (Nepal) Medium high (China, Indonesia, Malaysia, Vietnam)
	Perceived lack of synergy between climate change and socioeconomic norms (local benefit sharing) especially by Malaysia respondents (S-20)	Medium high (Malaysia)
	General perception of high synergy between two forestry institutions (FLR and REDD+) (S14)	High (China, Vietnam); medium (Indonesia, Nepal)

broader ecological landscapes.

In the case of China, and to some degree Vietnam, where a relatively high proportion of respondents considered lack of cooperation across political boundaries as a problem, the political and administrative

system is highly integrated, and has significant coordination capacity. While creating new connections across existing grid-like governance structures requires political buy in and entails high transaction costs, it is likely that existing administrative and policy structures for cross-boundary forest governance are already in place. In China, a ministry-level body, the National Development and Reform Commission (NDRC) coordinates policy and planning across natural resource and land sectors from the central government to county levels, following a vision of ecological integration established at the highest level and increasingly articulated in national 5-year plans. While village governance is technically autonomous from higher levels (Joseph, 2014), through relatively effective programs of land distribution to smallholders, forestry subsidies and tax relief (aligned, as indicated by responses to Statement 7, with sustainable forestry objectives), the Chinese government has achieved a high degree of forest governance integration.

In Indonesia and Nepal, spatial fragmentation of forest governance is complicated both by physical discontinuity across the archipelago (in Indonesia) and between mountain watersheds (in Nepal), cultural diversity as well as a history of resistance to centralized political control, and insufficient capacity at higher scales of government to coordinate across jurisdictions. Our survey responses indicate that in Indonesia, and potentially Nepal, the relationship between forestry authorities between administrative levels may be relatively conflicted. While many studies on Nepal's decentralization of forest governance to local levels and community groups associate local resource management with improved forestry outcomes (reflected clearly in our survey's responses to Statement 22), there may be insufficient coordination across boundaries and between upstream and downstream watersheds, along with their respective economic interests. While environmental degradation of mountain watersheds and associated soil erosion was a primary impetus for decentralization, incentives for community forest management are highly linked to access to forest products (in particular timber), which may explain the perceived lack of alignment, in Nepal's case, of economic benefits from ecosystem services and sustainable forest management.

In China, national and provincial government subsidies go a long way towards bridging the gap between loss of timber revenues and local generation of forest ecosystem services. In contrast, local forest users in Nepal, Vietnam and Indonesia continue to depend heavily on timber incomes as an incentive to manage forests. In Nepal, the devolution of forest rights along with increased forest benefits has in some cases been sufficient to encourage better forest management by communities. In Indonesia and Vietnam, the government has promoted smallholder and/or community forest management through credit schemes and smallholder forestry contracts. The results of these efforts have been mixed, in part due to mismatches between loan schemes and the interests and economic standing of smallholders (in Indonesia) and the low productivity of a severely degraded forest resource base over a large area (particularly in Vietnam, where especially natural forest allocated to smallholders, as compared to production forest, has seen significant degradation ¹²).

12 L. V. Cuoug, personal communication, May 23, 2018.

The difference in perceptions among Indonesia's and Malaysia's survey responses pertaining to spatial and scalar FGF is interesting, given that both economies are relatively decentralized. Based on Indonesia's sample, it is possible to assume relatively conflictive characteristics of fragmentation between national and local scales within forestry, corresponding to a negative outlook on the outcomes of decentralization policies. This is also reflected by a perceived lack of cooperation between forestry and local/indigenous actors and low integration of forestry and customary institutions. Malaysia's responses are comparatively less decisive and cohesive on the FGF dynamics of spatial discontinuity and decentralization.

↘ Global norms and FGF

Many of the selected indicators of FGF reflect global norms, including those that relate to biodiversity conservation, global trade, climate change, market-based approaches, livelihoods, and local/indigenous rights. In general, more synergy was apparent in statements related to the environmental dimensions of forest management than those related to economic and social dimensions. While overall responses indicated synergy between forestry and a range of social and environmental institutions (sustainable forest management, climate change mitigation, timber legality in trade, economic development, and rural livelihoods), there was less consensus around more specific indicators.

There was a relatively positive perception of the alignment between conservation and climate change mitigation goals; the majority of respondents, especially in China, Vietnam and Malaysia, indicated that forestry targeting carbon sequestration is associated with co-benefits to biodiversity. China and Vietnam have seen significant deforestation and forest degradation over large areas, to the extent that the effects of tree planting, which mitigates carbon, can have habitat co-benefits. It is provided that plantation monocultures do not replace native forest, which has been a problem in both economies. On the other hand, respondents (particularly from Malaysia) perceived a problem associated with the sharing of economic benefits derived from forest carbon at the local scale, to the benefit of outsiders. This potentially indicates insufficient attention to the conflict between local and higher scale interests in the governance of climate change mitigation.

Respondents from China (with high consensus) and Malaysia tended to disagree with the idea that direct interventions from global institutions had a disintegrative effect on national forest governance. In the case of China, it is possible that this response reflects government policies that limit the exposure of national institutions and actors to outside intervention by restricting the independent activities of non-governmental organizations and maintaining strong diplomatic oversight over conservation and development work involving foreign agencies. This ensures that international cooperation does not conflict with national planning and priorities. Malaysia, on the other hand, relies heavily on the engagement of international

NGOs in the forestry sector, to whom the government has devolved a fair amount of responsibility for conservation and forest management. Both Malaysia and China also tended to disagree with the statement national forestry authorities might lose clarity of mission in seeking to conform to international expectations, such as those of donors. Responses from Vietnam were divided among these two related questions.

On the other hand, a less positive perception emerged in responses from China, and especially Malaysia, related to the effects of global-scale governance of the timber trade as reflected in responses to statements on forest law enforcement, governance and trade (FLEGT), a largely European institution. On one hand, Malaysia's and China's respondents showed relatively less perceived synergy between FLEGT and cross-border forest governance. In addition, their responses to Statement 13 indicate that FLEGT potentially conflicts with the economic interests of forestry, producing a disconnect between forest governance in producing economies and governance of the timber processing sector in consuming economies.

Over the past 20 years, China, Vietnam, Indonesia and Nepal have all devolved a range of forest ownership and use rights to smallholders and community forest groups. Our survey did not generate clear signals as to how this relates to forest governance fragmentation. There appear to be conflictive relationships between forestry and customary/traditional institutions and local/indigenous actors, and mixed perceptions of synergy between forestry and local rights to land and resources. These appear less in responses from Nepal, where devolution of rights and forest management has been central. In China and Vietnam, while large areas of land and forest management responsibilities have been distributed to smallholders, this did not involve a devolution of governance functions to local and indigenous systems or an integration of customary systems of governance, but rather a reliance on national-level tenure instruments.

Overall, responses indicated a high degree of conflictive fragmentation between forestry and non-forestry sectors, likely signaling insufficient cooperation among sectoral agencies with overlapping jurisdictions, responsible for governing forestry, water, lands and agriculture and potentially other sectors. Respondents particularly from Nepal and, to a lesser degree, China, perceived a misalignment between the private sector (i.e. private companies) and social and environmental standards, which are central to effective forest governance. Except among China respondents, market-based green growth, which attempts to align environmental interests with economic activity largely associated with the private sector, was not widely perceived to contribute to sustainable forest management. In China, the central government has incorporated green growth as a central development strategy, which may have an integrative effect in forestry.

Conclusions and recommendations

Forests are vital to global ecological systems and human wellbeing. An estimated eighty percent of remaining terrestrial biodiversity is contained within the world's forests, which cover around thirty percent of the earth's surface. However, by 2050, the diversity of forest species is expected to decline by thirty-eight percent¹³. In this era of rapid climate change, forests have the potential to significantly reduce atmospheric carbon, and yet, due to continued deforestation and forest degradation, forests continue to emit 0.8 billion tonnes more carbon each year than that they capture and store¹⁴. As dwindling fresh water stocks and deteriorating soil conditions reduce the ability of ecosystems and agricultural systems to adapt to climate change, the role of forests in providing these ecological services is increasingly central to social and economic health worldwide, and particularly in developing economies. At the same time, global demand for forest products continues to increase: in 2016, global production of roundwood alone reached 3.7 billion tonnes, an increase of eight percent over the year 2000¹⁵.

Given the many ways in which forests contribute to the global good, and the determinative role of humans in shaping the future extent and quality of forested ecosystems, decisions need to be made. What are the best ways to manage forest ecosystems in order to conserve and maximize the many benefits they generate? Where should the people and institutions with the capacity and resources to affect forest management target their efforts? Who and where are those people and institutions, and how can they agree on which approaches to adopt? The fact is, there are a multitude of options and decision makers at all geographic scales and levels of society, from local to global, and they represent a huge diversity of divergent and overlapping interests. It is therefore no surprise that governing the myriad activities affecting forests is not a simple endeavor, and that the institutions that have evolved to do so are by nature kaleidoscopic. However, failure to effectively govern forests and the use of their resources would likely result in deforestation, degradation, and insufficient restoration of forests, thereby reducing the benefits they provide to humanity in the form of ecological services.

The purpose of this study was to provide insights into the character and effects of forest governance fragmentation (FGF). Through a brief review of scholarship on this topic, we settled on a working definition of FGF and identified the main dimensions of fragmentation affecting forest governance as spatial, scalar, sectoral, functional, inter-systemic, and normative. Within each of these dimensions, we found specific

13 Vital forest graphics. UNEP, FAO, UNFF. 2009. <http://www.grida.no/publications/152> (Accessed 4 April 2018).

14 FAO assessment of forests and carbon stocks, 1990–2015. FAO. 2015. <https://www.fao.org/Fa-i4470e.pdf> (Accessed 4 April 2018).

