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A GLOBAL REVIEW OF THE GOVERNANCE AND TENURE DIMENSIONS OF COASTAL MANGROVE FORESTS

Brian Rotich, Esther Mwangi and Steven Lawry

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Report submitted to TetraTech as part of the work:
"Assessment of natural resource governance including land and forest tenure in coastal mangrove forests of Southeast Asia and East Africa"

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TABLE OF CONTENTS

ACKNOWLEDGMENTS vi

GOVERNANCE AND TENURE DIMENSIONS OF COASTAL MANGROVE FORESTS: A GLOBAL REVIEW 1

1. INTRODUCTION AND BACKGROUND 1

2. LEGAL FRAMEWORKS FOR THE GOVERNANCE OF MANGROVES 6

3. MANGROVE GOVERNANCE AND TENURE IN PRACTICE ..... 12~~11~~

3.1 Fragmented authority and overlapping jurisdictions ..... 12~~11~~

3.2 Local mangrove governance and tenure ..... 13~~12~~

3.3 Gender differentiation: A missing dimension in mangrove governance ..... 17~~16~~

4. MANGROVE GOVERNANCE: EMERGING LESSONS FOR POLICY AND PRACTICE ..... 20~~19~~

REFERENCES ..... 22~~21~~

ANNEXES ..... 28~~27~~

LIST OF BOXES

1. Mangrove deforestation trends in selected countries 3
2. Mexico: Mangrove-specific law and policy 9
3. Senegal community involvement in mangrove restoration ..... 16~~15~~
4. Collaborative governance: Mangroves for the Future (MFF) ..... 18~~17~~

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ON THE LAND AND IN THE SEA

A GLOBAL REVIEW OF THE GOVERNANCE AND TENURE DIMENSIONS OF COASTAL MANGROVE FORESTS

1. INTRODUCTION AND BACKGROUND

Commented [A1]: Please ensure that governance and tenure are both highlighted in title, main text etc. Even though it's there under governance, given this is a project supported by the LAND office of USAID, it's important to stress the tenure aspects where appropriate.
done

The purpose of this literature review is to provide a general picture of the legal and governance frameworks that relate to the use and management of mangrove forests globally and to highlight challenges typically encountered in the governance and tenure dimensions of mangrove forest management. This review is part of a study that includes selected case studies in Indonesia and Tanzania.

Mangroves are trees and shrubs juxtaposed between land and sea in the world's subtropics and tropics, with the largest percentage of mangroves occurring between 5° N and 5° S latitude (Alongi 2002; Giri et al. 2011). Mangrove forest ecosystems are highly productive, rich in biodiversity and adapted to the harsh and variable interface between land and sea. In total, 73 mangrove species and hybrids are considered to be true mangroves (ITTO 2012). Mangroves fulfill important socioeconomic and environmental functions, including the provision of a large variety of wood and non-timber forest products (NTFPs); coastal protection against the effects of wind, waves and water currents; conservation of biological diversity, including a number of endangered mammals, reptiles, amphibians and birds; protection of coral reefs, sea-grass beds and shipping lanes against siltation; and provision of habitat, spawning grounds and nutrients for a variety of fish and shellfish, including many commercial species (FAO 2007). Satellite imagery captured between 1999 and 2003 estimates the total mangrove forest area of the world at 152,360 km^2 distributed within a total of 123 countries and territories (ITTO 2012). According to the *World Atlas of Mangroves* (Spalding et al. 2010), the five countries with the largest mangrove areas are Indonesia (21% of the global total), Brazil (9%), Australia (7%), Mexico (5%) and Nigeria (5%). Most mangroves (42%) are found in Asia, followed by Africa (20%), North and Central America (15%), Oceania (12%) and South America (11%). About 75% of all mangrove forests are found in just 15 countries (Giri et al. 2011).

Commented [A2]: Also consider:

Kainuma, M., Collins, L., & Spalding, M. (2010). *World atlas of mangroves.* London: Earthscan.

Cited on the next page

There are references in here on Tanzania that aren't in Tanzania document, and also Brown et al from Tanzania that could be useful here.

Brown, B. et al. (2014). Case study: Community-based ecological mangrove rehabilitation (CBEMR) in Indonesia. *Sapiens*, 7, 2.
Included in the gender section

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Now included in the references

Most of the research on mangroves has traditionally focused on the biophysical aspects of mangrove management such as carbon sequestration measurements, mangrove tree species differentiation and relative growth rates, biophysical factors influencing restoration/rehabilitation, physical effects on coastal erosion and biodiversity (Katon et al. 2000; Kairo et al. 2001; Quarto

2005; Kanagaratnam et al. 2006; Field 2007; Powell et al. 2007; Maliao and Polohan 2008; Primavera and Esteban 2008; Primavera et al. 2011; Macintosh et al. 2012). Most studies on mangrove rehabilitation and restoration started in the early 2000s and picked up from around 2004, especially after the 2004 tsunami that affected up to 13 Asian countries. There are also a growing number of biophysical studies on the role of mangroves in climate mitigation and adaptation, most of which were conducted between 2010 and 2016 (Limaye and Kumaran 2012; Schmitt et al. 2013; Wang et al. 2013; Liu et al. 2014; Munji et al. 2014; Alongi and Mukhopadhyay 2015; Murdiyarso et al.2015; Stringer et al. 2015). Alongside this rich and diverse set of biophysical studies was the actual implementation of mangrove rehabilitation programs, mostly in Asia, by NGOs (such as IUCN's Mangroves for the Future, Seacology and Oceanium) and academic organizations (e.g. the Zoological Society of London) in partnership with national governments and local communities.

Compared with the biophysical work, much less research on the human dimensions of mangrove management has been done, and while there is a steadily growing literature on community-based management, the gap in governance work is clearly evident. Analyses of governance arrangements and how they affect mangrove sustainability are scarce. In particular, the policy and institutional frameworks that govern mangroves, the distribution of tenure and rights, gender and social differentiation, and interactions of actors across governance levels are all important aspects of governance that influence how mangroves are managed and whether management efforts have potential for achieving sustainability and human well-being/livelihoods outcomes. This global review thus explores the existing literature on those aspects of governance and tenure that are scarce in the mangrove management literature.

The policy importance of coastal mangrove forests lies in their offering multiple and diverse benefits, which include supporting local livelihoods, disaster risk reduction, sustainability of fisheries and carbon sequestration. Yet the world's mangroves are under threat. According to the United Nation's Food and Agriculture Organization (FAO), there was a dramatic loss in mangroves between 1980 and 2000 in nearly all the regions of the world (except Australasia), with estimates of greater than 20% loss in East Asia, Pacific Islands, Southeast Asia, and North and Central America FAO 2007). The annual loss rate between 2000 and 2005 was 0.66% (ITTO 2012).

Commented [A4]: Better to integrate this first sentence into the section above that discusses mangrove forest loss trends.
Done

The major causes of decline in mangrove forests are anthropogenic and include over-extraction and deforestation; infilling, drainage and conversion to aquaculture; agricultural, urban and industrial runoff; oil spills; and poorly managed dredging and coastal development (Van Lavieren et al. 2012). Box 1 below illustrates trends in mangrove losses in nine selected countries in Africa, Asia and Latin America. Mangrove losses are primarily associated with economic development, especially conversion to aquaculture in Asia and Latin America. In oil-producing countries, such as Nigeria and Mozambique, pollution from the industrial production of oil and gas is a major factor in mangrove degradation and loss.

There have been a variety of conservation efforts around the world aimed at slowing the rates of mangrove loss. These efforts have included legislation seeking to regulate use (such as in Columbia where licenses are required for exploitation), enhanced protection and conservation (e.g. in Brazil where some mangrove forests are designated as areas of permanent preservation), and expanding restoration and rehabilitation through community-based initiatives (such as in the Philippines, Thailand and Indonesia (Spalding et al. 2010; Van Lavieren et al., 2012). However, poor

Commented [A5]: If it is possible, good if this para could be less list-ish and bring a sense of which countries have particularly mobilized to conserve their mangroves.
Specific Countries examples added

enforcement of regulations, corruption, jurisdictional ambiguities, overlapping mandates of different management authorities and increasing pressure for conversion of mangrove forests to aquaculture, agriculture and urban development have provided substantial challenges to conservation and sustainable management efforts (Lugo et al. 2014).The FAO (2007) further notes that even with the existence of protected areas and conservation policies, effective implementation and enforcement have remained a challenge, particularly in places with limited resources and capacity and where there are high pressures for conversion to other land uses.

