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The geopolitical economy of Thailand's marine plastic pollution crisis

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Abstract: *Currently approximately 9 million tons of plastic enter the world's oceans annually. This is a major transboundary problem on a global that threatens marine wildlife, coastal ecologies, human health and livelihoods. Our concern in this paper is with the environmental governance of marine plastic pollution that emanates from Thailand, the sixth biggest contributor globally. By zooming in on land-based polluters in Thailand, we highlight both the systemic nature of the marine plastic problem and the relative impunity with which drivers of transboundary environmental harm function at all levels of governance. Drawing from 19 interviews conducted with actors from the public, private and non-profit sectors, we examine three stages of the problem: production, consumption and waste management. We found that three major barriers prevent Thailand's government, private sector and citizens from engaging in the sort collective action needed to reduce marine plastic pollution. They are: (i) insufficient incentives to enact political change; (ii) scalar disconnects in waste management; and (iii) inadequate public and private sector ownership over plastic waste reduction. As the state alone cannot change corporate and consumer behaviour, we argue that multi-stakeholder efforts across organisational scales of governance and administrative boundaries are needed to address the barriers.*

Keywords: *marine litter, plastics production, Thai environmental governance, Thailand marine plastic pollution, transboundary commons, waste mismanagement*

In June 2018, about 80 plastic bags weighing 8 kg were found inside the stomach of a beached pilot whale in southern Thailand. Although veterinarians tried to save it, the plastic had torn the whale's stomach and it died a few days later (Resnick-Ault, 2018). The death of the whale serves as a stark reminder of a growing transboundary environmental problem: the deleterious impacts of plastic debris on the health of the world's marine ecosystems.

Accounting for 60–80% of all marine litter, plastic pollution takes either the form of user-end products (plastic bags, bottles and packaging) or industry raw materials (resin, granules and pellets) (Todd *et al.*, 2010; Pawar *et al.*, 2016). While it is not possible to know exactly how much plastic pollution reaches the sea annually, it is currently estimated that over eight million tons of plastic litter are dumped, carelessly handled or accidentally released at an estimated cost to the global economy of US

\$2.5 trillion per year (Jambeck *et al.*, 2015; Beaumont *et al.*, 2019). More than 80% of the world's ocean plastic pollution originates in Asia (Faulder, 2018), where increasingly affluent urbanising societies are the fastest growing consumers of plastic worldwide (Thevenon *et al.*, 2014). In Thailand alone, plastic usage has increased by 7–8% annually (Apinanwattanakul, 2018), with individual consumption (on average eight bags per day) generating around 200 billion bags each year (Styllis, 2018).

This is a major transboundary problem on a global scale that seriously threatens marine wildlife, coastal ecologies, human health and livelihoods. Some 267 species of marine animals have been adversely impacted by plastic debris through entanglement or ingestion, although this number will invariably increase as smaller species are studied (Moore, 2008: 131). Humans who have consumed plastic by eating

marine animals have experienced increased health problems such as cancer and infertility (Sharma and Chatterjee, 2017). Garbage patches composed of micro-plastic particles, chemical slurry and other human-made debris attract invasive alien species such as bacteria, algae, diatoms and barnacles, which absorb polychlorinated biphenyls from ingested plastics that dramatically reduce endemic marine biodiversity (Derraik, 2002). While 20% of plastic waste is generated by ocean fishing, aquaculture and nautical missions, the great majority of plastic litter, around 80%, is land-based (Clapp, 2012). Plastic debris makes its way to the ocean through rivers, drainage systems, storm runoff, industrial processes, beach visitors, ineffective waste management and illegal dumping.

In this article, we analyse the terrestrial origins of Thailand's contributions to plastic marine pollution as a problem of governing the transboundary environmental commons. Unlike the allied concepts of global commons and transnational commons, which only denote the spatial arrangements that govern common pool resources across international borders, transboundary commons refer to the governance of shared resources across administrative boundaries within as well as between nation-states (Miller, 2019). Critical social science engagement with the transboundary dimensions of common property in Asia has directed attention to questions of environmental (in)justice in communal resource claims (Yanagisawa, 2015; Galappaththi and Berkes, 2015; Green *et al.*, 2017) and to the enclosure of common pool resources for their sustainable commodification or conservation (Hirsch, 2000; Tubtim and Hirsch, 2004; Yong, 2013). In resource-rich but land-scarce Southeast Asia, transboundary environmental commons are increasingly being shaped and redefined by market forces that work through an extraordinary heterogeneity of private-public, private-societal and co-governance partnerships across mixed property regimes (Miller *et al.*, 2020). The concept of a transboundary commons thus affords consideration of the diverse corporate, state and societal actors who function at multiple organisational scales of environmental governance, and whose role in perpetuating the unfolding 'tragedy' (Hardin, 1968) of pollution of the oceanic commons has thus far been largely ignored or overlooked. While social science

scholarship has endeavoured to understand the different levels at which transboundary commons might be enacted to provide collective redress for the marine plastic problem (e.g. via transboundary publics that promote ethical forms of consumerism), questions of sharing and conserving common pool resources remain predominantly fixed at the supranational or regional scale of governance (Hirsch, 2016).

We treat transboundary commons as a function of governance in dealing with the cumulative environmental threat of marine plastic pollution. Our focus is on the land-based production of marine plastic pollution in Thailand because of its role as the fifth biggest producer of marine plastic globally and the second largest in terms of individual contributions (Ocean Conservancy and McKinsey Centre for Business and the Environment, 2015). By zooming in on land-based polluters in Thailand, we aim to highlight both the systemic nature of the marine plastic problem and the relative impunity with which drivers of transboundary environmental harm function at *all* levels of governance. This is important because land-based drivers of oceanic pollution either tend to be studied in aggregate national terms (such as Thailand's total contribution to marine plastic debris) or overlooked entirely in international environmental law.