15 Forest product statistics. FAO. 2016. <http://www.fao.org/forestry/statistics/80938/en/> (Accessed 4 April 2016).

fracture lines, across which forest governance is likely to be challenging. Then, through a comparative analysis of perceptions of forestry experts in five Asian economies — China, Indonesia, Malaysia, Nepal, and Vietnam — we identified the kinds of fragmentation that appear to be the most or least problematic, both in general and within each economy. Based on a discussion of the patterns of perceived FGF, tempered by an analysis of consensus among respondents overall and by economy, we came to some preliminary conclusions and recommendations for consideration by policy makers and for further research.

FGF is neither a positive nor negative state in itself. Conflict and lack of cohesion among the actors, institutions and norms involved in forest governance does at times impede or prevent policy decision making and implementation. At other times, the division of powers and responsibilities among diverse (even if sometimes competing) stakeholders with different specializations and capacities produces some efficiencies. With the assumption that all forest governance is highly fragmented, we implemented a survey among forest experts familiar with each economy to collect perceptions on which specific fracture lines were or were not associated with problematic outcomes. Along the lines of recent scholarship in the area of FGF of global forestry, climate and environmental regimes, we adopted terms such as synergy, cooperation, coordination and alignment, or conflict and misalignment, to characterize the nature of FGF as perceived by survey respondents.

In the survey, most respondents from Vietnam, Indonesia and Nepal considered FGF to represent a serious problem, in contrast to those from China and Malaysia, the majority of whom saw it as less problematic. The following FGF effects represent the majority of perceptions from all economies:

- There is a high degree of perceived synergy between forestry and other environmental institutions, including those involved in climate change mitigation, timber legality in trade, economic development, and rural livelihoods. This perception reflects complementarity among mandates of these institutions, from the perspective of forestry experts. However, there is insufficient coordination among agencies responsible for natural resource sectors — including forestry, lands, water, agriculture, *etc.*; and governance interactions are likely to be conflictive¹⁶.
- Political borders are an obstacle to integrated forest governance; and there is insufficient cooperation among authorities across jurisdictions. However, the majority of respondents indicated that programs promoting forest law enforcement, governance and trade (FLEGT) improve cooperation across international borders. In addition, the majority of respondents (though not consistently across economies) thought that national land use and forest classification systems, were well aligned with forest governance systems.

¹⁶ In view of this finding, China's recent integration of the administrations responsible for forestry and grasslands, and relocation of the new combined institution to the Ministry of Natural Resources, is significant.

- Although synergy between national forest restoration programs and community and/or smallholder forestry systems was perceived to be high, there is insufficient cooperation between forestry authorities and local/indigenous groups.
- Governance of forests for the purpose of improving ecosystem service delivery is well aligned with economic interests, even if it reduces revenues from timber. Similarly, there is a high degree of complementarity between conservation and programs addressing climate change through carbon sequestration, as well as between forestry institutions such as REDD+ and forest landscape restoration (FLR). On the other hand, the distribution of benefits of forest ecosystem services (for example monetized carbon benefits) favors outsiders more than local people. In other words, the governance of forests conflicts with the governance of the distribution of forest benefits.
- The perceived roles of private sector companies in implementing higher social and environmental standards did not generate a positive result; similarly, responses indicated a skeptical perspective as to the contribution of market-based green growth in forest governance (though more positive in China and Vietnam).

Based on specific results by economy, it is possible to make a series of recommendations for action or further attention to specific FGF problems.

▾ Recommendations for China

Although FGF in China may not be as serious a problem as elsewhere, there are areas where integration can be increased. In particular, although China has mechanisms for coordination across natural resource sectors, there is a perceived need for more integrated approaches. There have recently been efforts to integrate from above, through institutional reform placing forestry under the Ministry of Natural Resources, and through implementation of a national landscape restoration program (*shan-shui-lin-tian-hu*). The challenge is to achieve greater integration at lower scales, across subnational political boundaries, and through more inclusion of/devolution to local people (including ethnic minorities) in decision making. According to one survey respondent, there are limited mechanisms for broad stakeholder participation, across political scales, affecting forest policies, institutions, financing, and operations. For example, there is no platform for public participation to monitor progress in forestry development. At the same time, the government's institutional structure in the forestry sector is highly integrated, which is likely to result in overcapacities and inefficient allocation of funding resources. More of these resources could be used to improve linkages across natural resource and socioeconomic development sectors, and to build more inclusive and participatory systems of oversight.

China's market for timber has grown significantly in past years while domestic supplies have been restricted

through a number of measures including logging bans. Given the resulting influence of China's demand on regional forest governance, more attention is needed to the alignment of timber legality and economic benefits. China's finance and taxation system is very well aligned with the forest governance at the sub-national level, but work could be done to improve the alignment of fiscal tools with timber legality interests in order to reduce the pressure on forest governance systems in other economies.

▾ Recommendations for Indonesia

In Indonesia, coordination across political jurisdictions is highly problematic, and this is likely exacerbated by decentralization policies. In this context, the devolution of authority to non-state actors (NSAs), and in particular private sector actors, comes with risks. To date, there has been insufficient work to align forest governance and rural development, and insufficient effort to include local and indigenous forestry actors in decision making.

Between these two areas of concern, there are potential opportunities for actions to improve forest governance. The devolution of rights and responsibilities over forestry to private actors requires greater oversight by local communities, who could play a key role in monitoring outcomes and providing information to policy makers and law enforcement. Although tentative measures towards such devolution can be seen in Indonesia's recent recognition of customary forest management systems, there are insufficient incentives deployed to integrate those systems in broader forest governance.

▾ Recommendations for Malaysia

Although the National Land Council provides a mechanism for national-level policy development and implementation in Malaysia's federal system of government, there is insufficient cooperation and communication between state forestry departments and the federal government. While survey respondents largely did not see FGF to be a serious problem, there were indications of a sub-optimal integration of local economic interests and timber legality norms. Also in regards to the latter, respondents (compared with those from the other economies) saw forest law enforcement, governance and trade (FLEGT) as less useful in improving cross-border forest governance.

There is a need to review the norms of the forestry sector from the federal level to develop higher standards of economic inclusion of local stakeholders and to address illegal forest activities and trade by corporate actors. In order to make such an endeavor successful, one approach would be for the federal government to improve financial oversight of the forestry sector and ensure that an appropriate share of forestry rents deriving from large-scale forestry enterprises are captured at the federal level. In turn, those

proceeds would be helpful if used to improve incentives at the local level for better forest management and monitoring.

Although the majority of Malaysia's respondents to our survey did not see a disconnect between forestry policy and local land/resource rights or smallholder forestry systems, they were less positive on the integration of statutory and customary forest governance systems. It is recommended therefore to devote greater resources towards the study of customary systems of forest management with a view to creating higher-level frameworks in which those systems can be recognized and protected.

In addition, it is strongly advisable for the government of Malaysia to sponsor independent research on the degree to which sub-national/state-level governments (across sectors and functional divisions including forestry, economic development, and enforcement) are engaged in the oversight and management of the transnational timber trade, and to take appropriate measures to address cross-boundary flows of illegal timber.

▾ Recommendations for Nepal

Overall, responses from Nepal indicated a higher perception of FGF as a problem, though there was less consensus among respondents on the particular fragmentation lines. What does emerge strongly from both the survey data and qualitative responses from Nepal is that the decentralization of forest governance in favor of community forestry was successful in improving forest governance and its outcomes, but is now threatened by recentralization. One potential reason for this is that with the materialization of the benefits of community forestry — in the form of access to forest resources (mainly timber) — there are movements by the central government to reduce community rights to those resources. Given Nepal's past experience, there is a high potential that such movements delink community management systems from the incentives to manage forests, resulting in less sustainable forest management and overexploitation. It is therefore recommended that the central government tries to maintain the integrity of decentralized community forestry, but identifies ways to integrate the system across sectors (ecosystem services, tourism, *etc.*) to diversify income streams and reduce pressures to harvest wood.

Areas in which Nepal's respondents showed greater agreement included a perceived lack of synergy between forest governance and private sector actors and market-based approaches, ecosystem service benefit sharing, and management of the fiscal sector. While it is possible that there are cultural obstacles to overcome in improving alignment among these areas of forest governance, it is possible that increased devolution of diversified economic benefits to forest user community groups, beyond forest management with forest products as the dominant benefit, could help to integrate governance and address problems associated with FGF.

▾ Recommendations for Vietnam

While the majority of Vietnam's respondents perceived FGF to be a serious problem, there was little consensus in survey responses as to the relative importance of the most problematic forms of fragmentation.

While further study is likely required, greater attention to alignment of forestry with non-forestry sector governance and rural development, and greater cooperation to improve governance of forests across both sub-national and international borders, is recommended. There is some indication that in Vietnam, compared with other economies, the forestry sector has been disrupted to some degree by the efforts of national forestry institutions to comply with the ever-changing norms and expectations of global institutions and donors (even though interventions from abroad were seen in relatively positive terms).

As in Nepal, diversifying the economic benefits to forest users beyond access to land and timber resources could help integrate governance and improve governance. This would require significant investments to engage rural forest users in identifying such alternative activities, and then promoting and providing incentives to develop sectoral diversification.

▾ Overall recommendations

To improve forest governance across sub-national political boundaries, policy makers need to assess the capacity of existing higher scale institutions to increase and/or improve the quality of their coordination activities. These may include both government institutions (such as ministries or departments of forestry, natural resources, lands, planning, economic development) and non-governmental (civil society groups and associations, forest user groups), as long as they transcend the particular boundaries and have both the capacities and incentives to cooperate in governance of forests across boundaries.

In the case of decentralized forest governance systems, there is a need for increased planning and extension capacity at meso-levels of governance; however, at the same time, planners should consider strengthening the mandate of local level institutions, including customary and traditional forest management systems, to avoid creating disincentives to local-level community and smallholder forest management. Although a need for increased governance functions at higher levels may be indicated, local forestry systems are highly sensitive to shifts in power, rights and benefits; therefore, higher level efforts to overcome spatial disconnects in governance likely should focus on increasing connectivity and coordination capacity among local civil forestry groups and allied institutions, and expanding benefit sharing opportunities associated with increasing forest cover and quality.

