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Coastal transitions: Small-scale fisheries, livelihoods, and maritime zone developments in Southeast Asia

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ABSTRACT

Across Southeast Asia, coastal livelihoods are becoming more diverse and more commodified, as maritime zone developments intensify. We review literature from the ten maritime states in Southeast Asia to assess how older and emerging forms of maritime zone developments influence the viability of small-scale fishing livelihoods. Applying a political economy lens to small-scale fisheries and maritime zone developments at regional scale, we show how small-scale fisheries persist as a significant coastal livelihood activity across the region, despite declining opportunities due to long-term intensification of fisheries exploitation. The paper further analyses the ways in which newer maritime zone developments, including aquaculture, land reclamation, special industrial zones, and tourism interact with fishing, and are reconfiguring coastal livelihoods in the region. Key trends that small-scale fishers and coastal communities must negotiate include deepening commodification, worsening environmental degradation, loss of access to fishing grounds, and an intensifying 'squeeze' on coastal space.

1. Introduction

Agrarian transformations that see rural small-scale producers shift towards more diversified livelihoods and increased integration into markets are well advanced in Southeast Asia, and are the subject of a substantial literature (Cramb et al., 2009; Hall 2011; Rigg et al., 2016). Similar, but less well documented transformations are occurring in the ocean, associated with the development of new frontiers of intensifying environmental governance and economic development (Campling et al., 2012; Longo et al., 2015), particularly under the rubric of the 'blue economy' (Belton et al., 2020; Satizábal et al., 2020). Across coastal Southeast Asia, new forms of maritime zone development including aquaculture, land reclamation, industrial parks, and tourism are expanding rapidly, while older economic sectors such as industrial fisheries continue to adapt to market pressures. At the spatial intersection of maritime change processes, the implications of such transformations for coastal livelihoods, particularly among small-scale fishers, are especially acute. In this paper, we draw on literature

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covering the 10 maritime states in Southeast Asia (Fig. 1) to assess how changing patterns of maritime zone developments intersect with the livelihoods of small-scale fishers.

While change in Southeast Asian livelihoods and the maritime zone is continual (Butcher 2004), the geographical scale and the pace by which multiple drivers of change converge to drive transitions is escalating. Notional commodity frontiers for industrial fisheries are expanding spatially and intensifying (Campling 2012), significantly reducing catches for small-scale fisheries (SSF). Aquaculture aims to generate economic value through producing fish in new ways (Saguin 2016), while diverse forms of maritime zone development including tourism and infrastructure further transform the economic and physical landscape of coasts. Intersecting with these changes are new institutional arrangements that generate distinct dynamics in coastal and maritime spaces (Foley and Mather 2019). In sites where the value of coastal land is increasing through new coastal developments, for example, potential for a range of 'grabbing' processes is high (Bavinck et al., 2017; Barbesgaard, 2019a), while access to fisheries is becoming more restricted due to a range of new spatial and trade-oriented governance mechanisms (Vandergeest et al., 2015; Bush and Marschke 2016). The local outcomes of such changes are often uneven, sharpening social and economic differentiation along the coast (Fabinyi et al., 2019). When assessing the ways in which coastal livelihood activities are changing, therefore, it is important to bring a critical gaze to the politics of resource access, use and control in such contexts, assessing how entitlements, claims and counterclaims are created, applied and contested (Li 2017; Belton et al., 2020).

Within the scope of this paper, we focus on how wider, multisectoral maritime zone developments affect small-scale fishers and their livelihoods. Much discussion of livelihoods in the wider literature tends to be focused on local (rural) context, underplaying the macro drivers of change and the wider economic, social, cultural and political relationships in which livelihood activities are embedded (Carr 2015; Scoones 2015). Following Carr (2015) and the wider field of political ecology more generally (Perreault et al., 2015), we focus on how situated processes of livelihood change are reflective of broader, 'translocal economic, political and environmental processes and structures' (Carr 2015: 336) – what we term as maritime zone developments. While not ignoring the role of human agency, such an approach emphasises place-based livelihoods as entangled in wider processes of change (Scoones 2015; Rigg et al., 2016), or 'immanent development' (Morse and McNamara 2013). We therefore view coastal transitions as composed of both 1.) micro-scale individual (women and men, young and old) and household livelihood activities and strategies, and 2.) macro-scale (national, regional and global) processes of maritime zone change. The focus is on how these wider processes of maritime zone change manifest in terms of vulnerability for SSF livelihoods, broadly understood as exposure to risk (Allison and Horemans 2006; Nunan 2010).

There is no widely accepted definition of SSF.[1] While scale is often characterised in terms of size of vessels or gear used (see Smith and Basurto 2019 for a recent review), for the purposes of this paper we view small-scale marine fisheries as characterised by their social relations of production and exchange. Many SSF are organised at the household level and embedded within wider kinship and community relations, yet simultaneously rely on market exchange (Johnson 2006). In contrast, industrial fisheries tend to be characterised by high levels of capital investment, and by migrant labour that operates offshore, away from the coasts. Recognising that industrial and SSF are frequently interlinked, the paper includes discussion of industrial fisheries to the extent that their activities affect SSF. Our focus on marine SSF excludes inland fisheries, but does include coastal gleaning.

'Notoriously hard to quantify' (Teh and Pauly 2018: 2), official data for marine SSF in Southeast Asia and elsewhere are typically significant underestimates (Teh and Pauly 2018). Globally, SSF account for 90% of capture fisheries employment along the value chain, and an estimated 113 million people are employed along SSF value chains or depend on SSF for subsistence (Illuminating Hidden Harvests 2021). Long subject to policy narratives about the need for modernisation, improved management and efficiency (Johnson 2006; Béné et al., 2010), SSF remain one of the most important livelihood activities along many Southeast Asian coastlines, and particularly so in rural coastal and island contexts (Pomeroy 2012; Teh and Pauly 2018). Even where other sectors of the economy are more significant in terms of GDP, for example oil in Brunei, SSF remain important for livelihoods and food security (Cinco et al., 2015; Teh and Pauly 2018).

