Journal of Rural Studies 82 (2021) 184–195

Contents lists available at ScienceDirect

Journal of Rural Studies

journal homepage: www.elsevier.com/locate/jrurstud

From conversion to conservation to carbon: The changing policy discourse on mangrove governance and use in the Philippines

Andrew M. Song [a,*], Wolfram H. Dressler [b], Paula Satizábal [b], Michael Fabinyi [a]

[a] Faculty of Arts and Social Sciences, University of Technology Sydney, Ultimo, New South Wales, 2007, Australia
[b] School of Geography, University of Melbourne, Carlton, Victoria, 3053, Australia

ARTICLE INFO

Keywords:
Aquaculture
Blue economy
Climage change
Coastal governance
Framing
Small-scale fisheries

ABSTRACT

The current focus on mangroves as key ecosystems in mitigating the impacts of climate change has largely neglected the livelihoods of coastal dwellers interacting with mangroves. This article provides a review of scholarly and policy attention paid to these social groups and their means of struggle. It argues that the latest dominant governance discourse tying mangroves to blue carbon signifies a departure from catering to coastal people's interests and rights in mangroves. We describe the evolving discourses that have shaped mangrove use and conservation in the Philippines since the 1970s. While the mid-century preoccupation with mangrove conversion to fish farms gradually gave way to the pursuit of community-based mangrove conservation in the late 1980s and 1990s, recent experiences suggest a comparably weakened focus towards recognizing local access and use patterns. We contend that the present blue carbon framing of mangroves, which harbours technocratic and financialized ideals of sustainability, poses a fundamental disadvantage to local users of mangroves. We conclude by reflecting on ways to redress this trend via a new framing of mangroves.

1. Introduction

Situated in an ambiguous liminal space, mangrove ecosystems cut across oceans, coasts, land, livelihoods and modern ideals. Globally, the representation of mangroves has undergone several shifts over time informed by geography, poverty, economic and environmental management rationales across state and non-state actors (Walters et al., 2008). From backwater swamps in need of development, to effective buffers against storms surges, to biodiverse habitats for fisheries, and now blue carbon for climate change mitigation, mangroves have been represented, exploited and managed in diverse ways for centuries (Walters, 2003; López-Angarita et al., 2016; Friess et al., 2019).

The latest framing of mangroves as carbon sinks – or "blue carbon" – marks an important response to the urgency of climate change in international fora (e.g., Nellemann et al., 2009). The ability of blue carbon ecosystems to capture and store atmospheric carbon in the soil and living biomass is being recognized as a crucial, albeit significantly overlooked, aspect of climate change mitigation (Mcleod et al., 2011; Pendleton et al., 2012; Alongi et al., 2016). International organizations – the United Nations agencies and programs, the World Bank, International Union for Conservation of Nature and other large environmental non-governmental organizations (NGOs) – have provided funding, methodologies and policy guidance to enable precise and widespread incorporation of blue carbon "stocks" in national climate change mitigation plans while making them amenable to global monitoring (Thomas, 2014; Worthington et al., 2020). However, despite this appeal of mangroves as blue carbon, what is not evident in the current context of mangrove governance is any concomitant attention to local-level benefits – that is, the discourse is largely silent on fulfilling the promise of how blue carbon governance might provide "major economic and development opportunities for coastal communities around the world" (Nellemann et al., 2009, p. 7; see also Locatelli et al., 2014).

In accounting for local-level welfare in the blue carbon discourse, which also includes seagrass habitats and tidal marshes, mangroves constitute a particular area of interest because of their close connections to the livelihood and cultural needs of coastal dwellers (UNESCO, 1979; Kunstadter et al., 1986; Saenger, 1987; Kathiresan and Bingham, 2001; López-Angarita et al., 2016; Friess et al., 2019). Providing goods and services to human societies in a number of ways, from the harvesting of timber (e.g., firewood, charcoal, building material), non-timber (e.g., tannin, medicine, dye), and fishery products (e.g., fish, shellfish), to being used in aquaculture, saltworks, agriculture as well as a place of

* Corresponding author.
E-mail addresses: andrew.song@uts.edu.au (A.M. Song), wolfram.dressler@unimelb.edu.au (W.H. Dressler), paula.satizabal@gmail.com (P. Satizábal), michael.fabinyi@uts.edu.au (M. Fabinyi).

https://doi.org/10.1016/j.jrurstud.2021.01.008
Received 8 July 2020; Received in revised form 1 December 2020; Accepted 4 January 2021
Available online 16 January 2021

worship, mangrove areas have stayed as functionally valuable and culturally meaningful environments for coastal inhabitants (e.g., in the Philippines, see Jara, 1987). Thus, understanding the social relevance of blue carbon to mangrove systems, including how the changing representations of such systems can impact coastal people's struggles and wellbeing, forms an important but overlooked topic of inquiry.

The incipient representation of mangroves as a blue carbon sink is expected to increase replantation and conservation efforts. It will also likely bring about other material effects associated with the internationally driven foci on carbon stock accounting and valuation of ecosystem services (Gupta et al., 2012; Van Lavieren et al., 2012; Howard et al., 2014). While the apparent positive outcomes of blue carbon promotion have begun to be documented and lessons propagated (e.g., Locatelli et al., 2014; Wylie et al., 2016), and discussion emerging on best practices for implementation in local contexts (see Ingram et al., 2016; Thompson et al., 2017), the possibility of other impacts – in particular, any adverse consequences on people who rely on mangroves – has rarely been considered. The danger of this neglect could mean that emerging blue carbon policy discourses may work to ignore or displace existing local access to mangroves, adding pressure to coastal struggles towards securing livelihoods and tenure (see Barbesgaard, 2016; Satizábal et al., 2020; also Thomas, 2014 for a review of literature).

This paper critically examines how discursive constructions of ideas and actions towards mangroves have changed over time, starting with "conversion", "conservation", and now blue "carbon" of mangroves. Our aim is to understand the role of mangrove discourses in shaping government positions and programs that affect coastal dwellers' access to and use of mangrove ecosystems. In so doing, we highlight the potency of discursive framing by tracing the ways in which the various representations of mangroves have interacted with policies and actions to create material effects at both national and local levels.

This paper focuses on mangroves in the Philippines, where they are prominently featured in debates and policies surrounding coastal resource management. The paper reveals the historically contingent nature by which global expertise and donor support project particular constructions of mangroves, and how national policies come to mirror these by mediating the global-to-local flow of development ambitions. With the recent penetration of blue carbon ideals, the Philippine government's own policies have neglected resolving coastal tenure issues and property claims – a worrying trend that could further push coastal dwellers away from realizing livelihood benefits from mangroves and any meaningful empowerment.

Following a description of methodology, subsequent sections detail the two historical phases associated with mangrove development in the Philippines – conversion and conservation, and trace state support for each. Next, we analyse the recent representations of mangroves as blue carbon, governance objectives and policy uptake, before offering a discussion on future risks and considerations.

2. Methodology

This research draws from a review of reports and policies from bilateral and multilateral programs and organizations, government agencies, and civil society organizations as well as academic publications which include journal articles, edited books and conference proceedings. We limit the scope of the review to the second half of the 20th century onwards to focus on contemporary dynamics. Over 160 documents were collected (of which 84 were scholarly sources) as they were deemed relevant, primarily, to the issues of mangrove utilization, tenure, conversion, development and conservation in the Philippines, but also manifested in higher geographical scales such as Southeast Asia, other tropical regions and international fora. The publication dates of these English-language documents span from 1970s to 2010s, and their contents were examined for various representations of mangroves by employing a discourse analysis/critical textual analysis (van Dijk, 1993; Fairclough, 2013). We identify discourses as "(dominant) ideas, concepts and categorisations in a society that give meaning to reality and that shape the identities, interests, and preferences of individuals and groups" (Arts et al., 2010, p. 57). In terms of acting to normalize certain ideas, beliefs and social practices in varied institutional settings (Arts and Buizer, 2009), we build on the notion of *framing* where analysis can "illuminate the precise way[s] in which influence over a human consciousness is exerted by the transfer of information from one location—such as a speech, utterance, news report, or novel—to that consciousness." (Entman, 1993, p. 50). An analysis of emerging frames points to which aspects of a perceived reality deliberately gain more salience, in such a way as to promote a particular problem definition, causal interpretation, moral evaluation, and/or policy recommendation for the issue raised (Entman, 1993). The following analysis therefore focuses on what and whose frames are being prioritized, and what and who is promoted or excluded from mangrove discourses (see Brosius and Russell, 2003; Sievanen et al., 2013 for other environmentally themed studies).

3. Mangrove conversion

3.1. *"Worthless wastelands"*

Coastal dwellers in the tropics and sub-tropics, including the Philippines, have long depended on mangroves as a source of food, fuel, and construction material (Kunstadter et al., 1986; Saenger, 1987; Walters, 2003; López-Angarita et al., 2016; Friess et al., 2019). Being partially integrated with external (provincial and national) markets, coastal households have used mangrove forests and associated products for subsistence and cash income for centuries. Collection, processing and sale of fishery harvests (e.g., edible crustaceans, mollusks and sea cucumbers), timber-based items (e.g., firewood, charcoal and construction material) and non-timber products (e.g., tannin, medicine and dye as well as alcohol, wine and vinegar from the sap of nipa palm) are important activities for local mangrove users who are typically small-scale and poor (Alcala, 1982; ADB, 1992). Mangroves have provided particularly significant benefits to marginalized groups of people; and long-term users were able to adapt their ways of life to this unique socio-ecological system (Kunstadter et al., 1986; Jara, 1987; Van Lavieren et al., 2012).

Although there are examples where these benefits were "discovered" and subsequently exploited by faraway elites (e.g., the Spanish colonizers to the American continent between the 16th and 18th century on mangrove timber, see López-Angarita et al., 2016), mangroves were mostly considered marginal due to being relatively remote, often swamp-like, and uncultivable (Kunstadter et al., 1986). Between land and sea, the intertidal zone where mangroves thrive was construed as "mysterious" and even "objectionable" (Australian Conservation Foundation, 1972). Mangroves have also been conceived as "wastelands" filled with vectors of human and animal pathogens including malaria and other respiratory and digestive diseases (UNESCO, 1979; Baines, 1979).

Offering productive potential only in a cleared, reclaimed and drained state, mangroves were therefore frequently viewed as "worthless and available for the taking", targeted by colonial developers as a low-cost development option (Kunstadter et al., 1986; ADB, 1992). In 1887, for example, civil engineer Franz A. Velschow recommended the agricultural reclamation of mangroves in Fiji's delta by urging colonial developers to "take possession of these deltas at once, while they are lying entirely unregarded …" resulting in the conversion of over 2,700 ha of mangroves (Baines, 1979, p. 12). In much of the 20th century, then, the framing of mangroves as a "wasteland", "swampland" or "marginal" justified a boom in land reclamation worldwide, fuelling an extensive conversion of mangroves into fishponds and agricultural plots – a process that conspicuously played out in the Philippines, too, as we detail below (Australian Conservation Foundation, 1972; Baines, 1979; PCARRD, 1992).