The following specific approaches are recommended. These include:

- ▣ Landscape approaches to engage stakeholders across sub-national borders and build consensus across sectors. Local social networks and higher scale institutions that have the capacity to integrate across borders and sectors are recommended to be identified.
- ▣ Integration of local/indigenous communities in forestry planning/management and improved sharing of benefits.
- ▣ A cautious approach to devolving forest governance and oversight to the private sector or NSAs. There is a need for increased oversight (by government/civil society organizations), strengthened regulations and compliance instruments, and empirically supported use of market-based instruments (e.g. certification).
- ▣ Evaluation of benefits and improved benefit-sharing mechanisms at local levels to support climate change mitigation and other forest ecosystem services.
- ▣ That market-based green growth ideas cannot be taken for granted. There is a need to start with a home-grown central vision (e.g. an effort to develop environmental citizenship, mechanisms to establish a green economy or the mandate of an ecological civilization) to align values, beliefs and norms across a broad range of actors and institutions.

References

- Arts, B. J. M. , and I.J. Visseren-Hamakers. 2012. Forest Governance: Mainstream and Critical Views. *ETFRN News* 2012 (53 (April)): 3–10. <http://edepot.wur.nl/211957>.
- Arts, Bas, Jelle Behagel, Séverine Van Bommel, Jessica De Koning and Esther Turnhout. 2013. Prelude to practice: Introducing a practice-based approach to forest and nature governance. In: Arts, Bas, Jelle Behagel, Séverine Van Bommel, Jessica De Koning and Esther Turnhout. *Forest and Nature Governance*. Dordrecht: Springer.
- Asian Compliance and Enforcement Network. n.d. Organizational Chart of Indonesian Ministry of Environment and Forestry. Accessed June 20, 2018. https://www.google.com/url?sa=t&rct=j&q=&esrc=s&source=web&cd=3&cad=rja&uact=8&ved=0ahUKEwjVydfmiObbAhWoljQIHRwNC_4QFgg3MAI&url=http%3A%2F%2Fwww.aecen.org%2Fsites%2Fdefault%2Ffiles%2Fcountry_report_indonesia.pdf&usg=AOvVaw0ehkTjtMRKlvZ7bWErTYPK.
- Asselt, Harro van. 2013. *The Fragmentation of Global Climate Governance: Consequences and Management of Regime Interactions*. Amsterdam: VU University Amsterdam.
- Barr, Christopher, Keith Barney, and Sarah A Laird. 2014. 10 Governance Failures and the Fragmentation of Tropical Forests. *Global Forest Fragmentation*, CABI: 132.
- Benson, Bruce L. 1999. An Economic Theory of the Evolution of Governance and the Emergence of the State. *The Review of Austrian Economics*, 12 (2): 131–60.
- Bernstein, Steven, Benjamin Cashore, Richard Eba’a Atyi, Ahmad Maryudi, Kathleen McGinley, Tim Cadman, Lars Gulbrandsen, Daniela Goehler, Karl Hogl, and David Humphreys. 2010. Examination of the Influences of Global Forest Governance Arrangements at the Domestic Level. *IUFRO (International Union of Forestry Research Organizations) Secretariat*, 28: 111-135.
- Biermann, Frank, Philipp Pattberg, Harro Van Asselt, and Fariborz Zelli. 2009. The Fragmentation of Global Governance Architectures : A Framework for Analysis. *Global Environmental Politics*, 9 (4): 14–40.
- Brown Weiss, Edith. 1993. International Environmental Law: Contemporary Issues and the Emergence of a New World Order. *The Georgetown Law Journal*, 81 (3): 675–710.
- Cashore, B, G Auld, S Bernstein, and C McDermott. 2007. Can Non-State Governance Ratchet Up’Global Environmental Standards? Lessons from the Forest Sector. *Review of European Community and International Environmental Law*, 16 (2): 158.
- Cashore, Benjamin, and Michael W. Stone. 2012. Can Legality Verification Rescue Global Forest Governance?. *Analyzing the Potential of Public and Private Policy Intersection to Ameliorate Forest Challenges in Southeast Asia*. *Forest Policy and Economics*.
- Chan, Barney. 2008. Institutional restructuring in Sarawak, Malaysia. In: P. Durst et al. *Re-inventing forestry agencies: Experiences of Institutional Restructuring in Asia and the Pacific*. Bangkok: FAO: 161–72.
- Chee, Yoke Ling and Li Ching Lim. 2014. *Fragmentation to Integration: Environmental and Sustainable*

- Development Challenges in Malaysia. In: Huang, Jing and Shreekant Gupta. *Environmental Policies in Asia: Perspectives from Seven Asian Countries*. Singapore: World Scientific Publishing: 109–132.
- Clement, Floriane, and Jaime M. Amezaga. 2009. Afforestation and Forestry Land Allocation in Northern Vietnam: Analysing the Gap between Policy Intentions and Outcomes. *Land Use Policy*, 26 (2): 458–70.
- Clement, Norris. 1999. International Transboundary Collaboration: A Policy- Oriented Conceptual Framework. In: European Regional Science Association. 39th Congress of the European Regional Science Association: Regional Cohesion and Competitiveness in 21st Century Europe, August 23-27. Dublin, Ireland: European Regional Science Association (ERSA), Louvain-la-Neuve.
- CONNECT. n.d. Coping with Fragmentation. Accessed March 20, 2019. [Http://www.fragmentation.eu](http://www.fragmentation.eu)
- Contreras-Hermosilla, A, H Gregerson, and Andy White. 2008. *Forest Governance in Countries with Federal Systems of Government: Lessons for Decentralization*. Bogor, Indonesia: Center for International Forestry Research.
- Corson, Catherine, Bridget Brady, Ahdi Zuber, Julianna Lord, and Angela Kim. 2015. The right to resist: Disciplining civil society at Rio+ 20. *Journal of Peasant Studies*, 42 (3-4): 859-878.
- Cronkleton, P, Y Artati, H Baral, K Paudyal, M R Banjane, J L Liu, T Y Tu, L Putzel, E Birhane, and H Kassa. 2017. How Do Property Rights Reforms Provide Incentives for Forest Landscape Restoration? Comparing Evidence from Nepal, China and Ethiopia. *International Forestry Review*, 19 (S4): 8–23.
- de Rueda, Renato A. Re-inventing the Forestry Agencies of the Department of Environment and Natural Resources, Philippines: a Case Study. *Re-inventing Forestry Agencies: Experiences of Institutional Restructuring in Asia and the Pacific*, 2 (2008): 79-102.
- Dermawan, Ahmad, Eric Kemp-Benedict, Annette Huber-Lee, and Amanda Fencl. 2013. Testing a Multi-Scale Scenario Approach for Smallholder Tree Plantations in Indonesia and Vietnam. *Technological Forecasting and Social Change*, 80 (4): 762–71.
- Downie, David Leonard. 1995. UNEP and the Montreal Protocol. *Contributions in Political Science*, 355: 171-186.
- Dupuits, Emilie. 2015. Forest Policy and Economics Transnational Self-Help Networks and Community Forestry : A Theoretical Framework. *Forest Policy and Economics*, 58: 5–11.
- Durst, P, C Brown, J Broadhead, R Suzuki, R Leslie, and A Inoguchi. 2008. *Re-Inventing Forestry Agencies: Experiences of Institutional Restructuring in Asia and the Pacific*. RAP Publication., (05): vi+233.
- Ellefson, Paul V, Robert J Moulton, and Michael A Kilgore. 2002. An Assessment of State Agencies That Affect Forests. *Journal of Forestry*, 100 (6): 35–41.
- Engel, Alex. 2014. *Forest Interactions between the CBD and UNFCCC*. Wageningen, Netherlands: Wageningen University.
- FAO. 2008. OVERVIEW: RE-INVENTING FORESTRY INSTITUTIONS Rapid. In: Patrick Durst, Chris Brown, Jeremy Broadhead, Regan Suzuki, Robin Leslie, and Akiko Inoguchi. *Re-Inventing Forestry Agencies: Experiences of Institutional Restructuring in Asia and the Pacific*, Bangkok: FAO: 1–6.
- Frye, Timothy, and Andrei Shleifer. 1996. *The Invisible Hand and the Grabbing Hand*. 5856. Cambridge,