We argue that it is important to take such a multi-scalar, multi-sector view of marine plastic pollution for at least three reasons. First, as noted, plastics are discharged into the ocean via diverse pathways that can be traced back to land-based anthropogenic activities. Second, multi-level and multi-sited communal activities are needed to provide redress for this problem because the higher the organisational scale of environmental governance, the more likely it is that overlapping spheres of authority will render resource rights and responsibilities ambiguous and therefore unenforceable (Perrings, 2012; Wiering and Verwijmeren, 2012). Both international legislation (e.g. the 1972 Convention on the Prevention of Marine Pollution by Dumping Wastes and Other Matter) and transnational treaties among blocs of nation-states have been critiqued for their failure to enforce compliance with global environmental standards. In the absence of any international plastics treaty with legally binding targets and timelines (Borrelle *et al.*, 2017), major perpetrators of plastic

marine pollution frequently evade punitive action.

Third, in the specific regional context of ASEAN (Association of Southeast Asian Nations), we argue that political sensitivity among post-colonial nation-states about outside interference necessitates a multi-layered approach to dealing with marine plastic pollution that does not place the sole onus of responsibility on individual countries. Even Thailand, which prides itself on never having experienced European colonisation in the same way as its neighbours, is deeply entrenched in ASEAN's geopolitical culture of 'engaged non-indifference' to environmental cooperation (Pelling, 2011: 85). As such, the success of transboundary environmental commons in mitigating plastic marine pollution will likely hinge on economic strategies such as green growth partnerships that highlight collective benefits while actively minimising geopolitical tensions.

In what follows, we critically examine why land-based strategies for mitigating marine plastic pollution are essential for improving transboundary governance of the oceanic commons. We begin by foregrounding transboundary issues in governing global plastic marine pollution. Thailand's governance structure of plastic pollution control is then evaluated. Drawing from 19 primary source interviews conducted in August 2018 with actors from the public, private and NGO sectors, we examine three consecutive stages of the plastic ocean pollution problem: production, consumption and waste management. We conclude by suggesting avenues forward to formulate more effective and inclusive transboundary governance strategies to reduce marine plastic pollution in the oceanic commons of Southeast Asia.

Transboundary governance of a global environmental problem

In examining the governance of plastic marine pollution, we are concerned with geographies of human environmental practice rather than with the transboundary flow of plastic debris itself. We do recognise, however, that the biophysical properties of anthropogenic waste shape their spatialities of governance. This distinction between humans and their waste is important because the concept of governance places the

onus of responsibility on human agency rather than on non-human or non-living actants. This approach departs from actor-network inspired scholarship (Latour, 2005) that ascribes a 'transgressive' agency (Beery, 2016) to non-living actants such as plastic products that transform from passive entities into transboundary pollutants when they kill endemic species and destroy ecosystem functions (Mason, 2008).

As a function of transboundary governance, plastic marine pollution is a human-generated problem that cuts across multiple spheres of competing interests. We define transboundary environmental governance as the *collective* of state, societal and private sector decision-making, norms and practices that shape the formal and informal (re)distribution of environmental costs and benefits across territories and timeframes (Miller, 2019). Our emphasis on networked environmental collectives across bordered spheres of human interest is tied to our understanding of the concept of transboundary commons. As political spaces for governing common pool resources across administrative borders within and between countries, transboundary commons require geographically dispersed communities of environmental practice who either come together to protect a particular environmental good or to respond to a cross-border environmental threat or crisis.

The convergence of common interests across borders and sectoral boundaries is crucial in establishing transboundary commons because the attainment of environmental security necessitates collective recognition of the 'interconnectedness of securities' (Dalby, 1992: 516). The efficacy of governance responses to plastic marine pollution thus requires, as a starting point, consensus among key stakeholders that their combined activities constitute ecologically unsustainable behaviours that erode environmental security by creating a common problem (Ansari *et al.*, 2013). If people do not see their lives and livelihoods as being intertwined in the face of an emerging threat or crisis and identify their own behaviours as contributing to that problem, then they will not be incentivised to change their environmental behaviours and adopt more sustainable modes of production, consumption and waste management.

Such consensus about the underlying causalities, drivers and remedies for plastic marine pollution is currently lacking at all organisational levels of environmental governance. At the international level, the introduction in 1982 of the United Nations Convention on the Law of the Sea (UNCLOS) aimed to establish a legal framework to protect and preserve the marine environment, but it does not sufficiently address the key sources, types, and entry points of marine pollution. Nor does UNCLOS or any other international legislation properly acknowledge the terrestrial origins of the vast majority of plastic waste (Landon-Lane, 2018). In the absence of legally binding mechanisms to reduce global plastic production and consumption and increase recycling among land-based governance systems, international institutions such as UNCLOS and the non-binding Honolulu Strategy merely act as 'dialogue forums' (Dauvergne, 2018). Ethical consumer norms and cultures are neither strong nor comprehensive enough in their current form to offset these deficits in international law (Dauvergne, 2018; Landon-Lane, 2018). Moreover, the plastic industry has been effective in pushing back against policies that seek to curb plastic consumption (Clapp and Swanston, 2009) by investing in marketing strategies aimed at convincing consumers to take responsibility for their own waste (Fuhr and Patton, 2019). The governance of plastic pollution is thus fragmented both horizontally – between sectors and product lines – as well as vertically, with loopholes and limited implementation at all organisational levels (Dauvergne, 2018).