Commented [A6]: What do the Tanzania and Indonesia cases have to say about this issue of protection and conservation? Good to weave in some of the findings where appropriate.

Have held back from including Tanzania and Indonesia cases since they are not published yet

Box 1. Mangrove deforestation trends in selected countries

- Vietnam: over 80% loss since the 1950s due to aquaculture and spraying of defoliating agents during the Vietnam War (Sam et al. 2005; Powell et al. 2007).
- Bangladesh: decreased by 215 ha in the period 1982–2005 (FAO 2007).
- Philippines: more than 50% lost at the turn of the century to leave 240,800 ha as of 2010 due to aquaculture, overexploitation and agriculture (Long and Giri. 2011).
- Mozambique: lost 60,451 ha in the period 1997–2005 from population pressure and oil spills FAO (2007).
- Nigeria: 21,342 ha lost between 1986 and 2003 due to urbanization, dredging activities, and pollution from the oil and gas industries (Adedeji et al. 2012).
- Senegal: about 45,000 ha of mangroves have been lost since the 1970s due to droughts and overexploitation (Livelihoods 2016).
- Honduras: from 1985 to 2013, about 11.9% loss due to shrimp farming (Chen et al. 2013).
- Mexico: is estimated to have suffered a 2.1% annual loss of mangroves in the period 1990–2000 as a result of coastal development and aquaculture (Alatorre et al. 2011).

Besides providing a diverse set of ecological goods and services, mangroves are complicated ecosystems in terms of governance. They sit at the confluence of land and sea, and formal authority for their management is more often than not fragmented across a range of government agencies such as forestry, fisheries, wildlife, agriculture or environment. These formal systems often overlap with local customary and traditional practices for resource use and management, adding to the complexity. This review therefore aims at providing an overview of the status of mangrove governance globally. In particular, the review is concerned with identifying the variety of institutional structures, formal and informal, that have been designed and implemented for mangrove governance across different settings and to identify governance challenges that span the different settings. The review is also aimed at identifying institutions and patterns of local management and use, including tenure rights and gender differentiation and how these local institutions might influence mangrove management and rehabilitation efforts. The review focuses on published and gray literature during the period 2000–2016 and used online databases such as Science Direct, Google Scholar and Web of Science. Searches were also conducted in databases of

specialized agencies such as the FAO, IUCN and mangroves-focused websites. The approach to the study is described more fully in Annex 1, where we show the distribution of the literature we reviewed across themes and study countries.

The policy and legal architecture for mangrove forest governance across the globe is diverse. In a large number of countries represented in the review, the architecture does not reflect the unique positioning of mangroves on both the land and seascapes, but instead applies the framework used for terrestrial forests to mangrove governance. In an equal number of countries in the review, the authority for mangrove governance is fragmented across forestry and other land-based agencies as well as marine and fisheries agencies. In most cases, formal governance is constrained by lack of enforcement and implementation of mandates, weak cross-sectoral coordination and sometimes conflict and competition among mandated agencies. Although protection and regulation appear to be the main objective of management across most settings, there seems to be a transition toward increased community participation through co-management arrangements for management and rehabilitation, but with ownership rights to mangroves strongly vested in governments.

Some of the key features of mangrove governance originating from this review are highlighted in the following paragraphs:

- Authority over mangrove conservation management is overwhelmingly vested in state institutions and protection is a central objective though multiple use, where both consumptive and nonconsumptive are allowed in some cases. The configuration of state authority in each country appears to take one of two forms. Authority may be vested in a single line agency such as the department of forestry, or split among two or more agencies (e.g. departments of fisheries, agriculture, wildlife). This contributes to a high level of fragmentation and jurisdictional ambiguity. Frameworks and mechanisms for coordinating across agencies and governance levels are uncommon, and where they exist, they are difficult to put into practice.
- In general, laws and policies have not been crafted for the specific management requirements of mangroves. Instead, mangroves are regulated under legal frameworks intended for forests, environment, water, land or marine fisheries. Regulation and management in practice are even more complex than the legal/policy frameworks might suggest. Protection efforts face major challenges: enforcement is constrained by inadequate personnel and budgets.
- Local tenure rights to mangrove resources vary. Customary rights and systems of use and management (especially in Africa) are often unrecognized by statutory systems and are even sometimes undermined. Local, indigenous rights are more often than not recognized by the state in Latin America, where full ownership, including titles, is issued to communities. In Asia, long duration leases are granted to households and communities; these leases often offer a broad range of rights in the bundle, sometimes including transfer rights.
- There is increasing experimentation with community-based approaches motivated primarily by continued mangrove degradation and loss under strict protection regimes and increasing interest and involvement of NGOs, international organizations and development funders.
- Community-based approaches have mixed outcomes for mangroves. Community concessions and extractive reserves that accord full ownership or longer term rights appear to be more effective in mangrove conservation. Programs involving communities jointly with NGOs, research organizations and those that provide other incentives (e.g. capacity building,

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Agencies added

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Included at the end of the sentence

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Replaced the paragraph with something different.

technology) appear to generate better outcomes in terms of mangrove rehabilitation. Where customary rights are not respected or recognized and are actively undermined or community institutions are subject to government interference, mangroves tend to deteriorate.

- While national governments continue to be central actors in mangrove conservation management, international organizations and NGOs are exerting influence and shaping agendas and approaches to mangrove management and, in particular, are increasingly experimenting with inclusive models of community-based management.
- Gender equity is a missing element in mangrove conservation and management. The few available studies showed that there is gender differentiation in the type of products harvested, in the economic value of products harvested, and places where harvesting is conducted. However, community-based rehabilitation programs are increasingly integrating gender and some are even focused solely on empowering women.

This report is divided into three further main sections. Section 2 presents the legal and institutional frameworks for mangrove management. Section 3 presents key issues in the practice of mangrove governance; this includes issues in the implementation of legal frameworks and policies, local tenure rules and institutions, and gender differentiation in use and management. Section 4 presents the main lessons learnt for mangrove governance based on Sections 2 and 3. It draws conclusions regarding which governance arrangements work (and which do not) with regards to promoting sustainable management and conservation of mangrove forests. Annex 1 describes the methodology used in the review. Annex 2 provides the outlines of a tool/framework that can help policy makers and practitioners better take into account resource governance and tenure when designing and implementing coastal projects.

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Done

2. LEGAL FRAMEWORKS FOR THE GOVERNANCE OF MANGROVES

Due to the general trend of significant loss of mangroves globally as illustrated in Section 1, many countries have promulgated laws and regulations intended to protect the remaining mangrove areas and mitigate against further loss (MFF 2008). This section presents the legal frameworks that govern mangrove forests in Africa, Asia and Latin America. It identifies the policy and institutional frameworks commonly used in mangrove management and the main approaches that are pursued by countries with regard to mangrove governance. It also highlights the stakeholders that have statutory authority for mangrove management.

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Globally, the authority for mangrove management is commonly vested in state agencies. This happens in three different ways. First, authority can be vested in a single agency, which may comprise a single sector (e.g. forestry) or an integrated sector (such as environment). Second, authority may be vested in two separate agencies (e.g. Forestry Department and Department of Wildlife Conservation). Third, authority can be vested in three or more separate agencies. The single-agency model is found in Bangladesh, Brazil, Kenya, Tanzania, Myanmar and Mozambique, where forestry departments or agencies are the most common legally authorized manager. In these countries, although the Forestry Department is the legally recognized manager, other policies such as the environmental policy and the coastal area policy are also relevant. In Sri Lanka and Mexico, two separate agencies have legal mandates for mangrove management. In Sri Lanka, these are the Forest Department (in the Ministry of Environment and Natural Resources) and the Department of Wildlife Conservation (Ministry of Agrarian and Wildlife Services), while in Mexico, mangroves management falls under the Ministry of Environment and Natural Resources and the National Forestry Council.