In practice, women and men living in coastal areas of Southeast Asia often have multiple occupations, as part of diversified livelihood strategies (Bailey and Pomeroy 1996; Mills et al., 2017). Fishery related livelihoods are often complex, dynamic and adaptive, whereby fishing can be practiced as a part-time, supplementary, full-time or seasonal activity. Fishing might be a part of diversified livelihood strategies for individual fishers or within a broader household unit, or a 'fall-back' when other strategies (e.g. farming) are unavailable or unproductive (Harkness 2020; Béné et al., 2010). Migration and mobility is often a form of fishing livelihood strategy (Pauwelussen 2015; Zayas 1994). As with all livelihoods, fishing is also embedded within social relationships (e.g., with fish processors, traders, other fishers) (Johnson 2006; McWilliam et al., 2021). Different social and ethnic groups adopt different fishing livelihood strategies, and all are influenced by gender norms that influence the gendered division of labour along the fisheries value chain, access and control over fishery resources, and intra-household decision making (Lawless et al., 2019). Our use of the term SSF livelihoods, therefore, refers to a wide range of capture fisheries activities with varying levels of commitment, which are inextricably linked in with wider social, economic and political relationships.

In contrast to agrarian studies in the region, fewer scholars have applied a political economy lens (Campling et al., 2012) to the study of fisheries and coastal landscapes. Of those studies, usually the focus is on localised case studies from locations within a single country. Here we broaden the literature by applying this lens to fisheries and coasts at the regional scale, based on an extensive review of varied sources. In methodological terms, the paper is a critical review (see e.g. McDowell and De Haan 1997) that aims to identify and analyse key maritime zone developments and their relationship to SSF livelihoods. To assess the extent and nature of coastal transitions, the authors reviewed changing patterns of coastal livelihood activities and maritime zone developments in each country, based on literature in multiple languages and their specific expertise in each Southeast Asian country. While longer-term historical trends are identified where relevant, the focus is on developments since 2000. From these national assessments, we selected major developments in coastal resource use across primary (raw materials), secondary (manufacturing) and tertiary (service) sectors of the economy. SSF interactions with aquaculture, land reclamation and industrial developments, and tourism are the most prominent drivers of change within specific localities and across the region. For each activity, we reviewed and assessed the challenges and opportunities they present for SSF livelihoods in terms of vulnerability. Our interpretation of this literature draws on the wider insights of authors informed by our collective long-term residence, fieldwork and research experiences in all maritime countries of Southeast Asia.

After a section introducing the Southeast Asian context in greater detail, we focus first on changes in SSF, followed by analyses of aquaculture, coastal land reclamation, manufacturing, and tourism. We also consider the gendered nature of these transitions where identified

[1] Or related terms such as artisanal or inshore.

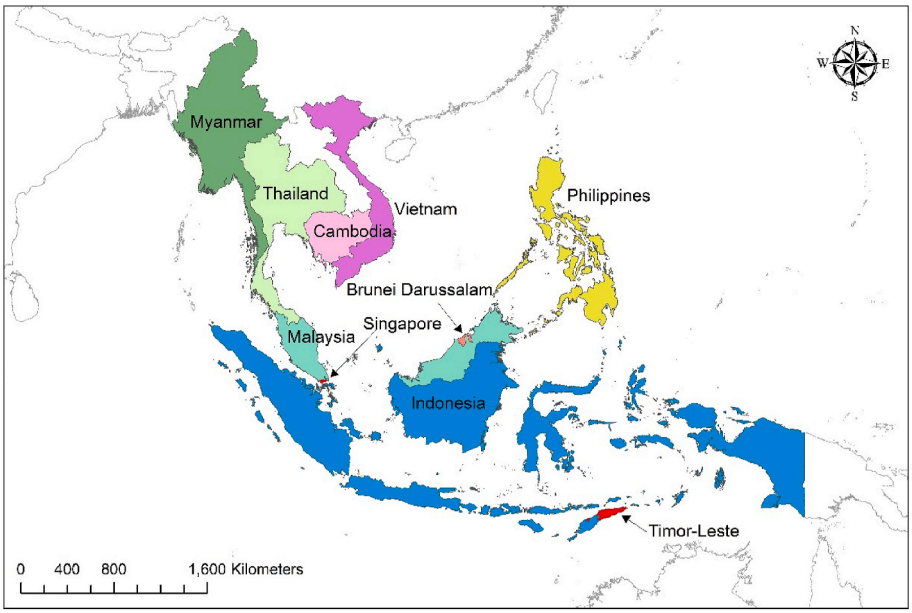

Fig. 1. Map of maritime states of Southeast Asia.

(Stacey et al., 2019).[2]

2. Southeast Asia: coastal resource use and governance context

Southeast Asia is a conventional unit of analysis in area studies (Nevins and Peluso 2008; Rigg and Vandergeest 2012), and is increasingly characterised by regional political institutions such as the Association of Southeast Asian Nations. It is a valuable region to study coastal transitions due to both its long history of maritime-oriented trade in many locations (Reid 1993; Butcher 2004), and its considerable social, political and economic diversity (Rigg and Vandergeest 2012).

The 10 maritime states have varied demographic, economic and fisheries production characteristics (Table 1). Indonesia, The Philippines, Thailand, and Vietnam are particularly prominent in terms of population and fisheries production, while Malaysia has a comparatively lower population relative to its high volume of fisheries production. Myanmar, Cambodia and Timor-Leste are less prominent in terms of overall production, and less wealthy. Singapore and Brunei are outliers as small rich countries. Yet they also play significant regional roles (for example in the trade and consumption of fish), and, as the paper shows, Singapore has in the past displayed examples of the coastal transitions (e.g., land reclamation) now taking place in other Southeast Asian countries.