At the supranational or regional level of governance among blocs of nation-states, there has been some success in coordinating transboundary governance efforts, but not in Asia. The European Parliament voted in October 2018 to ban single-use plastics (e.g. plastic bags and bottles) by 2021 (Yeginsu, 2018). Caribbean countries have also implemented a Regional Action Plan on Marine Litter Management (Vince and Hardesty, 2018). Across Asia, however, collective action remains limited. In Southeast Asia, home to four of the world's worst six plastic polluting countries – Thailand, Indonesia, the Philippines and Vietnam (Jambeck et al., 2015) – the transboundary terrestrial dimensions of plastic marine pollution

warrant a region-wide response. ASEAN countries agreed in January 2019 to the Bangkok Declaration on Combating Marine Debris in the ASEAN Region, which will serve as a guide to tackle plastic pollution. Yet this document lacks legally binding responsibilities and concrete action plans (Gong, 2019). Its premise on voluntary compliance reflects the 'ASEAN Way', which is grounded in non-interference in the sovereign affairs of ASEAN member countries (Yukawa, 2018).

Given these deficits at the international level and regional levels, there is a need to better understand how national and sub-national processes connect with higher organisational scales of governance and interact across sectors of expertise. Specifically, more domestic political economy analyses are required to reveal 'underlying interests, incentives and institutions that enable or frustrate change' (DFID, 2009: 1). Such political economy studies could help to identify opportunities for policy reform, existing barriers, and ways of addressing obstacles to the adoption of more sustainable ecological behaviours. For instance, at an Inter-Parliamentary Union hearing to plan for the 2017 Ocean Conference, several country representatives stated that they want to address the problem of marine plastic pollution within their borders, but they lacked enforceable legislation and supporting infrastructures to build compliance with sustainability measures across scales and sectors of governance (Borrelle et al., 2017).

Thailand's contribution to transboundary plastic pollution

Production and consumption

Thailand's culture of plastic consumption has developed over half a century. In the 1950s, zero micro-plastics were detected in sediment core collected from the Gulf of Thailand, suggesting that the 1960s marked the beginning of the nation-wide transition to plastic consumption (Matsuguma et al., 2017). The scale of plastic consumption in Thailand rapidly increased from 1970s and 1980s alongside the worldwide adoption of single-use plastic bags (Rivers et al., 2017). Previously, Thailand had used banana leaves, bamboo, earthenware pots and

tin cans for packaging. By 2017, 41% of plastic products used in Thailand were for packaging (see Fig. 1) (Pollution Control Department (PCD), 2019). As the head of a local NGO observed, 'Natural containers have been replaced by plastic containers' (11).

When Thailand's plastic industry began to develop in the 1960s, it relied on imported resin. By the late 1970s, however, Thailand's petrochemical industry was producing its own plastic resin. In 1996, the country achieved full-integration of plastic production. Around 70% of Thailand's plastic resin production serves the domestic market while the rest is exported, mainly to other Asian countries (Plastic Industry Club, 2009). Thailand's petrochemical sector is currently the second largest in Southeast Asia and sixteenth in the world (Thailand Investment Review, 2017), with the plastic industry comprising 7% of the country's gross domestic product. As a board member of Thailand's biggest plastic company, PTT Global Chemical Public Company Limited (PTTGC), proclaimed: 'We are one of the top biggest exporters of plastic in the world... There are 200,000 workers in the plastic industry and it supports one million people' (4).

The growth of Thailand's plastic industry has fuelled domestic consumption. By 2015, according to the Plastic Waste Management Plan 2017–2021, Thailand was producing 2.33 million tons of plastic for domestic usage annually (PCD, 2017). With an average individual consumption rate of 40 kg per year, Thailand is the highest per capita plastic consumer in Asia (Corben, 2017). Nationwide, retail stores and

convenience stores each consume 30% of plastic bags, while open market vendors use the remaining 40% (5). Retailers prefer plastic bags because of their low cost: one kilogram of plastic bags is only 120 baht (US\$3.65) (8). To minimise expenditure, producers make plastic bags using thin resin, necessitating two bags for heavier items (10). Little wonder, then, that plastic has become woven into the social fabric of Thai society. As one Thammasat University Professor explained, 'For the past 20-30 years, anything plastic has become our culture or way of life' (10). A Siam Cement Group senior official added that 'street food is part of our lifestyle and now street food needs plastic' (13).

Waste management

Although Japan is a high-producing plastic country, its successful waste management system has kept plastic discharge into marine environments relatively low (Hornyak, 2017). By contrast 80% of Thailand's marine plastic pollution is linked to land-based waste that is inefficiently managed (8, 16). According to the PCD, which is under the Ministry of Natural Resources and Environment (MONRE), in 2016 some 26% of 1.3 million tons of garbage generated by Thailand's 23 coastal provinces washed into the ocean (Thai PBS, 2018). A 2017 study by Thailand's Department of Coastal and Marine Resources disaggregated this land-based marine plastic debris into contents comprising 24% plastic bags, 20% plastic bottles, 18% glass bottles, 12% polystyrene foam, 10% plastic wraps, 6% plastic caps, 5% plastic straws and 5% cigarette butts (Department of Coastal and Marine Resources, 2017).

A nationwide culture of littering underscores this problem. Whilst illegal, waste disposal in or around drainage canals, rivers and the ocean remains commonplace (1, 4, 11). An official of Rangsit Municipality near Bangkok admitted that in her city, 'some people lack awareness and throw away plastic bags into waterways' (15). Additionally, an unknown number of ships secretly dump their waste into the ocean (11). One interviewee blamed poor law enforcement, claiming that 'police are not strict about littering. Officers are a bit timid to confront those who litter' (4). Although many tourists litter on beaches, police officers are said to be

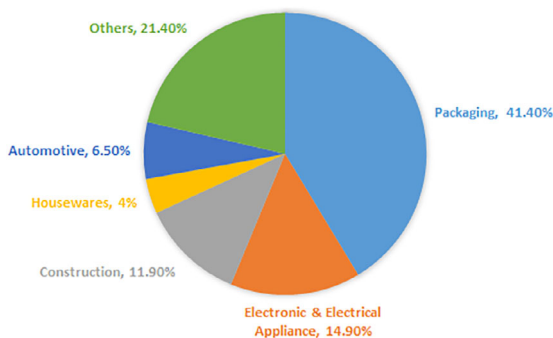


Figure 1. Breakdown of plastic products used in Thailand in 2017 (Pollution Control Department, 2019) [Colour figure can be viewed at wileyonlinelibrary.com]

reluctant to issue fines because of their importance to the national economy (5, 8, 11). As a local NGO official explained, 'Convenience is a priority to service tourists' (11).

