



Marine Litter in Cambodia:

A Situation Analysis and Recommendations for
Planning and Action

Working Paper

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Acknowledgement:

This report was developed as part of '**SEA circular – Reducing marine litter by addressing the management of the plastic value chain in South-East Asia**' a project jointly implemented by the United Nations Environment Programme (UNEP) and the Coordinating Body on the Seas of East Asia (COBSEA), with funding from the Government of Sweden.

This Situation Analysis identifies marine litter challenges and policy priorities in Cambodia, to inform evidence-based planning to address plastic pollution and marine litter at national level, in line with regional and global frameworks. This document includes information up to end of 2020 and is not exhaustive.

The Situation Analysis for Cambodia was developed by Fauna & Flora International (FFI) and COBSEA, with valuable input from the Ministry of Environment of Cambodia. The Ministry approves the publication of the report; however, views and opinions expressed in the report do not necessarily represent those of the Royal Government of Cambodia and the Ministry of Environment.

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The United Nations Environment Programme would like to thank the Royal Government of Cambodia (RGC), including the Ministry of Environment (MoE); the Department of Fisheries Conservation (DFC) of the Fisheries Administration (FiA) of the Ministry of Agriculture, Forestry and Fisheries (MAFF); and provincial Governments of Sihanouk and Koh Kong provinces. Fundamentally, this work would not have been possible without the willing participation of community members of the Sihanouk and Koh Kong provinces and their support is acknowledged, with thanks. FFI is also grateful to Arcadia for providing financial support to make this work possible.

Suggested citation:

United Nations Environment Programme (2022). Marine Litter in Cambodia: A Situation Analysis & Policy Recommendations. Nairobi.

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The **SEA circular** project – Reducing marine litter by addressing the management of the plastic value chain in South-East Asia is implemented by the UNEP Regional Office for Asia and the Pacific and the Coordinating Body on the Seas of East Asia (COBSEA), with funding support from the Government of Sweden. SEA circular aims to reduce and prevent plastic pollution and its impacts by working with governments, businesses, civil society, academia, and international partners. The initiative promotes market-based solutions and enabling policies to transform plastic value-chain management, strengthens the science base for informed decision making, creates outreach and awareness. The project leverages COBSEA's regional mechanism to tackle the transboundary challenge of marine litter in a harmonized manner.

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The **Coordinating Body on the Seas of East Asia (COBSEA)** is a regional intergovernmental mechanism and one of 18 Regional Seas programmes. It is the decision-making body for the East Asian Seas Action Plan, bringing together nine countries – Cambodia, China, Indonesia, Republic of Korea, Malaysia, the Philippines, Thailand, Singapore and Viet Nam – in protection and sustainable development of the marine and coastal environment. COBSEA focuses on marine pollution, ecosystem-based marine and coastal planning and management, and ocean governance. The COBSEA Secretariat is hosted by Thailand in Bangkok and administered by the UNEP Ecosystems Division.

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Established over a century ago, **Fauna & Flora International (FFI)** is the world's oldest international wildlife conservation organisation. FFI's focus is on protecting biodiversity, which underpins healthy ecosystems and is critical for the life-support systems that humans and all other species rely on. FFI has been working on marine plastics since 2009, and was the first biodiversity conservation organisation to address the emerging threat from microplastics in our oceans. The Coastal & Marine Conservation Programme (CMCP) is part of FFI's programme of work in Cambodia. The CMCP supports the RGC to protect coastal and marine biodiversity, sustainably manage fisheries resources and improve livelihoods of local fishers and communities. Over the past 10 years, the CMCP has focused on building community, government and local partner capacity for biodiversity conservation and the design and management of an MPA network, whilst tackling key threats such as illegal fishing and most recently, plastic pollution.

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Abbreviations

ALDFG	Abandoned, Lost and Discarded Fishing Gear
CFI	Community Fisheries
COBSEA	Coordinating Body on the Seas of East Asia
EPR	Extended Producer Responsibility
FFI	Fauna & Flora International
FiA	Fisheries Administration
GAEA	Global Action for Environment Awareness
GGGI	Global Ghost Gear Initiative
HH/HHs	Household/s
IUU	Illegal, Unreported and Unregulated (fishing)
KII/KIIs	Key Informant Interview/s
KSA	Koh Sdach Archipelago
KSWM	Kampong Som Waste Management
KRA	Koh Rong Archipelago
KRA-MFMA	Koh Rong Archipelago Marine Fisheries Management Area
MAFF	Ministry of Agriculture, Forestry and Fisheries
MEL	Monitoring, Evaluation and Learning
MEF	Ministry of Economy and Finance
MFMA	Marine Fisheries Management Area
MoE	Ministry of Environment
MoI	Ministry of Interior
MoT	Ministry of Tourism
MPA	Marine Protected Area
MSME/MSME's	Micro-Small-Medium Enterprises
NCMDC	National Committee on Management and Development of the Coastal Zones
TWG-Fi	National Technical Working Group for Fisheries
PEMSEA	Partnership in Environmental Management for the Seas of East-Asia
PKWS	Peam Krasaop Wildlife Sanctuary
RGC	Royal Government of Cambodia
RUPP	Royal University of Phnom Penh
SUP	Single Use Plastic
SWM	Solid Waste Management
UNDP	United Nations Development Programme
UNEP	United Nations Environment Programme
WASH	Water, Sanitation and Hygiene



Executive Summary

The purpose of this Situation Analysis is to investigate and articulate the Cambodian context pertaining to marine litter, with the view to developing informed and responsive recommendations that dovetail with current and planned interventions in Cambodia, as well as regional and international frameworks. This report specifically focuses on macroplastic pollution from land-based sources as the most ubiquitous, lasting and wide-spread type of marine litter in Cambodia. Marine litter is a complex and multifaceted threat that necessitates holistic, systemic and highly collaborative solutions that are actionable within the local context.

The United Nations Environment Programme (UNEP) defines marine litter³ as “*any persistent, manufactured or processed solid material discarded, disposed of or abandoned in the marine and coastal environment*”. Marine litter is made up of items that have been manufactured or used by people and lost, deliberately discarded or abandoned into coastal and marine environments; or carried indirectly into these ecosystems by water bodies, sewage systems, wind or rain. In this context, marine litter includes plastic leakage into the environment from source to sea, including inland and across borders. Marine litter originates from a variety of sources and has far reaching, long term impacts on people,

economies and the environment. The slow rate of degradation of marine litter, especially plastic, coupled with the rapidly growing quantity of debris entering the environment is leading to increases in marine litter in oceans and on shorelines around the world.

Globally, awareness of marine litter has grown rapidly, especially with regards to plastic materials. The scale of waste entering the ocean in South-East Asia exceeds global averages, and Cambodia echoes regional trends, experiencing rapid economic and population growth, increased resource consumption and waste generation paired with Solid Waste Management (SWM) deficiencies and barriers to effective governance and enforcement. Cambodia claims one of the fastest rates of improvement in the global Human Development Index (12,13), though growth has slowed in response to the global coronavirus pandemic (126). This Situation Analysis seeks to describe the complexities and nuances surrounding marine litter in Cambodia to unravel context in a manner that informs action, serving as a mechanism to support governance reform and foster locally-led interventions. Key contextual considerations explored in this report are summarised as follows:

³ It is noted that the terms “marine debris” and “marine litter” may be used interchangeably in the context of this report.