In practice, governance of the coastal zone in Southeast Asia involves a range of formal and informal institutions (Steenbergen et al., 2019). In many countries, fisheries governance has been decentralised, with some countries such as the Philippines and Indonesia introducing spatial zones exclusive to small-scale fishers. Many countries in the region have implemented various forms of co-management or integrated coastal management, including Brunei, Cambodia, Indonesia, the Philippines, Thailand and Vietnam (Marschke 2012; Ratner et al., 2012; Cinco et al., 2015; Ferrol-Schulte et al., 2015). Customary institutions governing access to marine resources remain relevant in many parts of Southeast Asia and in some cases are recognised in state law, for example *sasi* in Indonesia (Halim et al., 2020). In the context of limited state resources and capacity, for example in Timor-Leste, private sector and civil society actors have been active in establishing fisheries co-management arrangements and repurposing customary institutions to function within modern state-based governance structures (Tilley et al., 2019; Steenbergen et al., 2019; Alonso-Población et al., 2018).

In recent years, there has been a widespread intensification of monitoring and regulation of coastal and marine spaces in Southeast Asia in ways that increasingly constrain access for small-scale fishers. Marine conservation initiatives, driven in many cases by international NGOs and donor agencies, have led to the expansion of marine protected areas both within individual countries and at a regional scale (for example, the Coral Triangle Initiative) (Clifton and Foale 2017), while the emerging concept of the 'blue economy' has paid limited attention to the priorities of small-scale fishers (Satizábal et al., 2020). Market-based governance through certification schemes (such as the Marine Stewardship Council Fisheries Standard) is expanding rapidly, including for many SSF (Bush and Marschke 2016). Trade measures from importing countries to address Illegal, Unreported and Unregulated fishing has forced some Southeast Asian countries to change or introduce legislation, which can have negative impacts on small-scale fishers, many of whom operate outside formal state reporting and governance systems (Song et al., 2020).

3. Coastal transitions

3.1. SSF

3.1.1. Intensification, decline and impacts on SSF livelihoods

Across Southeast Asia, SSF have intensified with the use of new technologies such as motorization and refrigeration, and the increasing demand from regional markets such as China (Fabinyi et al., 2012; Tezzo et al., 2018; Belton et al., 2019). Industrial fisheries also expanded rapidly across the region since the postwar period, contributing significantly to declines in SSF (Butcher 2004; Teh and Pauly 2018). In the Philippines, for example, major provincial contributors to overall

[2] There are many other coastal livelihood activities and maritime zone developments not covered here, including oil palm and other agricultural crops, artisanal and industrial mining, and various small-scale household enterprises and forms of waged labour that take place across rural to urban areas in Southeast Asia (Lamb et al., 2019; Mills et al., 2017; Pham et al., 2020). We recognise that, as in any study of rural change, there are multiple drivers of change that overlap and interact with each other (Cramb et al., 2009). Our aim is not to exhaustively document the diversity of changes taking place, but to identify key sectoral and cross-cutting themes emerging from the major forms of change.

Table 1
Selected demographic, economic and fish production characteristics of maritime states of Southeast Asia. Sources: World Bank https://data.worldbank.org/indicator/SP.POP.TOTL for population and World Bank Lending Status (https://datahelpdesk.worldbank.org/knowledgebase/articles/906519-world-bank-country-and-lending-groups), Sea Around Us (https://www.seaaroundus.org/) data for fisheries production by country (see Pauly et al., 2020; Pauly and Zeller, 2015 for full description of methods and data).

Country	Population (2020)	World Bank Lending Status (2022)	Marine small-scale fisheries production (1000 tons, 2018 data)	Marine industrial fisheries production (1000 tons, 2018 data)
Brunei-Darussalam	437,483	High income	5.38	11.57
Cambodia	16.7 million	Lower-middle income	6.85	196.04
Indonesia	273.5 million	Lower-middle income	2126.92	4626.84
Malaysia	32.4 million	Upper-middle income	710.07	1666.21
Myanmar	54.4 million	Lower-middle income	410.59	901.26
Philippines	109.6 million	Lower-middle income	797.2	1190.96
Singapore	5.7 million	High income	1.93	0.77
Thailand	69.8 million	Upper-middle income	620.71	4109.74
Timor-Leste	1.3 million	Lower-middle income	6.54	0
Viet Nam	97.3 million	Lower-middle income	854.21	2959.03

municipal (small-scale) fish catch have shown steep declines since the 1980s (Zamboanga del Norte and Negros Oriental) and 2000s (Palawan) (Anticamara and Go 2014). In Malaysia, biomass in coastal waters has decreased significantly since the widespread use of trawls in the 1960s, in some areas by more than 80% (DoF, 2019). Similar declines are evident even in parts of Southeast Asia where intensive industrial fishing began later such as Myanmar, where assessments suggest that marine fish resources have declined by as much as 90% since the early 1980s (Hosch et al., 2021). These resource declines have meant that small-scale fishers need to travel longer distances, fish for longer periods of time, and are catching lower volumes of fish, in many cases smaller-sized (Muallil et al., 2014; World Bank & EMR, 2013; Belton et al., 2019). New weather extremes, including unseasonal and stronger storms and waves, mean that small-scale fishers have greater difficulty using traditional knowledge and must use modern technologies such as GPS and sounders to cope with the uncertainty (Kongkaew et al., 2017, 2018, 2019).

These changes in fishing practices can have flow-on social effects, among them related to gender. In the Philippines, declining SSF in one municipality coincided with a boom in fish trading from industrial fisheries (Turgo 2014). Female fish traders became the primary breadwinners in households, while men, employed in the struggling SSF, became more responsible for looking after the home, and experienced a crisis of 'disrupted masculinity'. In other cases, declining returns from fishing and border controls have encouraged a shift into higher-risk livelihood activities, such as illegal forms of fishing, people smuggling between Australia and Indonesia, or moving into urban areas to seek work (Missbach 2016; Stacey et al., 2017). Singapore provides an extreme example of declining fisheries, where today the vast majority of Singaporeans interact with the fisheries sector only as consumers and very few Singaporeans fish to make a living (Corpus 2014).