There is currently no civic culture to support the sorting and cleaning of plastic waste. The head of the Thai Plastic Club lamented that 'if Thais were taught properly like the Germans and Japanese, they would separate and clean their waste' (9). The head of Chulalongkorn University's Zero Waste programme agreed that 'waste separation should be the duty of everybody, not only the local government. The perception is not yet there' (12). Condominium management systems exacerbate this problem by not providing recycling stations to separate different items (9, 10). Most used plastic packaging is contaminated by food remnants, making it too time-consuming and costly for waste pickers to invest in cleaning and recycling (17). Consequently, the overwhelming majority of plastic packaging is directly sent to waste sites; in 2017 only 25% of Thailand's plastic waste was recycled (PCD, 2018; see also Rujivanarom, 2018b).

At the community and household scales, inadequate waste management infrastructure fuels the plastic pollution problem. Rubbish bins are often too small, uncovered and infrequently collected. In floods and heavy rain, litter spills out of waste bags and enters waterways (10, 14). For example, a survey of Maka Sarakham Municipality in northeast Thailand revealed that 65% of garbage bins constituted uncovered baskets (Yukalang *et al.*, 2017a, 2017b). This 'representative example of many local governments in Thailand' (Yukalang *et al.*, 2017a, 2017b: 1) highlights the way in which faulty or inadequate rubbish bins severely impede effective waste management. Local governments tend not to replace stolen curb-side rubbish bins or if residents complain that they are unsightly and smelly. As a result, black plastic waste bags without bins are frequently left on curbs for dump trucks to collect, which leak into open drains, canals and rivers when waste pickers or animals tear them apart or they overflow (Yukalang *et al.*, 2017a, 2017b). After dump truck workers collect waste from residential areas, informal sector waste pickers only extract valuable products that they can sell to recycling companies, such as high-quality plastic products. As a result, items like single-use plastic bags and other low-value

items such as straws and cups are not typically collected by waste pickers (17). In recent years, Thailand has also been importing plastic waste, which is generally sent to recycling factories or incinerators for conversion into energy. While most of Thailand's plastic waste imports are processed by recycling factories, there is substantial leftover residue that contributes to the country's marine plastic pollution (4). Moreover, since January 2018, when China stopped importing plastic waste as part of its 'National Sword' policy, Thailand, like other countries in East and Southeast Asia, struggled to expand its domestic capacity to keep pace with surging waste imports that China once absorbed (Chantanusornsiri, 2018). In 2018 alone, Thailand received 481 000 tons of plastic waste imports, compared with 70 000 tons in 2016 (Macan-Markar, 2019).

With Thailand's waste disposal facilities critically unprepared to deal with burgeoning volumes of plastic scrap, it has been estimated that around 70% of the country's waste is mismanaged (5). In 2018, the PCD estimated that of 27.8 million tons of solid waste generated, 39% was properly disposed, 34% utilised (for recycling, producing animal feed and fertiliser), and 27% improperly disposed, including via open dumping (PCD, 2019). As of 2018, Thailand had 2764 operating waste disposal sites, of which 647 were properly implemented and 2117 were deemed faulty (PCD, 2019). According to the head of an international NGO working on marine plastics, 'most landfills [in Thailand] are insecure and very simple dump sites. Since they are not well-managed, waste will leak into canals and onto beaches' (14). For example, in 2017, when Southern Thailand experienced heavy flooding, a lot of plastic debris washed into the sea (1). Yet even under normal weather conditions, there is no government agency, private company or civil society organisation actively invested in cleaning the country's waterways to prevent debris from oozing into the ocean (1).

Public awareness of a more-than-national problem

Public awareness of Thailand's terrestrial contributions to marine plastic pollution rose to the political fore in 2011 in the aftermath of major floods (Marks, 2015). It was during this period

that Thai citizens 'found many plastic bags in our drainage systems' (10). Additionally, 2011 marked the entry of plastic into the United Nations General Assembly agenda (2). Awareness of the transboundary nature of Thailand's marine plastic problem was further heightened by the publication of two reports (Jambeck *et al.*, 2015; Ocean Conservancy and McKinsey Centre for Business and the Environment, 2015) which ranked Thailand among the world's worst ocean polluters. Then in 2017, a series of garbage islands, measuring over a kilometre in diameter, were discovered off the coast of southern Thailand floating toward major tourist resorts (Satyaem, 2017). Adding to this negative publicity, the global media spotlight in 2018 on the death of a pilot whale by plastic ingestion in Songkhla province prompted Thai Prime Minister Prayuth Chan-O-Cha to declare waste management a national priority and appeal to Thai citizens to lead more eco-friendly lifestyles (Styllis, 2018). As a National Reform Committee member noted, 'compared to a few years ago, there is more awareness of this issue [marine plastic pollution]. The whale story had a big impact. Also so did our high ranking as a marine plastic polluting country' (4).