Knowledge & capacity gaps, including limited technical capacity in country: Limited data exists to quantify and characterise marine litter in Cambodia. A review of marine plastics research in South-East Asia compiled in 2019 found that no formal, peer reviewed research had been conducted on marine plastic pollution in Cambodia (92). The review found no available information on hotspots, source differentiation, ecological and environmental impacts or discarded fishing gear. Since this time, key actors including Fauna & Flora International (FFI), The World Bank and the United Nations Development Programme (UNDP) have sought to bridge this dearth of evidence. Lyons et al (2019) recommend that research methodologies be standardised regionally to support transboundary interventions and comparisons between sites (92) – a recommendation echoed herein. Whilst a robust evidence base is still emerging, the inescapable visual presence, prevalence of plastic use and absence of effective waste management systems leaves little doubt that marine litter presents a challenge for the Kingdom, threatening people, ecosystems and economies. Knowledge and capacity gaps are explored in Section 5.5 of this report.

High plastic consumption, challenging disposal behaviours & high reliance on plastic: Plastic use and disposal behaviours, high consumption levels and the types of plastics most commonly used drive the amount of plastic waste produced and the volume of marine litter in Cambodia (61,72,111,112). The rate of plastic consumed is rising in line with the Kingdom's rapid growth (61). Urban Cambodians are estimated to consume 2,158 plastic bags per person per year (73). Phnom Penh's population is thought to use more than 10 million plastic bags each year (65), with used plastic bags costing over US\$100,000 per annum in maintenance of the city's sewage and drainage systems, according to a specific study conducted in 2016 by Fondazione ACRA (72). This causes similar problems in the coastal city of Sihanoukville, where 60% of waste collected from drains is plastic bags (72). To date, the majority of research has focused on cities, however, scoping research at coastal sites suggests these communities rely on plastic, with a higher-than-average proportion of plastic in Household (HH) waste (111). This could be due to Water, Sanitation and Hygiene (WASH) deficiencies and food security challenges in coastal and island areas, though further study is needed. A study led by The World Bank (2019)

focusing on the shorelines of freshwater canals and coastal zones found the most common types of macroplastic debris to be food wrappers, bags, water bottles, plastic cups and polystyrene food containers (112). In the absence of SWM systems many coastal and island communities have no alternative but to improperly dispose of their waste and at one coastal site 96.5% of people reported disposing of their HH waste directly into the ocean or on the shoreline (111). Details regarding plastic consumption & disposal behaviours can be found in Section 3.2 of this report.

Deficient or absent SWM paired with increasing waste generation: Despite Cambodia's rapid development and economic growth, national infrastructure and administrative resources for waste management remain limited, especially outside of urban centres (47,57-59). The volume of waste produced annually is increasing in line with the Kingdom's economic growth, and it was estimated in 2010 that 87% of Cambodia's plastic waste was inadequately managed (60-62). The Royal Government of Cambodia (RGC) is reportedly reviewing the agreements held with all private waste contractors, with the view to increasing the quality, transparency and accountability of these service providers. The perceptions of Government informants, business owners and private citizens highlight deficiencies in the performance of private waste contractors. Conversely, interviews with private waste contractors highlight the contextual and logistical challenges of SWM in Cambodia, especially at coastal and island sites, and the impact this has on the profitability of their businesses and capacity to meet the needs of their clientele. Ultimately, the outcome is the ubiquitous presence and abundance of mismanaged waste and growing tensions among waste sector actors (120). To date, SWM reform has focused on urban areas, however 80% of Cambodia's population live in rural areas (68), with coastal and island sites presenting particular contextual and logistical challenges that necessitate dedicated technical and financial support. Further, many coastal and island communities rely on fishing as a primary source of income, driving the generation of fisheries waste, including nylon nets and lines. Scoping studies found that at one site 52% of used nets were disposed of directly into the ocean, driving marine litter in the form of Abandoned, Lost and Discarded Fishing Gear (ALDFG), and limiting the potential of alternative livelihoods such as tourism (111). Information about SWM in Cambodia is detailed in Section 3.

Underutilized governance frameworks & governance gaps: Whilst governance around SWM and plastic management has evolved over time and political will is strong, gaps remain, and limited capacity, resourcing and enforcement mean existing governance mechanisms are rarely utilised to their full potential. Governance mechanisms, including policies, legislation and regulations are only as powerful as their implementation and if limited investment in operationalising these frameworks continues they could remain largely as documentation rather than acting as a mechanism for change. Key Informant Interviews (KIIs) with Government officials highlighted that there is limited awareness of the existing SWM and plastic management legislation across various ministries and levels of Government. For example, a number of Government informants called for increased enforcement and the development of regulations, but were unaware of the existing regulations or under whose remit enforcement would fall (111). Governance gaps also exist, and there is scope to drive novel interventions through strengthened governance, including through the development of new instruments that support innovative approaches such as Extended Producer Responsibility (EPR) and circular resource use. It is crucial, however, that barriers to operationalising governance instruments are addressed so that both existing and novel interventions are met with an enabling environment. Cambodia's governance landscape is explored in Section 6 of this report.

Contextual challenges of coastal and island sites: Low livelihood diversity and socio-economic status, remote off-grid locales, limited infrastructure and increasing pressure on coastal and marine ecosystems all lead to heightened vulnerability of coastal communities, threatening their wellbeing. From a marine litter perspective, coastal communities face interconnected complexities that impact their ability to respond to this threat, though many coastal communities have expressed their concern, highlighting the urgent need to find actionable solutions that suit their unique circumstances. Coastal communities and ecosystems are detailed in Section 1.

High momentum and enthusiasm: The bright spot on the marine litter agenda is the incredible momentum and enthusiasm across Cambodia to address this threat. In recent years, an array of stakeholders across public, private and third sectors have taken steps to address Cambodia's deficient waste management systems and abundant pollution, including that which is impacting coastal and marine areas.

Key to success will be collaboration and coordination of effort, as well as ensuring that vulnerable stakeholders are empowered and their voices heard. The RGC, intergovernmental and non-governmental organisations have highlighted their concern (62) and the MoE have expressed increasing commitment to act, including proposing a ban on single-use plastic (SUP) and developing a sub-decree to better manage plastic materials & products (63,64,122,123). The landscape for collaboration is unfolding with promise, with key actors coordinating efforts to maximise impact. Key actors and their work is explored in Section 5 of this Situation Analysis.

Marine litter presents a complex, interconnected challenge – there is no simple solution. Transboundary collaboration and cross-sectoral commitments must be adopted to address unsustainable resource use and support resource cycling and management to prevent marine litter and address litter that exists in situ. Systemic change and innovative approaches are essential – though change must be balanced with contextual considerations and awareness of community needs, especially with regards to vulnerable peoples and developing nations who are disproportionately impacted by environmental degradation. A sense of urgency and commitment is apparent across consumers, governments, civil society, academia and the private sector - but in the face of what is an immense, ubiquitous and complex threat extraordinary action is needed, necessitating technical expertise, sustainable funding and lasting reform. Based upon the findings of this Situation Analysis the following recommendations have been developed:

- **Recommendation 1:** Mainstream & operationalise existing governance instruments.
- **Recommendation 2:** Develop new frameworks and novel interventions to address the drivers of marine litter, prioritising reduced plastic use and waste generation.
- **Recommendation 3:** Bridge knowledge & capacity gaps to inform iterative, evidence-based action that is locally appropriate.
- **Recommendation 4:** Strengthen collaboration and cooperation to create an enabling environment for marine litter planning and management.

- **Recommendation 5:** Foster and empower local leadership to enable action and shape upstream reform.

These recommendations and their associated actions are detailed in full in Section 7 of this report.