3.1.2. *Ongoing significance of SSF livelihoods*

Yet SSF continues to be important for many people along the coasts, reflecting the various ways in which livelihood diversification unfolds. In many cases, transition into new opportunities for diversified or alternative livelihoods is difficult, and only certain households with more assets can do so with some level of success (e.g. Knudsen 2016; Thanh et al., 2021). In other instances, the lack of practical alternative livelihood options, compounded by ineffective fishery regulatory systems, has meant that people continue to fish in heavily exploited marine ecosystems, despite diminishing returns (Andriesse 2018; Warren and Steenbergen 2021). This can manifest in the shift from targeting a lower volume of higher-valued species, to a higher volume of lower-valued species, often by using advanced technologies (Akamine 2005; Prescott et al., 2017). As fish become scarcer they tend to become more expensive, which can allow fishers to keep fishing even as catches dwindle to much lower levels than before.

Showing close parallels with the persistence of smallholder agriculture throughout Southeast Asia (Rigg et al., 2016), SSF remains important as a buffering strategy to reduce vulnerability, or as one livelihood activity among many for households, the significance of which can vary over time (Marschke and Betcherman 2016; Betcherman et al., 2019). In many parts of the region, farming and fishing are especially important for villagers without tertiary education. In Thailand, for example, many are choosing to live in rural areas and pursue primarily agrarian livelihoods, which they prefer to wage work in construction, on industrial fishing boats, or in seafood processing factories (Vandergeest 2012).

Crucially, the viability of SSF as a livelihood activity often relates to labour mobility, an important component of many livelihood strategies (McDowell and de Haan, 1997). In Indonesia, for example, there are large migrant fishing populations who are either long-term fisher families, or seasonal migrants belonging most commonly to the 'Bugis-Buton-Makassar-Bajau' maritime populations of central and eastern Indonesia (Stacey and Allison 2019). This mobility can extend across international borders, for example Indonesian small-scale fishers in Brunei (Knudsen 2021). In the Philippines, households have traditionally seasonally fished across different parts of the country (Zayas 1994), which sometimes leads to permanent relocation (Knudsen 2012). In Timor-Leste, histories of forced relocation of inland communities to coastal areas prior to independence in 1999 resulted in some cases in a misfit between peoples' skills and identity and the available livelihood opportunities (McWilliam 2002; Mills et al., 2017).

Labour mobility continues to be important for fishing livelihoods, particularly for industrial fisheries (e.g. Belton et al., 2019). However, in SSF, mobility is increasingly being challenged. Conservation agendas have impacted the livelihoods of migratory indigenous peoples, whose fishing grounds are often in areas of high biodiversity significance (Pauwelussen 2015; Stacey et al., 2017), while increased border controls have reduced opportunities for fishing across transnational borders (Adhuri 2013; Stacey and Allison 2019). In parts of the Philippines, the mutually beneficial relationship between 'migrants' and 'original people' has deteriorated due to increased competition for declining fish resources, increased government regulation and rising demand for beachfront property, whereby migrant and seasonal fishers have become marginalised and more vulnerable to various forms of exclusion (Knudsen 2016).

3.2. *Aquaculture*

Aquaculture has undergone rapid growth in much of Southeast Asia, driven by demand from domestic and export markets, rapid technological change and national policies (Akber et al., 2020). Most aquaculture in the region has been concentrated in inland freshwater deltaic areas producing fish for domestic markets (Belton et al., 2018). The fastest growing coastal aquaculture subsectors have been shrimp, grown

mainly in coastal brackish water ponds, for export (particularly in Thailand, Vietnam, Indonesia and the Philippines) (Hall, 2004), and seaweed, grown in shallow marine environments for industrial processing and export (primarily in Indonesia and the Philippines) (FAO 2018). Production of high value fish in marine cages for domestic urban markets and export to China has been established in several countries in the region but continues at a far smaller scale (in volume terms) than inland fish culture. Shellfish farming on intertidal mudflats is significant in parts of Vietnam and Thailand. We review each of these and their relationship to SSF livelihoods in the remainder of this section, noting a range of pathways by which they can magnify or reduce vulnerability.

3.2.1. Shrimp

Shrimp farming is by far the most heavily researched and controversial of Southeast Asia's aquaculture subsectors. Established in Thailand in the 1980s through technology transfer from Japan and Taiwan, it has subsequently spread rapidly throughout coastal areas of the region, following an archetypal crop boom trajectory (Hall, 2011), punctuated by periodic collapses associated with disease outbreaks, regulatory policies and weather (e.g. Thitamadee et al., 2016; Joffre and Aung, 2012). In Indonesia and the Philippines, brackish water fishpond expansion for milkfish, or interchangeably with shrimp, has induced similar effects to those described here for shrimp farming (Hannig, 1988; Song et al., 2021). Shrimp farming interacts with fishing and other coastal livelihoods in four main ways.

First, mangroves and other sensitive coastal habitats are enclosed and converted to shrimp farms (Primavera, 1997; Thanh et al., 2021). The early expansion of shrimp farms in mangrove areas impacted fishers by preventing access to an important common access resource, and by destroying nursery habitat for marine fauna (Song et al., 2021). However, mangrove deforestation rates have slowed over the past decade in most of Southeast Asia, and remote sensing indicates that aquaculture is no longer among the primary drivers of mangrove conversion in the region (Richards and Friess, 2016).

Second, agricultural lands are often converted to shrimp ponds: often privately or state-owned land converted by smallholders *in situ*, but also expropriated from former users by powerful individuals, companies or the state (Skladany and Harris, 1995; Primavera 1997; Hall, 2011). The conversion of farmland (usually paddy) to shrimp ponds is closely linked to soil salinization (Flaherty et al., 1999), which can damage agricultural productivity whilst creating an environment suitable for shrimp cultivation (Thia-eng et al., 1989), as has been observed in the Southern Mekong Delta in Vietnam (Tho et al., 2008; Trong et al., 2010; Renaud et al., 2015; Pham et al., 2020). The shift from rice to shrimp can induce varied (negative and positive) outcomes for inhabitants of these areas, patterned in part by initial patterns of resource access and availability of off-farm alternatives (Pham et al., 2020). A case from Vietnam highlights these heterogeneous outcomes for small-scale fishers transitioning into aquaculture (shrimp and other high-value species), with early adopters and landowners experiencing economic success, while those remaining in SSF experienced heightened vulnerability (Thanh et al., 2021).