3.2. Early Philippine mangrove governance – "fishpond boom" and "shrimp fever"

An archipelagic nation, the Philippines has experienced several centuries of coastal settlement, governance and resource use during the colonial (Spanish 1565–1898, American, 1898–1946) and independence period (1946–1965), Marcos' regime (1965–1986), and until present (Dressler, 2009). Once fringed by vast mangrove forests, the country has lost in excess of 70 percent of its original mangrove cover due to different forms of conversion for livelihood and commercial purposes (Walters, 2000). Different governance approaches have attempted to accelerate, arrest or mitigate such conversion, sometimes in support of coastal dwellers, sometimes against them. In line with the shifting representations of mangroves, the role of coastal dwellers also had changing meanings.

Several sources trace the origin of brackishwater pond culture in the Philippines to at least five centuries ago, but the first documented fishpond is reported to have occurred in Rizal Province in 1863 (Marte et al., 1984; SEAFDEC, 1989). By the 1920s, large-scale milkfish (*Chanos chanos*) ponds containing hundreds of hectares were already concentrated in Manila Bay, once a rich habitat of mangroves including the species locally called "nilad" (*Scyphiphora hydrophyllacea*) to which Manila owes its name (Primavera, 1995). It is estimated that about 61,000 ha of brackishwater ponds existed around Manila Bay before World War II (Bagarinao, 1999; Villamor, 2017).

With the common view that mangrove forests were convenient and readily available places to build ponds in (Bagarinao, 1999), the most prolific conversion period was the 1960–70s when the average depletion rate reached 6,685 ha/yr, and fishpond area and production figures increased from 137,200 ha to 168,100 ha and 63,100 tons to 96,500 tons between 1965 and 1970, respectively (World Bank, 1973). In the mid-1980s, the extent of brackishwater fishponds began to surpass that of mangroves in the country; and by 1993, the mangrove area converted to fishponds was at least twice the size of the remaining mangrove forest (261,402 vs. 123,400 ha) (Janssen and Padilla, 1996; Aypa and Baconguis, 2000).

Mangroves as fishpond areas became part of the broader national development agenda and poverty reduction strategies, particularly after the creation of the Bureau of Fisheries in 1947 (later, the Bureau of Fisheries and Aquatic Resources [BFAR]), which received loans worth USD23.6 million from the International Bank of Reconstruction and Development for the expansion and operation of fishponds (Primavera, 1995). Throughout the 1950s–1980s, a number of national government policies helped to keep the fishpond (mangrove) development trajectory on-course (see Fig. 1 for summary). The initial effort to classify mangrove areas was attempted as early as 1952 when Forestry Circular No. 95 instituted the zoning of mangrove areas that could be released for fishpond purposes (Saenger et al., 1983; SEAFDEC, 2004). In the 1960s, formal leasing of fishponds to private operators from the government began with the Fishpond Lease Agreement (FLA) created through Fisheries Administrative Order No. 60 of 1960 (SEAFDEC, 2004). Ramping up the effort in the 1970s was the Presidential Decree 43 of 1972 "providing for the accelerated development of the fishery industry of the Philippines" which facilitated the systematic, expeditious and large-scale transfer of public mangrove forests available for fishpond development from the Bureau of Forestry to the BFAR and the Philippines Forest Corporation for administration (World Bank, 1973; SEAFDEC, 2004). The policy bias towards the development of the pond culture industry was also evident in President Marcos' State of the Nation Address in 1976, where he laid out his vision for reclamation of wetlands and increased fish production: "By the year 1980, we should be halfway with the reclamation of 100,000 ha in the northern part of Manila Bay, part of which should be utilized for high-quality marine products in sea farming, in the fishponds that shall be allocated thereat."

Importantly, this "fishpond boom" (and later the "shrimp fever" targeting *Penaeus monodon* instead of milkfish, see Primavera, 1993) was facilitated by the support of international development organizations that included the World Bank, the Asian Development Bank, the Southeast Asian Fisheries Development Center (SEAFDEC) and International Development Research Centre (IDRC), which, with the former two institutions, aligned with Marcos' economic strategy of technocratic, export-oriented industrialization fueled by the entry of foreign capital, akin to "development from above" (Bello and Gershman, 1990, p. 39). These influential groups often explicitly marked mangroves as "swamplands available for development", with the Fisheries Statistics of the Philippines using this exact label in its official documents until 1984 (Primavera, 1995). In 1973, the World Bank made its intentions clear in its own Agricultural Sector Survey:

> Given the uncertainty as to the extent of marine resources, the clearest priority relates to improving fish farming as rapidly as possible – both the yields of existing fishponds and the development of new fishpond areas. Most of the increase in demand for fish in the next 10 years could be met by a program to *develop about half of the available swampland area* (25,000 ha a year) … Such activities have much to offer in development of lagging regions, since *large swampland areas are particularly available* in Mindanao, Samar, Bohol, and Palawan. (World Bank, 1973, italics added)

The World Bank legitimized increased farmed fish production by highlighting the projected concern of domestic food shortages and unaffordability of fish. For example, it emphasized that "Retail prices of fish have risen faster since 1960 than any other component of the retail price index of foodstuffs in Manila … More likely there will be a shortfall [of fish] and prices will continue upward", hence justifying accelerated mangrove conversion (World Bank, 1973). The BFAR, partnering with international actors such as SEAFDEC and IDRC, was similarly unequivocal in promoting pond culture expansion in mangrove areas for meeting the country's nutritional requirements from fish, while also improving the country's foreign exchange position through the export of aquaculture products (Camacho and Macalincag-Lagua, 1988). Milkfish – described as the "national fish" and a "by-word in every Filipino household" by Felix R. Gonzales, Director of BFAR at the time – was thus construed as an "ideal, cheap protein source for the masses" inspiring the sentiments of the blue revolution (Gonzales, 1975; Spurgeon, 1979). Such organizations also strongly backed the expansion of shrimp culture in the Philippines, citing the comparative advantages of the Philippines such as ideal climatic, soil, and water quality conditions, and crucially the availability of "vast areas of undeveloped mangrove swamps and estuaries in various parts of the country" (MSU-SEAFDEC-BFAR-NSDB, 1974; Camacho and Macalincag-Lagua, 1988).

Domestic and international credit institutions followed suit by offering loans towards conversion of mangroves for fishpond construction. Financial investment was futher encouraged by the Presidential Decree 704 of 1975, which made it mandatory for government-owned or controlled banks to grant loans for the development of fishponds (Gonzales, 1975). For instance, the Development Bank of the Philippines, the Central Bank, and the Philippines National Bank had released over P400 million, P240 million and the P90 million, respectively, by the mid-1980s (~USD9.7 million, USD5.8 million, USD2.2 million in 1985 terms) (SEAFDEC, 1984). Among the various aquaculture types (e.g., fingerling production, mussel and seaweed culture, as well as fishpond development, improvement and operation), fishpond construction is reported to have received the highest share of financing in terms of loan exposures (SEAFDEC, 1984). This sub-sector accounted for 92 percent of the total amount released by the Development Bank, similar to the loan records of other credit channels (SEAFDEC, 1984). International lenders have also played a part. Notably, a World Bank loan in June 1969 for distribution through the Rural Bank (supervised by the Central Bank of the Philippines) included USD1.9 million for fishpond construction (World Bank, 1973). In the research sector, the Canada-based IDRC provided a 6-year research grant totalling over

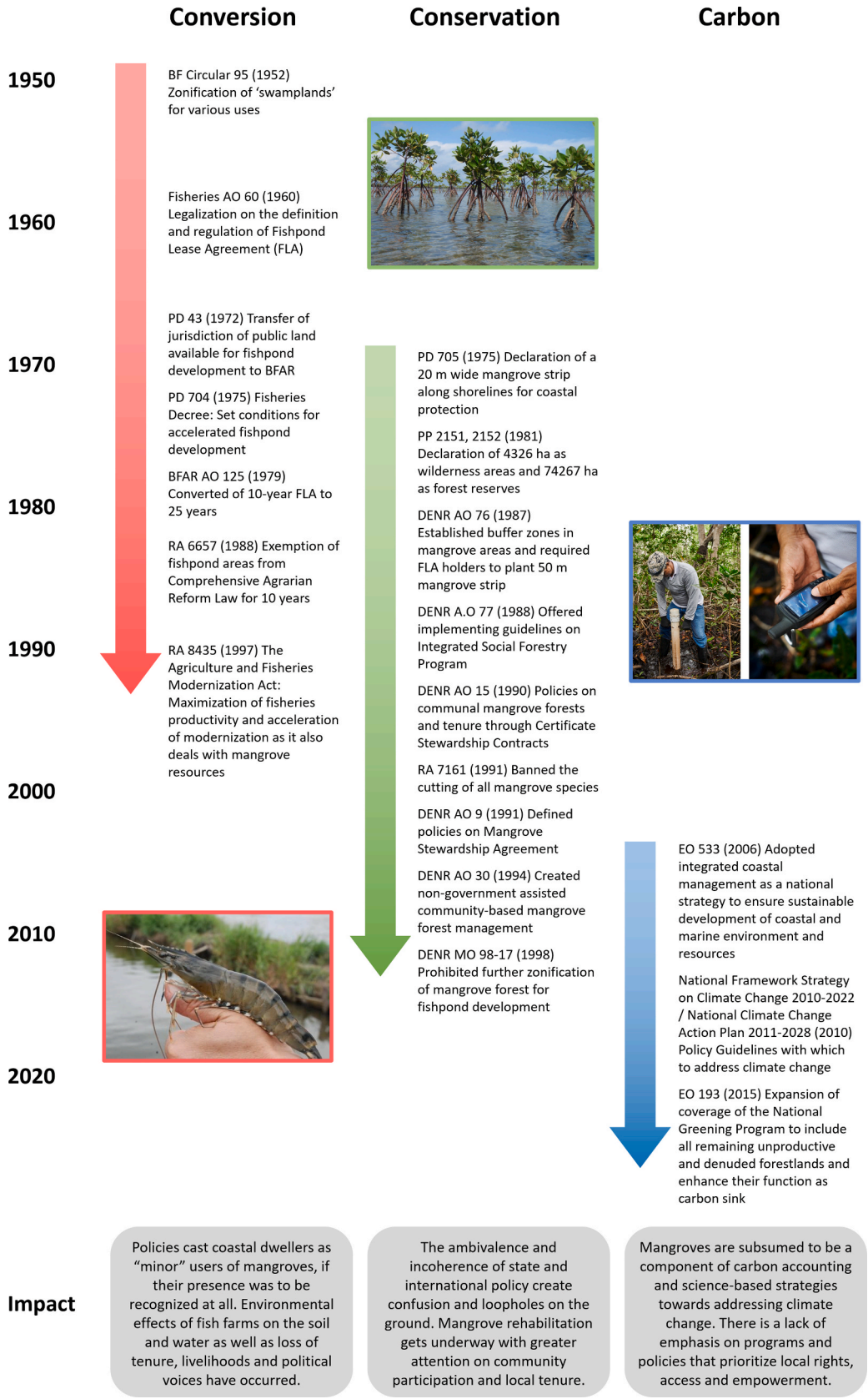

Fig. 1. A timeline of the different mangrove representations in the Philippines with a summary of key government policies and their social impacts (AO: Administrative Order; BF: Bureau of Forestry; BFAR: Bureau of Fisheries and Aquatic Resources; DENR: Department of Environment and Natural Resources; EO: Executive Order; MO: Memorandum Order; PD: Presidential Decree; PP: Presidential Proclamation; RA: Republic Act; adapted from Primavera, 1993, 2000; SEAFDEC, 2004).