- Massachusetts. <https://doi.org/10.1111/j.1540-6210.2011.02506.x>.
- Frye, Timothy, and Andrei Shleifer. 1996. *The Invisible Hand and the Grabbing Hand*. In: NBER. National Bureau of Economic Research. NBER Working Paper 5856. Cambridge, Massachusetts: National Bureau of Economic Research.
- Galaz, Victor, Frank Biermann, Beatrice Crona, Derk Loorbach, Carl Folke, Per Olsson, Måns Nilsson, Jeremy Allouche, Åsa Persson, and Gunilla Reischl. 2012. "Planetary Boundaries" -exploring the Challenges for Global Environmental Governance. *Current Opinion in Environmental Sustainability*, 4 (1): 80–87.
- Gallemore, Caleb, Monica Di Gregorio, Moira Moeliono, and Maria Brockhaus. 2015. Transaction costs, power, and multi-level forest governance in Indonesia. *Ecological Economics*, 114: 168-179.
- Glück, Peter, Arild Angelsen, Marie Appelstrand, Samuel Asembe-Mvondo, Graeme Auld, Karl Hogl, David Humphreys, and Christoph Wildburger. 2010. Core Components of the International Forest Regime Complex. IUFRO (International Union of Forestry Research Organizations) Secretariat, 28: 37-55.
- Gonigle, Michael M, and Louise Takeda. 2012. The Liberal Limits of Environmental Law 30 (3): 1–69.
- Government of Malaysia. n.d. Ministry of Forests and Environment Website. Accessed June 20, 2018. <http://www.mfsc.gov.np/index.php>.
- Government of Nepal. n.d. Department of Forests Website. Accessed June 20, 2018a. <http://www.dof.gov.np/>.
- Government of Vietnam. n.d. Organization Chart of the Ministry of Agriculture and Rural Development. Accessed June 20, 2018. <https://www.mard.gov.vn/en/PublishingImages/lcard-E.jpg>.
- Gutiérrez Rodríguez, L., N. Hogarth, W. Zhou, L. Putzel, C. Xie, and K. Zhang. 2015. Socioeconomic and Environmental Effects of China's Conversion of Cropland to Forest Program after 15 Years: A Systematic Review Protocol. *Environmental Evidence*, 4 (1): 76-81.
- Hayes, Jarrod and Janelle Knox-Hayes. 2014. Security in Climate Change Discourse: Analyzing the Divergence between US and EU Approaches to Policy. *Global Environmental Politics*, 14(2): 82–101.
- Hiedanpää, Juha, Juha Kotilainen, and Matti Salo. 2011. Forest Policy and Economics Unfolding the Organised Irresponsibility : Ecosystem Approach and the Quest for Forest Biodiversity in Finland , Peru , and Russia. *Forest Policy and Economics*, 13 (3): 159–65.
- Hooghe, Liesbet, and Gary Marks. 2003. Unraveling the Central State, but How? Types of Multi-Level Governance. *American Political Science Review*, 97 (2): 233-243.
- Howlett, Michael, Jeremy Rayner, Daniela Goehler, Eva Heidbreder, Frederic Perron-Welch, Olivier Rukundo, Patrick Verkooijen, and Christoph Wildburger. 2010. Overcoming the Challenges to Integration: Embracing Complexity in Forest Policy Design through Multi-Level Governance. IUFRO (International Union of Forestry Research Organizations) Secretariat, 28: 93-110.
- Imrie, Rob and Mike Raco. 1999. How New Is the New Local Governance? Lessons from the United Kingdom. *Transactions of the Institute of British Geographers*, 24(1): 45–63.
- Jaung, Wanggi, Louis Putzel, Gary Q Bull, Manuel R Guariguata, and Ussif Rashid Sumaila. 2016. Estimating Demand for Certification of Forest Ecosystem Services: A Choice Experiment with Forest Stewardship

- Council Certificate Holders. *Ecosystem Services*, 22: 193–201.
- Johnston, Ronald J. and Charles J. Pattie. 1996. Local Government in Local Governance: the 1994–95 Restructuring of Local Government in England. *International Journal of Urban and Regional Research*, 20(4): 671–96.
- Joseph, William A. 2014. *Politics in China*. Oxford, UK: Oxford University Press: xviii + 577 .
- Kelly, Alice B, and Nancy Lee Peluso. 2015. Frontiers of Commodification: State Lands and Their Formalization. *Society & Natural Resources: An International Journal*, 28 (5): 473-495.
- Keshav Raj Kanel, and Dhruva Prasad Acharya. 2008. RE-INVENTING FORESTRY AGENCIES: INSTITUTIONAL INNOVATION TO SUPPORT COMMUNITY FORESTRY IN NEPAL. In: Patrick Durst, Chris Brown, Jeremy Broadhead, Regan Suzuki, Robin Leslie, and Akiko Inoguchi. *Re-Inventing Forestry Agencies: Experiences of Institutional Restructuring in Asia and the Pacific*. Bangkok: FAO: 133–60.
- Kim, Yeon Su, Jae Soo Bae, Larry A. Fisher, Sitti Latifah, Mansur Afifi, Soo Min Lee, and In Ae Kim. 2016. Indonesia’s Forest Management Units: Effective Intermediaries in REDD+ Implementation? *Forest Policy and Economics*, 62: 69–77.
- Kowler, Laura F., Ashwin Ravikumar, Anne M. Larson, Dawn Rodriguez-Ward, Carol Burga, and Jazmin Gonzales Tovar. 2016. Analyzing Multilevel Governance in Peru: Lessons for REDD+ from the Study of Land-use Change and Benefit Sharing in Madre de Dios, Ucayali and San Martin. *CIFOR*, Vol. 203.
- Krott, Max, Axel Bader, Carsten Schusser, Rosan Devkota, Ahmad Maryudi, Lukas Giessen, and Helene Aurenhammer. 2014. Actor-Centred Power: The Driving Force in Decentralised Community Based Forest Governance. *Forest Policy and Economics*, 49: 34–42.
- Lambin, E.F., P. Meyfroidt, X. Rueda, A. Blackman, J. Borner, P.O. Cerutti, T. Dietsch, et al. 2014. Effectiveness and Synergies of Policy Instruments for Land Use Governance in Tropical Regions. *Global Environmental Change*, 28: 129–40.
- Leach, Melissa, Robin Mearns, and Ian Scoones. 1999. Environmental Entitlements: Dynamics and Institutions in Community-Based Natural Resource Management. *World Development*, 27 (2): 225–47.
- Lin, Justin Yifu. 1987. The Household Responsibility System Reform in China: A Peasant’s Institutional Choice. *American Journal of Agricultural Economics*: 69 (2): 410–15.
- Liu, Jinlong, Ming Liang, Lingchao Li, Hexing Long, and Wil De Jong. 2017. Comparative Study of the Forest Transition Pathways of Nine Asia-Pacific Countries. *Forest Policy and Economics*, 76: 25–34.
- Liu, Ping, Runsheng Yin, and Hua Li. 2016. China’s Forest Tenure Reform and Institutional Change at a Crossroads. *Forest Policy and Economics*, 72: 92–98.
- Ma, Tianjie, and Qin Liu. 2018. China Reshapes Ministries to Better Protect Environment. *China Dialogue*. 2018. <https://www.chinadialogue.net/article/show/single/en/10502-China-reshapes-ministries-to-better-protect-environment>.
- Mayers, James, and Sonja Vermeulen. 2012. Company-Community Forestry Partnerships. *The Forest Dialogue on Investing in Locally Controlled Forestry (ILCF)*, 6-9 February 2012, 30 (1): 117–18.

- Meyfroidt, Patrick, and Eric F Lambin. 2009. Forest Transition in Vietnam and Displacement of Deforestation Abroad 106 (38): 16139-16144.
- Mundell, Thomas C. 1982. The Tribal Sovereignty Limitation on State Taxation of Indians: From Worcester to Confederated Tribes and Beyond. *Loyola of Los Angeles Law Review*, 15: 195-225
- Nair, CTS. 2008. PUBLIC SECTOR FORESTRY AGENCIES AT THE CROSS-ROADS: ARE THEY FADING INTO IRRELEVANCE? In: Patrick Durst, Chris Brown, Jeremy Broadhead, Regan Suzuki, Robin Leslie, and Akiko Inoguchi. *Re-Inventing Forestry Agencies: Experiences of Institutional Restructuring in Asia and the Pacific*, Bangkok: FAO: 7–18.
- Newell, Peter, Philipp Pattberg, and Heike Schroeder. 2012. Multiactor Governance and the Environment. *Annual Review of Environment and Resources*, 37 (1): 365–87.
- O'Connor, Sorca M. 1990. Rationales for the Institutionalization of Programs for Young Children. *American Journal of Education*, 98 (2): 114–46.
- Obidzinski, Krystof, and Koen Kusters. 2015. Formalizing the Logging Sector in Indonesia: Historical Dynamics and Lessons for Current Policy Initiatives. *Society and Natural Resources*, 28 (5): 530–42.
- Ojha, Hemant R. 2011. The Evolution of Institutions for Multi-Level Governance of Forest Commons: The Case of Community Forest User Groups Federation in Nepal. In: IASC. *Sustaining Commons: Sustaining Our Future*, 13th Biennial Conference of the International Association for the Study of the Commons (IASC) January 10-14, 2011.
- Ojha, Hemant R., Mani R. Banjade, Ramesh K. Sunam, Basundhara Bhattarai, Sudeep Jana, Keshab R. Goutam, and Sindhu Dhungana. 2014. Can Authority Change through Deliberative Politics?. *Lessons from the Four Decades of Participatory Forest Policy Reform in Nepal*. *Forest Policy and Economics*, 46: 1–9.
- Olowu, Dele. African Decentralisation Policies and Practices from 1980s and beyond. *ISS Working Paper Series/General Series*, 334 (2001): 1-44.
- Ongolo, Symphorien. 2015. On the Banality of Forest Governance Fragmentation: Exploring gecko Politics as a Bureaucratic Behaviour in Limited Statehood. *Forest Policy and Economics*, 53: 12–20.
- Orsini, Amandine. 2013. Institutional Fragmentation and the Influence of “Multi-Forum” Non-State Actors: Navigating the Regime Complexes for Forestry and Genetic Resources. *Global Environmental Politics*, 13 (3): 34–55.
- Ostrom, Elinor. 2005. *Unlocking Public Entrepreneurship and Public Economies*. WIDER Discussion Paper, No. 2005/01: 8.
- Overdevest, Christine, and Jonathan Zeitlin. 2012. Assembling an Experimentalist Regime : Transnational Governance Interactions in the Forest Sector. *Regulation & governance*, 8(1): 22-48.
- Pattberg, Philipp, and Oscar Widerberg. 2016. Transnational Multistakeholder Partnerships for Sustainable Development: Conditions for Success. *Ambio*, 45 (1): 42–51.
- Paudyal, K., H. Baral, L. Putzel, S. Bhandari, and R.J. Keenan. 2017. Change in Land Use and Ecosystem Services Delivery from Community-Based Forest Landscape Restoration in the Phewa Lake Watershed, Nepal. *International Forestry Review*, 19 (4): 88–101.