Credit: Hannah Becker / FFI

Introduction

Marine litter poses an unprecedented threat globally. In South-East Asia the amount of waste entering the ocean exceeds global averages due to the rapid rate of socio-economic development, absent or deficient SWM systems, and systemic barriers (1,2). Marine litter presents a disproportionately high threat to marine biodiversity in South-East Asia, with the region housing a global marine biodiversity hotspot and being disproportionately reliant on the crucial ecosystem goods and services provisioned by this biodiversity (1,4). Cambodia follows regional trends, with economic growth shifting consumption patterns and leading to increased waste generation, which is met by insufficient or absent Solid Waste Management (SWM) systems, governance and enforcement limitations and significant capacity gaps.

UNEP defines marine litter as, “*any persistent, manufactured or processed solid material discarded, disposed of or abandoned in the marine and coastal environment*”. In South-East Asia, 80% of marine litter is estimated to be plastic (2,3). This report focuses on plastic as a lasting, ubiquitous, wide spread and disproportionately harmful component of marine litter. In particular macroplastics are prioritised based upon a dearth of evidence regarding microplastics, the volume and omnipresence of macroplastic pollution in Cambodia, as well as the local capacity to address macroplastic pollution. Additionally, it is estimated that upwards of 80% of marine litter is from land-based sources (127), and as such this report prioritises solutions that address this component of litter.

In order to address marine litter in Cambodia we must understand the nature of this threat in the local context. This Situation Analysis explores and articulates the landscape surrounding marine litter in the Kingdom, identifying where gaps exist and how interventions might be prioritised in the face of knowledge, policy, financial and technological barriers. This evidence is utilised to formulate a series of recommendations targeted at reform & development to address marine litter, building a framework to guide action. The recommendations aim to facilitate subsequent working steps, such as stakeholder consultations, marine litter hotspot assessments, and the development of a national action plan and monitoring

programme. This report has been developed based on published research, primary and secondary data and other evidence available in Cambodia.

This report was compiled by Fauna & Flora International (FFI), in partnership with the United Nations Environment Programme (UNEP) and the Coordinating Body on the Seas of East Asia (COBSEA), in support of the SEA circular initiative. The SEA circular initiative is led by UNEP & COBSEA and aims to build technical capacity, inspire market-based solutions and encourage enabling policies to solve marine plastic pollution at the source. Working with national and provincial governments, private sector corporations, civil society groups and NGOs, SEA circular promotes circular economy principles and seeks solutions to marine litter.

Section I. Background and Context

1. Cambodia's coastal and marine environments

Situated in the Gulf of Thailand, Cambodia's 435-kilometre coastline encompasses 69 islands and an array of interconnected ecosystems, including regionally significant Ramsar protected mangrove forests, sweeping seagrass beds and spectacular coral reefs (5). These habitats support biological diversity that is crucial to the provision of essential ecosystem goods and services, including carbon sequestration, climate regulation and protection against severe weather events; as well as underpinning the livelihoods and subsistence of coastal and island communities and blue economies that support the Nation's economic outlook (6,7).

Following a turbulent 20th century, Cambodia has emerged as a fast-growing and open regional economy. Despite substantial tourism and manufacturing sectors, it remains reliant on natural resource exploitation and agriculture.

Key ecosystems

Coral reefs (2,806 ha): Coral reefs are highly biodiverse, shallow water marine ecosystems that provide coastal protection and support blue economies, including fisheries and tourism.

The primary threats to Cambodia's marine ecosystems include Illegal, Unreported and Unregulated (IUU) fishing, unregulated coastal development, habitat loss and pollution (8-10). This is driven by weak regulation, limited management capacity, and a growing coastal population with few alternatives to fishing as a primary income source. Marine ecosystems underpin the Cambodian economy, bringing in US\$12 million in benefits annually through fisheries, and increasingly through tourism (8,11). A high proportion of Cambodians still rely directly on natural resources for their subsistence and livelihoods needs (12,13) with marine fisheries accounting for 1.14% of the GDP (2014 data) (5) and 30% of the population relying directly on small-scale fisheries for their livelihoods (14). Additionally, the vast majority (88%) of the coastal population rely on fish as their primary source of protein (15).

Cambodia's fishing-dependent coastal communities and relatively short coastline have historically been underrepresented nationally, regionally and internationally. However, Marine Protected Areas (MPAs) and Locally Managed Marine Areas (LMMAs) are subject to increasing attention in the country. In 2016, Cambodia's first MPA, known under national law as the Koh Rong Archipelago Marine Fisheries Management Area (KRA-MFMA), was established by a consortium led by the Fisheries Administration (FiA) and FFI (139). Within two years of this achievement, the model was replicated through the creation of a second zoned MFMA in Kep Province. Subsequently, the KRA-MFMA was upgraded by the Ministry of Environment (MoE) to a Marine National Park (MNP), expanding the site and conferring higher protection status, becoming the Kingdom's first actively managed MPA, known as the Koh Rong Archipelago Marine National Park (KR-MNP) (139). The Koh Sdach Archipelago (KSA) is currently slated to become the nation's next MFMA and over the next five years Cambodia plans to develop an ecologically and social connected network of MPAs and marine management areas.

Cambodian reefs have been degraded by overfishing, coastal development, destructive fishing practices and marine litter. Despite these challenges reefs in many areas have maintained considerable biodiversity, cover and structural complexity (5), for example 17.5km² of reef was mapped around the KSA in 2019 (16). The

condition of reefs in the KRA have also remained stable since community-based protection came into place in 2016, though, low overall abundance of key fish species is suspected to be an outcome of historic overexploitation (17). Coral reefs in the Kep Archipelago are thought to be heavily exploited, however fish density and diversity were observed to have increased between 2015 and 2018 (18). The outer islands of Koh Tang and Koh Prins were found to maintain high coral cover from surveys conducted in 2019, and are popular sites for dive tourism.

Sea Grass (30,000 ha): Seagrass habitats are found throughout shallow coastal areas in Kep and Kampot and around islands in KRA and KSA. Seagrasses have a vital role underpinning the wider marine ecosystem, including harbouring charismatic species like seahorses and sea turtles, and supporting blue economies (5,19). Declines in seagrass bed size and diversity have been observed in KRA, which is attributed to coastal development and eutrophication (20). Around 7.5km² of seagrass, representing nine species, exist in the Kep Archipelago (21). Trawl fishing is another key threat to seagrass meadows, and is thought to have degraded these habitats in Kampot and Kep (19).

Mangroves (78,400 ha): Mangroves are intertidal forests that possess high biodiversity,

provide coastal protection and sequester carbon. Cambodia possesses mangrove forests in the Southwest of the country, but these have declined considerably over previous decades, primarily due to shrimp farming, harvesting for charcoal and salt farming. As mentioned by Kozhikkodan Veettil and Quang in 2019, between 1989 and 2017, Cambodia lost 42% of its mangrove forests, with Preah Sihanouk Province losing the most at 52%, followed by Kampot at 45% (22). Since 1995, the decline has slowed down in recent years as charcoal production was banned, aquaculture became less frequent and reforestation initiatives proved successful in some areas (22,100,101). Peam Krasaop Wildlife Sanctuary (PKWS) and the Koh Kapik Ramsar site in Koh Kong are considered a regional conservation priority; satellite mapping data collected and organized by Zhang in 2020 shows the mangrove forest appears stable with less fragmentation than the surrounding area, but still more habitat was lost than gained between 2014 and 2020 (102). Mangrove areas in Botum Sakor appear to have increased between 2015 and 2020 (103), and replanting initiatives have been successful in previously degraded areas of mangroves and abandoned shrimp farms, particularly in Koh Kong (22).