There are at least five ministries that are directly or indirectly involved in regulating mangrove resource allocation and management in Indonesia. They include the Ministry of Environment and Forestry, the Ministry of Marine and Fisheries, the Ministry of Home Affairs, the National Land Bureau (BPN), and the Ministry of Life Environment (Kusmana 2012). However, Indonesia's Ministry of Environment and Forestry has the major authority to regulate the exploitation, protection and rehabilitation of mangrove resources. Environmental agencies have management authority in Colombia, Honduras, Nigeria and Senegal. These agencies are integrative and bring together several sectoral concerns; for example, in Colombia, the Forestry and Wildlife Institute (in the Ministry of Environment, Housing and Territorial Development) has legal mandate over mangrove management; in Nigeria it is the Federal Environment Protection Agency, which draws from the Environmental Law, Natural Resources Law and the Land Act; while in Senegal, the Ministry of Environment and Protection of Nature has authority for mangrove management and draws heavily from the Forest Code for implementation.

Thus, while the formal models that countries adopt to manage their mangrove forests vary, the role of forestry departments or agencies appear central. Importantly, there is no mangrove-specific agency in any of the countries that this literature review covered. Where multiple agencies are

mandated by law, there are ambiguities and confusion; these issues are further explored in Section 3, where on-the-ground mangrove management practices are discussed.

Legal and policy frameworks that govern mangrove management also vary along a continuum from strict protection that bans any kind of consumptive use, through mixed protection and use whereby protection is the main goal but some regulated use is tolerated, to the promotion of multiple-use regimes that endorse sustainable use and management. Several countries such as Sri Lanka, India, China, Tanzania, Kenya and Brazil pursue protectionist policies. In Sri Lanka, traditional fishing is the only activity allowed in mangrove areas, with a total ban on collection, removal and clearing of mangroves (Department of Wildlife Conservation 2009). A large proportion of mangrove forests in India are declared as reserve forests, reserve lands or sanctuaries and are protected by the Forest Department of the different states (MFF 2008). In China, a total of 34 mangrove nature reserves, accounting for more than 80% of the mangrove areas have been established in different locations as of 2009 (Chen et al. 2009). Mangroves were gazetted as forest reserves in Tanzania from 1928, under the management of the Forestry Department and successor agencies. Mangrove areas in Kenya were declared government reserve forests in 1932. A ban on exporting mangrove wood was implemented in 1978, lifted in 1981 and reinstated again in 1982 (Taylor et al., 2003). Currently, mangroves in Kenya fall under the jurisdiction of the Forest Act (2005) and are managed by County Forest Officers, who administer licenses and are in charge of conservation within the respective counties. Less emphasis has been placed on mangrove ecosystems by the Kenya Forest Service as it is primarily concerned with terrestrial forests, which are seen as far more valuable than mangrove forests in terms of timber (Samoilys et al. 2013). In Brazil, mangroves are protected under the federal Forest Law and are designated as 'areas of permanent preservation' through the Forestry Code. Total or partial removal of mangrove vegetation is prohibited unless authorized by relevant government agencies and only when deemed to be in the 'public interest' (Almeida Magris and Barreto 2010).

Approximately 14.2% of all mangroves worldwide (Schmitt et al. 2009) contribute to the global protected areas system, some of which are found in the abovementioned countries that pursue mangrove protection as their main policy objective. In Brazil, for example, more than 82% of the country's mangroves are located within protected areas (IUCN Categories I–VI), with many of them permitting sustainable harvesting of resources (Gravez et al. 2013). Several mangrove-rich countries have ratified the Ramsar Convention on Wetlands and have subsequently designated mangrove areas as Ramsar sites, national parks, reserves or wildlife sanctuaries. All South American countries with mangroves, with the exception of Guyana, have at least one Ramsar mangrove site, a clear indication of a level of political commitment to protecting these habitats and their environmental richness (FAO 2007).

Strict protection and total bans on mangrove harvesting have not always been adhered to by mangrove-dependent populations. Despite long-standing legal protection, extensive mangrove losses and degradation have occurred in Tanzania, with the greatest losses occurring around Dar es Salaam due to conversion to urban and agricultural uses (Samoilys et al. 2013). However, the gazettement of forest reserves in Tanzania helped reduce degradation rates compared with neighboring East African countries. Tanzania further adopted a new approach to mangrove protection and sustainable use in 1988 through the Mangrove Management Project (MMP). This helped reduce illegal cutting and clearance of mangrove forests in addition to encouraging

Commented [A12]: Is this a theme found in other countries when it comes to mangroves?
No

Commented [A13]: So this is not a strictly protected area?
Most mangroves in brazil fall under IUCN's category VI where low level non industrial use is permitted

Commented [A14]: Is Samoilys cited in Tanzania report?
Yes

replanting of large, degraded areas (Samoilys et al. 2013). Legislation on mangroves in Mexico was restored and strengthened in 2007 to provide for their absolute protection after the legislation had been initially rescinded in 2004. Protection efforts have, however, faced challenges in the form of poor enforcement due to limited human and fiscal resources. Developers in the tourism sector have also continued to push for reduced regulations (Spalding et al. 2010). Although mangrove losses in El Salvador led to a complete ban on mangrove logging in 1992, illegal logging and other unauthorized uses of mangroves have continued across their range, due in large part to limited resources for law enforcement and to complex and onerous regulations that make illegality a more attractive option for many mangrove users (Gammage et al. 2002).

Vietnam is a country that exemplifies a mixed approach, whereby the legal and institutional framework pursues both protection and a level of use of mangroves. Here, the ownership of mangrove forests is primarily vested in the state, with 70% of mangroves classified as protection or special-use forest (national parks and nature reserves), and the remaining as production forest (Brunner 2010). Also, the state has granted short-term (≤50 years) and long-term (>50 years) lease agreements to households with the aim of improving community livelihoods and mangrove forest protection. The legal framework of forest tenure in Vietnam changed from state based to society based after the enactment of the Land Law of 1993, which stipulates that land is the property of the Vietnamese people. The state therefore allocates land to organizations, households and individuals for sustainable and long-term uses. The rights enjoyed by resource users include use, transfer, rent, inheritance and mortgage (Do and Iyer 2003). On 22 January 2015, the Vietnamese Prime Minister issued Decision No. 120/QD-TT to approve the plan on coastal forest protection and development in response to climate change during the period 2015–20. The plan targets expanding the coastal forest coverage to 19.5% by 2020 from the current 16.9%, and to grow an additional 46.058 ha of forests to have a total coastal forest area of 356.753 ha Vietnam law and legal forum magazine 2015). In light of this decision, a new Coastal Forest Policy has been developed and now awaits ratification.

While Indonesia currently pursues a legal framework that primarily promotes mangrove protection and nonconsumptive use (such as ecotourism), two categories of lease permits for mangrove exploitation have been issued over the past couple of decades by central and local governments. The central government has issued 30-year lease permits for mangrove forests greater than 100 ha, while the provincial government granted two-year lease permits for areas less than or equal to 100 ha. The shift of leasing responsibility for major mangrove forests (area greater than 100 ha) from the provincial to the central government was aimed at stimulating and facilitating foreign investment in mangrove resources(Kusmana 2012).

Very few countries pursue policies and statutes that explicitly advocate for multiple use as a pathway toward sustainable mangrove management. Mexico, the only country in this review with formal regulations that are specifically designed for mangroves, pursues the principle of sustainable use in respect of mangrove management. See Box 2 for a description of Mexico's regulations. The two regulations that are targeted at mangrove management, the Norma Official Mexicana (use and restoration) and the Wildlife Law (mangrove protection), both advocate for economic benefits and environmental protection. In the Philippines, government and individual families, communities and corporations entered a production-sharing contract in 1990 for the management of plantation areas previously established under the short-term contract reforestation program, on a 25-plus-25-year

Commented [A15]: What about information from CIFOR's Indonesia mangrove study? That it was local leaders that took initiative, working with the government and universities to address mangrove protection and reforestation….