- Phelps, Jacob, Edward L Webb, and Arun Agrawal. 2010. Does REDD+ Threaten to Recentralize Forest Governance? *Science*, 328 (5976): 312–13.
- Pirard, Romain, Sophia Gnych, Pablo Pacheco, and Steven Lawry. 2015. Zero-deforestation Commitments in Indonesia: governance challenges. *CIFOR*, Vol. 132.
- Putzel, L., A. Dermawan, M. Moeliono, and L.Q. Trung. 2012. Improving Opportunities for Smallholder Timber Planters in Vietnam to Benefit from Domestic Wood Processing. *International Forestry Review*, 14 (2): 227-237.
- Putzel, L., A.B. Kelly, P.O. Cerutti, and Y. Artati. 2015. Formalization as Development in Land and Natural Resource Policy. *Society and Natural Resources*, 28 (5): 453-472.
- Putzel, Louis, Peter Cronkleton, Anne Larson, Miguel Pinedo-vasquez, Omar Salazar, and Robin Sears. 2013. Peruvian Smallholder Production and Marketing of Bolaina (*Guazuma Crinita*), a Fast-Growing Amazonian Timber Species. *Center For International Forestry Research Brief*, 23: 1–6.
- Rametsteiner, Ewald. 2002. The Role of Governments in Forest Certification—a Normative Analysis Based on New Institutional Economics Theories. *Forest Policy and Economics*, 4 (3): 163–73.
- Rayner, Jeremy, Alexander Buck, and Pia Katila. 2010. IUFRO World Series Vol . 28 Embracing Complexity : Meeting the Challenges of International Forest Governance, 28: 172.
- Rhodes. 1996. Governing without government. *Political Studies*, XLIV: 652-667.
- Ribot, Jesse C. 2002. *Democratic Decentralization of Natural Resources: Institutionalizing Popular Participation*. Washington, D.C : World Resources Institute: v + 30.
- Ribot, Jesse C., Arun Agrawal, and Anne M. Larson. 2006. Recentralizing While Decentralizing: How National Governments Reappropriate Forest Resources. *World Development*, 34 (11): 1864-1886.
- Robinson, William I. 1998. Beyond Nation-State Paradigms: Globalization, Sociology, and the Challenge of Transnational Studies. *Sociological Forum*, 13 (4): 561–94.
- Rosenau, James N. 1997. *Many Damn Things Simultaneously: Complexity Theory and World Affairs*. Complexity, Global Politics, and National Security. Washington, DC: National Defense University: 32–43.
- Roszkowski, Michael J., and Margot Soven. 2010. Shifting Gears: Consequences of Including Two Negatively Worded Items in the Middle of a Positively Worded Questionnaire. *Assessment and Evaluation in Higher Education*, 35 (1): 117–34.
- Sahide, M.A.K., S. Supratman, A. Maryudi, Y.-S. Kim, and L. Giessen. 2016. Decentralisation Policy as Recentralisation Strategy: Forest Management Units and Community Forestry in Indonesia. *International Forestry Review*, 18 (1): 78–95.
- Salganik, Laura Hersh, and Nancy Karweit. 1982. Voluntarism and Governance in Education. *Sociology of Education*, 55 (2-3): 152–61.
- Sande, Jon Bingen. 2001. *Restructuring and Globalization of the Forest Industry: A Review of Trends, Strategies and Theories*. World Forestry Institute Working Paper: 24.
- Savilaakso, Sini, Paolo Cerutti, Javier Gustavo, and Montoya Zumaeta. 2016. Conserving Biodiversity and

- Improving Human Livelihoods through Interaction between Public Regulation and Forest Management Certification. In: Policy Matters No. 21: Certification and Biodiversity. Gland, Switzerland: International Union for Conservation of Nature and Natural Resources (IUCN).
- Sayles, Jesse S., and Jacopo A. Baggio. 2017. Social–ecological Network Analysis of Scale Mismatches in Estuary Watershed Restoration. *Proceedings of the National Academy of Sciences*, 114 (10): E1776–85.
- Smith, J, K Obidzinski, and I Suramenggala. 2003. Illegal Logging , Collusive Corruption and Fragmented Governments in Kalimantan, Indonesia. *International Forestry Review*, 5(3): 293-302.
- Söderström, Sara, Kristine Kern, Magnus Boström, and Michael Gilek. 2016. “Environmental Governance” and “Ecosystem Management”: Avenues for Synergies between Two Approaches. *Interdisciplinary Environmental Review*, 17 (1): 1–19.
- Stern, Paul C. 2000. New Environmental Theories: Toward a Coherent Theory of Environmentally Significant Behavior. *Journal of Social Issues*, 56 (3): 407–24.
- SurveyMonkey. n.d. SurveyMonkey Inc. San Mateo, California. Accessed April 1, 2018. <https://www.surveymonkey.com>.
- Swainson, Luke John. 2016. The Complexities of Green Economy Policy Reform: A Case Study in Aceh, Indonesia. Canberra, Australia: Australian National University (Doctoral Thesis).
- Tan, Nguyen Quang. 2008. RE-INVENTING FORESTRY AGENCIES: INSTITUTIONAL RESTRUCTURING OF FORESTRY AGENCIES IN VIET NAM SINCE 1994. In: Patrick Durst, Chris Brown, Jeremy Broadhead, Regan Suzuki, Robin Leslie, and Akiko Inoguchi. *Re-Inventing Forestry Agencies: Experiences of Institutional Restructuring in Asia and the Pacific*. Bangkok: FAO: 19–44.
- Tastle, William J., and Mark J. Wierman. 2007. Consensus and Dissent: A Measure of Ordinal Dispersion. *International Journal of Approximate Reasoning*, 45 (3): 531–45.
- Tastle, William J., M. J. Wierman, and U. R. Dum Dum. 2005. Ranking Ordinal Scales Using the Consensus Measure. *Issues in Information Systems*, 6 (2): 96–102.
- Tobergte, David R., and Shirley Curtis. 2013. *Forest Policies, Legislation and Institutions in Asia and the Pacific*. RAP Publication, 10: vi + 52 .
- Tyack, David, and Elisabeth Hansot. 1981. Conflict and Consensus in American Public Education. *Daedalus*, 110 (3): 1–25.
- United Nations. 2015. *The Millennium Development Goals Report*. United Nations, 72.
- Valler, David, Andrew Wood, and Peter North. 2000. Local Governance and Local Business Interests : A Critical Review. *Progress in Human Geography*, 24(3): 409-428.
- van Asselt, Harroand Fariborz Zelli. 2014. Connect the Dots: Managing the Fragmentation of Global Climate Governance. *Environmental Economics and Policy Studies*, 16(2): 137–55.
- Visseren-Hamakers, Ingrid J., Mona Wang, Wil de Jong, and Benjamin Cashore. 2013. How Can REDD + Foster Local Rights and Livelihoods ? Lessons and Insights from. *Issues and Options Brief*.
- Vogel, David. 1997. *Trading up and Governing across : Transnational Governance and Environmental*

Protection. *Journal of European Public Policy*, 4(4): 556-571

- Wanner, Thomas. 2015. The New “Passive Revolution” of the Green Economy and Growth Discourse: Maintaining the “Sustainable Development” of Neoliberal Capitalism. *New Political Economy*, 20 (1): 21–41.
- Water Environment Partnership in Asia. n.d. Organizational Arrangement: Malaysia. Policies: State of Water Environment, Water-Related Issues and Policies. Accessed June 20, 2018. <http://www.wepa-db.net/policies/structure/chart/malaysia/orgchart.htm>.
- Water Environment Partnership in Asia. n.d. Organizational Arrangement: Malaysia. Policies: State of Water Environment, Water-Related Issues and Policies. Accessed June 20, 2018. <http://www.wepa-db.net/policies/structure/chart/malaysia/orgchart.htm>.
- Weiss, Thomas G, David P Forsythe, Roger A Coate, and Kelly-Kate Pease. 2013. *The United Nations and Changing World Politics*. Boulder, Colorado: Westview Press.
- Weschler, Louis F. 1990. Coping With New Federalism: The Predicaments And Options Of Local Officials. *Review of Policy Research*, 9 (3): 604–16.
- Wong, Meng-Chuo. 2009. Prospects for Malaysian Forest Governance: An NGO Perspective. In: Asia Pacific Forestry Commission. *The Future of Forests Asia and the Pacific: Outlook for 2020*, 16–18 October 2007, Chiang Mai, Thailand: Asia Pacific Forestry Commission.
- Wright, Glenn D, Krister P Andersson, Clark C Gibson, and Tom P Evans. 2016. Decentralization Can Help Reduce Deforestation When User Groups Engage with Local Government. 113 (52): 14958-14963.
- Xu, Jintao, Runsheng Yin, Zhou Li, and Can Liu. 2006. China’s Ecological Rehabilitation: Unprecedented Efforts, Dramatic Impacts, and Requisite Policies. *Ecological Economics*, 57 (4): 595–607.
- Zhang, K., and L. Putzel. 2016. Institutional Innovation and Forest Landscape Restoration in China: Multi-Scale Cross-Sector Networking, Household Fiscal Modernization and Tenure Reform. *World Development Perspectives*, 3: 18-21.
- Zhang, Lei. 2008. Reform of the Forest Sector in China. In: Patrick Durst, Chris Brown, Jeremy Broadhead, Regan Suzuki, Robin Leslie, and Akiko Inoguchi. *Re-Inventing Forestry Agencies: Experiences of Institutional Restructuring in Asia and the Pacific*. Bangkok: FAO: 215–33.