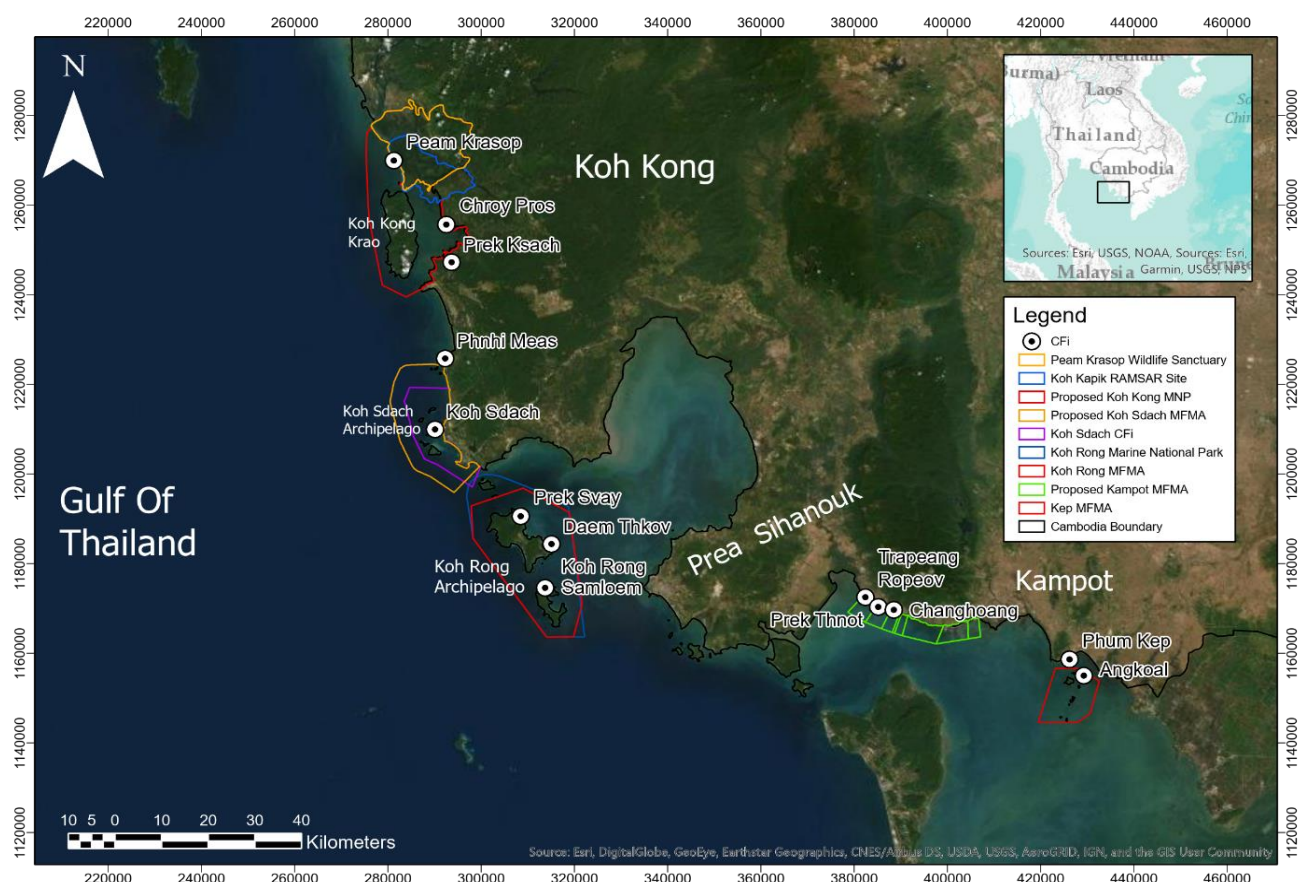


Figure 1. Coastal provinces and key areas of conservation management. Moving from north to south, these include: 1) Northern Koh Kong sites, including Peam Krasaop Wildlife Sanctuary, Koh Kapik Ramsar site and Koh Kong Krov island; 2) Koh Sdach Archipelago, including the proposed Marine Fisheries Management Area; 3) Koh Rong Archipelago, including the Koh Rong Marine National Park; 4) Kampot, including the seagrass and Community Fishery (CFI) areas within Kampot province proposed as an MFMA and 5) Kep, including the recently proclaimed Kep archipelago MFMA.

2. Cambodia's coastal communities

Administratively, Cambodia's coastline consists of three municipalities and four provinces: Koh Kong Province (bordering Thailand); Sihanouk Province (including the Sihanoukville Municipality and capital city of Sihanoukville); Kampot province (including Kampot Municipality, and bordering Vietnam) and Kep Province (including Kep Municipality) (26). An Exclusive Economic Zone (EEZ) approximately 200 nautical miles from the coast, covering around 55,600 km² of the Gulf of Thailand was established following the ratification of United Nations Convention on the Law of the Sea (UNCLOS) (27). There are several unresolved claims over maritime borders, islands and resources between Cambodia and its neighbours, including Vietnam and Thailand, despite agreements to rectify this (28,29). Details regarding each coastal province are set out below:

Sihanouk Province

Sihanouk Province is a coastal province located in south-west Cambodia, covering an area of 2,537km² (121). The capital city of Sihanouk Province, Sihanoukville, is located on the coast of the Gulf of Thailand some 200 kilometres from Phnom Penh. Sihanoukville Municipality has a total land area of 868 km² containing three districts, 23 communes and 82 villages (31). The city of Sihanoukville has experienced a rampant development boom as part of China's Belt & Road Initiative. Chinese investment in the city drove dramatic and dynamic socioeconomic shifts during the late 2010s, with the 2018-2020 period being particularly turbulent. Whilst limited research or data is available, extensive media coverage and anecdotal evidence emphasises the transformation of this quiet seaside town into a hub of rapid coastal construction with limited regulation and gambling-centric tourism (30,34,35). Sihanoukville's population density of 255 persons per km² is high compared to the

neighbouring coastal provinces, with the national average being 75 persons per km² (31). The number of HHs in Sihanouk Province have increased in recent years, with a population growth rate of 2.8% in 2019, primarily due to migration from other provinces and from China. Sihanouk Province has proven attractive, particularly for younger people seeking employment and education (41). Widespread, large-scale construction projects have also attracted a large number of transient migrants seeking employment opportunities. However, one study estimated that 97% of Cambodians employed in Sihanoukville's construction sector do not have a formal contract, are exploited by employers, and hold vulnerable socioeconomic positions. Inequality and conflict between Chinese and Cambodian workers also exists, sometimes escalating to violence (42).

Sihanoukville is home to Cambodia's largest deep-sea port, which handles 70% of the Kingdom's import and export market (30). The port's environmental policy sets out mandatory compliance with Cambodia's Environmental Protection and Natural Resource Management Law of 1996, and other regulations. In 2019, the Guardian reported that Sihanoukville port had received 1,600 tonnes of waste in 83 shipping containers from the USA and Canada, which the RGC returned stating that "Cambodia is not a dumping ground" (33). Another article published by the Guardian described the city as having "mountains of plastic", with plastic pollution and other mismanaged waste found at such a density on beaches and in the ocean that the water and sand cannot be seen (40,111). A 2015 study conducted by 17 Triggers identified that participants in Sihanoukville were more likely to litter compared to those in Siem Reap or Phnom Penh (73). Construction and property development have reportedly increased levels of pollution and environmental degradation around the city (35); this, together with increasing waste generation in the city and limited enforcement, is likely resulting in waste flowing off land and into the ocean, though the evidence base is still being established.

A plan to build a new landfill based on estimated waste generation amount is currently under development to serve Preah Sihanoukville province for the next 10 years, in order to improve the local solid waste management system and prevent wider environmental impact (147).