CAD1.2 million to the SEAFDEC starting in 1974, which resulted in the first-ever successful captive breeding of milkfish (Spurgeon, 1979). Furthermore, in the late 1970s to early 1980s, BFAR hosted the United Nations-funded Brackishwater Aquaculture Development and Training Project, which saw the establishment of four brackishwater aquaculture centers across the country (FAO, 1999).

3.3. Fragility of concern towards coastal dwellers

As this development narrative unfolded, there was a lack of appreciation for the ways coastal dwellers traditionally use and access mangrove ecosystems. Mangrove tenure regimes and customary rights were generally unrecognized by the authorities (Kunstadter et al., 1986), and so was the important link between mangrove species and food benefits (Baines, 1979). Likewise, existing users were relegated to a position of secondary importance, described merely as "minor" users (vis-à-vis fishpond operators, see Kapetsky, 1982). Historically, minimal attempts had been made to research the social-ecological systems of mangrove dwellers, including their knowledge and management systems (Kunstadter et al., 1986; Jara, 1987; ADB, 1992). The paucity of basic information on who lives in mangrove systems and what they are doing implies that those living near or in mangroves were considered to be as marginal as the "swamp" itself (Kunstadter et al., 1986; ADB, 1992).

In the Philippines, what this conversion discourse meant for mangrove users was the danger of marginalization and exclusion resulting not only from the destruction of mangrove forests caused by fishpond construction, but also from reduced access due to the granting of exclusive rights to the private sector over mangrove areas (World Bank, 1973; SEAFDEC, 1984; SEAFDEC, 1989; Primavera, 1991; FAO, 1994; Agbayani, 2000). While fishponds covered about 168,000 ha in 1970, over half of this was privately owned, with the remainder also seemingly "privatized" through the renewable 25-year fishpond lease agreement granted by the government (World Bank, 1973; Agbayani, 2000; Saguin, 2016). What was once common property utilized by coastal dwellers was transformed into a public forest leased for the use of few entrepreneurs. Paralleling this trend, Aksornkoae et al. (1984) report that the beneficiaries from jobs created by the commercialized exploitation of the mangrove forest in Thailand are often outsiders, not the people whose local habitat is being destroyed – with only about 17 percent of the people employed in mangrove concessions actually coming from the nearby areas (Kunstadter et al., 1986; see also Stonich, 1995 for Honduras). With the rise of coastal grabbing, brought on by privatization, spatial enclosure and denied access (Bavinck et al., 2017), many activists and practitioners began to highlight the need for greater equity in the use, access and tenure of mangroves, together with more even distribution of income and benefits from the resources (Kunstadter et al., 1986; PCARRD, 1992; Nickerson, 1999; Walters, 2003; Van Lavieren et al., 2012).

The overthrow of the Marcos regime in 1986 by the popular uprising known as the People Power Revolution led to considerable constitutional changes and a significant shift toward the decentralized governance of coastal resources and peoples (see also Korten, 1994 for the forestry sector) under the reformed Aquino government. Major donors such as the World Bank, the US Agency for International Development (USAID) and the Ford Foundation were some of the first to support new state-civil society partnerships advocating for community-based coastal resource management initiatives (White et al., 2006). In light of the persistent pressure of industrial mangrove conversion, the importance of coastal dweller participation in resource management was thus gradually being recognized (FAO, 1994; White et al., 2006). Gregersen et al. (1989) notes that during the decade 1977 to 1986, some 60 percent of World Bank lending in forestry (USD1.3 million) was spent towards "social forestry" (i.e. "forestry for local community development") and related community-based fuelwood projects, a significant increase from a mere 5 percent in the previous decade (Korten, 1994). This foreshadows a beginning of an emerging discourse that accepts the ecological and social problems of widespread mangrove conversion and destruction bolstered by the "wasteland" metaphor, and the accompanying need for community-based coastal management. The following section traces the emerging focus on mangrove conservation and local community involvement.

4. Mangrove conservation

4.1. The ambivalence of state mangrove conservation efforts

By the early 1990s, the negative ecological impacts of extensive mangrove conversion were becoming apparent among state bureaucrats and managers. As Primavera (1993, p. 165) noted, the loss of mangroves was "the single most important consequence of brackish water aquaculture in the Philippines.". In addition to the denudation of mangrove forests, there were other severe and long-lasting effects such as draining of the underground freshwater table, subsequent salinization of soil and water, and the land becoming infertile and unproductive for later agricultural use (SEAFDEC, 1989). In response to the mounting evidence of the destructive impacts of fish farm conversion, administrators began promoting greater efficiency in existing pond areas as a means to reduce the need for further mangrove clearing. Suggestions ranged from the intensification of aquaculture, better pond siting procedures in mangroves, and the integrated management of the mangrove ecosystem, to promote the kinds of aquaculture deemed more compatible with the sustainable use of mangroves (e.g., silviculture) (Kapetsky, 1982; Agbayani, 2000). The general belief of the political and economic elite was that the negative environmental effects could be eliminated while still pursuing an aquaculture growth trajectory.[1] Such double-barrelled optimism was undergirded by the prevailing policy setting of the neoliberal, free-market economy of the time. Bello et al. (2005) points out that the Aquino government and the succeeding Ramos administration were very much following the old World Bank-Marcos formula – structural adjustment and deregulation of many extractive industries (see also Bello and Gershman, 1990). The Department of Agriculture Undersecretary for fisheries, Cesar Drilon Jr., in 2004 extended this pro-development stance: "… taking note that shrimp aquaculture has been *alleged* to have led the massive destruction of mangroves in this region. *True or not we still cannot confirm*. But this time, let us make sure that our shrimp aquaculture should be friendly to the mangrove ecosystems and the environment" (SEAFDEC, 2005, p. 15, italics added).

The uneasy infusion of conservation imperatives into the state development agenda was marked with ambivalence – often leading to ineffectiveness and incoherence in practice (see Primavera, 2000). For instance, despite the creation of the multi-agency National Mangrove Committee in 1976 (Aypa and Baconguis, 2000), it was not uncommon to see different departments pursuing contrasting policies on fishpond development in mangrove areas. On the one hand, the Department of Agriculture had strongly encouraged fishpond development. On the other hand, the Department of Environment and Natural Resources (DENR) had refused to issue a mangrove clearing permit necessary to begin fishpond development (Ferrer et al., 1996). As a result, while the fishpond developers insisted on developing fishponds on the ground that they had the legal rights via the Fishpond Lease Agreements, the DENR did not cooperate, sparking a number of court battles between the DENR and the fishpond developers (Christensen, 1983; Hyman, 1983; Ferrer et al., 1996).

Nevertheless, beginning in the 1980s and throughout the 1990s and beyond, the preservation and rehabilitation of mangrove ecosystems received a widespread call for action (see Fig. 1). The recognition of the nursery functions of mangroves in enhancing fish production, and their

[1] The Agriculture and Fisheries Modernization Act of 1997, RA 8435, is explicit in calling for transforming fisheries to a technology-based industry.

role in climate change adaptation as a "natural buffer" to coastal storm surges and sea level rise, have subsequently led to vigorous restoration and conservation efforts. These initiatives were often paid for and managed by state departments (e.g., DENR) and in-country NGOs, and broadly financed through big international NGOs (e.g., Conservation International) and international donor programs (e.g., USAID) (Courtney and White, 2000). Building on the top-down Forestry Act of 1975, numerous laws and regulations came into force to protect remaining mangrove areas and mitigate widespread deforestation (SEAFDEC, 2004). For example, in 1982, Presidental Proclamation 2146 was approved prohibiting mangrove cutting throughout the country. Other DENR regulations and policies issued since 1986 included measures designed to prevent further destruction of the mangroves through implementing mangrove reforestation, disallowing the conversion of vegetated mangrove areas into fishponds – made punishable by imprisonment for 6–12 years (Bagarinao, 1999), and instructing the BFAR to revert back all mangrove areas that had been abandoned for five years into the category of forest land (Agbayani, 2000).[2] Likewise, many timber concessions were canceled. The key recommended practices were therefore replanting degraded areas, establishing reserves and reversing abandoned or underutilized ponds back to mangroves (Agbayani, 2000; SEAFDEC, 2005).[3]

4.2. Mangroves as a suite of values and a springboard for community action

New understandings of mangroves as the object to be treated with protection and regeneration intersected with two dominant representations of mangroves – as something that holds a suite of values which needs to be better captured, and as a site of community empowerment and conservation action.

First, there was a movement to associate mangroves with a range of non-market as well as marketed goods and services (Spaninks and van Beukering, 1997). Based on cost-benefit calculations, earlier market valuation was limited to that of mangrove wood products which drove severe undervaluation of mangrove benefits and further justified many conversion projects (ADB, 1992). In particular, the fish nursery functions of mangroves were confirmed to be significantly supporting the catches of municipal fisheries (Camacho and Bagarinao 1987), evoking the metaphor of "mother of the sea" by the executive director of the Philippine Council for Agriculture, Forestry and Natural Resources Research and Development (PCARRD, 1992). To that end, a reduction of 670 kg in fish catch for every hectare of clear-cut mangrove forest was estimated (CRMP, 1998; SEAFDEC, 2005). Beyond fishery and forestry gains, the non-market values of mangrove ecosystem were also foregrounded, including natural process benefits such as stabilizing land from erosion, preventing floods and absorbing organic waste as well as biodiversity values (White and Cruz-Trinidad, 1998). The range of economic values that would be lost when mangroves are converted to other uses were estimated to be in the range of USD500-1,550 per hectare per year (White and Cruz-Trinidad, 1998; Schatz, 1991; SEAFDEC, 2005). Similarly, where they are extensive and close to human populations, mangroves have been found to be worth USD2,000–9,000 per hectare per year (Wells et al., 2006). These figures grossly contradicted the low fishpond lease agreement fee (FLA) of PHP50/ha/yr (~USD1.32 in 1998 terms) for government-owned ponds (Gregersen et al., 1989; Bagarinao, 1999; SEAFDEC, 2005). Understanding the market and non-market value of mangroves was seen to trigger greater long-term benefits to the coastal ecosystems and the surrounding communities. Economic valuations of mangrove ecosystem goods and services would thus provide some of the most powerful arguments for effective mangrove management, even with the recognition that many of those who depend on mangroves live largely outside regular cash economies and are often ignored in economic valuations, centralised planning and policy formulation (Van Lavieren et al., 2012; Menéndez et al., 2018).