Acronyms

5MHRP	Five Million Hectare Reforestation Program (Vietnam)
APFNet	Asia-Pacific Network for Sustainable Forest Management and Rehabilitation
CBD	Convention on Biodiversity
CBO	Community-based Organization
CCFP	Conversion of Cropland to Forest Program (China)
CFUG	Community Forest User Group
CIFOR	Center for International Forestry Research
CSO	Civil Society Organization
DFO	District Forestry Office (Nepal)
FAO	United National Food and Agriculture Organization
FECOFUN	Federation of Community Forestry Users Nepal
FLEGT	Forest law enforcement, governance and trade
EU	European Union
FGF	Forest governance fragmentation
FLR	Forest landscape restoration
FMU	Forest management unit
FSC	Forest Stewardship Council
FYP	Five-year Plan (China)
GPFLR	Global Partnership on Forest Landscape Restoration
IFRC	International forest regime complex
IO	International organization
MARD	Ministry of Agriculture and Rural Development (Vietnam)
MONRE	Ministry of Natural Resources and Environment (Vietnam)
MTCC	Malaysia Timber Certification Council

NDRC	National Development and Reform Commission
NGO	Non-governmental Organization
NSA	Non-state Actor
REDD+	Reduced emissions from deforestation and forest degradation and enhancement of forest carbon stocks
SFA	State Forestry Administration (China)
SFGA	State Forestry and Grassland Administration (China)
SFM	Sustainable forest management
UN	United Nations
VBN	Values, beliefs and norms

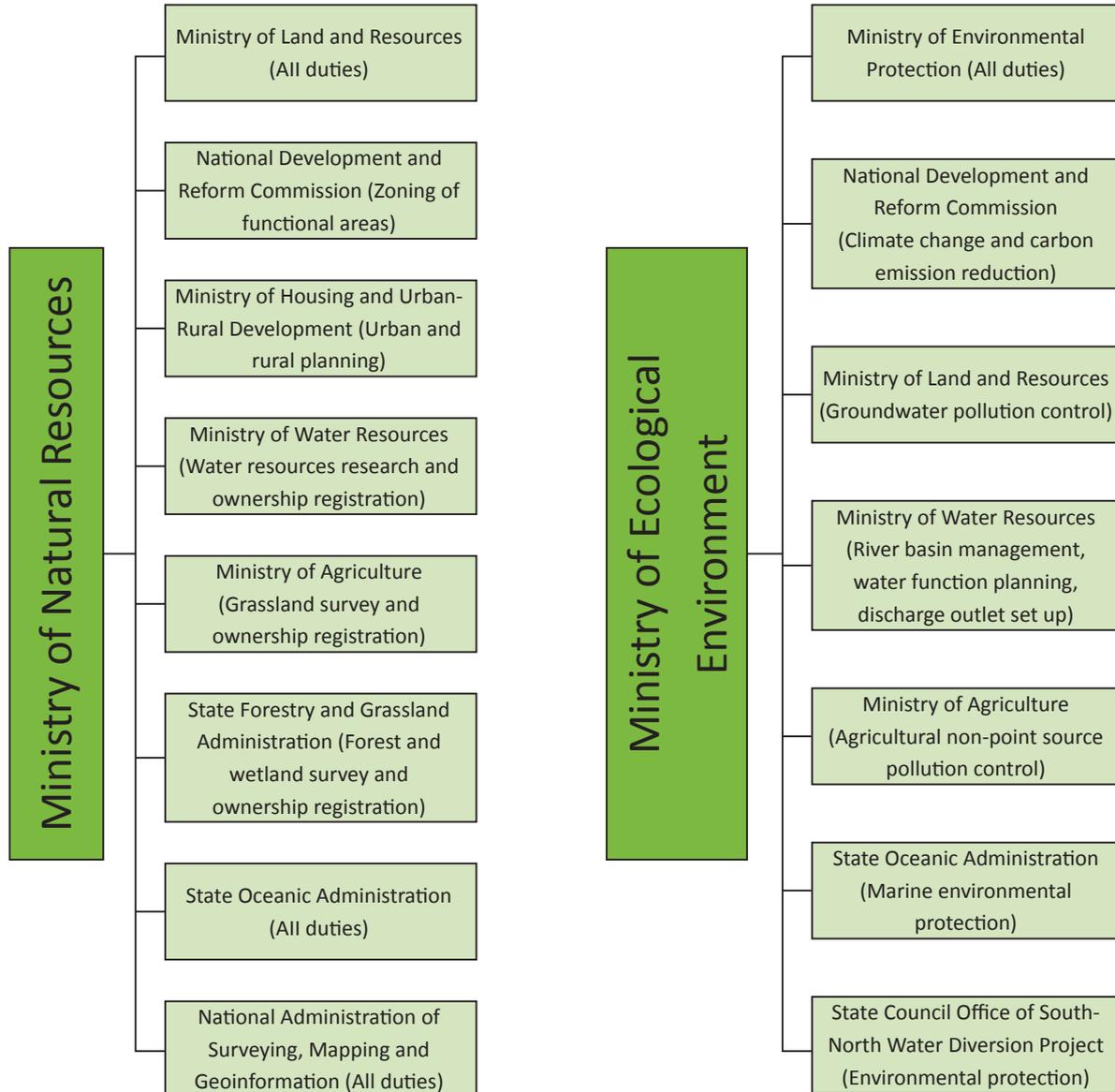
Appendix 1 Data associated with analyses of mean responses to Statements 1-24

Negative action-based statements				Positive action-based statements			
Fragmentation lines	N	Mean	Std	Fragmentation lines	N	Mean	Std
Forest users and law enforcement actors	119	2.891	1.040	Forestry and finance/tax authorities	119	2.941	1.076
Forestry and local/indigenous community actors	119	3.168	1.084	Forestry and private actors	119	3.118	1.035
Forestry and non-forestry sector actors	119	3.345	1.146	Forestry and socioeconomic / rural development actors	118	2.644	0.965
National forestry and global actors	119	2.765	0.998	National and local forest governance actors	119	2.437	1.014
Total	475			Total	474		
	DF	<i>F</i> Ratio	<i>P</i> -value		DF	<i>F</i> Ratio	<i>P</i> -value
ANOVA	3	7.204	<.0001*	ANOVA	3	10.449	<.0001*
Negative intuition-based statements				Positive intuition-based statements			
Fragmentation lines	N	Mean	Std	Fragmentation lines	N	Mean	Std
Forest economics and legality institutions	113	2.920	0.992	Across national borders (FLEGT)	112	2.357	0.804
Forestry and global institutions	112	2.705	1.079	Multiple environmental and social institutions	113	2.035	0.812
Forestry and market-based institutions	112	3.027	0.875	National and community/smallholder forestry institutions	113	2.292	0.852
Two forestry institutions (FLR and REDD+)	112	2.536	0.770	National forestry and customary/traditional institutions	113	2.611	0.977
Total	448			Total	450		
	DF	<i>F</i> Ratio	<i>P</i> -value		DF	<i>F</i> Ratio	<i>P</i> -value
ANOVA	3	6.164	0.0004*	ANOVA	3	8.451	<.0001*
Negative norm-based statements				Positive norm-based statements			
Fragmentation lines	N	Mean	Std	Fragmentation lines	N	Mean	Std
Climate change and socioeconomic norms	110	3.045	0.882	Conservation and climate change norms	111	2.333	0.778
Conservation and socioeconomic norms	111	2.640	1.016	Ecosystem service and economic norms	111	2.342	1.100
Decentralization and forestry norms	111	2.829	1.127	Forest environmental norms and local land/resource rights	108	2.435	0.960
Forestry and geopolitical norms	111	3.342	1.014	Forestry and land use/spatial planning norms	111	2.306	0.872
Total	442			Total	440		
	DF	<i>F</i> Ratio	<i>P</i> -value		DF	<i>F</i> Ratio	<i>P</i> -value
ANOVA	3	9.837	<.0001*	ANOVA	3	0.392	0.759

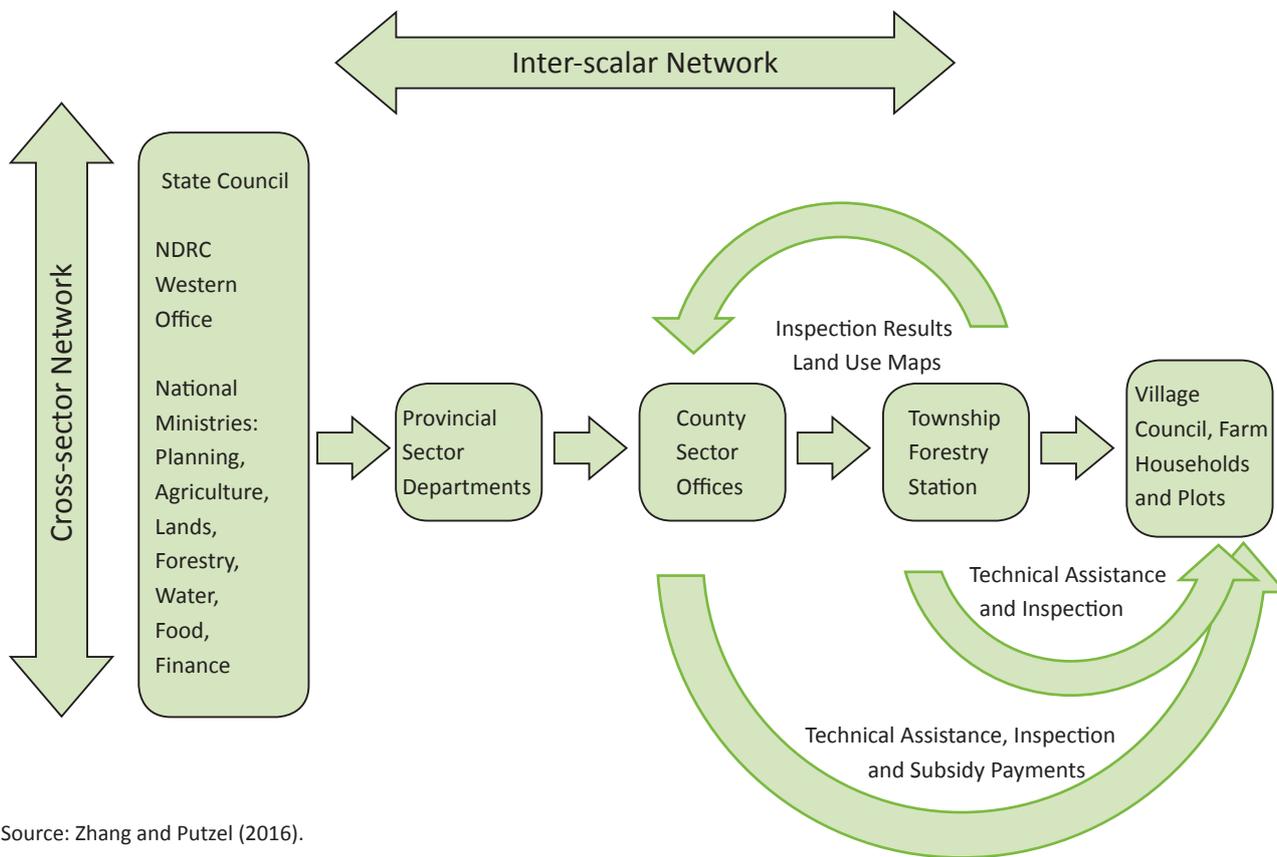
Appendix 2 Examples of governmental administrative structures affecting integration/ fragmentation of forest governance

(Note below: Outdated, to revise following review. Please provide updated forestry administrative structures if available.)