Third, the use of low market value 'trash fish' (many of which are juveniles) from Southeast Asia's marine fisheries for aquaculture feed has driven the latter's expansion (Funge-Smith et al., 2005). While this may have negative impacts on fish stocks and thereby fisher's livelihoods, the ability to sell bycatch may also allow some fisheries to remain economically viable (Funge-Smith et al., 2005). Fourth, seafood processing (of shrimp and other coastal products) in coastal zones such as Samut Sakhon in Thailand employs large numbers of migrant workers, many from Myanmar, who work under discriminatory labor policies (Vandergeest et al., 2021).

Shrimp farming has a range of gendered aspects, including a gendered division of labour, where men tend to occupy senior farm operating roles, and women are involved in processing (Sari et al., 2017; Goss et al., 2000). In Indonesia, shrimp farming has generated incomes and contributed to women's empowerment through increased influence over decision making within households, but has also increased time burdens for women, who were expected to continue domestic household work in addition to work in aquaculture (Sari et al., 2017).

3.2.2. Seaweed

Seaweed aquaculture has expanded significantly in Indonesia and the Philippines, and they are now the second and third highest producers of seaweed in the world, respectively. Seaweed from Southeast Asia is exported to China, the EU and North America, where it is used in the food, cosmetics, and pharmaceutical industries (FAO, 2018). In the Philippines, government agencies and donors promote seaweed farming because it is seen as more environmentally sustainable than capture fisheries, and has low financial barriers to entry. Often, seaweed farming forms part of a household's diversification strategy to reduce vulnerability, as a supplemental source of income (Andriesse and Lee 2017). In Indonesia, government support for seaweed production saw rapid market growth and infrastructure expansion in the sector, causing many coastal households to pivot to seaweed farming entirely. The sustained lucrative trade over time has elevated coastal people's standard of living, education and economic capital and has made them less reliant on capture fisheries (Steenbergen et al., 2017; Ramirez et al., 2020).

Yet transition into seaweed farming does not always reduce household vulnerability. In a case from Iloilo, Philippines, Andriesse and Lee (2017) found that seaweed farmers' vulnerability rose due to intense typhoons, disease, insecure incomes, and the emergence of regional monopsonies from China. Overall seaweed production in the Philippines has stagnated in recent years (BFAR, 2016). Fishing based livelihoods are sometimes seen as less vulnerable to short term shocks compared with seaweed farming, and provide a fall back activity in time of need (Harkness 2020). In a contrasting case in Bali, seaweed farming provided a fall back option for coastal residents forced out of tourism due to the impacts from COVID-19 (Davis 2021). This shows how a decline in labour demand for certain types of commodity production can lead coastal people to return to pre-existing livelihood strategies, such as fishing or farming.

3.2.3. Fish

Production of high value marine fish such as groupers and barramundi, as well as lobsters, has grown to supply domestic and export luxury seafood markets and tourism. For example, in Brunei, the government plans to develop offshore cages for barramundi (Department of Fisheries 2019), while Singapore aims to dramatically expand marine finfish production to ensure enhanced food self-sufficiency (Bohnes et al., 2020). Vietnam is particularly technologically advanced in marine fish culture.

Juveniles of some species are still harvested from the wild, though others are increasingly produced in hatcheries, and the earlier practice of stocking live wild fish in cages for fattening persist in some places (Fabinyi et al., 2012; Petersen et al., 2015), which impacts capture fisheries productivity. Heavy reliance on use of marine trash fish as feeds (recently increasingly replaced with pelleted feeds) provides another linkage to fisheries and has resulted in significant water pollution and disease problems (Hai and Speelman, 2020), particularly where cages are stocked at high density in sheltered bays with little current.

3.2.4. Molluscs

Culture of molluscs, particularly oysters, cockles and mussels, is a significant activity in some coastal areas of Thailand and Vietnam, where there are substantial domestic markets for these products (e.g. Szuster et al., 2008; Hang, 2018). Despite its low profile in the aquaculture literature, bivalve farming has sometimes given rise to conflicts as dramatic as those associated with shrimp. For instance, the Thai Navy recently sent patrol boats to observe an armed standoff between a group of 300 small-scale fishers, and cockle farmers who turned out in an opposing flotilla of 100 longtail boats (Chaolan, 2020). Struggles over

access are also reported in North Vietnam by Kleinen (2003) who described a 'gold rush' in shellfish culture on coastal mudflats leading to power struggles between the local authorities and a family that controlled much of local production and trade. This struggle culminated in the formalization of land titles for some commune residents and the marginalization of others who previously gleaned wild shellfish in these areas.

3.3. Coastal land reclamation and industrial developments

3.3.1. Land reclamation

Closely associated with high population densities and growing demand for land, maritime land reclamation has increasingly been taken up by governments in urban coastal zones, such as in the megacities of Jakarta and Manila (Sengupta et al., 2018). As a small, heavily urbanised island state, Singapore has been at the forefront of land reclamation projects. Since the first reclamation project in 1822, Singapore's land area has seen a gradual expansion and is today 25 per cent larger than 200 years ago (Powell 2021). Coastal reclamation for residential, recreational and commercial purposes expanded rapidly in the post-colonial period, driven by a booming economy, rapid population growth and high real estate prices. In a survey of four east coast fishing villages in the mid-1970s, certain fishing methods such as palisade traps and beach-seine could no longer be used as a result of land reclamation (Chou 1977: 21–22). Today, boat storage facilities are a key issue for small-scale fishers. While from the 1970s to 2007, the National Parks Board offered four smaller wharfs or boat storage areas for east coast fishermen affected by resettlement (Straits Times 2018), today, there is only one small wharf remaining.