Secondly, government-initiated replantation plans increasingly sought community participation as an essential means by which to implement conservation. Informed by foreign and domestic anthropologists who noted that tenurial insecurity presumably drove ecologically destructive practices, many state policy-makers began implementing strategies towards providing more support to social forestry and improving tenure conditions (Schnurr and Holtz, 1998). Externally, the idea of coastal zone management being circulated in the Philippines in the 1970s was picked up by international agencies as a way to counter the problems of fisheries decline, mangrove destruction and impoverished coastal communities (see Vannucci, 1988). For instance, in 1981, USAID sponsored a coastal zone management workshop in Manila where it was suggested that coastal resources could be better managed if local management and property ownership were prioritized over a centralized approach (Ferrer et al., 1996).

What took shape was a broad transition from a top-down to a decentralized mode of coastal governance, supported by the passing of the Local Government Code (RA 7160) in 1991. Specifically, then as now the involvement of local communities was described as critical to the success of any mangrove management intervention, with apparent problems arising when communities are not benefitting from profit-sharing or payments for ecosystem services (PES), or when their access is denied through the establishment of protected areas (Van Lavieren et al., 2012). Two complementing governing strategies undergirded the community-based approach or more formally called "community-based coastal resource management" (CBCRM), that is, empowering the local communities to be the "day-to-day managers" of mangrove resources while securing their resource tenure. Put together, it meant that empowered coastal residents managing and exploiting mangrove areas on a sustainable basis was to be contingent upon providing use rights and security of land tenure, and vice versa (Ferrer et al., 1996; Aypa and Baconguis, 2000; Primavera and Esteban, 2008).

The Philippine government had launched a vigorous agenda of community-based conservation and management programs since the early 1980s (Katon et al., 2000; SEAFDEC, 2005). Various major foreign-funded projects were commissioned and implemented through state-NGO partnerships or were simply outsourced to local NGOs (i.e., participatory grassroots organizations, often linked to social movements) for implementation and management (see Courtney and White, 2000; SEAFDEC, 2005).[4] While many state-nonstate partnerships delivered such projects effectively, each actors' contrasting ideological orientations typically made any co-management arrangement problematic (Bryant, 2001). Most notably, to facilitate local conservation of mangroves, the DENR issued tenurial instruments called the Certificate of Stewardship Contract to smallholder beneficiaries, later superceded by the Mangrove Stewardship Agreement – a renewable lease to small areas (~1ha) (Ferrer et al., 1996; Primavera et al., 2004). In 1993, the DENR stopped its contract reforestation efforts and soon consolidated tenure instruments into a 25-year Community-Based Forest Management Agreement (CBFMA) which is granted in place of the previous agreements (Executive Order No. 263 s. 1995) (Primavera and Esteban, 2008). CBFMAs were required to be issued only to community-level People's Organizations or similar (i.e. not companies or individuals)

[2] For example, DENR Memorandum Circular No. 15 of 1989; DENR Administrative Order No. 15 of 1990.

[3] The ensuing widespread promotion of mangrove rehabilitation in the Philippines has been met with mixed success, however (for details, see Primavera and Esteban, 2008; Duncan et al., 2016; Barnuevo et al., 2017).

[4] The Central Visayas Regional Project in 1984; the Fisheries Sector Program in 1990; the Coastal Environment Program and the Coastal Resource Management Project in partnership with the regional offices of DENR in 1993 and in 1996.

for coastal dwellers who depend on mangrove systems (Melana et al., 2000).

Overall, there was a noticeable policy acceptance that addressing the question of property rights through the granting of tenure is an important precondition for the success of community-based mangrove management plans, as it legitimizes the *de facto* claims of coastal dwellers over coastal resources.[5]

5. Mangroves as blue carbon

5.1. A new global framing

Although the importance of mangroves as part of climate change adaptation strategies has long been recognized (Mazda et al., 1997; Massel et al., 1999; McIvor et al., 2012; Blankespoor et al., 2017), it was not until the emergence of blue carbon science (see Duarte et al., 2005) and the establishment of early climate change mitigation initiatives in mid-2000s (e.g., Nelleman et al., 2009; Lafolley and Grimsditch, 2009) that the specific value and role of mangroves for climate change mitigation were seized on by climate policy experts (Crooks et al., 2017; Pangilinan, 2017). The depiction of mangroves as a significant carbon sink has since then found its way into large international organizations across the Global North and South. Several high-level, globally financed initiatives have been set up, such as the Blue Carbon Initiative and the International Partnership for Blue Carbon, to outline policy directions and funding options for enabling national and local-level blue carbon actions. Mangroves are increasingly seen as core targets for market-based instruments including carbon offset crediting schemes or PES mechanisms (Lau, 2013; Locatelli et al., 2014; Thompson et al., 2014; Vanderklift et al., 2019). There are also non-market mechanisms such as grants from private foundations, philanthropic donors, large conservation NGOs and Overseas Development Assistance (Van Lavieren et al., 2012; Herr et al., 2014). Furthermore, finding innovative ways to secure private industry investment is viewed as a particularly important challenge for protection and restoration of blue carbon ecosystems (see Herr et al., 2015).

Discourse and actions on blue carbon have revolved around the following technical elements: coordinated scientific research to fill gaps in the knowledge of carbon sequestration and fluxes in blue carbon ecosystems (Macreadie et al., 2019); development of methodologies for assessing carbon stocks and emissions and conducting economic valuation of ecosystem services (Fourqurean et al., 2012); establishment of associated financing mechanisms (e.g., a global Blue Carbon Fund and national Reducing Emissions from Deforestation and Forest Degradation [REDD+] strategies); and creation of a network of demonstration projects for scaling out blue carbon solutions. Despite difficulties that have historically led to the absence of robust mitigation metrics for carbon analyses, such as the complexity of coastal ecosystems (e.g., tidal submergence and their status as a common property resource), new guidelines and practical methodologies have begun to emerge, all of which refer to the need for internationally accepted measuring and monitoring procedures for carbon accounting that could form the basis of global blue carbon markets (Nellemann et al., 2009; Herr et al., 2014; Howard et al., 2014). Together, the "blue carbon movement" is predicated on designing economic incentives, policies and financing mechanisms for maintaining carbon sequestration and avoiding emissions. With uncritical embrace, coastal blue carbon is increasingly viewed as a clear win-win solution that offers coastal ecosystem conservation and climage change mitigation while generating livelihood benefits for coastal dwellers (Bird, 2016).[6]

5.2. Blue carbon in the Philippines: accounting and science-based tendencies of government uptake

The Philippine government has been an enthusiastic subscriber of blue carbon programs. As early as 2011, the Philippines participated in the International Blue Carbon Group of Experts (Pangilinan, 2017). Later, following the process of the Paris Agreement, the (Intended) Nationally Determined Contribution (NDC) commitment[7] submitted by the Philippines was deemed "medium" in ambition, which had more detail and credibility than that of Indonesia, for instance – another archipelagic nation with a much larger extent of mangroves, whose pledge was considered "inadequate" (Amponin and Evans, 2016; Crooks et al., 2017).[8] Domestically, the 2011–2018 National Greening Program (in particular, the Mangrove and Beach Forest Development Program initiated under it in 2015) implemented the planting of mangroves and beach forest species like nipa to combat climate change (Rep. of the Philippines, 2017). Also, the Climate Change Commission was set up to lead formulating relevant domestic policies, which went on to formalize the Blue Carbon Steering Committee and the Technical Working Group following a series of Blue Carbon Adhoc Working Group meetings initiated by Conservation International-Philippines in 2015 onwards (CTI, 2017; Pangilinan, 2017).

National blue carbon programs in the Philippines have largely mirrored the global foci of carbon accounting and science-based strategies. The national government is a country partner to the technical advances aimed at improving and intergrating natural capital accounting through an implementation of a World Bank-led global partnership called the Wealth Accounting and Valuation of Ecosystem Services (Phil-WAVES). In line with the governance reforms the Philippine government is undertaking towards transparent and science-based policy making, Phil-WAVES is expected to facilitate a progressive inclusion of natural capital values in the System of National Accounts in order to improve the country's ability to monitor and manage key natural resource-based sectors in its economic development (WAVES, 2016). Several opportunities are promised for blue carbon: creating new data that situates mangrove values in the national accounts; analysing contribution of mangroves to the income of local communities and enhanced climate change resilience by quantifying the extent of mangrove associated products (fish production), biomass and carbon sequestration;

[5] The DENR Administrative Order No. 15, 1990 serves as a useful demonstration of this trend, which established 'communal mangrove forests' to allow selective, low-impact harvest of mangrove products for livelihood, thereby encouraging community participation and ensuring local responsibility and sustainability of mangrove rehabilitation. Another example of mangrove tenurial instrument is Nipa-Bakauan Special Use Permit, which was issued to individuals or groups for managing and maintaining Nipa (*Nypa fruticans*) and bakauan (*Rhizopora* spp.) stands, after satisfying the documentary requirements and payment of corresponding fees (SEAFDEC, 2005).

[6] It is worth acknowledging recent scientific studies that have presented a more cautious outlook on the promise of blue carbon (see Ouyang and Lee, 2020; Richards et al., 2020).

[7] For the 21st Conference of the Parties (COP) to the United Nations Framework Convention on Climate Change (UNFCCC), 163 INDCs have been submitted and 81 Parties have submitted their NDC. The INDCs are meant to outline Parties' intended contributions to addressing climate change and achieving the objective of the Convention. Parties were requested to include information on the scope and coverage of their mitigation and adaptation efforts, as well as on methodological approaches for estimating and accounting for anthropogenic greenhouse gas emissions and removals. The Paris Agreement requires countries to regularly submit revised NDCs every 5 years with intention to show increased ambition (Herr and Landis, 2016).

[8] The Philippines was also one of only five countries that used the term "blue carbon" as part of Land-Use, Land-Use Change and Forestry (LULUCF), while also making an explicit mention of the phrase "blue carbon potential" in the context of emissions trading (Herr and Landis, 2016; Crooks et al., 2017). Similarly, the contributions of coastal ecosystems are prominently articulated in the Philippine National REDD+Strategy and the Philippine Biodiversity Strategy and Action Plan (Herr and Landis, 2016).

identifying priority sites for mangrove restoration for coastal protection; and deriving risk reduction benefits of mangroves that may influence insurance premiums and lead to the development of innovative finance mechanisms to support mangrove management (WAVES, 2017). Given the high government demand for indicators, tools, and methodologies, another large-scale blue carbon project funded by the Japanese government has focused on advancing the modelling and simulation of blue carbon cycle and budgets, economic valuation of ecosystem services, and geospatial decision support systems for mangrove conservation (DENR, 2016a; BlueCARES, 2017). Much of this reflects the government's penchant for infrastructure and science interventions as solutions for driving development outcomes (Satizábal et al., 2020).

5.3. Inadequate consideration of coastal dwellers

Subsequently, coastal blue carbon activities in the Philippines have to date been largely limited to technical commentaries and scientific activities with few efforts priorizing domestic and more localized action (IPBC, 2016; see also Thomas, 2014). This is because the funded projects and their activities have closely aligned with the so far dominant technocratic and rational framing of mangroves as blue carbon (see Blue Climate Coalition, 2010; CTI, 2017). The need to include, consult and benefit local communities has been stated in various ways in the blue carbon literature and policies (e.g., as a rationale and an outcome), but do not have clear implementation and design strategies. Budget Secretary Florencio Abad announced in March 2015, "All of our [mangrove] rehabilitation efforts will need to be grounded on ensuring the safety of communities against natural disasters in the future" (DENR, 2015). The revised implementing rules and regulations of Executive Order 193 (Expanding the National Greening Program) also reportedly aim to enhance the role of social enterprise as means to improve the social wellbeing, environmental sustainability and economic performance of a community (DENR, 2016b).