Also situated within Sihanouk Province is the KRA, which in 2018 became Cambodia's first large scale MPA, the KR-MNP. The KR-MNP encompasses the two main islands of Koh Rong and Koh Rong Sanloem and eight smaller islands. The KR-MNP is one of only two formal MPAs in Cambodia with active marine conservation management and patrols (45). This site includes a number of ecologically diverse and socio-economically vital habitats, including seagrass beds, coral reefs and mangroves (46). There are four villages on Koh Rong and two on Koh Rong Sanloem. International tourism was well established in the KRA, with continued growth forecast and plans for further large-scale development, though this faces an uncertain future following the global pandemic (47,48). The land area of Koh Rong and Koh Rong Sanloem was granted as a concession to Royal Group in 2008, and there are plans to spend US\$2 billion on developing it into a luxury resort destination (48), including a road network and an airport (49). How this development will impact local communities and the ecosystems protected under the KR-MNP remains to be seen.

Koh Kong Province

Koh Kong Province covers an area of 11,160 km², borders Pursat Province in the north, Kampong Speu Province in the east, Sihanoukville Municipality in the south, and the Gulf of Thailand and the Thai border in the west. For administrative land management, the Province is divided into 8 districts, 32 communes and 127 villages and has a population of 128,618, making up 0.8% of the total population in the country. With only 12 people per km², it is the second most sparsely populated province (41). Koh Kong, however, is developing rapidly with large investments in infrastructure, natural resource exploitation, the expansion of its provincial capital "*Krong Khemarak Phoumin*", and the development of nearby Special Economic Zones (50,51).

Within Koh Kong Province sits the KSA, which includes nine islands. This archipelago is an area of significant marine biodiversity and valuable ecosystem services covering 16,158 ha of fishing ground (5). Administratively, Koh Sdach commune has three villages: Koh Sdach, Peam Kay and Prek Smach, with Koh Sdach Village housing the largest population. However, due to a large scale coastal development known as "*Dara Sakor*", both Peam Kay and Prek Smach villages have been relocated further inland.

Recently, the FiA and Koh Kong provincial authorities, with support from FFI, identified KSA to be designated as an MFMA to protect marine biodiversity, strengthen marine resource management and secure sustainable livelihoods that support community wellbeing. This would see the archipelago become the next MPA in Cambodia alongside the KR-MNP and Kep MFMA. Crucially, this designation would create a network of MPAs along Cambodia's coastline, supporting coastal connectivity and management of coastal and marine habitats at a larger scale. This designation presents an opportunity to integrate measures to address marine litter within MPA frameworks for the first time in Cambodia. Both the KSA community and local authorities have shown a strong desire to address mismanaged waste and prevent waste entering the ocean. Key to considerations of marine litter, is the Dara Sakor development, which is progressing within the bounds of Botum Sakor National Park, located on the mainland some 500 metres from KSA. Given the lack of SWM systems or regulation of the construction sector, debris is expected to travel from the coastline into the ocean; posing a risk to the planned MFMA at KSA.

Kampot Province is located in the south-western part of Cambodia, shares a boundary with Kampong Speu to the north, Takeo to the east, Kep and Vietnam to the south and Sihanouk Province to the west, covering a total area of 4,873 km², including 73 kilometres of coastal line (129). Two-thirds of the province is mountainous areas and low lying plains, including karst ecosystems. Tourism, agriculture and mining, including cement mining of karsts, are key sectors in the province (130). The coastline stretches from the Vietnamese border to the Prey Nup district of Sihanouk Province. Kampot Province comprises eight districts with 92 communes and 477 villages. Key industries in the province include pepper production and domestic tourism (31).

Kep Province is located in the southeast part of the country, approximately 175 km from the capital Phnom Penh and includes 12 kilometres of coastline with a total land area of 375 km² (31,131). Administratively, Kep was recently designated as a province, including being

divided into 2 district with 5 communes and 16 villages (131). Its maritime area is in close proximity to the Vietnamese island of Phu Quoc and includes an archipelago within its boundaries (31).

Socio-economic status and demographics of coastal communities

Despite rapid economic growth and development, Cambodia's socio-economic vulnerability is apparent, with the Nation ranked as the 19th most vulnerable country to climate change associated extreme weather (52) and having a regionally high economic vulnerability (53). Many coastal and island communities rely on fishing as their primary source of income, though tourism is emerging as a key growth sector and/or aspirational livelihood in some areas. Whilst figures vary from site to site, livelihood diversity is relatively low across coastal areas, indicating limited resilience in the face of shocks and stressors. This suggests communities will have limited adaptive capacity in response to changes in social, economic and environmental factors, especially those that threaten marine fisheries (11,132, 133). Reliance on fishing as an income source means many communities face elevated risk from factors that threaten coastal and marine ecosystems, including marine litter but also unregulated coastal development, climate change and IUU fishing. Further, both legal and IUU fisheries can act as drivers of marine litter, namely via ALDFGs, with direct disposal onto shorelines and into the ocean being common in Cambodia (111). Emerging and growth sectors, including hospitality & tourism, present avenues for diversified livelihoods if managed sustainably, but are also at risk from absent or deficient SWM systems and marine litter. For example, a 2018 report highlighted "*deteriorating environmental conditions*" around Koh Rong due to a "*lack of sanitation and inadequate solid waste management*" despite the growth of tourism associated development (47). Further, with drops in international tourism due to the covid-19 pandemic the tourism and ho spitality sectors face an increasingly uncertain future, though domestic tourism at coastal sites has been less affected by the pandemic than other areas (105).

Table 1: Population breakdown of coastal provinces from the 2019 General Population Census of the Kingdom of Cambodia (41)

Province	Households	Males	Females	Total population
Kampot	138,374	280,537	312,308	592,845
Kep	9,347	20,615	21,183	41,798
Koh Kong	26,716	62,304	61,314	123,618
Sihanouk	51,983	153,255	149,632	302,887
All coastal provinces		516,711	544,437	1,061,148

3. Solid waste management in Cambodia

Mismanaged solid waste is a key driver of marine litter globally, with an estimated 3.87 Mt of macroplastic entering the marine environment annually at global level as a result of mismanaged waste (54) - a challenge disproportionately felt by developing nations, including Cambodia (55,57). Rapid population growth, economic development and industrialisation coupled with increased municipal waste generation and systemic limitations mean that SWM is a complex and intensifying challenge nationally (57-59, 104). The Kingdom does not yet have the infrastructure, technologies or human resources to adequately collect and treat waste, and interventions such as recycling remain largely unexplored and/or are limited by systemic deficiencies.

Though figures vary, an estimated four million tonnes of waste is generated in Cambodia annually, which equates to around 0.73 kg per person per day (2015 figure). In urban areas, 50-60 % of the waste has been determined as organic, and plastics reaching over 20% and increasing in share. (119) Formal SWM practices in Cambodia are primarily focused on transporting waste to landfills, the majority of which have limited technical design. Informal practices include burning and open disposal of waste, as well as networks of waste pickers known as “*ecchay*” (57,59,65,66). Data collected from the MoE and organized in a Global Green Growth Institute’s report in 2020, estimated that 37% of the Kingdom’s waste is sent to landfills, around 11% is recycled and 51% is illegally dumped or burned (67), although figures varying with some studies suggesting the rate of recycling is much lower.