Commented [A16]: What's the theme that ties all this together??
Level of protection---from strict protection, through mixed, to multiple use/functionality

tenure basis. Under this Forest Land Management Agreement (FLMA), the contract holders were entitled to harvest, process, utilize or sell the wood and other commodities produced from the plantation in exchange for protecting, maintaining and managing the forest (Primavera and Esteban 2008). In 1993, the Department of Environment and Natural Resources (DENR)combined a three-year mangrove reforestation contract and 25-year Forest Land Management Agreement into a new 25-year FLMA of up to 1–10 ha for families and 10–1,000 ha for communities (Primavera et al. 2013). Similarly, the Bangladesh Forest Department (BFD), through its local forest offices allocates operational-level rights through issuing permits to forest-dependent communities (Kumer et al. 2013). However, only about half of the forest-dependent communities are licensed, authorized users. The excluded half enter the forest illegally by paying bribes to BFD staff, which is unavoidable due to their high dependency on forests for their livelihoods (Kumer et al. 2013).

Box 2. Mexico: Mangrove-specific law and policy

Mangrove forests in Mexico are under the authority of the Ministry of Environment and Natural Resources (SEMARNAT) as well as the National Forestry Council (CONAFOR). The General Law for Ecological Equilibrium and Environmental Protection (LGEEPA) regulates access to natural resources and their use. It defines regulatory instruments based on the principle of sustainable use, which comprises the joint pursuit of economic benefits and ecosystem preservation (Fraga and Jesus 2008). This law lays the basis for two regulations that are focused specifically on mangroves. The first is the *Norma Official Mexicana* (NOM-022-SEMARNAT-2003), which establishes guidelines for the preservation, conservation, sustainable use and restoration of coastal wetlands in mangrove areas (Ruiz-Luna et al. 2008). The second is federal legislation under the Wildlife Law, which requires mangrove protection and preservation rather than extraction (Ruiz-Luna et al. 2008).

This section shows that globally, the authority for mangrove conservation and management is overwhelmingly and uniformly vested in state institutions. Moreover, *protection* is the primary pathway through which conservation management is intended to be achieved, either through formal integration into the protected area system defined by the IUCN or through other international obligations such as the 1971 Ramsar[1] Convention on Wetlands conservation. However, some countries in Latin America, Asia and Africa appear to adopt a more integrated approach, where the portfolio of activities goes beyond protection to include allowing a level of consumptive use such as timber logging through the issuance of licenses and permits to users. Lease agreements is another instrument used by states for the management and utilization of mangrove forests. Attempts at providing communities with incentives for investing in resource management, such as long-term leases and permits or formal co-management agreements suggest that mangrove conservation and

Commented [A17]: Which year was Ramsar?
1971

1 The Ramsar Convention is an international treaty for the conservation and sustainable use of wetlands. It is the oldest multilateral international conservation convention, signed in 1971, and the only one to deal with one habitat or ecosystem type, wetlands. The Convention's mission is the conservation and wise use of all wetlands through local and national actions and international cooperation, as a contribution toward achieving sustainable development throughout the world. The Convention has 169 Contracting Parties. Wetlands included in the Ramsar List are recognized as being of significant value, not only for the country or the countries in which they are located, but for humanity as a whole.

management is transitioning from strict protection by line agencies toward greater inclusion of communities.

Even though state agencies are vested with extensive management authority, the configuration of authority among agencies is diverse. In some cases, authority is vested in single agencies, such as national forestry agencies, which have jurisdiction across all forests nationwide. When authority is vested in a single agency, it is mostly in a forestry agency. In other cases, authority is split between multiple national agencies, which includes forestry alongside other related non-forestry agencies such as wildlife, fisheries and environment. In very few cases does the legal framework explicitly provide for a mechanism for coordinating across multiple agencies and stakeholders. Such efforts are underway with Vietnam's drafted Coastal Forests Policy and Indonesia's National Strategy on Mangrove Ecosystem Management, which was recently authorized by Presidential Regulation 73/2012.

This fragmentation of authority across agencies is unsurprising given the ambiguous nature of mangroves. What is unexpected is the general paucity of mangrove-specific policies and the lack of legally mandated coordination mechanisms. It is clear that law and policy recognize the central role of forestry agencies in mangrove management. There is no case where forest agencies are excluded. All single-agency models are comprised mostly of forestry agencies and some environmental agencies that draw on forest codes and legislation. In the case of multiple agencies, forestry is one among them, and often has an overriding/dominant role. With the exception of Mexico, most countries do not have specific laws for mangroves.

The evolution of these legal and policy configurations requires further exploration as does their relative performance. The growing recognition of the ecological and socioeconomic values of wetlands (including mangroves) – which were previously viewed as wastelands – also led to increased conservation and management efforts globally for ecological, social and economic benefits. However, there are different turning points in the three continents of Asia, Africa and Latin America that have probably motivated a search for better approaches for mangrove management. In Asia, the 2004 tsunami led to prioritization of mangrove restoration by most national governments in an effort to protect their coastal areas from future storms and natural hazards. Regular typhoons (especially in Vietnam) and their changing timing and intensity which resulted in disasters, also motivated changes in the management of mangroves. The governments partnered with community members and nongovernmental organizations – most notably IUCN's Mangroves for the Future – for restoration and better management of coastal mangroves. In Africa, the paradigm shift in the early 1990s from state-controlled forestry to community involvement in forest management proved a major boost for community-based mangrove management. This shift toward community inclusion in management was necessitated by the failure of state-centric management systems and the continued loss of mangrove forests associated with them. In Latin America, civil unrest contributed to the change in the management regimes in Brazil and Mexico. In Mexico, the Mexican Revolution in the second decade of the 20th century led to the implementation of land reforms that allowed communities to exercise greater autonomy over mangrove resources. Brazil's forest communities' uprising in the late 1980s in a bid to gain legal recognition of territorial rights led to their inclusion in the co-management of natural resources under the provisions for *reservas extrativista* (RESEX), thereby reducing conflicts between the state and forest communities.

Commented [A18]: Are there no cases where mangroves fall under a non-Forestry jurisdiction?
Non forestry agencies added

Commented [A19]: Are there any attempts to do so? Indonesia?
Yes—have added

Commented [A20]: This whole para could probably be more nuanced given the experience in Bangladesh, and the role of Min of Environment or Wildlife Conservation Departments?

Commented [A21]: The analysis in this para is very interesting. It may be useful to put this up near top of this section to set the scene. In Asia, it is probably not only tsunamis but also regular typhoons (and their changing timing and intensity) leading to disasters that has motivated change. In Vietnam that is the case. Philippines has a fairly long history of work on mangroves (under DENR) from the 1990s.
Paragraph retained at end because it didn't quite fit into the front material as it is hypothetical.

3. MANGROVE GOVERNANCE AND TENURE IN PRACTICE

In this section, we consider the ways in which conservation and sustainable management of mangrove forests play out in reality. We start the section by considering the actual implementation of legal and institutional frameworks and provide examples of the main challenges and opportunities for implementing laws and policies relevant for mangrove governance. The section also reviews local-level governance and tenure arrangements.

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3.1 Fragmented authority and overlapping jurisdictions

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Unlike other resources, and despite their ecological uniqueness and socioeconomic importance, few countries have passed laws that are specifically designed for the management of mangrove forests. Instead, mangroves are considered under the legal frameworks for forests, environment, wildlife, water, land and fisheries. This results not only in fragmentation of authority and in ambiguities, but also in conflict and competition during implementation (Feka 2015). Multistakeholder consultations and cross-sectoral coordination appear to not be widely practiced in mangrove conservation management.

Commented [A24]: But if as you indicate earlier, its primarily the forestry ministry/dept that has the mandate – how does the issue of fragmentation come into play? Is the issue one of fragmentation of responsibilities, or one of lack of multi-sectoral integration across ministries?