Spurred by international and domestic pressure in intergovernmental events such as the Asia-Europe Meeting, Thailand's military government, led by Prime Minister Prayuth Chan-O-Cha, introduced a suite of programmes aimed at reducing plastic marine pollution (4, 5). In 2017, the government established the National Reform Committee with 11 sub-committees, including one on plastic waste management. The PCD also drafted the 5-year Plastic Waste Management Plan (2017–2021), which, in 2018, led to bans on cigarette smoking on 24 popular beaches (*Reuters*, 2018) and plastic bag use and Styrofoam containers in national marine parks (Bangkok Post, 2018). Also in 2018, the government worked in partnership with retailers to eliminate an additional layer of plastic covering plastic bottle caps (Rujivanarom, 2018a). Following China's lead in banning plastic waste imports, and unable to cope with its own surplus, the Thai government further pledged to ban plastic waste imports by 2021 (Zein, 2018). Finally, the aforementioned Sub-Committee on Plastic Waste Management,

chaired by MONRE, developed a 20-year Plastic Waste Action Plan in January 2018. This sub-committee, comprising private sector representatives but no environmental NGOs or civil society actors, resolved to ban seven types of single-use plastics. Three products, namely micro beads, cap seal, oxo-degradable plastics are scheduled to be banned in 2019 while Styrofoam containers, thin plastic carrier bags (less than 36 µm), plastic straws and plastic cups are scheduled to cease production in 2022 (Wipatayotin, 2018). However, at the time of writing, no detailed implementation of the plan has been announced, raising questions about the willingness and ability of policymakers to meet these deadlines.

Government-led plastic reduction measures tend to focus on voluntary lifestyle choices rather than legal reforms. As part of its public awareness campaign, MONRE directed the Department of Environment Quality Promotion (DEQP) to launch targeted programmes encouraging Thai citizens to use less plastic for their collective health and well-being. DEQP officials and their recruited volunteers have visited wet markets to dissuade vendors from selling single-use plastic bags by encouraging them to switch to recyclable bags. They have also conducted social media campaigns on Facebook and other online platforms (6).

Several interviewees agreed, however, that it is difficult to convert to recycled plastic when 'the government initiatives are mostly voluntary programmes, just campaigns' (quote from 14; also 2, 5, 11). A PCD official conceded that in the absence of enforceable environmental regulations, supporting infrastructure and compliance incentives, 'all of these campaigns are not very effective' (5). The head of a local NGO complained that the government's 'plan promotes reduction of plastic usage but has no mandatory regulations. Thailand hasn't taken any strong measures... This is quite different from other Asian countries, such as China and Bangladesh' (11). For these reasons, a number of interviewees believed a tax on single-use plastic consumption and institutional changes to Thailand's waste management system are needed. The following sections will explore the key obstacles and challenges to enacting these more substantive reforms.

Barriers to change

In this section, we examine three major barriers that are currently preventing Thailand's government, private sector and citizens from collaboratively engaging in activities necessary to reduce marine plastic pollution. These barriers can be broadly summarized as: (i) insufficient incentives to enact political change; (ii) scalar disconnects in waste management; and (iii) inadequate civil society and private sector ownership over plastic waste reduction. As the Thai state cannot single-handedly change corporate and consumer behaviours, norms and cultures, we argue that multi-stakeholder efforts across organizational scales of governance and administrative boundaries are needed to comprehensively address each of the barriers described in turn below.

Insufficient incentives to reduce single-use plastic bag usage. As of December 2018, 27 countries worldwide had banned single-use plastic bags, while 30 more countries charged fees for plastic consumption (Anzilotti, 2018). While our Thai interviewees did not advocate a total ban on single-use plastics, many agreed that a tax might discourage overuse. In the United Kingdom, this policy has proven successful: the concentration of plastic bags in surrounding seas dropped significantly after a levy of five pence (US\$0.06) per bag was imposed in 2015 (BBC, 2018). A majority of Thais supported this policy; a December 2017 opinion poll of 2000 Thais revealed that 60% of respondents were willing to pay a plastic bag fee of one baht (US \$0.03) (ERTC Network, 2018). Based on this poll, a team of researchers proposed to the government that it should charge consumers two to three baht per single-use plastic bag (10).

Yet to date, Thailand's military government has resisted imposing a plastic tax, preferring the less confrontational vehicle of civic volunteerism to reform Thailand's consumer culture. In part, this approach is designed to shore up popular support for the pro-military conservative Palang Pracharat (People's State Power Party), which prioritises economic growth over environmental reforms. One senior member of the National Reform Committee claimed that the former Minister of Natural Resources and Environment, General Surasak Karnjanarat, 'did

not move on this. Most sectors in Thailand use plastic bags... If this policy came into effect, he would be scared of voters' (7). Another member of the committee concurred that 'the Thai government are afraid of the people, especially now that we have Facebook. They can shout to the government' (4). Taking a longer-term view, a Thammasat professor explained that not only the military government's party, but 'all Thai political parties have never had major environmental policies in their campaigns' (2).

The Thai government is also reluctant to introduce a plastic tax because of its historically close relationship with the powerful petrochemicals industry. This public-private partnership involves a delicate balancing act between protecting the industry's growth imperative on the one hand, while responding to international and domestic pressure to reduce Thailand's ecological footprint on the other hand. These boundaries between government and big business are frequently blurred and overlap. For instance, Thailand's biggest plastic producer, PTT Global Chemical Public Company Limited (PTTGC), is a state-owned enterprise (10). Since assuming power in May 2014, the Prayuth government has enacted a number of policies and made decisions which 'reflected its close relationship with big business' (Kongkirati and Kanchoochat, 2018: 20).

The goal of this mutually beneficial relationship is to maintain the status quo by protecting investments and expanding production while at the same time minimizing transboundary flows of environmental harm generated by petrochemical companies. We saw this at the global scale in 2019 when the plastics industry invested US\$1 billion into an Alliance to End Plastic Waste as a means of protecting its US \$20 billion investments in expanded production for the next 5 years (Fuhr and Patton, 2019). Similarly, at the national scale in Thailand, the PTTGC has invested in sustainable business strategies aimed at 'Making life more OK with bioplastics' derived from biodegradable sugarcane, cassava and corn (GC News, 2019a). PTTGC and other petrochemical companies such as SCG Plastics Co. Ltd., Thailand's second biggest plastics producer, have promoted their corporate social responsibility commitments within an eco-industry framework. PTTGC even claims to be involved in

'upcycling' ocean plastic by removing and recycling plastic before it can reach marine environments and landfills (GC News, 2017). Not only is this physically impossible because PTTGC's production rates far exceed its contributions to sustainable waste management, but the concept of upcycling has attracted criticism for delaying the inevitable path of plastic to the sea rather than closing the loop on industrial cycles (Phipps, 2018).