China

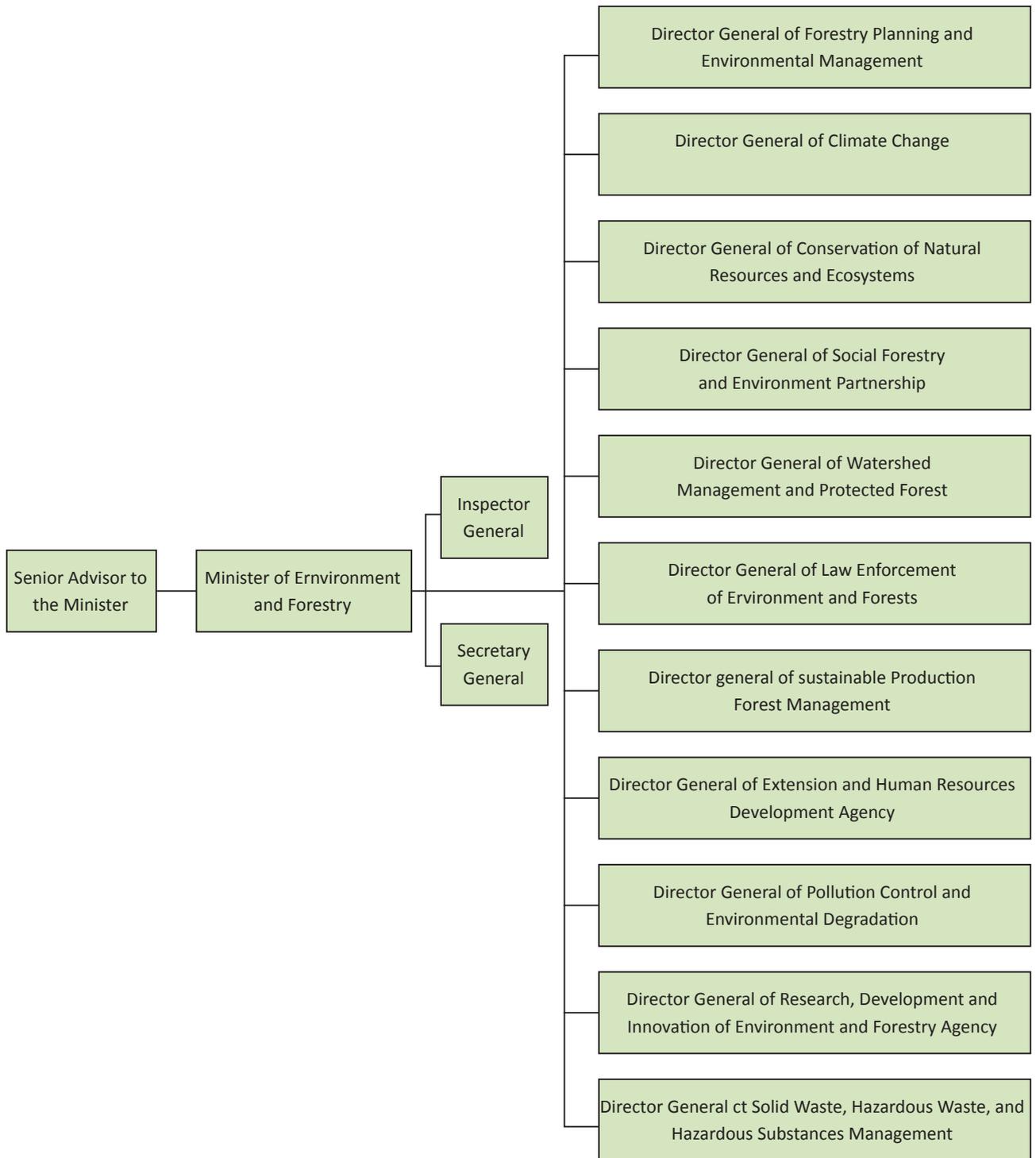


Source: Ma and Liu (2018).



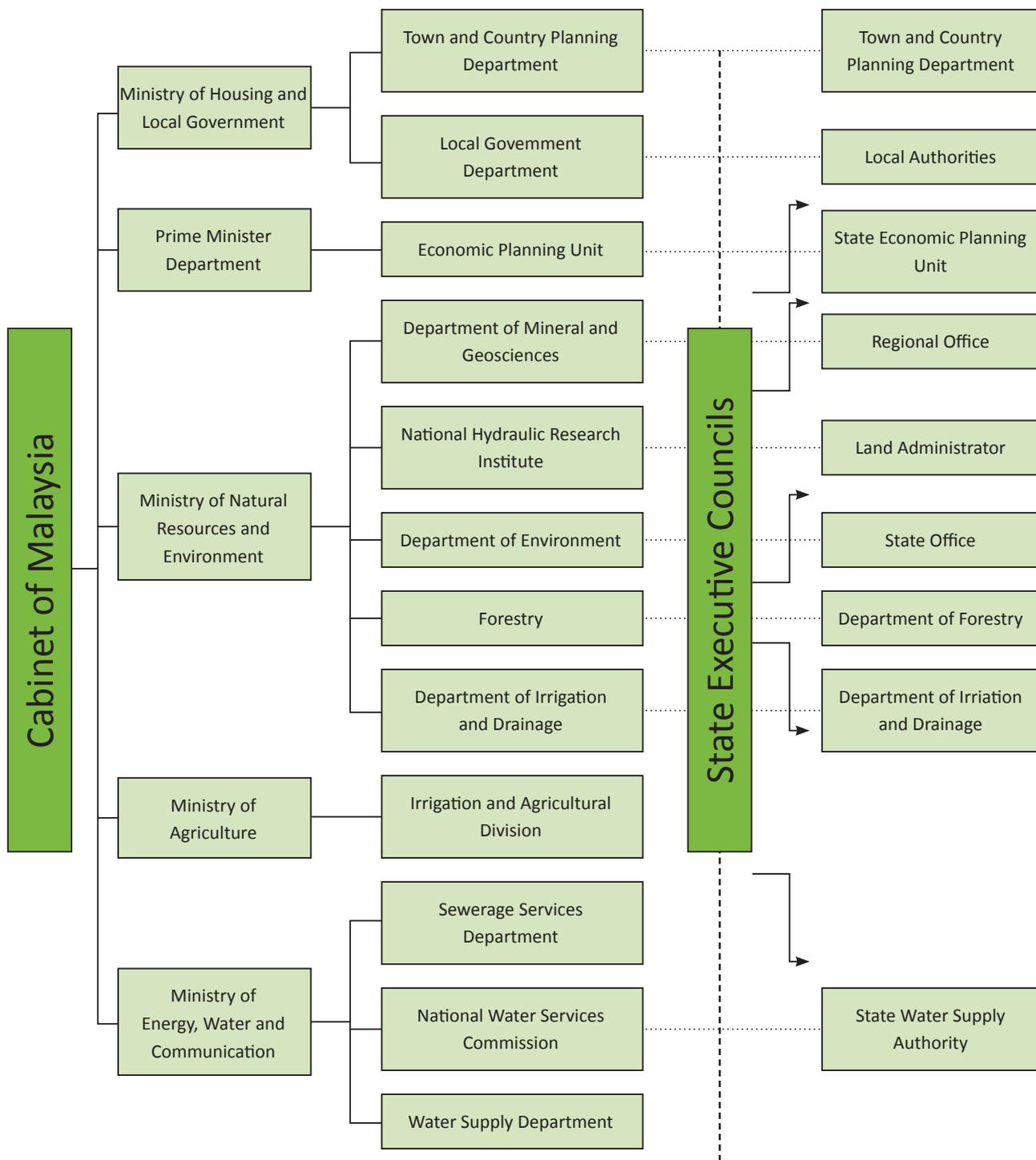
Source: Zhang and Putzel (2016).