In Indonesia and the Philippines, land reclamation programs have similarly impacted livelihoods of people in coastal communities. In 2018, the People Coalition for Fisheries Justice (KIARA, 2019) reported 41 reclamation projects across Indonesia, cumulatively covering 79,348 ha of coastal area and potentially impacting over 700,000 fishers. In Jakarta Bay, Ramadhan et al. (2016) estimate that the planned establishment of 17 artificial islands means a potential loss of over 14 million USD annually for fishers and aquaculture farmers. Former smaller boat operators have had to find alternative livelihoods or join as crew on larger commercial boats fishing further to the sea. The Jakarta bay case joins several other reported cases of land reclamation impacts, including in Benoa Bay, Bali (Warsilah 2021), and Makassar (Mengge 2018). In the Philippines, poor environmental planning and consultation for land reclamation in one case removed small-scale fishers' access to beaches, forced them to park vessels far away from their houses, and generated health problems caused by sewerage accumulating around residential areas (Fernandez 2019), while a recent plan for a 174 ha reclamation project in the city of Dumaguete will likely generate significant environmental impacts (Pal 2021).

Land reclamation also illustrates important regional dynamics. Much of the sand for land reclamation in Singapore has come from other parts of Southeast Asia, initially Indonesia or Malaysia, and then Cambodia, Vietnam and Myanmar. Between 2007 and 2016, Singapore imported 80.2 million metric tons of sand from Cambodia, representing a third of the city-state's sand imports (Lamb et al., 2019). Sand mining has led to erosion, river-bank instability, and habitat disruption in both source and infill areas (Hackney et al., 2020; Marschke et al., 2021). Coastal households reliant on sand-infused ecosystems – fishers, river bank farmers, and even eco-tourist operators, see no benefits to such sand exports, rather bear the ecological and livelihood consequences – a loss of fish species, noise pollution and a damaged environment (Lamb et al., 2019). Sand mining produces few jobs: for most workers, when sand mining opportunities do emerge, they are short-term, low-paid and transient (Marschke et al., 2021). Further offshore, Chinese island reclamation in the South China Sea has also impacted small-scale fishers from the region through environmental impacts (Smith et al., 2019).

3.3.2. SEZs and other forms of industrial development in coastal areas

Across many Southeast Asian countries, special economic zones (SEZs) have been developed along coastlines to increase economic growth and regional interconnectivity (Song et al., 2018). Intensifying trade between China and Southeast Asia has meant a deepening regional economic footprint, through investments under the Belt and Road Initiative (Gong 2020).

The main coastal SEZ in Cambodia, Koh Kong, operates near the Thai border in an area where households had typically fished or farmed (Marschke 2012), and now primarily employs women aged between 18 and 26 (Horlings and Marschke 2020). Originating from fishing and farming households, younger women pursue work in the SEZ to overcome household poverty and debt, livelihood decline, and a lack of formal work, or to experience city life (Horlings and Marschke 2020). Benefits of SEZ factory work include a predictable income, less exposure to climate risk, the ability to send household remittances, increased personal assets, and less workplace harassment. The latter results in households being willing to support younger female members to engage in this work. While SEZ work is also difficult to sustain, since women are not able to take maternity leave if they have a child and hiring preferences skew young, SEZ jobs offer temporary economic relief and, for some women, an opportunity to move beyond the constraints of the fishing village. This is altering the rural landscape, including gender population dynamics.

However, not all industrial development jobs end up benefitting local fishing villages in terms of remittances or offering jobs to younger people (e.g. for Timor-Leste, see Rose, 2017). In many instances, new physical developments along the coasts precipitate forms of coastal grabbing (Bavinck et al., 2017). In Myanmar, for example, offshore oil and gas development (and associated onshore infrastructure such as pipelines), ports and special economic zones, agricultural concessions, and conservation, has already resulted in or is likely to result in displacement of populations, or conflict over access to natural resources (MCRB, 2014; Barbesgaard, 2019a, 2019b; Thein et al., 2018). In Manila, special economic zones have been characterised as a form of exclusive development, aiming to attract foreign investment at the expense of the urban poor (Kleibert 2018). Entertainment City, for example, is a 120-ha SEZ of reclaimed land on the waterfront, centred around casino tourism. Environmental costs are also present. In Thailand, transformation of land and mangrove forests into industrial land associated with the emerging Eastern Economic Corridor (EEC) will affect a great number of fishing villages (Internet Law Reform Dialogue, 2019; Photisarn, 2019).

3.4. Tourism

Facilitated by government policies, growing wealth and better transport access, international tourist arrivals into Southeast Asia have increased rapidly over the past decades, from around 20 million in 1990 to more than 120 million in 2018 (Trupp et al., 2020). Thailand and Malaysia are the most popular destinations by some way, but arrivals into other countries including Vietnam, Indonesia and the Philippines are all growing rapidly, with recent years showing a particular increase in arrivals from East Asian countries such as China (Trupp et al., 2020). In some countries such as Cambodia, the Philippines and Thailand, tourism has expanded dramatically, driving revenue amounts to over 20% of GDP (Trupp et al., 2020). While the types of coastal tourism can vary significantly – from various types of eco-tourism, to luxury tourism to mass tourism (Dolezal et al., 2020) – they can reinforce each other's development over time (e.g. Fabinyi 2020). Here we highlight some of the pathways by which tourism affects the vulnerability of SSF livelihoods through environmental effects, and through more direct interactions with livelihoods.