Mangroves jurisdiction in Vietnam falls under two ministries: the Ministry of Agriculture and Rural Development (MARD), and the Ministry of Natural Resources and Environment (MONRE). MARD is in charge of the management of forests, terrestrial and marine protected areas, capture fisheries, aquaculture, sea dikes, storm and flood control (Swan 2009), while MONRE is responsible for coastal planning, land allocation, biodiversity conservation, aquatic ecosystem management and protection, and climate change. The overlapping jurisdiction and weak collaboration between these two ministries has created confusion for stakeholders and uncertainty in mangrove management. The mangrove-rich Xuan Thuy National Park (XTNP) in northern Vietnam is a clear indication of failed coordination between agencies, as it falls between the jurisdiction of MARD and MONRE and is currently not supervised or supported by either ministry(Hawkins et al. 2010).

Commented [A25]: Any examples of where this specifically happens? In managing mangroves? Or in conservation in coastal environments?
XTNP—as indicated

In Bangladesh, policies relevant to the management of coastal forests include the Forest Policy (1994), Environment Policy (1992) and Coastal Area Policy (2005). The Forest Department is mainly responsible for policy implementation. Other institutions involved in mangrove management are the Local Government Engineering Department (LGED), the Water Development Board (WDB) and NGOs operating in the region. The Forest Policy emphasizes the establishment of plantations on all newly accreted lands in the coastal areas, whereas the Coastal Area Policy (2005) is committed to sustainable development in the coastal region. The latter directly supports the establishment of coastal plantations and the conservation of existing coastal forests and habitats (Islam 2006).

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Moved from the legal framework section as per comment. Theme-multiple agency management

In the Philippines, regulation of mangrove forest lands has historically fallen under the legal jurisdiction of both the Department of Environment and Natural Resources, whose mandate was to protect and sustainably manage these forests, and the Department of Agriculture, whose mandate was to promote brackish water aquaculture development in these same areas (Walters 2003). These government agencies, which are responsible for mangroves and for the administration of brackish waters, have shown a lack of coordination. This was evident in a case where the Department of Agriculture had earlier issued Fishpond Lease Agreements for mangroves around Cogtong Bay, Bohol Province. The Department of Environment and Natural Resources, however, later refused to grant cutting permits in order to save the well-developed mangroves from pond development (Primavera 2000). Decisions on mangrove use can therefore be made concurrently by the two departments, which often have differing priorities, leading to conflicts. Similar problems have been documented in Ecuador, India, Thailand, Indonesia, Sri Lanka and Brazil (Walters et al. 2008). There are also conflicts between the oil and gas industry and the fisheries sector in the Mahakam Delta in Indonesia, and between coastal communities and the oil and gas industry in the Niger Delta in Nigeria (Mmom and Arokoyu 2010; Powell and Osbeck 2010). In Nigeria, the effectiveness of policies and laws for mangrove management has been hindered by weak enforcement, alleged mismanagement within the Federal Environmental Protection Agency (FEPA), and a strong influence of the petroleum industry on government (Ayanlade and Proske 2015). In the absence of shared understanding and agreements regarding mangrove use and management, clarity of government rules and regulations, and effective means of enforcement and dispute resolution, conflict will continue to undermine the conservation and sustainable use of mangrove forests given the multiple uses, users and interests.

Efforts at coordinating across sectors are on the rise and take several forms. In Indonesia, the president authorized a national strategy for mangrove ecosystem management, which includes committees at national and subnational levels that are charged with ensuring coordination across the five authorities that have responsibility for mangroves management. This has not been implemented during its four years of existence due to lack of budgets, personnel and an overall reluctance to collaborate. Tanzania's expired mangrove management plan of 1991 also spoke to improved coordination between sectors, especially forestry and marine and fisheries. This plan was not implemented for the same reasons as those given for Indonesia. The most recent effort is the Government of Sri Lanka's comprehensive five-year plan to protect and rehabilitate its mangrove forests, initiated in 2015. The plan aims to protect 8815 ha and rehabilitate 3885 ha of degraded mangrove forests by providing socioeconomic benefits in the form of alternative job training opportunities and microloans to 15,000 women. This program is conducted in partnership with two NGOs – one local and one international (IUCN 2014).

3.2 Local mangrove governance and tenure

Most indigenous coastal communities worldwide hold customary/traditional rights to mangrove forests and related resources, which they have exercised over extended periods of time. These customary rules are embedded within social structures and often evolve with them. However, as we have seen in previous sections, statutory control of mangroves is just as widespread, with governments exerting their authority through state-sanctioned agencies. Failure to recognize customary practices by the governing state is a source of tension between coastal communities and formal institutions (Van Lavieren et al. 2012). Over the past two decades, there has been a tendency

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Commented [A29]: Might be good to start with this 2015 plan – it's the first government in the world to develop a national mangrove protection policy in this way.. and particularly one that focuses on role of women … its lost in this para.
Moved from the legal framework section

Commented [A30]: Anything to say on why communities engage in community-based management? What specifically motivates them?
Improved livelihoods
Equity in benefit sharing

by central states to devolve rights and the management of terrestrial forests to lower levels of governance, including local communities. Whereas some states have recognized customary systems in this process and devolved some authority to them, others have created new administrative authorities that have superseded customary authority. While devolution has been more prominent in terrestrial forestry settings, there is increased experimentation in mangrove management, where various kinds and ranges of rights have been granted to lower-level entities, including households and communities.

Mangrove forests were traditionally owned by communities in Nigeria. Today, all land is legally vested in the state government, although individuals and communities continue to use the land. The federal government also owns all mineral rights. This has caused anger and spurred communities to protest in oil producing areas because the industrial exploitation does not benefit such communities. Instead, it contributes to the impoverishment of agricultural soils on which the communities depend for their livelihoods (Abere and Ekeke n.d.). Traditional resource conservation practices are, however, still applied in the Niger Delta of Nigeria, as certain portions of the mangrove forest and its fauna are designated as sacred and their extraction prohibited. Periodic or seasonal harvesting of these mangrove resources is practiced in some communities, where picking of periwinkle and other seafood are restricted to specified seasons or days in the week. Other customary rules include the prohibition of logging premature mangrove trees and strict sanctions that include fines, seizure of property and punishment by the gods, and to the excommunication of repeat defaulters (Mmom and Arokoyu 2010). Similarly, communities in Ghana have organizational structures, traditional authorities and family elders, that are in charge of decision-making and control of the mangroves. Most lands are held in trust by them for the communities' members or families. With decentralization in 1992, district assemblies and unit committees were established as key parts of a formally devolved political structure. These formal administrative structures greatly diminished the powers of the traditional institutions, resulting in competing claims of ownership and authority over mangrove resources (Agyeman et al., 2007.). In the Solomon Islands, about 90% of land and marine areas are owned and used by local family groups or clans/tribes through inheritance (Aswani et al. 2007). Like in Ghana, prior permission from the tribal chiefs is required for access and use of mangrove resources (Warren-Rhodes et al. 2011). Long-term mangrove loss in Fiji has been associated with the mismatch between the mangrove ecosystem and the property rights regime whereby traditional clans (*mataqali*) have communal claims over physical resources and the environment, including mangroves; however, the government has declared these rights as temporary, thereby limiting the amount of compensation paid for losses to mangrove access (Lal 2002).

Commented [A31]: Again, better to build up a narrative/analysis and then provide information from countries to illustrate this. Otherwise, continues the list-like tenor of things.
The narrative is in the previous paragraph

Commented [A32]: Under Forest Law?
Under customary laws

Commented [A33]: It would be good if some of these insights could be added to the Introduction section.