Systems for the administration, management, collection and processing of waste are predominantly concentrated in the urban population centres of Phnom Penh,

Sihanoukville, Siem Reap and Battambang (58) where private SWM contractors are responsible for waste collection and transportation (66). Due to drastic increases in the volume of waste generated, landfills around the country are rapidly reaching maximum capacity. For example, the amount of municipal solid waste collected in Phnom Penh increased by 35% between 2016 and 2018 (119). This, coupled with insufficient financial resources, human capital and technical capacity sees the SWM contractor in Phnom Penh struggling to meet the needs of the city (119). Most recently this has led to strikes among Phnom Penh’s waste collectors employed by the private SWM contractor, Cintri (120).

Outside of the Nation’s formal systems, the informal waste sector is comprised of more than 3,000 *ecchay* picking sellable waste to generate income, capturing an estimated 11% of waste generated nationally (67). Anecdotal evidence suggests the *ecchay* form part of large waste trading networks that transport recyclables to Thailand and Vietnam for sale. Both of these countries, however, have announced impending bans on the import of recyclables, including plastic, which will severely disrupt the informal waste sector in Cambodia – domestic solutions are essential. Whilst adopting innovative circular economy approaches is crucial, businesses that have adopted such approaches face a number of barriers, including social norms surrounding waste separation and cleaning, infrastructure limitations and high overhead costs, all of which hinder profitability (67).

With a vision of continued growth, investment in spatial planning, supporting infrastructure and sustainable practices is essential to enable cognizant development and improved service delivery. SWM deficiencies are seen as a significant barrier to economic development, as well as driving an array of negative social and environmental outcomes. The RGC has demonstrated ongoing commitment to reform

of Cambodia's SWM systems, and a number of development partners are facilitating this process, including The World Bank and the UNDP. To date efforts have largely focused on urban areas, which is arguably a necessity given the high volume of waste generated and the population density (40, 62-64). Outside of cities, in suburban areas, it is estimated that 20% of waste is buried or disposed of in public spaces and a further 66% of waste is burned in open areas (57, 65). In rural areas, which house 80% of the population, SWM systems are largely absent and burning, dumping and burying of refuse are the primary methods of waste disposal (69). In these areas local and provincial authorities are struggling to cope with the overburdened system paired with significant logistical and contextual complexities, especially at coastal and island sites (58,68,69).

3.1 Solid waste management in coastal & island areas

The challenging landscape of SWM in Cambodia leads to a high proportion of mismanaged waste, which is likely a key driver of marine litter in the Kingdom, though studies elucidating this link are limited. In urban areas around 20% of solid waste is plastic and figures from 2010 illustrate that the vast majority (87%) of Cambodia's plastic waste is mismanaged (54,60,119,124). Scoping studies from coastal and island sites suggest that a higher-than-average proportion of HH waste is plastic, around 27%, which may suggest a higher-than-average reliance on plastic, possibly driven by food and water insecurity or WASH deficiencies (111). Further, coastal and island sites receive limited technical or financial support, a particular need given the logistical and contextual complexities of these areas (47,59,68,69). Details of SWM in the four coastal provinces, and at key island locales, are set out below.

Koh Kong Province

Koh Kong City: Key-informant interviews (KIIs) were conducted in late 2020 with the Provincial Department of Environment, Koh Kong (PDoE-KK) and the province's private waste contractor, Ruy Rithy. Ruy Rithy has been operational in Koh Kong for three years. Prior to this another private waste contractor was in place, however, they reportedly found maintaining profit margins prohibitive. A number of challenges were illuminated through these KIIs, including:

- *Finding skilled labour:* Garbage collection is perceived as a "low value" job, which, coupled with low pay and a management structure that does not motivate staff, means attracting and keeping staff is difficult.
- *Technical design and management of the city's landfill:* The current landfill is too small for the city, and whilst it has been expanded over time, Ruy Rithy cannot meet the rapid and increasing rate of waste generation. The landfill negatively impacts the health and wellbeing of people living in the vicinity, and the rainy season leads to high levels of waste leakage from the landfill site.
- *Infrastructure challenges:* Limited infrastructure, notably poor roads, limit SWM in Koh Kong especially during rainy season when flooding is common, prohibiting access to some communities and the landfill site.
- *HH participation & community engagement:* Waste collection from HHs presents a challenge, with limiting behaviours such as open burning and dumping being common, and enabling behaviours such as waste separation and cleaning being uncommon. Behaviours that support ease of collection (such as disposal of waste at designated collection sites) are also uncommon. The Chief of Ruy Rithy perceives that Cambodian people don't respect waste management systems and behavioural change is needed to enable SWM systems to succeed.
- *Fee payment & collection:* Fee payment and collection is very challenging and of 6,000 HHs just 1,700 are estimated to pay their waste collection fees (about 30%), which heavily impacts the profitability of Ruy Rithy. A key focus for the PDoE-KK and Ruy Rithy is engaging people in "clean city" initiatives, however more support is needed to effect change.

The Chief of Ruy Rithy advised that a number of sound waste management laws are already in



place in Cambodia – he recommended motivating people to follow these laws to encourage them to manage their waste “*in the right way*”. As part of this he recommended working with influencers to shape people’s behaviour, including commune authorities and community leaders. He advised that whilst many individuals don’t respect SWM systems, others care deeply about living in a clean community and once systems are in place some community members actively criticize those who don’t comply.

Koh Sdach Village, KSA: In 2013 a local businessman established a waste collection system in Koh Sdach Village, focusing on waste collection and incineration. This system failed after two years, and since this time there has been no waste collection services in Koh Sdach Village. Community members, business owners and local authorities are highly concerned about the growing concentrations of mismanaged waste on the island, with 75% of HHs surveyed in 2018 stating they were concerned or very concerned about plastic waste (111). When questioned about SWM, 69% of respondents reported being highly or very highly concerned about the lack of waste collection services, and 92% were willing to pay for waste collection services (111).

Sihanouk Province

Sihanoukville: Between 2016 and 2020, uncontrolled growth in Sihanoukville led to a 400% increase in waste generation (119). KIs carried out in Sihanoukville in 2018, suggest that the city’s SWM system is overwhelmed and operating at a sub-optimal level. Whilst informants advised that between 80-100% of waste was typically collected, customer dissatisfaction and uncertainty were clear, with informants expressing doubt about the effectiveness of the waste contractor, Kampong Som Waste Management (KSWM). Interviews with the Sihanoukville Municipality highlighted the need to monitor the performance of SWM contractors (111). Indeed, the perceived low quality of service offered by KSWM has been well publicised in the local media, with residents calling for KSWM to be replaced (134,135).

Conversely, KIs with KSWM highlight the logistical and contextual barriers faced by the company. As seen in other coastal provinces, KSWM highlighted the difficulty of fee collection, limited availability of skilled staff and challenges accessing the province’s landfill, emphasizing that these and other factors undercut profitability (111). This is not a new pattern, with KSWM taking over from Cintri in 2017; the later ceasing operations in Sihanoukville due to “unsustainable losses” (136,137). Social norms surrounding disposal

behaviours were also identified as a limiting factor, with KSWM suggesting that an improved system would require residents and businesses to sort waste prior to collection. From KSWM's perspective, the *ecchay* play an important role, and KSWM workers are allowed to collect and sell recyclables for personal profit. KSWM perceived the Government to be a crucial player in the improvement of SWM systems, prioritising Government support in the form of technical guidance and resourcing (111).

KRA: In the KRA, SWM services are delivered to some communities by a local business owner. This system involves the business owner collecting and transporting waste to Sihanoukville by boat, with KSWM transporting the waste from the port to the landfill. According to local authorities, this business owner has a high level of interest in SWM because mismanaged waste poses a threat to their tourism-centric businesses. Whilst this SWM system is essential given the lack of alternatives, it is based solely on the initiative of one individual with limited regulation, accountability or technical capacity. Anecdotal reports suggest that waste leakage into the ocean during transport is common (111).