3.4.1. Environmental effects

Much literature, state policy, and civil society perspectives on coastal

tourism in Southeast Asia highlights its potential as an alternative livelihood to fishing that is more environmentally sustainable, for example through non-extractive resource use activities (Lowe et al., 2019). Yet other forms of coastal tourism have generated significant environmental impacts that subsequently affect SSF livelihoods. In Malaysia, while the Malaysian National Tourism Policy (NTP) was formulated in 1992 to promote sustainable tourism in the country (Bhuiyan et al., 2013), unplanned development of tourism activities has had a negative impact on coastal ecosystems, particularly through sewage and waste disposal (Masud 2019). This is similar in other locations of mass coastal tourism, such as Thailand (Kongkaew et al., 2018; Kongkaew et al., 2019). In the Philippines, the popular tourist island of Boracay was temporarily closed in 2018 due to sewerage and pollution related issues (Fabinyi 2020).

3.4.2. Interaction with coastal livelihoods

Researchers have highlighted multiple ways in which fishers have transitioned into tourism livelihoods. Fishers have converted fishing boats into tour-guiding boats, gained employment through new wage labour opportunities in tourism associated livelihoods such as construction and transport, and set up small household enterprises such as accommodation, health and beauty, local boat transport, and selling local products (Stacey et al., 2021; Fabinyi 2020). In many cases tourism can be a supplemental or seasonal livelihood activity, while in other areas, it can involve a transition to a full-time tourism (Lasso and Dahles 2020; Fabinyi 2020). Tourism can also provide important and lucrative markets for high value seafood caught by small-scale fishers.

Many challenges have also emerged for fishing livelihoods as a result of the growth in tourism. When coastal land values increase with tourism, pressure is placed on those with weak land tenure to be evicted (Knudsen 2012; Fabinyi 2020). In Myanmar, coastal tourism has been confined primarily to a handful of beaches. In these areas there are reports of grabbing agricultural and beach front land for resort development, displacement of fishers (e.g. prevented from drying fish on beaches close to hotels), resettlement of communities, and land speculation resulting in escalating land prices, land sales and land grabs (e.g. MCRB, 2015; Nordby, 2018). In Thailand, burgeoning developments along the coasts have also deprived small-scale fishers of their shore land use activities such as mooring, and drying fishing nets (Chaiyabun, 2009). Inflation generated by tourism can mean those still on fishing incomes can struggle (Fabinyi 2020).

The distribution of benefits of coastal tourism can be highly variable. Several cases of dive tourism in the Philippines and Indonesia have shown how the transition from fishing into tourism livelihoods can lead to uneven social and economic impacts and outcomes (e.g. Oracion et al., 2005; Steenbergen 2013). In the Philippines coastal tourism has benefited wealthier migrant groups and further marginalised indigenous residents (Dressler 2011). The growth in tourism is gendered, with different sets of opportunities and challenges available to men and women in fishing households (Angeles et al., 2019). Mass tourism can also give rise to sex tourism, which brings significant social challenges to coastal communities formerly characterised by fishing livelihoods, such as Puerto Galera in the Philippines (Wiss 2013). More generally, the asymmetrical power relations between tourists and hosts in fishing communities mean that when disputes arise, livelihood repercussions can be significant through reputational loss (Lehman and Rungby 2017).

Coastal tourism livelihoods can be particularly vulnerable to international shocks, as demonstrated by the COVID-19 pandemic since 2020. While some have returned to fishing or seaweed farming (Davis 2021), fishers who have converted their boats to tourist vessels, and sold their fishing gears, in many cases are not able to easily return to fishing (Lasso and Dahles 2020). Demand for high-value marine products in areas of high tourism, such as parts of coastal Thailand, has dropped significantly (Chanrachkij et al., 2020; Ferrer et al., 2021). Southeast Asia has been particularly hard hit by declining international tourist arrivals, and residents who now rely on tourism as a major livelihood strategy have been heavily impacted (Trupp and Dolezal 2020).

4. Key trends in coastal transitions

Several broader trends cut across, and go beyond, the transition processes analysed above. In particular, key interactions between wider processes of maritime zone development and SSF livelihoods articulate with intensified commodification, worsening environmental degradation, and forms of coastal squeeze. While these interactions have always been present to greater or lesser degrees, their pace and scale is intensifying across the region.

4.1. Commodification

The patterns of resource use described so far involve intensifying processes of commodification, where increasingly strong links are forged with domestic and international markets that operate under the principles of exchange value (Longo et al., 2015). While fishing in Southeast Asia has long been subject to market dynamics (Firth 1975), strengthening demand and new technologies have facilitated their expansion, leading to exploitation of different species and product forms, and intensified competition for sellers of marine commodities (Nevins and Peluso 2008). Increasingly, the governance of fisheries is also subject to market dynamics, through certification interventions such as eco-labels and trade measures imposed by major importing countries, and the use of public-private partnerships (Satizábal et al., 2020; Song et al., 2020). Not only are the links to more market-oriented livelihoods becoming stronger, but the nature of these links is also changing. Coastal people now increasingly must secure livelihoods in physical contexts of highly developed landscapes, where value is realised through the production of secondary commodities made in factories, the development of artificial environments to provide opportunities for new economic growth, or through the commodification of natural landscapes for tourism. In particular, China's role in this process of rapid capitalist transformation appears set to continue to increase in significance.

While some households have been able to take advantage of this increased commodification through more secure waged labour jobs that can contribute to remittances (Horlings and Marschke 2020), or through better access to new markets (Fabinyi et al., 2012), in other instances this transformation has resulted in more precarious and insecure labour (Belton et al., 2019). While this variation reflects the differentiated outcomes of economic change more generally (Rigg et al., 2016), the underlying trajectory of the growth imperative that drives intensified commodification as a socio-ecological 'fix' to accommodate capital accumulation (Brent et al., 2020) has fundamental consequences for the natural environment.

4.2. Environmental degradation

Declines in fisheries resources in Southeast Asia documented in 3.1.1 are mirrored by broader processes of coastal and marine ecosystem degradation driven by local and global factors (Ferrol-Schulte et al., 2015). SSF, aquaculture, land reclamation, industrial developments and tourism all contribute to these challenges. For example, between 2000 and 2012 more than 100,000 ha of mangroves were lost in Southeast Asia, at an average annual rate of 0.18% per year (Richards and Friess 2016). Pollution is a major problem, where sources range from plastic and solid waste, to discharges from coastal tourism developments, agriculture, factories and oil spills (de Haan 2017; Kongkaew et al., 2018; Kongkaew et al., 2019). Southeast Asia's coral reefs are globally the most threatened, with 95% of coral reefs at risk from local threats, especially overfishing and destructive fishing methods (e.g. poison and blast fishing) (Burke et al., 2011).