At the other end of the spectrum, there are situations where governments have formally recognized local claims and gone to the extent of granting full, documented ownership. These cases are associated with better mangrove management outcomes, including less conflict among stakeholders. For example, local stakeholders in Ecuador have clear, legal title to mangroves. Here, more than 40 mangrove concessions covering nearly 40,000 ha are proving effective in curbing deforestation, sustaining increased seafood yields, improving livelihoods, empowering concession holders, and reducing conflicts with the large-scale shrimp industry (Lugo et al. 2014). In Brazil, the establishment of large extractive reserves in mangrove forests offers an alternative management approach to strict protected areas that generally exclude local inhabitants. In the extractive reserves, control and ownership of natural resources is conferred to local communities, which regulate access

to and the harvesting of timber and fishing resources. Saint Paul (2006) finds that many of these extractive reserves are more effective at protecting the area and resources of mangrove and other forests than are reserves managed by the Federal Government of Brazil. Local resource users assume the duty of resource management such as monitoring, excluding outsiders from resource access and designing local resource management rules (Glaser and Oliveira 2004).

In between unrecognized customary institutions and full, titled community ownership are leases of various kinds to households, communities and corporations, as well as joint state–community management of mangroves. Under Vietnam's Decision 51, also known as the 7:3 Policy, individuals and households enter into long-term contracts with Forest Protection and Management Boards for forest use and protection (Hawkins et al. 2010). Under the agreement, landholders are required to maintain 70% of the contracted land under forest cover, while the remaining 30% of the land and surface water can be utilized for agriculture, aquaculture and other income-generating activities. The 7:3 Policy is applicable for mangrove and terrestrial forests, and has special provisions that apply in mangrove areas. In the Kien Gang Province of Vietnam, 490 households (or 52.5% of the 932 eligible households) have already participated for five years since Decision 51 was passed and there has been generally strong support for the policy from Forest Protection Management Boards, local authorities and local communities. Most households that participated in the program expanded aquaculture and are now earning increased income from shrimp, blood shell culture and fish farming. At the same time, forest cover has increased by 20%, according to the An Minh-An Bien Forest Protection Management Board (Hawkins et al. 2010). Similar leases, Fishpond Lease Agreements (FLAs), from the central government for public lands are evident in the Philippines. The DENR has jurisdiction over all forest lands; it classifies mangrove areas as suitable for fishpond development and releases the list to the Bureau of Fisheries and Aquatic Resources (BFAR), which manages the leasing program. The duration of each FLA has evolved over time since 1932 and currently the maximum FLA area stands at 50 ha for corporations, cooperatives, and individual persons, with a 10-year duration. These may be re-assigned or transferred under specified conditions, but cannot be used as collateral for loans (Primavera et al. 2013).

The Community Based Mangrove Management (CBMM) program has been used as an effective tool in the rehabilitation of degraded mangrove forests. From the 1980s to the present, mangrove restoration has been one of the key objectives of the central government of the Philippines; mangrove replanting has been popular in the Philippines, mostly in collaboration with coastal communities. After the 2004 tsunami disaster in Asia, efforts were launched in most affected countries to restore mangroves in the areas where they were destroyed (Abdullah et al. 2014). The Philippine's co-management program, the Community-based Mangrove Rehabilitation Program (CMRP), which commenced in 2009, was established with the aid of international development assistance from entities such as the Zoological Society of London. CMRP aimed to re-establish legally mandated mangrove green belts along the Philippines coast and rehabilitate abandoned government Fishpond Lease Agreement (FLA) ponds in Panay Island, central Philippines. This was in line with several legal provisions, including: a) the Department of Environment (DENR) Administrative Order 15 of 1990, DA-DENR Memo; and b) Order 3 of 1991, and Rep. Act 8550, which provides for the cancellation by the Fisheries Bureau (BFAR) of abandoned, underutilized, and unutilized ponds, and their reversion to the Forestry Bureau of the DENR for mangrove rehabilitation (Primavera et al. 2011).

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Added

Commented [A35]: There's a lot more to say about the interesting Philippines experience – especially about jurisdictional battles between DENR and BFAR over rehabilitation of abandoned fishponds- *Literature added*
. Primavera 2014 publication goes into the whole tenure mapping issue in detail…. Since we're talking about tenure here in this global review – this is important to highlight. It's an extremely detailed tenure mapping exercise they undertook. In addition, Primavera has advocated reconstructing oral histories of mangrove ecologies through interviews with elders so that monocultures are not promoted.
Tenure arrangements added

Post-tsunami Thailand and Indonesia were the most successful nations in the implementation of mangrove rehabilitation programs through CBMM (Brown et al. 2014). Many coastal communities initiated CBMM programs voluntarily with various forms of support, such as appropriate technologies, from NGOs, research organizations and belatedly, the government. Similar community-based programs in India, Pakistan, the Philippines, Vietnam, Tanzania and South Africa achieved moderate-to-low levels of success, as rehabilitation programs in most of these countries were top-down, initiated primarily by the central government (Abdullah et al. 2014). Past failings of state management have prompted many communities to initiate local collective action for mangrove conservation. A study in Trang Province, southern Thailand, shows successful mangrove conservation and management by two coastal villages. The communities have crafted and maintained well-defined institutions for forest management, resulting in a superior stand structure in the community-managed mangrove forests compared with that in the open-access state forest (Sudtongkong and Webb 2008). In Senegal, where the world's largest mangrove rehabilitation project can be found, several organizations are working with the local communities to restore and conserve mangrove forests (see Box 3 for a description of this program).

Box 3. Senegal community involvement in mangrove restoration

In Senegal, Waamé (a Senegalese NGO) and its Belgian counterpart Development Agency of Gembloux (ADG), in collaboration with the local communities and under the supervision of the Senegalese National Parks Authority, launched a wide-ranging biodiversity conservation project in the Saloum delta in 2001 targeting 35 villages over three years (European Union 2001).

About 350 local villages and 200,000 people in local communities in Senegal have been mobilized to restore mangroves by an NGO (Oceanium); these groups are comprised of professionals and volunteers in Senegal and in neighboring countries such as Gambia and Burkina-Faso. With initial support from Danone, and subsequently from the Livelihoods Fund, Oceanium started replanting mangroves in 2008 over a surface area of 173 ha. It is the world's largest mangrove reforestation project and currently the replantation area stands at 10,000 ha with 79 million mangroves already replanted (*Livelihoods 2016*).

Community-based management of mangrove resources does not always result in improved conditions of mangrove forests. There have been several barriers to the expansion of community-based arrangements. This is well exhibited in Kisakasaka village, Zanzibar, which was selected as a site for a community-based management pilot project of forest resources in Zanzibar. There was initial success in setting up a local management structure and regulation of access to the mangrove for charcoal production. The management plan and associated by-laws were later revoked by the state after the initial five-year pilot period (1996–2001) and the local conservation committee was disbanded with the formation of a new one, as it was believed that it was not fulfilling its responsibility and upholding its commitments within the institutional arrangements (Saunders et al. 2008). This resulted in a dramatic deterioration of the forest conditions due to institutional problems in the form of inadequate formal powers by the new committee to issue permits, collect revenue, and undertake formal enforcement. Unregulated use of forest resources ultimately led to a

less productive forest with lower resource values. Contextual factors such as urban population increase and market pressure for charcoal, coupled with shortcomings in governance arrangements (e.g. lack of operational support by the government, abrupt withdrawal of the Community Based Natural Resources Management arrangements) contributed to mangrove degradation (Saunders et al. 2008).