Plastic producers are powerful, with strong connections and lobbyists who promote their interests to governments. Chemical process industries are adept at competitively benchmarking their corporate responsibility and environmental performance against a wide variety of global sustainability indices that are 'not data-driven, but rather more check-list oriented' (Cobb *et al.*, 2007). They win public acceptance by incorporating sustainability concepts into open access sustainability reports that highlight their commitment to strategic sustainability goals. Their lobbyists convince government officials to protect industry interests in closed door meetings that later translate into legislative choices and policy programmes geared toward waste management practices which pose no real threat to plastic production. According to several interviewees, lobbyists have convinced Thai government authorities that a plastic tax would be ineffective and too radical. In 2010, for instance, when Prime Minister Abhisit Vejjajiva (2008–2011) sought to initiate a packaging tax, he faced strong opposition from the Federation of Thai Industries, which eventually blocked the proposed tax (17; Kongrut, 2010). As one interviewee pointed out, 'the government has to listen to industries before it takes any action' (2). Another added that 'the petrochemicals industry is quite influential and connected to big politicians' (14).

With political will lacking to legislate environmental reforms, a broader cultural shift is needed that goes well beyond project-based solutions. Transboundary publics could help to fill formal policy gaps by challenging ecologically unsustainable behaviours through ethical forms of consumerism, sustainable packaging innovations and investments in waste management infrastructures. Although a plastic tax may encourage a collective reduction in plastic consumption, as occurred in the United Kingdom, the current climate of Thai national politics remains too bound up with plastic industry

interests. Moreover, such a tax should only constitute part of a more comprehensive solution that includes efforts to cultivate a shift in environmental consciousness among Thai citizens. Without such a cultural shift, Thailand's increasingly urban middle class consumers may perceive the cost of plastic bags to be minimal compared with the cost of items purchased (Rucktum *et al.*, 2016). A concurrent legislative shift is also required to curb the excesses of the plastic industry itself, without which, the production of plastic will continue to transform into anthropogenic waste that flows into the sea.

Scalar disconnects in waste management. As described earlier in this article, waste management reforms in Thailand are mired by institutional, legal, economic and social challenges. There are scalar disconnects between decision-makers in Bangkok and bodies for implementing waste management in cities, neighbourhoods and households across urban and rural Thailand. In the absence of political will to reduce the pace and scale of plastic production, these scalar disconnects become ever more pronounced as government education campaigns and corporate investments into recycling processes are piecemeal and ineffective except on a small scale.

At the community and household levels, the national government's push to promote waste separation is ineffective because most local governments lack sufficient resources to invest into infrastructure and community-level activities around the reduction, reuse and recycling of plastic litter. For example, the Bangkok Metropolitan Administration allocates a far greater portion of its annual budget to the collection and disposal of general waste (six million baht or US\$189,000 per year) than it does to recycling, reducing and separating waste (50 000 baht, or US\$1,572) (Vassanadumrongdee, 2018). Households have little motivation to separate their waste due to the widespread perception that dump trucks simply consolidate collected waste (11), so they believe that their efforts will be in vain (Vassanadumrongdee and Kittipongvises, 2018).

This public perception is well founded as Thailand's waste management system is ill-equipped to recycle plastic. Neither municipal authorities nor private companies earn money from recycling. Instead, they allow informal

waste pickers to do the dirty work of sorting high-value materials obtained from trucks, transfer stations and dump sites, which they then sell to recycling companies. Sometimes, local government officials illegally charge waste pickers to obtain access to dump sites. As it is too costly for waste pickers to clean extracted materials, they only collect uncontaminated items and not low-value plastic bags or straws (9, 11, 17).

The Department of Local Administration under the Ministry of Interior (MoI) is officially responsible for public waste collection and disposal. Yet local governments have limited budgets, inadequate institutional capacity and little expertise in waste management (5). Unlike Japan, the Thai government does not have a coordinating national-level waste management agency (5, 8, 10). A senior PCD official explained that 'some municipalities just a dig hole and the waste goes everywhere. The system is like a time bomb. We need to improve it' (5). Other municipal governments outsource garbage collection and disposal to private companies whose profits derive from the volume of debris collected and not from the separation or reduction of plastic waste (9). Several local politicians own these private waste management companies (10, 14, 17). Although waste management ranks low on the Department of Local Administration's list of priorities, it does not want to cede any authority to the PCD that would involve forfeiting a portion of its budget (7). As one interviewee put it, 'it is about politics between MoI and MONRE' (7). A senior member of the government's National Reform Committee on Marine Debris agreed that 'the overall picture is quite bleak' (7). Although several interviewees and the PCD have called for a new comprehensive waste management law, the latter has been unable to make headway due to its marginal position in government (5, 11, 12, 14).

Limited public and private sector buy-in. In the absence of enforceable legislation and punitive mechanisms to compel more sustainable plastic use, the Thai government has actively encouraged voluntary civic and private sector participation to tackle plastic marine pollution. Yet neither the business sector nor civil society organisations have been granted any real sense of ownership over the process of reducing

plastic pollution. Communal activities around scrap-to-craft recycling, clean city or neighbourhood awards programmes and public education activities could provide participatory pathways through which to encourage wider buy-in from businesses and ordinary citizens. However, according to all interviewees, no substantive efforts have been made to facilitate collaborative environmental activities across sectoral or administrative boundaries.