Climate change is expected to worsen these challenges. Coral bleaching is a central threat to coral reefs, including in Southeast Asia

(Licuanan 2020), as are the related issues of variable sea levels, storms and ocean acidification. Climate change is already contributing to changes in coastal livelihoods in Southeast Asia. For example, Cyclone Nargis in 2008 left over 138,000 people dead in the Ayeyarwady Delta, including the loss of many lives on fishing rafts at sea, and destroyed large numbers of homes, farms, fishing vessels and gears (Doan and Mark, 2008; Thein et al., 2019). Similarly, Typhoon Haiyan in 2013 highlighted the vulnerability of small-scale fishers to extreme weather events, with significant impacts on fishing communities (Monteclaro et al., 2018). Across all sectors of society, the livelihoods of small-scale fishers are becoming exposed to greater levels of environmental risk.

4.3. Mobility and coastal squeeze

In many cases, mobility for small-scale fishers has become less flexible. As fish stocks decline, and governance of the marine zones through conservation initiatives expands, the result is forms of 'sedentarisation' and heightened competition for scarce resources (Knudsen 2012; Stacey et al., 2017; Fabinyi et al., 2019). While productive fishing opportunities still attract (typically poorer) migrants in some instances, as described in Myanmar (e.g. Okamoto, 2010), or for industrial fisheries, in many other instances, migration is towards other forms of economic activity, such as wage labour in special economic zones and/or in urban and peri-urban areas, or for tourism. Pressures from wider-scale processes also impact upon mobility. COVID-19 impacted significantly on fishers' mobility as well as their supply chains (Ferrer et al., 2021), while geopolitical tensions in the South China Sea also impact upon the ability of people from Vietnam and the Philippines to travel to previous fishing grounds (e.g. Roszko 2020). Overall, a process of increased territorialisation is unfolding across coastal and maritime spaces (Vandergeest et al., 2015), resulting in 'coastal squeeze' (Gupta and Bavinck 2017).

While grabbing processes are a typical component of coastal squeeze (Bavinck et al., 2017), everyday processes of differentiation related to migration, gender, ethnic identity and position in the value chain (Fabinyi et al., 2019; Andriesse and Lee 2021; McWilliam et al., 2021) are a key element of coastal transitions but are often overlooked in accounts that privilege dramatic or highly visible large scale events (Barbesgaard, 2019b). Crucially, such dynamics of exclusion are intensified in a context of declining resources. While SSF activities remain focused on and around the sea, secure land tenure is a key factor in success or otherwise of small-scale fishers' transitions into new economic opportunities, such as aquaculture (Marschke and Betcherman 2016; Thanh et al., 2021) or tourism (Fabinyi 2020). Coastlines are spaces where land tenure is typically more ambiguous than in many inland areas and, especially with increased activity in coastal areas, where access to these spaces and resources is subject to particularly intense competition (Knudsen 2012; Belton et al., 2020; Fabinyi 2020). They therefore serve as a particularly strong exemplar of the sorts of challenges facing smallholders vulnerable to exclusion and marginalization across Southeast Asia more generally (Li 2017).

5. Conclusion

This paper has assessed the ways in which key maritime zone developments interact with SSF livelihoods, contributing to the literature on SSF by locating them within historical and newer processes of agrarian change. In doing so, the paper has extended the literature on agrarian change by expanding its geographical reach to address maritime settings at a regional scale. We have emphasised how SSF livelihoods are entangled in multiple drivers of change, some older and some more recent.

As with related processes of agrarian change in Southeast Asia (Cramb et al., 2009), coastal transitions are not linear (Belton and Thilsted 2014). While coastal transitions away from capture fisheries have effectively taken place in locations such as Singapore, in larger coastal nations, fishing is and will continue to be a major source of rural income generation. Despite the emergence of narratives about a more efficient blue economy, SSF remain a dominant activity across coastal Southeast Asia (Pomeroy 2012; Teh and Pauly 2018) that support livelihoods. Particularly in times of shock and vulnerabilities, such as COVID-19, SSF persists as part of wider livelihood portfolios that can be drawn on in the context of precarious living (Harkness 2020; Marschke et al., 2020). Frequently, diversification and occupational multiplicity over time and within households is the result.

Beyond the question of the extent of transition from one sector to another is the extent to which small-scale fishers have been able to effectively negotiate and benefit from these changes, or whether their boats have been lifted by the rising tides of economic transformation sweeping across Southeast Asia (Li 2017). Diversification can sometimes reflect distress and precarity, while under other circumstances it can reduce vulnerability for a household (Andriesse 2020; Horlings and Marschke 2020; Thanh et al., 2021).

While the diversity of coastal transitions has led to varying levels of success for small-scale fishers engaging in them, the broader context of intensifying commodification, widespread environmental degradation, and coastal squeeze together comprise a setting of heightened pressure on livelihood activities that compound people's vulnerability. Small-scale fishers negotiate new livelihood opportunities, but increasingly within the constraints set by these broader structural processes.

An important feature of these processes is their mutually reinforcing nature: the growth imperative driving commodification leads to unsustainable resource exploitation, and the movement of diverse and contested interest groups to coastal spaces. Counter-narratives and practices exist in the form of social movements and civil societies advocating for social justice and recognition for small-scale fishers (Satizábal et al., 2020), new international governance guidelines for SSF (Jentoft et al., 2017), and interventions focused on inclusive forms of economic development (Andriesse and Lee 2017). Yet without more fundamental changes to the pathways of immanent development characterised by the intensification of commodification, environmental decline, and coastal squeeze, SSF livelihoods will experience increased vulnerability.

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