Kampot Province, faces a number of challenges regarding sanitation and waste management. Rapid growth in the tourism sector has driven waste generation, but has also presented opportunities for improved SWM, incentivising clean-up activities and improved waste management. Kampot generates around 32–35 tonnes of solid waste per day, the majority (60%) being organic waste from HHs, restaurants, hotels and shops (70). Global Action for Environment Awareness (GAEA) is the private waste contactor in Kampot. As in other coastal provinces, financing and human resource challenges limit GAEA's outputs, with just 36% of HH waste being collected. As a result, a significant amount of waste is burned or disposed of in open spaces, including waterways or at illegal dumpsites. The informal sector is particularly active at Kampot, with more than 30 *ecchay* operating in the town, most of whom are female and earning between \$2–\$3.50 (USD) per day (70).

As seen at other sites, tourism in **Kep Province** impacts the production of waste with day-to-day waste generation fluctuating by roughly 10 tonnes between peak and low seasons, with recent figures estimating around 55 tonnes of waste is produced per day in peak season,

compared to 45 tonnes per day when tourist numbers are lower. Around 59% of Kep's waste is collected and disposed of, with incineration being the primary method of management (71). SWM challenges at Kep stem from decentralization and governance inefficiencies, including provincial rather than municipal authorities entering into contracts with private SWM companies and limited enforcement, monitoring and evaluation by authorities to ensure service providers meet their contractual commitments (71).

3.2 Disposal practices & plastic use behaviours in Cambodia

Poor disposal practices, high plastic consumption levels, and the types of plastics most commonly used drive marine litter in Cambodia (61,72). Whilst a robust evidence base is still emerging, studies conducted to date evidence that plastic use is extremely high (72). This, paired with social & cultural norms surrounding shopping habits and disposal behaviours drive use and pollution from littering (73). According to a specific study conducted in 2016 by Fondazione ACRA, combining primary and secondary data collected through interviews, surveys and reports analysis, in Phnom Penh alone, used plastic bags cost over US\$100,000 per year in maintenance of the city's sewage and drainage systems, and account for 20% and 45% of the waste collected from the pumping stations and the drainage system respectively. Similarly, in Sihanoukville, 60% of waste collected from the wastewater treatment plant is plastic bags (72). Faced with absent or limited SWM systems individuals and businesses often have no alternative but to improperly dispose of their waste. In coastal areas this most often takes the form of direct disposal into the environment. For example, in Koh Sdach Village where SWM systems are absent, 96.5% of HHs reported disposing of waste directly into the ocean or on the coastline. Specifically with regards to plastic waste, 42% of respondents in Koh Sdach Village reported open burning as the method of management (111).

Despite being mandated under Sub-Decree 113, waste separation and cleaning is uncommon in Cambodia – undermining the profitability of SWM systems and hindering the potential of circular economy enterprises. For example, at one coastal site, 64% of respondents said they did not separate waste (111). Anecdotal

evidence suggests that HHs view waste separation and cleaning as the responsibility of the ecchay. Further, it has been observed during field studies that even when waste is separated by HHs, waste collectors are not sufficiently equipped and waste is remixed at the time of collection. Whilst circular economy enterprises remain novel in Cambodia, typically taking the form of recycling Micro-Small-Medium Enterprises (MSME's), KII's illustrate that the costs associated with waste separation and cleaning, as well as prohibitive operating costs, prevent the growth of this emerging sector.

4. Marine litter in Cambodia

In South-East Asia, the scale of waste entering the ocean exceeds global averages with more than half of the world's 4.8-12.7 million tonnes of marine plastic waste originating from China, Vietnam, Indonesia, the Philippines, and Thailand (54). Of the world's 20 most polluting rivers, 15 are in Asia, including the Mekong at 11th place (76). The Mekong river's drainage basin covers around 86% of Cambodia's land

Impacts of marine litter

Social: Plastic pollution poses a threat to human health. As plastics are used and then break down, particularly with exposure to heat and sunlight, endocrine-disrupting toxins such as Bisphenol A leach into the food and drinks they contain, or the environment once discarded (86,143). Early global research suggests microplastics found in seafood, the result of bioaccumulation and biomagnification up food chains, could present a human health risk (87,88). Plastic nanoparticles have also been shown to cross the blood-brain barrier and penetrate human brain tissue and placental tissue, with unknown long-term effects (89, 138). Mismanaged plastic waste also blocks drainage systems and dams, which can cause flooding, increasing the risk of water- and mosquito-borne diseases (87). Whilst Cambodia-specific studies are limited, one coastal study found that 75% of people were concerned or very concerned about plastic waste, with a key concern being the increased incidence of water-borne diseases caused by blocked drains (111).

The consideration of human rights and gender equity is also key to successful marine litter interventions. Groups utilise marine resources in different ways, with vulnerable and

area and is estimated to deposit between 18,800 and 37,600 tonnes of mismanaged plastic waste into the ocean each year (27,76). Echoing regional trends, Cambodia is undergoing rapid development with an average growth in GDP of 7% per annum and one of the fastest rates of improvement in the global Human Development Index (12,13). Whilst the global COVID-19 pandemic has slowed the nation's economic growth, it is unclear what the lasting effect will be, with some forecasting continued - albeit decelerated - growth in 2021 (126). This new-found affluence has shifted consumption patterns, especially in cities such as Phnom Penh and Siem Reap (62). Other reports suggest that the tourism industry alone uses 4.6 million plastic bottles each month (142). As explored above, economic growth is driving resource consumption and waste generation, which is met by absent or deficient SWM systems, resulting in high levels of mismanaged waste entering coastal and marine ecosystems, and it is estimated to cost Cambodia US\$2.5million each year to clean up marine plastic pollution (78).

marginalised peoples most heavily impacted by environmental degradation, including that driven by marine litter (75). The informal waste sector in South-East Asia almost exclusively employs the urban poor, including children, leading to already vulnerable people facing heightened health and safety risks, as well as low wages and limited (if any) social protection (further details in Section 5.4). Gender norms see women most commonly acting as primary care givers and managers of HHs, governing the use of plastic and the generation of plastic waste (73). In Cambodia, women are predominantly responsible for operating market stalls, food shopping and food preparation, making them primary consumers of plastic bags (61,73). Women are often employed in plastic manufacturing and form a substantial proportion of the informal waste management sector, despite paid waste management jobs being dominated by men (2). Gender considerations are crucial for several reasons, not least to identify meaningful opportunities to work towards gender parity and empowerment and to avoid entrenching existing hierarchies (91).

Economic: The blue economy forms the basis of market systems for many nations and global figures estimated the value of marine ecosystems at US\$16.5 trillion in 2015 (2).

Globally, marine plastic pollution costs the tourism and fisheries sectors around US\$13 billion per annum (90). Notably, these figures do not take into account the intrinsic value of marine ecosystems, such as cultural, aesthetic and recreational services; were these taken into account the cost of plastic pollution would be even greater. Cambodia's coastal ecosystems support sectors, ranging from fisheries, aquaculture, trade, tourism and other natural-resources based activities, with an estimated value of US \$2.4 billion or around 16% of the country's GDP. Moreover, ecosystem services could account for an estimated economic value ranging from US\$200.4 million to US\$583.4 million per year in mitigation of extreme climatic events (145).