Only a small, privileged segment of Thailand's population has been visibly active in reducing single-use plastic consumption. According to the head of an international NGO, 'the upper-middle class have made changes. They use social media and Instagram to show that they use Tupperware' (14). The Facebook group, Greenery Challenge, boasts over 10 000 members comprising mainly middle-class educated urban people who want to reduce their daily waste (12). Yet these relatively affluent citizens possess greater purchasing power and tend to generate bigger ecological footprints than people from lower socioeconomic groups. With time-consuming waste separation and recycling efforts concentrated among an elite minority, all interviewees agreed that more socially and economically inclusive campaigns are needed to encourage systemic change. A member of the government's National Reform Committee explained that 'outside of Bangkok there is not much awareness. A lot of marine debris comes from rivers upstream. We need to raise awareness of those who live near the river' (1). Public awareness alone is unlikely to translate into more ecologically sustainable practices among poor riverine communities, however, unless they are provided with incentivized opportunities and time-saving alternatives to transform existing uses of plastic.

In the private sector, plastic reduction efforts have operated on a small scale compared with Europe, but are slowly gaining momentum as businesses seek to capitalize on the commercial advantage of selling environmentally friendly products. In 2017, an Asia-wide consumer survey found that 67.6% of participants in Thailand preferred to buy from businesses perceived as ethical (Koh, 2017), reflecting both the changing values of Thailand's growing urban middle classes who are prepared to pay premiums associated with sustainable goods

and their negative perceptions about unsustainable growth. Despite this trend towards ethical consumerism, the greening of Thailand's economy remains focused on niche products rather than broad-based environmental achievements. Most Thai retailers are reluctant to charge customers for plastic bags due to fear of losing business to their competitors, although a number of interviewees said they would welcome a government tax (2, 3, 9). Yet the viability of such a plastic tax has also been questioned, with one survey finding that middle class Thai shoppers are likely to treat the cost of plastic bags as insignificant compared with the cost of goods purchased. This suggests that any plastic tariff would need to be couched in more comprehensive sustainability narratives around ethical consumerism in order to succeed (Rucktum *et al.*, 2016).

The more radical solution of banning plastic entirely has only been taken up by a minority of retailers. Makro, IKEA and Decathlon have stopped using plastic bags in their Thai outlets. In July 2019, the Mall Group, a large mall operator, started charging customers 1 Baht per bag (Coconuts Bangkok, 2019). Additionally, in September 2019, 26 companies, including retail giants, such as CP All (owner of 7–11 retail stores), and Big C Supercentre, plastic manufacturers, such as PTT, and department stores, including the Central Group and Mall Group, agreed that from January 2020, they will stop handing out single-use plastic bags to customers for free. However, details of their plans, such as whether they will completely ban plastic bags or instead will charge customers for them, as well as how stringently the campaign will be followed remain unclear (Wipatayotin, 2019). Further, traditional forms of pre-plastic packaging are slowly returning to find new Thai middle class markets. One local supermarket, Rimping, in the northern city of Chiang Mai, became a social media sensation in April 2019 when it replaced plastic bags with banana leaf packaging. This business strategy proved so popular that Vietnamese supermarkets Lotte Mart (Ho Chi Minh City) and Saigon Coop and Big C (Hanoi) announced that they too would experiment with banana leaves as a packing alternative, with a view to eventually replacing all plastic with leaf packaging nationwide (Liotta and Marsha, 2019).

Despite these initiatives around ethical consumerism, consensus is lacking about the root cause of the plastic marine pollution problem. Reflecting the plastic industry's tendency to focus on the 'wrong end' of the service life of plastic (Fuhr and Patton, 2019), one company executive argued that plastic itself is not the problem, but, rather, Thailand's waste management system needs to become more like that of Japan (13). Plastic producers are understandably reluctant to agree to principles of extended producer responsibility that would hold them accountable for the entire lifecycle of their products. As the head of the Thai Plastic Club lamented, 'Petrochemicals have not spent any part of their profits to teach people how to use plastic properly and correctly and responsibility' (9). To deflect such criticisms, corporations like PTTGC have begun to engage in community outreach activities like its 'Think Cycle Bank' programme, which aims to educate school children about the importance of separating plastics for recycling (GC News, 2019b). However, such programmes only operate on a small scale and are convened too infrequently to offset the transboundary flows of environmental harm generated by plastic production.

To scale up partnerships and programmes aimed at maximizing the service life of plastic, the economically and socially interdependent countries of Southeast Asia would need to recognise that plastic marine pollution cannot be contained within borders or addressed within silos of sectoral expertise. A combination of policies and programmes at the international, regional, national and sub-national scales are required to address the tragedy of the commons that marine plastic pollution has become (Vince and Hardesty, 2018). In this, transboundary publics around ethical consumerism have an important role to play in mobilizing cultural change by sharing information about the collective benefits of minimizing both the production and consumption of plastic products. Networked environmental collectives can also serve as vehicles for building innovations around more sustainable forms of packaging and environmentally efficient waste management services and infrastructures. Without a more holistic and inclusive approach to mitigating the land-based drivers of marine pollution, Thailand and surrounding countries will be

unable to stem the tide of plastic waste at different stages in its service cycle.

Conclusions: navigating a transboundary path forward

Marine plastic pollution is one of today's most serious environmental transboundary problems. The five biggest contributors to this problem are Asian countries, including Thailand. In this article, we have sought to contribute to an ongoing agenda to better understand the diversity of land-based drivers of marine plastic pollution. We have argued that it is important to situate these drivers, who operate in national contexts, within the wider geographies of their transboundary environmental impacts. This is necessary because the world's oceans are governed by non-binding international legislation that is repeatedly transgressed by terrestrial polluters whose actions are rarely interrogated beyond the borders of the countries in which they reside.

Our focus on actors and institutions based in Thailand has directed attention toward the situated processual geographies of plastic production, consumption and waste management that contribute to transboundary pollution of the oceanic commons. The political, socio-economic and structural barriers we identified that render the service cycle of plastic unsustainable in Thailand are mirrored across the Southeast Asian region. Around 70% of Southeast Asia's human population resides in coastal areas under conditions of intensive urbanisation, industrialisation, fishing and shipping traffic that seriously pollute marine environments and deplete their biodiversity (Todd *et al.*, 2010). While coordinated region-wide responses to Southeast Asia's marine plastic pollution problem are critically needed, supranational and national governance regimes continue to be impeded by low levels of political will, weak legislative and regulatory frameworks, insufficient civic and private sector participation and scalar disconnects between decision-making and policy implementation bodies.