Indonesia



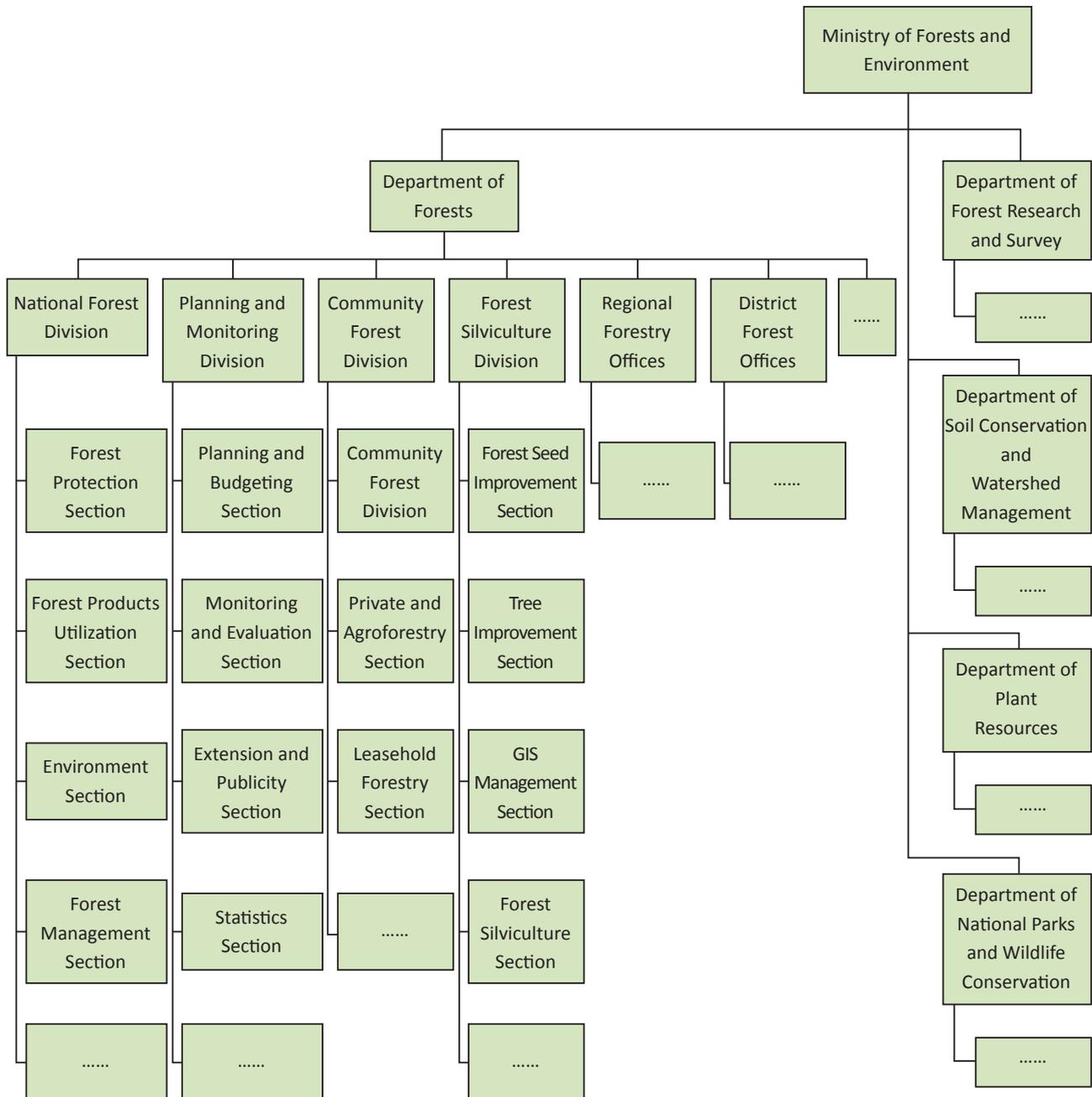
Source: Asian Compliance and Enforcement Network (n.d.).

Malaysia



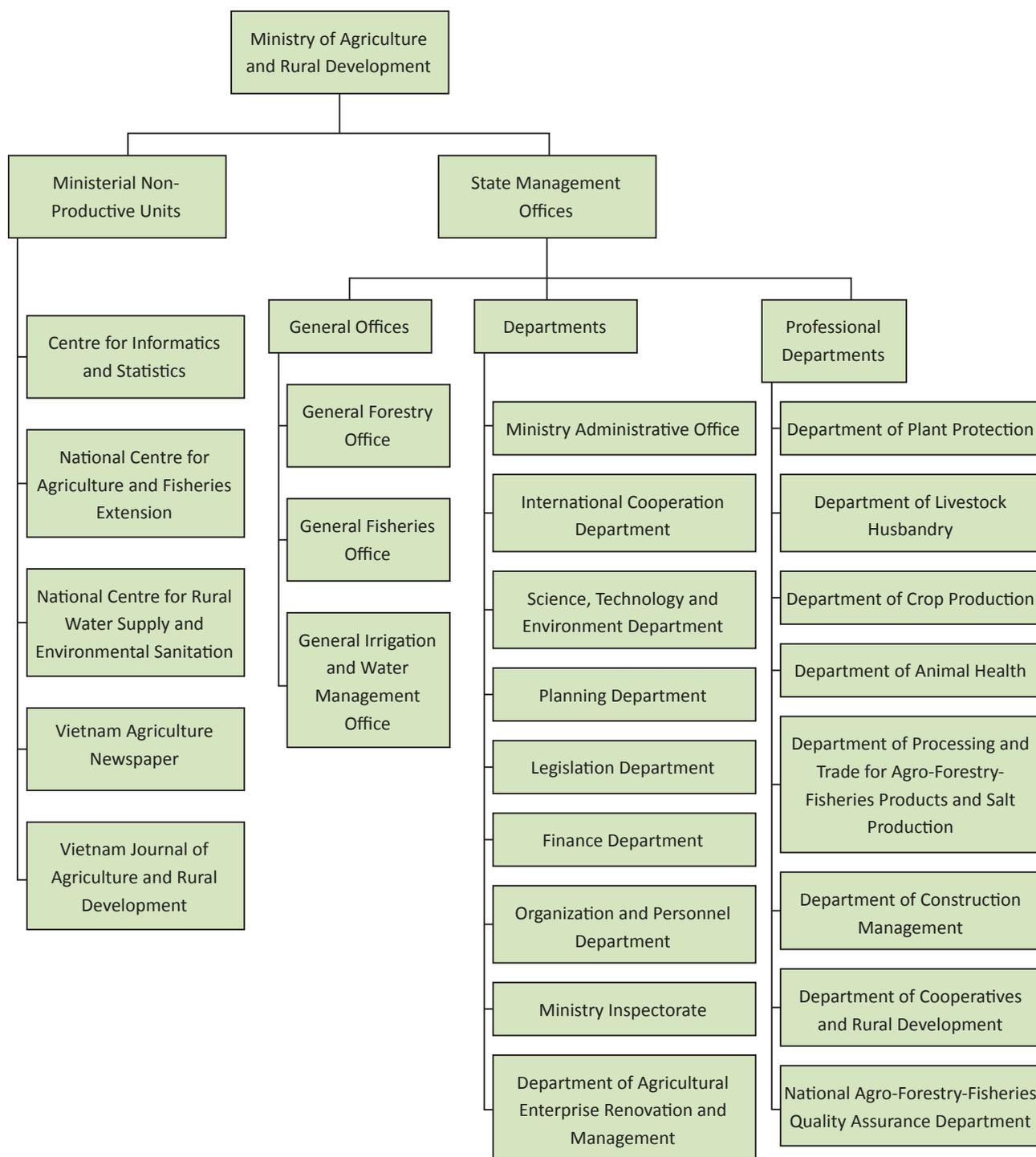
Source: WEPA (n.d.).

Nepal



Source: Government of Nepal (n.d.).

Vietnam



Source: Government of Vietnam (n.d.).

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Dr. Nguyen Dinh Tien, Faculty of Development Economics, University of Economics and Business, Vietnam National University, Hanoi, Vietnam

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Izaidah binti Talib, Assistant Director of Forest Economic Institution, Forestry Department of Peninsular Malaysia, Malaysia

Hoang Xuan Thuy, Deputy Director, People and Nature Reconciliation (PanNature)

Iqtie Qamar Laila Mohd Gani, Senior Assistant Director, Enforcement, Forestry Department of Peninsular Malaysia, Malaysia

Ir Hanni Adiati Msi, Senior Staff of Ministry of Environment and Forestry, Indonesia

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Ishwari Prasad Poudel, Under Secretary, Department of Forests, Nepal

Krishna B. Khadka, Program Manager, FEDWASUN, Jaycees Marga Thapathali, Kathmandu

Li Hao, Beijing Forestry University, China

Lila Puri, Assistant Professor, Institute of Forestry, Nepal

Liu Jinlong, Professor, Renmin University of China, China

Lok Mani Sapkota, RECOFTC, The Center for People and Forests

Ly Thi Minh Hai, Country Director, RECOFTC, Vietnam

PhD Maheshwar Dhakal, Joint Secretary, Ministry of Forests and Soil Conservation, Nepal

PhD Mani Ram Banjade, Research Associate, CIFOR

Meine van Noordwijk (World Agroforestry Centre (ICRAF))

Bishnu Prasad Acharya, General Secretary, Nepal Foresters Association (NFA), Babarmahal, Kathamandu; Training Officer (Under Secretary) Central Forestry Training and Extension Centre, Babarmahal, Kathamandu, Nepal

Mohd Afzanizam Muda, Research Officer, Forest Research Institute Malaysia (FRIM), Malaysia

Pham Hong Luong, Director, Department of Planning and Finance, Vietnam Administration of Forestry, Vietnam

Poorneshwor Subedi, Eastern Regional Forest Training Center, Biratnagar, Nepal

Utharat Pupaiboon, Forestry Technical Officer, Senior Professional Level Forest Research and Development Bureau, Royal Forest Department, Thailand

Muhammad Alif K. Sahide, Forestry Faculty, Hasanuddin University

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Nguyen Manh Cuong Cuc Phuong National Park, Vietnam

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Orlando Alejandro Panganiban, Chief, Forest Resources Management Division, Forest Management Bureau

Pradeep Baral, Master Student, BJFU

Prakash Lamsal, Community Forest Development Officer, Department of Forests, Kathmandu, Nepal

Prof./Dr. Supratman, MP, Forestry Faculty of Hasanuddin University

Puad Elham, Research Officer, Forest Research Institute Malaysia (FRIM), Malaysia

PhD Ram P. Acharya, Research Student, University of Southern Queensland, Toowoomba

Rod Keenan, University of Melbourne

Sagar Kumar Rimal, Under Secretary (technical), Foreign Aid Coordination Division Ministry of Forests and Soil Conservation, Kathmandu, Nepal

Siti Fatimah Ramli, Assistant Secretary, Ministry of Natural Resources and Environment, Malaysia

Wang Hong, APFNet, China

Xiao Jianmin, Chinese Academy of Forestry, China

Yeni Nuraeni, S. Hut, Forest Research Center, Kementerian Lingkungan Hidup dan Kehutanan

PhD Yudi Setiawan, Faculty of Forestry, IPB, Indonesia

Zhang Ying, Assistant Professor, Research Institute of Forest Policy and Information, Chinese Academy of Forestry, China

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