Yet, what becomes clear is three other developments that work to constrain such mentions of local communities – encouraging the involvement of private actors; framing mangroves as commodities; and employing science-based strategies towards rehabilitating mangroves. First, the Expanded National Greening Program makes an explicit call to "involve and enhance the participation and investment of the private sector with a view towards enabling private companies to achieve carbon neutrality" (DENR, 2015). Second, mangroves (and bamboo) were described as the "commodities" to be given prominence in the country's campaign to combat climate change in the Commodity Roadmap of the Enhanced National Greening Program. In 2016, the Philippines Environment Secretary at the time, Regina Paz Lopez, officially identified mangroves as the drivers of economic growth while simultaneously recognizing their role in climate change mitigation and adaptation (DENR, 2016b). Finally, science-based monitoring and evaluation was to be fully implemented to "correct unscientific strategies that were used in the past mangrove rehabilitation projects" (Villamor, 2017). This meant that steps taken for the Mangrove and Beach Forest Development Project including site selection and validation, baseline data collection, mangrove nursery establishment, plantation development, and maintenance and protection would adopt systematic monitoring and evaluation protocols to avoid the past failures of reforestation (Villamor, 2017).

Communities, where mentioned, are typically described in an instrumental sense (see Camacho et al., 2011), that is, securing the long-term success of blue carbon projects requires the endorsement of local mangrove users and tapping into their ecological knowledge and livelihood aspirations (Herr and Landis, 2016). In turn, to secure community support, economic alternatives will need to be offered to those affected by conservation efforts and communities be educated on the importance of healthy blue carbon ecosystems upon which their food and livelihood security depends (Herr and Landis, 2016; IPBC, 2017; CTI, 2017). Hence, the main approach to dealing with local community needs has been setting up a network of demonstration sites through funding provision and knowledge transfer in hopes of scaling out the blue carbon solutions more widely (Herr et al., 2011; IPBC, 2017). Instead, a critical perspective would note the imperatives of clearly defining and allocating the rights of ownership, access and use of mangrove forests; ensuring the involvement of coastal dwellers in mangrove management; recognizing that successful protected areas require community engagement and unambiguous legal and management structures; and determining the level of social impact that conservation interventions could have (Van Lavieren et al., 2012; CTI, 2017).

A more direct appeal to ensure that blue carbon projects do not trivialize (or worse disadvantage) the interests of coastal dwellers has been attempted by the Blue Forests Projects via the Blue Carbon Code of Conduct. This aspirational code is designed as a non-binding voluntary commitment to support the development of fair, socially just, and accountable blue carbon projects (Blue Forests, 2017). Though its practical bearing is unclear at the time of writing, it represents an explicit call towards the recognition of local tenure and indigenous rights to resources and cultural practices, including affirming existing areas and territories sustainably used by indigenous peoples and local communities (Blue Forests, 2017). In the Philippines, the absence of grounded efforts in securing and caring for local rights to access, utilize and manage mangrove areas are serious and glaring omissions, resulting in little dedicated scholarly and policy attention so far.

Filling the void of alternate viewpoints both globally and in the Philippines, international civil society organizations have offered sharp criticisms of the blue carbon framing. Organizations such as World Forum of Fisher Peoples' (WFFP) & World Forum of Fish Harvesters and Fish Workers have accused the blue carbon agenda of serving the interests of corporations and global elites while marginalizing underprivileged coastal resource-dependent people (WFFP-WFF, 2015). The emphasis on putting an economic value on coastal wetlands is simply a way to objectify them as yet another commodity in the carbon markets to be financialized and speculated on by investors and multinational corporations. According to them, it is therefore another tool to profit at the expense of people – a false solution that legitimizes the continued emissions elsewhere (WFFP-WFF, 2015). At the same time, they argue that blue carbon "conservation" will result in the displacement of the people who live off these areas, involving expulsion of communities and reducing customary or communal access rights (Barbesgaard, 2016). The worry is that coastal dwellers are burdened with developing more "business acumen and financial literacy" to become part of the blue carbon projects, meaning the onus is laid on the mangrove-dependent people to learn and adapt (WFFP-WFF, 2015). Meanwhile, governments are subscribing to the prevailing developments in blue carbon that favour the rights of corporate and finance capital with a subsequent lack of regard for the fate of the people who live off coastal wetlands. Regrettably, the overt indication is that this is also the scenario unfolding in the Philippines in general.

6. Discussion: social agenda in deeper waters

Straddled between land and sea, mangroves have undergone several major shifts in how they are framed and valued by state and society. Reacting to the "wasteland" metaphor and the resultant environmental and social impacts of conversion activities were opposite framings that see mangroves as a natural buffer and a site of community-based conservation efforts. Most recently, a new representation of mangroves as a "natural capital" to be used in the accounting of carbon emission and sequestration is dominating the scientific and policy discussions around mangroves.

Common to these discursive developments are the extra-local (typically global) scale at which they originate. The colonial influences at earlier times and later the large-scale development funding tied to wealthy countries such as the USA and Japan as well as multinational

banks such as the World Bank enabled the politics, economics and scientific rationale that provided justifications for the new activities, and supported governments to adopt and implement the changing understanding of mangroves. Blue carbon is no exception in this regard. As this review has shown, the conventional global-to-national spread of policy ideals has been vigorously underway via international coalitions through multilateral negotiations or via bilateral assistance (see Song et al., 2019; Lawless et al., 2020). As a result, policy enthusiasm regarding blue carbon is now evident in many "recipient" countries in the Global South, including the Philippines.

Importantly, amid these shifting representations of mangroves, there is a need to reflect upon how issues of tenure and access have been constructed and prioritized in the policy domain. Over 30 years ago, anthropologist Peter Kunstadter wrote, "the future fate of the mangroves may be decided in the airconditioned board rooms of temperate-zone businesses" (Kunstadter et al., 1986). Not surprisingly, the mangrove ecosystem and the socio-economic relations of local users have been greatly subject to processes and events beyond the geographical borders of the mangrove forests (Kunstadter et al., 1986, p. 1). Indeed, the policies and the practices of the Philippine government demonstrate the relevance of these distal dynamics, which propped up the three above-mentioned framings of mangroves constructed for national benefits.

What this review therefore highlights is the unevenness and inadequacy of state policy action on securing customary access and tenure to mangroves and the resources therein. Whereas the sheer lack of regard for people's welfare, and more specifically their use relationships with mangroves, drove the policies of the conversion era, alternative voices also arose to caution against the marginalization of coastal dwellers resulting from the destruction of mangroves and the consolidation of exclusive use rights to outside business people (World Bank, 1973; Aksornkoae et al., 1984; Kunstadter et al., 1986; SEAFDEC, 1984, 1989). Persisting through to the so-called conservation era, the participation of coastal communities in resource use and management became a key message, although ownership and stewardship took on an increasingly instrumental complexion as a means to achieve conservation objectives rather than empowerment and sustainable use. The legal recognition of tenure allowing for selective, low-impact harvest of mangrove products for livelihood became part of ensuring local responsibility and sustainability of mangrove forests. All in all, such policy perspectives and implementation strategies were part of the important reaction generated against the relentless pressure of industrial mangrove conversion (FAO, 1994).

The discursive framing of mangroves as blue carbon tends to sideline dialogues and policies emphasizing customary tenure, access and benefits for coastal dwellers. A review of blue carbon programs operating in the country (most of which happen via oversight of or in partnership with state agencies) has revealed a noticeable dearth of any grounded efforts to deal with empowerment of marginal rural people, in favour of abstract and technocratic projects suited to the discussions of carbon science, accounting and finance. There appears a large gap between such elite practices that take the legibility of small-scale fishers and Indigenous peoples for granted, and the on-the-ground realities of the mangrove users who largely rely on traditional mixed economies that are often invisible in economic valuations and government planning. The way forward for the prevailing blue carbon discourse has thus been decisively one employing pilot project sites, where the belief is that interventions "can be put into place immediately and yield significant climate benefits" (Herr and Landis, 2016, p. 8). To ensure that mangrove conservation works as a cost-effective climate solution, the pilot sites are then to be networked and coordinated for widespread expansion (Herr et al., 2011).

This trend unfortunately signifies a regression in the way the Philippine government has dealt with policies concerning tenure and access to mangrove resources. Given the significant omission of any meaningful action on improving coastal dwellers' means of livelihoods and basis for empowerment, the current phase of framing mangroves as blue carbon may continue to evade any serious conversations about the complex and contested tenure regimes governing access and use to mangrove forests. The possibility of local actors' interests being marginalized at the whims of international priorities and influences is evident from the ongoing applications of similar discourses and practices such as those from REDD+ and the Blue Economy paradigm (Cotula and Mayers, 2009; Mahanty et al., 2013; Lyons and Westoby, 2014; Brent et al., 2020; Satizábal et al., 2020). Hence, one would hope that lessons about local livelihoods are taken seriously in the evolution of blue carbon projects. In this regard, organized activities that generate contention, such as filing obstructionist legal cases against rampant state-led development, such as large-scale coastal reclamation projects (e.g., the international airport project in Manila Bay), and mobilizing public sentiments, will continue to play a vital role in highlighting or rectifying this relapse (Nem Singh and Camba, 2016; see also Chavez and Agbayani, 2020 for a present controversy).

The representation of mangroves in terms of blue carbon or natural capital is the latest offering that reorders the relationships between governance systems, mangroves and coastal peoples in the Philippines and elsewhere in the region. Because blue carbon governance obscures the complex character of human-mangrove relations, there is a danger that coastal peoples' customary rights will be erased and their struggles for securing coastal livelihoods impaired. However, the trajectory of changing depictions over several decades – from conversion to conservation and now to carbon – mean that alternative framings are possible. A framing of mangroves that captures the explicit inclusion and foregrounding of coastal dwellers in decision-making arenas will be a welcome gesture. For instance, this could happen through creating a "governing coalition" that aims to elicit broad political support from a range of societal actors to draw legitimacy and authority (Nem Singh and Camba, 2020). Such coalitions can be seen as a way of re-negotiating power between elites and marginalized resource users to contribute towards a locally-relevant and just, and at the same time nationally beneficial, governance strategy. Here, the metaphor of mangroves as a "meeting place", which joins seemingly contrasting elements (i.e., land and sea), might allow for such bringing together of participants situated on the opposite ends of political agendas and power structures (e.g., state agenda and local people's needs).

As Castree details (2016, 2017), "scientized" concepts, models and questions can only lead to a partial understanding of the so-called human dimensions of environmental change (see also Nightingale et al., 2020). They create a false impression that human affairs can be objectively and accurately sketched through information about people's perceptions, preferences and behaviours. Yet, social struggles and conflicting demands are an inexorable part of human conditions, and therefore will need to be fully embraced in the conversations about mangrove uses, with particular recognition given to those left invisible and marginalized. In this context, interdependent and sustained operation of coastal civil society organizations to support local advocacy initiatives, to empower the (often fragmented) voices of coastal dwellers, and to liaise with government actors will form an important benefactor of the mangrove framing that inspires a coherent "meeting place". We believe such a framing can help accelerate the recognition of power dynamics governing shared and overlapping mangrove tenure regimes and become a catalyst towards addressing issues of equity and access in frontier coastal regions.