We have argued for a multi-sector, multi-scalar approach to governing plastic pollution rather than project-based 'solutions'. Transboundary commons around cross-sectoral

cooperation at different organizational scales might take the form of public-private partnerships, public-public partnerships or hybrid co-governance arrangements. These relationships may extend horizontally across sub-national and national borders as well as vertically to connect different organisational scales of environmental governance. For example, political room currently exists to start cultivating more sustainable relations between the plastics industry and the Thai government. Plastic producers in Thailand are beginning to follow their European counterparts in moving away from linear business operations and toward a circular economy to extract maximum value from plastic products during their service life. The Thai government could assist this transition by amending existing laws and regulations that currently obstruct the reduction of single-use plastics. Specifically, MONRE could be more proactive in operationalizing Thailand's National Waste Management Act, which incorporates principles of Extended Producer Responsibility, by engaging multiple stakeholders to minimise aggregate waste.

Grassroots environmental collectives can also help to mitigate the transboundary spread of plastic litter. In 2016, when the state-owned Chulalongkorn University launched its Zero Waste Programme, students learned during their orientation week how to reduce plastic consumption, supported by the availability of water refilling stations on campus. Students also quickly adjusted to paying two baht (US\$0.06) for bioplastic cups made from sugarcane and plastic bags purchased from campus shops, including from the Japanese-owned 7-Eleven convenience store. Less than a year after the programme's launch, the number of plastic bags consumed on campus had dropped by 90%, from 132 000 per month down to less than 13 000 bags per month (3).

Political will is generated by these sorts of success stories, which serve as examples of best practice for emulation and replication across borders. From a transboundary governance perspective, political will is crucial to the mobilization of communal activities that change our collective relationship with plastic. When political will is low at the level of the national government and big business, then external pressure from (international) NGOs, financial

institutions, and the mass media can help to turn public opinion toward participatory pathways to environmental reforms. This happened in 2017 when garbage islands off the coast of southern Thailand led to the government's temporary closure of nearby tourist resorts to facilitate coral reef rehabilitation and local waste management reforms, a move that received popular support within and beyond Thailand's borders (Chaolin, 2018). Global media attention in 2018 to the pilot whale that died from ingesting plastic similarly spurred the Thai government to publicly acknowledge the severity of the marine plastic problem, which found echoes in plastic producers' intensified publicity campaigns thereafter about their sustainable business activities.

At the supranational or regional level, ASEAN has an instrumental role to play in supporting civil society, plastic producers, retail businesses and governments across the Southeast Asian region. With its non-interventionist political culture, ASEAN's emphasis on protecting regional common goods through sustainable development strategies is not only palatable but appealing to member countries as it emphasizes collective economic, health and social rewards while avoiding apportioning blame to individual governments. In March 2019, ASEAN's environment ministers took a positive first step to laying the groundwork for such transboundary cooperation by approving in principle the aforementioned Bangkok Declaration (Gong, 2019). While considerable work remains to be done in translating this framework into actionable policies, region-wide consensus about the shared threat posed by marine plastic pollution represents a necessary starting point for thinking through collective forms of policy redress.

A region-wide commitment to reduce marine plastic among ASEAN member countries could open up political space and funding opportunities for diverse actors to make innovative contributions at lower organisational scales of governance. Transboundary commons thus warrant further investigation as an alternative to traditional state-led forms of environmental stewardship because informal, flexible and fluid cross-border arrangements for sharing knowledge, expertise and technologies can help geographically divided communities build capacities and learn from

each other. National governments, too, have much to learn from sectoral innovations at lower scales of governance, just as they do from other countries whose global marine plastic pollution rankings have dropped after undertaking environmental reforms. Understanding marine plastic as an inherently transboundary problem that affects us all 'in common' could facilitate the sort of cross-border structural adjustments that are urgently needed to transform unsustainable terrestrial cultures of plastic production, consumption and waste management.

Acknowledgements

We would like to thank Thareerat Laohabut for assisting with the data collection. The second author's contribution was financially supported by the Singapore Ministry of Education Social Science Research Thematic Grant titled 'Sustainable Governance of Transboundary Environmental Commons in Southeast Asia' (MOE 2016-SSRTG-068).

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APPENDIX I

Table A1 List of interviewees and date

1	Member 1 of National Reform Committee on Marine Debris	14 August 2018
2	Thammasat University Law Professor	14 August 2018
3	Senior official in Department of Coastal and Marine Resources	23 August 2018
4	Member 2 of National Reform Committee on Marine Debris and board member of PTT Global Chemical (PTTGC)	1 August 2018
5	Pollution Control Department Official	24 August 2018
6	Senior Department of Environment Quality Promotion official	24 August 2018
7	Senior member of National Reform Committee on Marine Debris	24 August 2018
8	Senior official of Thailand Plastic Institute	23 August 2018
9	Head of Thai Plastic Industry Club	15 August 2018
10	Thammasat University Political Science Professor	10 August 2018
11	Head of local NGO	15 August 2018
12	Senior member of Chulalongkorn University's Zero Waste Programme	7 August 2018
13	Siam Cement Group (SCG) senior official	13 August 2018
14	Head of international NGO	10 August 2018
15	Rangsit Municipality senior official	15 August 2018
16	Senior Bangkok Metropolitan Administration (BMA) official	16 August 2018
17	Head of Thailand Institute of Packaging and Recycling Management for Sustainable Environment (TIMPSE)	14 August 2018

Note: We have hidden the names of the two NGOs to protect the interviewees' identities. If we listed their names, we worry that it would be easy for those familiar with this topic to surmise who these two interviewees are.