In Vietnam, mangroves that are not allocated to households under the national program of forest allocation constitute about 20–30% of the mangrove cover and remain under the management of commune people's committees (CPCs) (MARD 2008; McNally et al. 2010). The CPCs typically lack the resources and expertise to exercise effective management, and consequently, mangroves under their control inevitably become *de facto* open access and subject to degradation (Hawkins et al. 2010). However, because communities are not legal entities under Vietnamese law, they cannot enter into legally binding contracts with end users (Hawkins et al. 2010), and the areas under CPC control cannot be transferred to community groups. In other settings such as Thailand and Cambodia, a major barrier to expansion of community-based mangrove forest conservation, management and rehabilitation is lack of access to suitable sites. Nearly all abandoned shrimp ponds in Thailand have either been planted out by the Department of Marine and Coastal Resources, or are under private ownership or the land is under dispute because of illegal occupation (Quarto 2013). In the Philippines, abandoned fish and shrimp pond lands are held under leases, while restoration on privately owned land requires purchasing the land, which is expensive. Furthermore, although the Department of Environment (DENR) gives mandate to the Fisheries Bureau (BFAR) for the cancellation of abandoned, underutilized, and unutilized ponds, and their subsequent reversion to the Forestry Bureau of the DENR for mangrove rehabilitation, in practice, very few ponds have been reverted and made available for community rehabilitation programs. This is because of the generally poor level of law enforcement in the country and lack of implementing rules. Importantly, the BFAR tends to retain the canceled leases within their area of jurisdiction by declaring them open and available to new applicants, instead of reverting them to the Forestry Bureau (Primavera et al. 2011). The Participatory Management of Coastal Resources of Cambodia project under the Ministry of the Environment could not locate any available sites for restoration in Koh Kong Province despite an eight-month search (Quarto 2013). Schönig (2014) warns that conflicts and mistrust between mangrove users and shrimp producers in the Gulf of Guayaquil, Ecuador, are likely to stall restoration efforts, as most of the restoration sites are former shrimp ponds, either abandoned or put out of use due to regularization.

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Done

This section has highlighted the confusion that results from having multiple agencies with overlapping mandates managing the same resource, often with differing priorities. It has also highlighted the particular problem of weak enforcement and a lack of coordination across relevant mangrove agencies. Local tenure rights to mangroves that determine use and management take different forms: (unrecognized) customary systems, state-recognized indigenous systems granted full ownership rights, long-duration leases that allow a broad range of rights including transfer and co-management between communities in states.

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Moved from gender section

3.3 Gender differentiation: A missing dimension in mangrove governance

Gender is an important factor in mangrove conservation, as men and women have different positions in society; they use mangroves differently and have unique perspectives about the

importance of mangroves and how they should be protected (Bosold 2012). Gender differentiation is evident along various dimensions such as how women and men value mangrove products, their rights to forests and forest products, how they harvest forest products, whether or not they take the products to market or use them for subsistence, and the extent to which they are involved in decision-making about mangroves. The factors driving gender differentiation are primarily cultural norms, which also influence gender roles and expectations. Because studies of gender and mangroves are scarce, there is very little empirical evidence from which to characterize or draw a pattern of gender differentiation with regard to mangroves. The following descriptions provide a preliminary sense of some of the dimensions of differentiation.

A study conducted in Honda Bay, Palawan, the Philippines, showed different valuation by men and women of mangrove products for their livelihoods. Women placed a higher value on the sea cucumbers, shells and invertebrates supported by mangroves in the intertidal zones, while men valued fish living in offshore reefs. Men's space tends to be perceived as more important and women's fishing needs are seen as secondary, leading to the marginalization of women and negatively affecting biodiversity conservation (Siar 2003).

Product harvesting practices by men and women differ and also affect the condition of mangrove forests. In southwest Cameroon, for example, women carry out seasonal, intensive harvesting of smaller mangrove trees over a larger working area closer to home, which contributes to mangrove ecosystem degradation. Men on the other hand carried out less frequent, small-scale and selective harvesting of larger trees further away from home (Feka et al. 2011).

Box 4. Collaborative governance: Mangroves for the Future (MFF)

Co-chaired by IUCN and UNDP, MFF provides a platform for collaboration among the many different agencies, sectors and countries that are addressing challenges to coastal ecosystem and livelihood issues. The goal is to promote an integrated ocean-wide approach to coastal management and to building the resilience of ecosystem-dependent coastal communities. MFF builds on a history of coastal management interventions before and after the 2004 Indian Ocean tsunami. It initially focused on the countries that were worst affected by the tsunami – India, Indonesia, Maldives, Seychelles, Sri Lanka and Thailand. More recently it has expanded to include Bangladesh, Cambodia, Myanmar, Pakistan and Vietnam. (MFF 2008)

A gendered division of labor was observed in the Galle-Unawatuna mangroves of Sri Lanka, where men were involved mostly in fisheries-related activities and women in edible plant collection (Satyanarayana et al. 2013). Similar differentiation has been observed in charcoal value chains, whereby cutting trees for commercial firewood and charcoal burning in the Mida Creek area in Kenya is done by men, while the actual selling of charcoal in the creek area is performed by women (Dahdouh-Guebas and Mathenge 2000). This differs from the coastal regions of Tanzania where income generated from mangrove activities was under the control and custody of males (Makalle 2012). Here, women are restricted to contact only family, kin and close family friends, particularly

Commented [A38]: What does the Kenya case indicate? Differential role along value chain?

Also, in general, do men and women see the importance of conserving mangroves differently? Or is it the case that women, with high dependencies on mangroves, tend to overuse them because of their lack of time to attend to conservation needs? *there is no evidence to support either of these hypotheses*

In Philippines, there are women-managed mangrove areas that networks such as LMMA have been promoting? Also, Gambia.. *Added to the first paragraph*

before marriage, during menstruation, before and after childbirth or following the death of the spouse. The taboos and restrictions often depress women's involvement in fisheries and result in women (married or widowed) being restricted to marginal activities such as seaweed farming (Makalle 2012).

Mangroves for the Future (Box 4) is a unique partner-led initiative to promote investment in coastal ecosystem conservation for sustainable development. The Mangroves for the Future (MFF) Secretariat, recognizing the importance of gender equality and its critical role in achieving the objectives of MFF, developed a strategic framework for gender integration into its programs in its eight countries of operation: India, Indonesia, Maldives, Pakistan, Seychelles, Sri Lanka, Thailand and Vietnam. The framework aimed at institutionalizing gender equality into MFF programming through planning, budgeting, reporting and monitoring, and ensuring gender equality is integrated in the implementation of all MFF activities (MFF 2012). In the PhangNga Bay in Thailand, MFFs gender equality programming found that initiatives that actively sought equal participation of men and women in the rehabilitation and protection of coastal mangroves resulted in increasing the capability of women to voice their concerns. In particular, women leaders were more willing and able to discuss conflicts and problems affecting their communities MFF 2012). In the Hinatuan Bay, southern Philippines, there are women-managed mangrove areas where women's community groups have been formed to address pressing issues facing coastal resources, which are their primary source of income. The issues addressed by these women-only groups include mangrove deforestation, illegal fishing methods and gears, and siltation of sea grass beds from limestone quarrying (Locally-Managed Marine Area Network n.d.). In Indonesia, there have been recent efforts to incorporate gender analyses and gender sensitization in community projects, including the formation of Womangrove groups to ensure the equal involvement of women in the process of mangrove rehabilitation and management (Brown et al. 2014). This is similar to Tanzania, where a recently launched community mangrove rehabilitation initiative has been formed to empower women through increasing their incomes from and their decision-making roles in mangrove management.

In sum, this section demonstrates that the reality and practice of mangrove conservation management is beset with numerous challenges that the legal and institutional framework fails to fully anticipate when it comes to gender dimensions of mangrove management. There is evidence of gender differentiation in the use and management of mangrove resources including the distribution of benefits from the harvesting of mangrove-related benefits between men and women. It is unclear the extent to which legal frameworks mandate attention to gender differentials or even how actual practices play out on the ground given the paucity of gender analysis in mangrove studies. What is clear, though, is that there are significant gender differentials, some of which are rooted in and affected by cultural norms and taboos.

Commented [A39]: So the gender dimensions are affected by cultural practices and norms..?
Yes

Commented [WB40]: Cite *https://www.mangrovesforthefuture.org* using the Author Year system in Box 4 and move the URL to the References, giving full publication and authorship details there.