Author contribution

Andrew Song: Methodology, Formal analysis, Writing – original draft, Writing – reviewing & editing, Visualization. Wolfram Dressler: Conceptualization, Methodology, Writing – reviewing & editing. Paula Satizábal: Methodology, Formal analysis, Writing – review & editing. Michael Fabinyi: Writing – reviewing & editing, Supervision, Funding acquisition.

Declarations of competing interest

None.

Acknowledgements

This paper was supported by funding from an Australian Research Council Discovery Project [DP180100965]. A. Song also acknowledges the support of the Australian Research Council through an ARC Discovery Early Career Researcher Award [DE200100712]. The authors thank the thoughtful and constructive comments of two anonymous reviewers and are grateful to Vera Horigue and Michael Pido for their assistance on earlier parts of the research.

References

ADB, 1992. Mangrove forests: a valuable but threatened Indo-Pacific resource. Staff Paper 5. Agriculture Department, Asian Development Bank, Manila.

Agbayani, R.F., 2000. Property rights and collective action in the management of mangrove ecosystems: implications of the adoption of mangrove-friendly aquaculture. In: Primavera, J.H., Garcia, L.M.B., Castaños, M.T., Surtida, M.B. (Eds.), Mangrove-friendly Aquaculture: Proceedings of the Workshop on Mangrove-Friendly Aquaculture Organized by the SEAFDEC Aquaculture Department, January 11-15, 1999, Iloilo City, Philippines. Tigbauan, Iloilo, Philippines: Southeast Asian Fisheries Development Center. Aquaculture Department, pp. 163–170.

Aksornkoae, S., Priebprom, P., Saraya, A., Kongsangchai, J., Sangdee, P., et al., 1984. Research on the socio-economics of dwellers in mangrove forests, Thailand. Faculty of Forestry, Kasetsart University, Bangkok, Thailand.

Alcala, E.P., 1982. Why conserve philippine mangroves: economics & ecology. Paper presented during the national mangrove research coordination symposium/ workshop at covelandia resort, kawit. Cavite on December 8-10, 1982.

Alongi, D.M., Murdiyarso, D., Fourqurean, J.W., Kauffman, J.B., Hutahaean, A., Crooks, S., Lovelock, C.E., Howard, J., Herr, D., Fortes, M., Pidgeon, E., 2016. Indonesia's blue carbon: a globally significant and vulnerable sink for seagrass and mangrove carbon. Wetl. Ecol. Manag. 24 (1), 3–13.

Amponin, J., Evans, J., 2016. Assessing the Intended Nationally Determined Contributions of ADB Developing Members. ADB Sustainable Development Working Papers Series. No 44. https://www.adb.org/sites/default/files/publication/189882/sdwp-044.pdf.

Arts, B., Buizer, M., 2009. Forests, discourses, institutions: a discursive-institutional analysis of global forest governance. For. Pol. Econ. 11 (5–6), 340–347.

Arts, B., Appelstrand, M., Eba'a Atyi, R., Enters, T., Hamakers, I., Kleinschmit, D., Pülzl, H., Visseren-McGinley, K., Yasmi, Y., 2010. Discourses, actors and instruments in international forest governance. Embracing complexity: meeting the challenges of international forest governance. IUFRO World Series 28, 57–73.

Australian Conservation Foundation, 1972. Mangroves and Man. Viewpoint Series No. 7. Australian Conservation Foundation, Carlton, Victoria.

Aypa, S.M., Baconguis, S.R., 2000. Philippines: mangrove-friendly aquaculture. In: Primavera, J.H., Garcia, L.M.B., Castaños, M.T., Surtida, M.B. (Eds.), Mangrove-friendly Aquaculture: Proceedings of the Workshop on Mangrove-Friendly Aquaculture Organized by the SEAFDEC Aquaculture Department, January 11-15, 1999, Iloilo City, Philippines. Tigbauan, Iloilo, Philippines: Southeast Asian Fisheries Development Center. Aquaculture Department, pp. 41–56.

Bagarinao, T., 1999. Ecology and Farming of Milkfish. Tigbauan, Iloilo, Philippines: Southeast Asian Fisheries Development Center. Aquaculture Department.

Baines, G., 1979. Mangroves for Natignal Development: a Report on the Mangrove Resources of Fiji. Institute of Applied Social Research, Brisbane.

Barbesgaard, M.C., 2016. Blue Carbon: Ocean Grabbing in Disguise? Amsterdam. Transnational Institute. www.tni.org/files/publication-downloads/final_tni_issue_brief_blue_carbon-1.pdf.

Barnuevo, A., Asaeda, T., Sanjaya, K., Kanesaka, Y., Fortes, M., 2017. Drawbacks of mangrove rehabilitation schemes: lessons learned from the large-scale mangrove plantations. Estuar. Coast Shelf Sci. 198, 432–437.

Bavinck, M., Berkes, F., Charles, A., Dias, A.C.E., Doubleday, N., Nayak, P., Sowman, M., 2017. The impact of coastal grabbing on community conservation–a global reconnaissance. Maritime studies 16 (1), 8.

Bello, W., Gershman, J., 1990. Democratization and stabilization in the Philippines. Crit. Sociol. 17 (1), 35–56.

Bello, W., Docena, H., de Guzman, M., Malig, M., 2005. The Anti-development State: the Political Economy of Permanent Crisis in the Philippines. Zed Books, London.

Bird, W., 2016. Are 'blue carbon' projects a win for the climate and the people? *Yale environment 360*. Available from. https://e360.yale.edu/features/african_mangroves_blue_carbon_win_for_climate_and_for_people.

Blankespoor, B., Dasgupta, S., Lange, G.-M., 2017. Mangroves as a protection from storm surges in a changing climate. Ambio 46, 478–491.

BlueCARES, 2017. Overview of the CTI blue carbon project. The Blue Carbon Factor in Climate Change Adaptation. Pasay City, Manila, 22 November 2017.

Brent, Z.W., Barbesgaard, M., Pedersen, C., 2020. The Blue Fix: what's driving blue growth? Sustainability Science 15, 31–43.

Blue Climate Coalition, 2010. Blue Carbon solutions for climate change: open statement to the delegates of COP16 by the Blue Climate Coalition. Available from. http://bluecsolutions.org/dev/wp-content/uploads/2015/07/BlueCarbonSolutions_COP16_BCC_Nov_30_10.pdf.

Blue Forests, 2017. Blue carbon code of conduct. Available from. https://news.gefblueforests.org/blue-carbon-code-of-conduct.

Brosius, J.P., Russell, D., 2003. Conservation from above: an anthropological perspective on transboundary protected areas and ecoregional planning. J. Sustain. For. 17 (1), 39–66.

Bryant, R., 2001. Explaining state-environmental NGO relations in the Philippines and Indonesia. Singapore J. Trop. Geogr. 22 (1), 15–37.

Camacho, A.S., Bagarinao, T., 1987. Impact of fishpond development on the mangrove ecosystem in the Philippines. Mangroves of Asia and the Pacific: Status and Management. In: Tech. Rep. UNDP/UNESCO Research and Training Pilot Programme on Mangrove Ecosystems in Asia and the Pacific (RAS/79/002). Natural Resources Management Center and National Mangrove Committee. Ministry of Natural Resources, Philippines, pp. 383–405.

Camacho, A.S., Macalincag-Lagua, N., 1988. The Philippine aquaculture industry. In: Juario, J.V., Benitez, L.V. (Eds.), Perspectives in Aquaculture Development in Southeast Asia and Japan: Contributions of the SEAFDEC Aquaculture Department. Proceedings of the Seminar on Aquaculture Development in Southeast Asia, 8-12 September 1987, Iloilo City, Philippines. SEAFDEC, Aquaculture Department, Tigbauan, Iloilo, Philippines, pp. 91–116.

Camacho, L.D., Gevaña, D.T., Carandang, A.P., Camacho, S.C., Combalicer, E.A., Rebugio, L.L., Youn, Y.C., 2011. Tree biomass and carbon stock of a community-managed mangrove forest in Bohol, Philippines. For. Sci. Technol. 7 (4), 161–167.

Castree, N., 2016. Broaden research on the human dimensions of climate change. Nat. Clim. Change 6 (8), 731, 731.

Castree, N., 2017. Global change research and the "people disciplines": toward a new dispensation. S. Atl. Q. 116 (1), 55–67.

Chavez, L., Agbayani, S.C., 2020. Missing Mangroves Are Root of Contention over Philippine Airport Project. https://news.mongabay.com/2020/09/missing-mangroves-are-root-of-contention-over-philippine-airport-project/.

Christensen, B., 1983. Mangroves - what are they worth? Unasylva 35 (139), 2–10 (Rome, Italy).

Cotula, L., Mayers, J., 2009. Tenure in REDD: Start-point or Afterthought? No. 15 IIED, London.

Courtney, C.A., White, A.T., 2000. Integrated coastal management in the Philippines: testing new paradigms. Coast. Manag. 28 (1), 39–53.

CRMP (Coastal Resource Management Project), 1998. Our Seas Our Life: A Guide to Understanding Ocean Life and its Importance to Us. Published by CRMP, Cebu, Philippines.

Crooks, S., von Unger, M., Schile, L., Allen, C., Whisnant, R., 2017. Understanding strategic blue carbon opportunities in the seas of east Asia. Report by silvestrum climate associates for partnerships in environmental management for the seas of east Asia (PEMSEA). Conservation International and the Nature Conservancy, with Support from the Global Environment Facility and United Nations Development Program.

CTI, 2017. Regional Workshop on Blue Carbon. The Coral Triangle Initiative (CTI) Climate Change Adaptation (CCA) Working Group. Available from. In: Workshop Proceedings Report, August 29-31, 2017, Tagaytay City. http://www.coraltriangleinitiative.org/library/regional-cti-workshop-blue-carbon-report. report.

DENR, 2015. Mangrove-Beach Forest Plan Gets P400-M Seed Fund. Available from. Department of Environment and Natural Resources. https://reliefweb.int/report/philippines/denr-mangrove-beach-forest-plan-gets-p400-m-seed-fund.

DENR, 2016a. Coron, Palawan Chosen as the Main Site of the Bluecares Project Funded by Japan Government. Department of Environment and Natural Resources (Available from: seems no longer available online).

DENR, 2016b. Mangroves, Bamboo Take Center Stage Among CC Strategies. Available from. Expanded National Greening Program. Department of Environment and Natural Resources. https://ngp.denr.gov.ph/index.php/reference-materials/9-ngp-news/1969-mangroves-bamboo-take-center-stage-among-cc-strategies-3.

Dressler, W., 2009. Old Thoughts in New Ideas. Livelihood, Conservation and Development on Palawan Island, the Philippines. Quezon, Anteneo de Manila Press.

Duarte, C.M., Middelburg, J.J., Caraco, N., 2005. Major role of marine vegetation on the oceanic carbon cycle. Biogeosciences 2, 1–8.

Duncan, C., Primavera, J.H., Pettorelli, N., Thompson, J.R., Loma, R.J.A., Koldewey, H. J., 2016. Rehabilitating mangrove ecosystem services: a case study on the relative benefits of abandoned pond reversion from Panay Island, Philippines. Mar. Pollut. Bull. 109 (2), 772–782.

Entman, R.M., 1993. Framing: toward clarification of a fractured paradigm. J. Commun. 43 (4), 51–58.

Fairclough, N., 2013. Critical Discourse Analysis: the Critical Study of Language, second ed. Routledge, Abingdon.

FAO, 1994. Mangrove Forest Management Guidelines. FAO Forestry Paper 117. FAO Forestry Department, Rome.

FAO, 1999. Rural Aquaculture in the Philippines. Regional office for asia and the pacific food and agriculture organization of hte united nations Bangkok, Thailand.

Ferrer, E.M., de la Cruz, L.P., Domingo, M.A. (Eds.), 1996. Seeds of Hope: A Collection of Case Studies on Community-Based Coastal Resources Management in the Philippines. College of Social Work and Community Development (CSWCD), University of the Philippines, Quezon City.

Fourqurean, J.W., Duarte, C.M., Kennedy, H., Marbà, N., Holmer, M., Mateo, M.A., Apostolaki, E.T., Kendrick, G.A., Krause-Jensen, D., McGlathery, K.J., Serrano, O., 2012. Seagrass ecosystems as a globally significant carbon stock. Nat. Geosci. 5 (7), 505.

Friess, D.A., Rogers, K., Lovelock, C.E., Krauss, K.W., Hamilton, S.E., Lee, S.Y., Lucas, R., Primavera, J., Rajkaran, A., Shi, S., 2019. The state of the world's mangrove forests: past, present, and future. Annu. Rev. Environ. Resour. 44 (1), 1–27.
Gonzales, F.R., 1975. Policies and programs concerning the bangos industry. In: Proceedings of the National Bangos Symposium, Philippine Village Hotel, Punta Baluarte, July 25-28 1975. Aquaculture Department, Southeast Asian Fisheries Development Center, pp. 177–184.
Gregersen, H., Draper, S., Elz, D. (Eds.), 1989. People and Trees. The Role of Social Forestry in Sustainable Development. The World Bank, Washington DC.
Gupta, A., Lövbrand, E., Turnhout, E., Vijge, M.J., 2012. In pursuit of carbon accountability: the politics of REDD+ measuring, reporting and verification systems. Current Opinion in Environmental Sustainability 4 (6), 726–731.
Herr, D., Landis, E., 2016. Coastal Blue Carbon Ecosystems. and. In: Opportunities for Nationally Determined Contributions. Policy Brief. Gland, Switzerland: IUCN. TNC, Washington, DC, USA.
Herr, D., Pidgeon, E., Laffoley, D. (Eds.), 2011. Blue Carbon Policy Framework: Based on the First Workshop of the International Blue Carbon Policy Working Group. IUCN and Arlington, Gland, Switzerland. USA: CI. vi+39pp.
Herr, D., Trines, E., Howard, J., Silvius, M., Pidgeon, E., 2014. Keep it Fresh or Salty. An Introductory Guide to Financing Wetland Carbon Programs and Projects. IUCN, CI and WI, Gland, Switzerland iv + 46pp.
Herr, D.T., Agardy, D., Benzaken, F., Hicks, J., Howard, E. Landis, Soles, A., Vegh, T., 2015. Coastal "Blue" Carbon. A Revised Guide to Supporting Coastal Wetland Programs and Projects Using Climate Finance and Other Financial Mechanisms. IUCN, Gland, Switzerland.
Coastal Blue Carbon: methods for assessing carbon stocks and emissions factors in mangroves, tidal salt marshes, and seagrasses. In: Howard, J., Hoyt, S., Isensee, K., Telszewski, M., Pidgeon, E. (Eds.), 2014. Conservation International. Intergovernmental Oceanographic Commission of UNESCO, International Union for Conservation of Nature, Arlington, Virginia, USA.
Hyman, E.L., 1983. Forestry administration and policies in the Philippines. Environ. Manag. 7 (6), 511–523.
Ingram, J., Mills, J., Dibari, C., Ferrise, R., Ghaley, B.B., Hansen, J.G., Iglesias, A., Karaczun, Z., McVittie, A., Merante, P., Molnar, A., 2016. Communicating soil carbon science to farmers: incorporating credibility, salience and legitimacy. J. Rural Stud. 48, 115–128.
IPBC, 2016. Draft Strategic Plan. International Partnership for Blue Carbon. Available from. https://bluecarbonpartnership.org/wp-content/uploads/2016/11/IPBC-Strategic-Plan-October-2016.pdf.
IPBC, 2017. Coastal Blue Carbon: an introduction for policy makers. Available from International Partnership for Blue Carbon. https://bluecarbonpartnership.org/wp-content/uploads/2017/11/Introduction-for-policy-makers_FINAL_web.pdf.
Janssen, R., Padilla, J.E., 1996. Valuation and Evaluation of Management Alternatives for the Pagbilao Mangrove Forest. In: CREED Working Paper Series No 9. Collaborative Research in the Economics of Environment and Development. CREED), London UK.
Jara, R.S., 1987. Traditional uses of the mangrove in the Philippines (p.114-130), 18-25th May 1985. In: Field, C.D., Dartnall, A.J. (Eds.), Mangrove Ecosystems of Asia and the Pacific: Status, Exploitation and Management. Proceedings of the Research for Development Seminar Held at the Australian Institute of Marine Science. AIMS, Townsville, Australia.
Kapetsky, J.M., 1982. Some potential environmental effects of coastal aquaculture with implications for site selection and aquaculture engineering. Report of Consultation/Seminar on Coastal Fishpond Engineering 4–12 August 1982, Surabaya, Indonesia. South China Sea Fisheries Development and Coordinating Programme, Manila, Philippines.
Kathiresan, K., Bingham, B.L., 2001. Biology of mangroves and mangrove ecosystems. Adv. Mar. Biol. 40, 81–251.
Katon, B.M., Pomeroy, R.S., Garces, L.R., Ring, M.W., 2000. Rehabilitating the mangrove resources of Cogtong Bay, Philippines: a comanagement perspective. Coast. Manag. 28 (1), 29–37.
Korten, F.F., 1994. Questioning the call for environmental loans: a critical examination of forestry lending in the Philippines. World Dev. 22 (7), 971–981.
Man in the mangroves. The socio-economic situation of human settlements in mangrove forests. sponsored by the. In: Kunstadter, P., Bird, E.C.F., Sabhasri, S. (Eds.), 1986. Proceedings of a Workshop Held at Nong Nuch Village, Pattaya, Thailand, 27-31 May 1985. United Nations University and the National Research Council of Thailand.
Lafolley, D., Grimsditch, G. (Eds.), 2009. The Management of Natural Coastal Carbon Sinks. IUCN, Gland, Switzerland, p. 53pp.
Lau, W.W., 2013. Beyond carbon: conceptualizing payments for ecosystem services in blue forests on carbon and other marine and coastal ecosystem services. Ocean Coast Manag. 83, 5–14.
Lawless, S., Song, A.M., Cohen, P.J., Morrison, T.H., 2020. Rights, equity and justice: a diagnostic for social meta-norm diffusion in environmental governance. Earth System Governance 100052. https://doi.org/10.1016/j.esg.2020.100052.
Locatelli, T., Binet, T., Kairo, J.G., King, L., Madden, S., Patenaude, G., Huxham, M., 2014. Turning the tide: how blue carbon and Payments for Ecosystem Services (PES) might help save mangrove forests. Ambio 43, 981–995.
López-Angarita, J., Roberts, C.M., Tilley, A., Hawkins, J.P., Cooke, R.G., 2016. Mangroves and people: lessons from a history of use and abuse in four Latin American countries. For. Ecol. Manag. 368, 151–162.
Lyons, K., Westoby, P., 2014. Carbon colonialism and the new land grab: plantation forestry in Uganda and its livelihood impacts. J. Rural Stud. 36, 13–21.
Macreadie, P.I., Anton, A., Raven, J.A., et al., 2019. The future of Blue Carbon science. Nat. Commun. 10, 3998.
Mahanty, S., Dressler, W., Milne, S., Filer, C., 2013. Unravelling property relations around forest carbon. Singapore J. Trop. Geogr. 34 (2), 188–205.
Marte, C.L., Quinitio, G.F., Garcia, L.M.B., Lacanilao, F.J., 1984. A Guide to the Establishment and Maintenance of Milkfish Broodstock (Technical Report No. 11). Aquaculture Department, Southeast Asian Fisheries Development Center, Tigbauan, Iloilo, Philippines.
Massel, S., Furukawa, K., Brinkman, R., 1999. Surface wave propagation in mangrove forests. Fluid Dynam. Res. 24, 219–249.
Mazda, Y., Magi, M., Kogo, M., Hong, P.N., 1997. Mangroves as a coastal protection from waves in the Tong King delta, Vietnam. Mangroves Salt Marshes 1, 127–135.
McIvor, A.L., Möller, I., Spencer, T., Spalding, M., 2012. Reduction of wind and swell waves by mangroves. Published by. In: Natural Coastal Protection Series: Report 1. Cambridge Coastal Research Unit Working Paper 40. The Nature Conservancy and Wetlands International, p. 27.
Mcleod, E., Chmura, G.L., Bouillon, S., Salm, R., Björk, M., Duarte, C.M., et al., 2011. A blueprint for blue carbon: toward an improved understanding of the role of vegetated coastal habitats in sequestering CO2. Front. Ecol. Environ. 9, 552–560.
Melana, D.M., Atchue, W.J., Yao, C.E., Edwards, R., Melana, E.E., Gon-Zales, H.I., 2000. Mangrove Management Handbook. Department of Environment and Natural Resources, Manila (Philippines through the Coastal Resource Management Project, Cebu City, Philippines).
Menéndez, P., Losada, I.J., Beck, M.W., Torres-Ortega, S., Espejo, A., Narayan, S., Díaz-Simal, P., Lange, G.M., 2018. Valuing the protection services of mangroves at national scale: the Philippines. Ecosystem Services 34, 24–36.
MSU-SEAFDEC-BFAR-NSDB, 1974. Proceedings of the First Seminar of the Fishpond Cooperators' Program on Prawn Culture in Mindanao Held on November 25-29, 1974 in Naawan, Misamis Oriental. Mindanao State University-Institute of Fisheries Research and Development SEAFDEC, Aquaculture Department Bureau of Fisheries and Aquatic Resources, National Science Development Board.
Blue carbon. In: Nellemann, C., Corcoran, E., Duarte, C.M., Valdés, L., De Young, C., Fonseca, L., Grimsditch, G. (Eds.), 2009. A Rapid Response Assessment. United Nations Environment Programme, GRID-Arendal.
Nem Singh, J., Camba, A., 2020. The role of domestic policy coalitions in extractive industries' governance: disentangling the politics of "responsible mining" in the Philippines. Environmental Policy and Governance 30, 239–251.
Nickerson, D.J., 1999. Trade-offs of mangrove area development in the Philippines. Ecol. Econ. 28 (2), 279–298.
Nightingale, A.J., Eriksen, S., Taylor, M., Forsyth, T., Pelling, M., Newsham, A., Boyd, E., Brown, K., Harvey, B., Jones, L., Bezner Kerr, R., 2020. Beyond Technical Fixes: climate solutions and the great derangement. Clim. Dev. 12 (4), 343–352.
Ouyang, X., Lee, S.Y., 2020. Improved estimates on global carbon stock and carbon pools in tidal wetlands. Nat. Commun. 11, 317.
Pangilinan, J., 2017. Blue carbon initiatives in the Philippines. In: Salmo SG III, Favis AMT, Ting MNS, Lim ABU. State of the Mangrove Summit: Southern Luzon Proceedings. 1–2 October 2015. Ateneo de Manila University, Loyola Heights, Quezon City, pp. 48–49, 113 pp.
PCARRD, 1992. Philippine Council for agriculture, forestry and natural resources research and development (PCARRD). Mangrove productivity, 1991. PCARRD, Los Barios, Laguna, p. 120p (Book Ser. No. 127).
Pendleton, L.D., Murray, B.C., Crooks, S., Jenkins, W.A., et al., 2012. Estimating global "blue carbon" emissions from conversion and degradation of vegetated coastal ecosystems. PloS One 7, e43542.
Primavera, J.H., 1991. Intensive prawn farming in the Philippines: ecological, social, and economic implications. Ambio 20 (1), 28–33.
Primavera, J.H., 1993. A critical review of shrimp pond culture in the Philippines. Rev. Fish. Sci. 1 (2), 151–201.
Primavera, J.H., 1995. Mangroves and brackishwater pond culture in the Philippines. Hydrobiologia 295, 303–309.
Primavera, J.H., 2000. Development and conservation of Philippine mangroves: institutional issues. Ecol. Econ. 35 (1), 91–106.
Primavera, J.H., Esteban, J.M.A., 2008. A review of mangrove rehabilitation in the Philippines: successes, failures and future prospects. Wetl. Ecol. Manag. 16 (5), 345–358.
Primavera, J.H., Sadaba, R.B., Lebata, M.J.H.L., Altamirano, J.P., 2004. Handbook of Mangroves in the Philippines – Panay. SEAFDEC Aquaculture Department (Philippines) and UNESCO Man and the Biosphere ASPACO Project, p. 106.
Rep. of the Philippines, 2017. Government Initiatives on Blue Carbon. In: 9th National Climate Change Consciousness Week, November 22, 2017, Manila.
Richards, D.R., Thompson, B.S., Wijedasa, L., 2020. Quantifying net loss of global mangrove carbon stocks from 20 years of land cover change. Nat. Commun. 11, 4260.
Saenger, P., 1987. Mangrove use and conservation (p.97-103). In: Field, C.D., Dartnall, A.J. (Eds.), Mangrove Ecosystems of Asia and the Pacific: Status, Exploitation and Management Proceedings of the Research for Development Seminar Held at the Australian Institute of Marine Science, Townsville, Australia, 18-25th May 1985. AIMS.
Global status of mangrove ecosystems (No. 3). In: Saenger, P., Hegerl, E.J., Davie, J.D. (Eds.), 1983. International Union for Conservation of Nature and Natural Resources.
Saguin, K., 2016. Blue revolution in a commodity frontier: ecologies of aquaculture and agrarian change in laguna lake, P hilippines. J. Agrar. Change 16 (4), 571–593.
Satizábal, P., Dressler, W.H., Fabinyi, M., Pido, M.D., 2020. Blue economy discourses and practices: reconfiguring ocean spaces in the Philippines. Maritime Studies 19, 207–221.
Schatz, R.E., 1991. Economic Rent Study for the Philippine Fisheries Sector Program. Asian Development Bank Technical Assistance 1208 Philippines, Manila, p. 42pp.