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4. MANGROVE GOVERNANCE: EMERGING LESSONS FOR POLICY AND PRACTICE

At the global level, there appears to be a predominance of direct state authority in the management of mangrove forests. State management is, however, constrained by a lack of resources and capacities, which has resulted in inadequate implementation, poor resource control and monitoring, and illegal harvesting. Moreover, no one piece of legislation focuses solely on mangrove management. Consequently, because mangroves occur both on land and in the sea, depending on tidal levels, different pieces of legislation apply and multiple implementing agencies hold relevant mandates. When management mandates are split across agencies, cases of overlapping jurisdictions and policies are likely to occur, as these agencies have different priorities. This often impedes effective management. This legislative fragmentation also results in confusion and conflict, pitting conservation and sustainable use goals against pressures to convert to other more profitable land uses. Attempts at coordination, whether through special legislation that mandates specialized structures or through targeted management planning, appears to be difficult to implement. Importantly, mangrove management is facing a major dilemma regarding the most appropriate model i.e. single-agency vs multiple implementing agencies. The single-agency model invariably attempts to apply policies and structures designed for terrestrial forest systems in mangrove systems, which are qualitatively different. On the other hand, the multiple agency model, which faces severe coordination challenges and jurisdictional conflict, is probably more reflective of the nature of mangroves. Greater attention and more resources need to be devoted to understanding the root cause of coordination failures and designing structures, mechanisms and incentives aimed at strengthening collaboration and coordination. An alternative approach would be to explore stakeholder interest in supporting a specific, mangrove-focused policy for implementation by a dedicated mangroves agency.

In certain instances, states have experimented with community-based programs, sharing management responsibility and benefits with communities under different terms and conditions. In some cases, control/full rights have been transferred to communities for long time periods, while in other cases leases of longer term duration that allow for rights transfer are under implementation. These arrangements appear to better enable conservation and sustainable use, checking illegal harvesting and supporting better cover and stand structure. Community involvement in joint management programs has also resulted in higher rates of success in mangrove rehabilitation and restoration, especially in Asia. The involvement of conservation NGOs and research organizations has provided support to communities through the development of appropriate technologies. It appears that where communities are accorded a greater degree of management and control (including transfer or even alienation rights), they have often invested in creating institutions and structures that monitor, sanction and distribute benefits and burdens. When communities exercise a wider array of use and management rights, they also take on the responsibility of meeting the variety of regulatory and permitting requirements mandated by different agencies. In effect, they

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Commented [A43]: Is it that where mangrove conservation approaches have been set out in law/policy, their results are weak? Or is it all degradation is related to state authority? Drivers such as illegal conversion, aquaculture etc all come under this umbrella? Please be more specific.

Commented [A44]: Or

Commented [A45]: Are you saying that overall devolution processes within forestry sector have only recently been implemented in mangrove areas? Or rather, mangroves have been retained under a state-centric regime despite devolution in terrestrial forests? Or is it that mangroves just aren't important to Forestry agencies and therefore don't receive adequate implementation resources?

take up the inter-agency coordination function that officials located at higher levels find difficult to achieve. Securing permits from various agencies to sanction single projects is a routine function of local governments everywhere. Where communities, or their local governments, take on the responsibility of securing permits, the difficulties of direct coordination among agencies is mitigated. The transition to community-based management of mangroves also provides opportunities for recognizing and integrating customary/traditional management systems. Customary systems have proven effective in regulating mangrove use, sanctioning infractions and promoting resource conservation. However, they have been challenged by the prevalence of state management.

Generally, the literature on mangrove forest management is scarce compared with that on terrestrial forests. From this review, it is evident that the majority of studies have been carried out in Asia, especially after the 2004 tsunami; fewer studies have been conducted in Latin America, Africa (especially West Africa) and Oceania. While the available literature flags some key issues in the governance of coastal mangroves, it generates even more questions relating to gender, the distribution of benefits and burdens, and subsequent impacts on resources and livelihoods, cross-level governance and local tenure rights.

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ANNEXES

Annex 1. Methodology

The review was conducted from November 2015 to February 2016. Peer-reviewed articles from academic journals and professional publications were supplemented by gray literature from specialized sources (including websites of specialized agencies such as FAO, IUCN and mangroves-focused websites). The online databases Science Direct, Google Scholar and Web of Science were used for the searches. The Directory of Open Access Journals (DOAJ) also provided some useful literature. Relevant literature on mangroves from the year 2000 to 2016 was retrieved in order to capture findings that spanned different time periods in resource governance innovations and paradigms, i.e. changes from strict protectionist, state-centric approaches to more decentralized approaches including those that focus on community inclusion. Searches were conducted using the following keywords: 'mangrove and tenure,' 'mangrove and governance,' 'mangrove and management,' 'mangrove and gender,' 'mangrove and climate change,' 'mangrove and restoration' and 'mangrove and rehabilitation.' In total, eight themes were covered, although some of the articles cut across several themes. The review was limited to materials written in the English language. After reading through the abstracts of retrieved articles and determining their relevance, each article was reviewed for insights and relevance to each of the respective themes. Additional literature was obtained from the articles' reference sections during the review. A total of 111 articles were reviewed, which covered studies from Asia, Africa, North and Central America, Oceania and South America, as summarized in the table below.

Theme		Country list																			
	General	Philippines	Vietnam	Indonesia	Cambodia	Thailand	Pakistan	India	Bangladesh	Cameroon	Tanzania	Kenya	Ghana	Mozambique	Nigeria	Brazil	Mexico	El-salvador	Solomon islands	Australia	TOTAL
Management	8	1	2			1	1				1	3	1		2	2	1			1	24
Governance				1	1			1	3		1			1							8
Tenure			1	3												1	2	1	1	1	10
Climate change	5		2	2				1	1	1	1	2		1							16
Rehabilitation		4	1	3				1							1						10
Restoration		1				3						1									5
Gender	3	4								1											8
Overlapping	11	2	5	2				4	2		4										30
TOTAL	19	11	9	11	1	4	1	7	6	2	6	3	1	2	3	3	3	1	1	2	
																					111

Commented [A46]: Countries arranged according to continent i.e Asia, Africa, Latin America, Australia

Annex 2. Framework for design and implementation of governance dimensions in coastal mangrove projects

PILLARS								
(A) Governance of tenure and rights	*Users/purpose (disaggregated across many lines e.g. age, wealth, migration status etc.)*		*Rights among actors (formal and informal)*		*Authorities assigning rights*		*Conflict resolution*	
	Men	*Species*						
	Women	*Spp*						
	Men and women	*Spp*						
(B) Collaborative governance	*Management and conservation actors*		*Actors' partnership/Coordination? How?*		*Links between actors and with the outside world*		*Conservation and management constraints*	
(C) Basic outcomes	*Cover and diversity of mangrove forests*		*Fisheries*	*Livelihoods*	*Awareness of rules and institutions*	*Tenure security*	*Stakeholder interaction platform*	*Rehabilitation efforts*

This literature review provides a general picture of the legal and governance frameworks that relate to the use and management of mangrove forests globally. It highlights challenges typically encountered in the governance and tenure dimensions of mangrove forest management. This review is part of a study that includes selected case studies in Indonesia and Tanzania.

Most of the research on mangroves has traditionally focused on the biophysical aspects of mangrove management such as carbon sequestration measurements, mangrove tree species differentiation and relative growth rates, biophysical factors influencing restoration/rehabilitation, physical effects on coastal erosion and biodiversity. There are also a growing number of biophysical studies on the role of mangroves in climate mitigation and adaptation. Much less research on the human dimensions of mangrove management has been done, and while there is a steadily growing literature on community-based management, the gap in governance work is clearly evident.

This review shows that authority over mangrove conservation management is overwhelmingly vested in state institutions and that protection is a central objective. The configuration of state authority in each country appears to take one of two forms. Authority may be vested in a single line agency such as the Department of Forestry, or split among two or more agencies (e.g. departments of fisheries, agriculture, wildlife). This contributes to a high level of fragmentation and jurisdictional ambiguity. Frameworks and mechanisms for coordinating across agencies and governance levels are uncommon, and where they exist, they are difficult to put into practice.

In general, laws and policies have not been crafted for the specific management requirements of mangroves. Instead, mangroves are regulated under legal frameworks intended for forests, environment, water, land or marine fisheries. Regulation and management in practice are even more complex than the legal/policy frameworks might suggest. Protection efforts face major challenges: enforcement is constrained by inadequate personnel and budgets.

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