Schnurr, J., Holtz, S. (Eds.), 1998. The Cornerstone of Development Integrating Environmental, Social, and Economic Policies. International Development Research Centre, Ottawa, Canada. CRC Press, Boca Raton, USA.
SEAFDEC, 1984. Prawn Industry Development in the Philippines. In: Proceedings of the National Prawn Industry Development Workshop, 10-13 April 1984, Iloilo City, Philippines. Tigbauan. Aquaculture Department, Southeast Asian Fisheries Development Center, Iloilo, Philippines.
SEAFDEC, 1989. Aquaculture for genuine development. Aqua Farm News 7 (3–4), 1–14.
SEAFDEC, 2004. Promotion of mangrove-friendly shrimp aquaculture in Southeast Asia. Report on the Regional Seminar-Workshop on Mangrove-Friendly Shrimp Aquaculture, Bangkok, Thailand, 24-27 June 2003. Report on the Mangrove-Friendly Shrimp Culture Project: Phase I (2000-2003). Aquaculture Department, Southeast Asian Fisheries Development Center Tigbauan, Iloilo, Philippines.
SEAFDEC, 2005. Report of the Regional Technical Consultation for the Development of Code of Practice for Responsible Aquaculture in Mangrove Ecosystems. Aquaculture Department, Southeast Asian Fisheries Development Center Tigbauan, Iloilo, Philippines.
Sievanen, L., Gruby, R.L., Campbell, L.M., 2013. Fixing marine governance in Fiji? The new scalar narrative of ecosystem-based management. Global Environ. Change 23 (1), 206–216.
Song, A.M., Cohen, P.J., Hanich, Q., Morrison, T.H., Andrew, N., 2019. Multi-scale policy diffusion and translation in Pacific Island coastal fisheries. Ocean Coast Manag. 168, 139–149.
Spaninks, F., van Beukering, P., 1997. Economic Valuation of Mangrove Ecosystems: Potential and Limitations. CREED Working Paper No 14. Collaborative Research in the Economics of Environment and Development. CREED), London UK.
Spurgeon, D. (Ed.), 1979. Give Us the Tools: Science and Technology for Development. International Development Research Centre, Ottawa.
Stonich, S.C., 1995. The environmental quality and social justice implications of shrimp mariculture development in Honduras. Hum. Ecol. 23 (2), 143–168.
Thomas, S., 2014. Blue carbon: knowledge gaps, critical issues and novel approaches. Ecol. Econ. 107, 22–38.
Thompson, B.S., Clubbe, C.P., Primavera, J.H., Curnick, D., Koldewey, H.J., 2014. Locally assessing the economic viability of blue carbon: a case study from Panay Island, the Philippines. Ecosystem Services 8, 128–140.
Thompson, B.S., Primavera, J.H., Friess, D.A., 2017. Governance and implementation challenges for mangrove forest Payments for Ecosystem Services (PES): empirical evidence from the Philippines. Ecosystem Services 23, 146–155.
UNESCO, 1979. The Mangrove Ecosystem: Scientific Aspects and Human Impact. In: Report of the Seminar Organized by Unesco at Cali, Colombia. 27 November - 1 December 1978 report.
UNFCCC Statement delivered at the Joint High Level Segment of COP 22 in November 2016 https://unfccc.int/sites/default/files/philippines_cop22cmp12cma1_hls.pdf.
Van Dijk, T.A., 1993. Principles of critical discourse analysis. Discourse Soc. 4 (2), 249–283.
Van Lavieren, H., Spalding, M., Alongi, D.M., Kainuma, M., Clüsener-Godt, M., Adeel, Z., 2012. Securing the Future of Mangroves. United Nations University, Hamilton, Canada.
Vanderklift, M.A., Marcos-Martinez, R., Butler, J.R., Coleman, M., Lawrence, A., Prislan, H., Steven, A.D., Thomas, S., 2019. Constraints and opportunities for market-based finance for the restoration and protection of blue carbon ecosystems. Mar. Pol. 107, 103429.
Vannucci, M., 1988. The UNDP/UNESCO mangrove programme in Asia and the pacific. Ambio 17 (3), 214–217.
Villamor, C.I., 2017. Status of mangroves and mangrove management in the Philippines. Salmo SG III, Favis AMT, Ting MNS, Lim ABU. State of the Mangrove Summit: Southern Luzon Proceedings. 1–2 October 2015. Ateneo de Manila University, Loyola Heights, Quezon City, pp. 31–32, 113 pp.
Walters, B.B., 2000. Local mangrove planting in the Philippines: are fisherfolks and fishpond owners effective restoratonists? Restor. Ecol. 8 (3), 237–246.
Walters, B.B., 2003. People and mangroves in the Philippines: fifty years of coastal environmental change. Environ. Conserv. 30 (3), 293–303.
Walters, B.B., Rönnbäck, P., Kovacs, J.M., Crona, B., Hussain, S.A., Badola, R., Primavera, J.H., Barbier, E., Dahdouh-Guebas, F., 2008. Ethnobiology, socio-economics and management of mangrove forests: a review. Aquat. Bot. 89, 220–236.
WAVES, 2016. Wealth accounting and the valuation of ecosystem services. Available from Philippines Country Report 2016. https://www.wavespartnership.org/sites/waves/files/kc/WAVES_CountryReport_Philippines2016_web.pdf.
WAVES, 2017. Policy brief: valuing the protection services of mangroves in the Philippines. Wealth accounting and the valuation of ecosystem services. Available from. https://www.wavespartnership.org/sites/waves/files/kc/Policy%20Brief%20Valuing%20Protective%20Services%20of%20Mangroves%20in%20the%20Philippines.compressed.pdf.
Wells, S., Ravilious, C., Corcoran, E., 2006. The Front Line: Shoreline Protection and Other Ecosystem Services from Mangroves and Coral Reefs. UNEP World Conservation Monitoring Centre, Cambridge, UK.
WFFP-WFF, 2015. No to Blue Carbon, Yes to Food Sovereignty and Climate Justice! Statement Issued by World Forum of Fisher Peoples' and World Forum of Fish Harvesters and Fish Workers in Relation to the COP21 Negotiations in Paris, 2015. Available from. https://worldfishers.org/2015/12/11/no-to-blue-carbon-yes-to-food-sovereignty-and-climate-justice.
White, A.T., Cruz-Trinidad, A., 1998. The Values of Philippine Coastal Resources: Why Protection and Management Are Critical. Coastal Resource Management Project, Cebu City, Philippines, p. 96p.
White, A., Deguit, E., Jatulan, W., 2006. Integrated coastal management in philippine local governance: evolution and benefits. Coast. Manag. 34, 287–302.
World Bank, 1973. Agricultural Sector Survey Philippines. Regional Projects Department. Asia Regional Office.
Worthington, T.A., Andradi-Brown, D.A., Bhargava, R., Buelow, C., Bunting, P., Duncan, C., Fatoyinbo, L., Friess, D.A., Goldberg, L., Hilarides, L., Lagomasino, D., 2020. Harnessing big data to support the conservation and rehabilitation of mangrove forests globally. One Earth 2 (5), 429–443.
Wylie, L., Sutton-Grier, A.E., Moore, A., 2016. Keys to successful blue carbon projects: lessons learned from global case studies. Mar. Pol. 65, 76–84.