Growth in key sectors met by a lack of regulation and enforcement has driven unsustainable resource use and pollution causing environmental degradation (8,12). Key sectors driving economic growth in Cambodia include tourism, construction, agriculture and garment manufacturing, though little research exists to quantify the specific impact of these sectors on marine litter (see Section 5.4 for details). As of 2016, the fisheries and aquaculture sectors provided employment to more than 2.4 million people in Cambodia (74). Cambodia's fisheries sector is vulnerable to the threat of marine litter, with a high dependence on healthy ecosystems; despite this fishing vessels are estimated to account for 20% of marine plastic litter produced (74). With a large proportion of the country's population reliant on the fishing industry for employment and to meet their subsistence needs, small declines in yield could have wide-spread impacts (75).

Coastal tourism is a growth industry in the Kingdom and development of the islands and coastline is rapidly increasing (47) with notable changes brought about by the global pandemic. Before Covid-19 pandemic, coastal tourism has been expanding rapidly with the number of international tourists increasing from approximately 2.9 million in 2011 to 6.6 million in 2019, with a sudden drop to 1.3 million in 2020 (144); in 2016, coastal tourism generated \$96 million (USD) of revenue in Sihanouk Province alone (74). The Ministry of Tourism (MoT) aims to increase the number of tourists travelling to Cambodia, and multi-million-dollar development projects are underway on Koh Rong (98) and the mainland coast at both Sihanoukville and Koh Kong (97). Despite investment in property development, limited

investment in supporting infrastructure such as roads, solid & liquid waste management and reliable power sources, ultimately hinders sustainable growth. One Cambodian study found that 72% of tourists visiting the Kingdom objected to the presence of litter, and 13% said the volume of litter deterred them from wanting to visit again (72). Similarly, a global study by Ocean Conservancy in 2009 found that 64% of marine plastic, including cigarette butts, food wrappers and plastic bottles, came from coastal recreational activities (75). The tourism sector itself is both impacted by and contributes to marine pollution and is working to adopt stewardship practices in order to protect the natural environment on which it depends (2).

Actors focusing on blue economy development in Cambodia can be found in Section 5.2 and 5.3 for more detailed information.

Environmental: A global marine biodiversity hotspot, South-East Asia boasts the most biodiverse coral reef systems in the world, more than a quarter of all mangrove systems, and a substantial proportion of global seagrass habitats (1,4). As such, marine litter in South-East Asia presents a disproportionately high threat to marine life and biodiversity. Cambodia's biodiverse marine and coastal environments provide invaluable goods and services, which have significant intrinsic value, as well as being crucial to the Kingdom's socioeconomic development. The impact of plastic litter is of particular concern to marine life due to direct impacts on biota and effects across marine species assemblages. Worldwide, 693 species have been recorded interacting with marine debris, with plastic making up 92% of these interactions (79). The impact of ingestion and entanglement is well documented, with fatalities recorded in seabirds, fish, marine mammals and turtles (80-83). In some locations macroplastic substrates are so widespread that they have altered the composition and abundance of species. Marine litter, especially plastic, is also known to aid the transit of invasive species through microbial colonisation on its surface (84), with one study finding an increased incidence of disease in coral species entangled in plastic (85).

Coastal debris density & characterisation studies carried out at Sihanoukville (2018) found that plastic was the most commonly logged debris type, making up 81% of debris collected. Cigarette butts were the most frequently found type of plastic, followed by

plastic food wrappers and plastic bags (111). Subsequent data collection carried out by The World Bank in 2019 found the top 10 most common macroplastic to be:

- *KRA*: Rope, plastic & polystyrene pieces (<2.5cm), and crisp packets and sweet wrappers were among the most common macroplastic items counted in the archipelago.
- *Sihanoukville*: Polystyrene, shopping bags, crisp packets and sweet wrappers, drink bottles (>0.5 litres), cups and cup lids were the most commonly found items in the city. And;
- *KSA*: String and cord, crisp packets and sweet wrappers, plastic bags and drink bottles (>0.5 litres) were the most

commonly found items in Koh Sdach Village. Transects on Coconut beach (in Koh Sdach Village) had some of the highest macroplastic counts of the study.

Overall across coastal areas included in the study, polystyrene pieces were the most common macroplastic item found. A study of composition of polystyrene macroplastic items found that they were mostly made up of expanded polystyrene (EPS), which was generally fragmented in several pieces. Styrofoam food containers were the most common EPS items, including foam bowls, lids, trays and some cups. Overall, plastic wrappers and shopping bags and/or bag pieces remain the most common macroplastic items found across all study areas (which also included Siem Reap and Phnom Penh).

4.1 Possible sources, pathways & hotspots

Hotspot identification presents an opportunity to address the most prevalent types of marine litter at their source or where the impact is greatest (96). Despite extensive desk research little data could be found on marine litter hotspots in Cambodia. Further, research that might elucidate the nature or location of hotspots was also limited or absent. Due to this dearth of evidence, and the nature of the desk-based data collection that informs this report, the following posits possible marine litter hotspots in Cambodia. This is a first step towards investigating hotspots in order to support future research efforts. In particular, this section of the report utilises UNEP's National Guidance for Plastic Pollution Hotspotting and Shaping Action (2020) to frame and organise the available evidence (96). A plastic hotspot is defined by UNEP as "*the most relevant plastic polymers, applications, industrial sectors, regions or waste management stages causing the leakage of plastics into the environment (including land, air, water and marine environment), as well as associated impacts, through the life cycle of plastic products*". The following sets out contributing factors and possible sites of high leakage and pollution concentration that may warrant on-site assessments.

Intense and large-scale coastal development likely contributes to marine litter hotspots in Cambodia. As set out above, the city of Sihanoukville has seen a rapid socioeconomic

transformation and property development in recent decades, though investment in infrastructure and urban planning has arguably not matched the city's rapid rate of growth leading to considerable sanitation and waste disposal issues (22,111). With poor compliance with and limited enforcement of existing regulations, development is thought to have affected seagrass and coral reef habitats in Cambodia (20), and of particular concern are construction projects within or near protected areas. Some of the largest developments are within designated National Parks or in the vicinity of MPAs, where Economic Land Concessions (ELCs) have been granted by the RGC. One of the largest is the Golden Silver Golf resort occupying 3,300 ha within Ream National Park (35) in Sihanouk Province. There is also large scale development slated for Koh Rong island, located within the KR-MNP (48). Particularly prevalent in the media is the Dara Sakor mega-project, situated within Cambodia's largest National Park at Botum Sakor (Koh Kong province) (97). This large-scale construction project is not only within a National Park, but is also located on the mainland some 500 metres from the KSA, a site of environmental significance identified for a planned MFMA. The Dara Sakor development has acquired 20 percent of Cambodia's coastline for 99 years and includes the construction of an airport, hotels, a golf course, casinos and a port (97). It is anticipated that the volume of marine litter will increase due to waste generated by these coastal developments both during and after their construction. Given the lack of supporting infrastructure and management systems - most notably SWM systems - paired with limited

regulation of the private sector, debris from these sites is expected to travel from the coastline into the ocean.

Popular tourist sites are also potential marine litter hotspots, with plastic use and waste generation by the tourism sector contributing to marine litter in Cambodia. For example, one study found high levels of plastic debris accumulation on Occheuteal beach, which is a high traffic area for tourists in Sihanoukville. National trends prior to the global Covid-19 pandemic evidence increasing coastal tourism (both domestic and international) (97,98, 105,125). Whilst shifts in tourism due to the pandemic are still being understood, the 2020 Tourism Statistics Report showed that coastal zones attract the majority of internal, domestic tourists (especially Sihanoukville). For example, whilst domestic tourism in Siem Reap dropped by nearly 99% between 2019 and 2020, domestic tourism at coastal sites has been more resilient, decreasing by just 4% in the same period.

Remote coastal and island sites face a number of complexities, including inaccessibility and logistical barriers, infrastructure limitations, low socio-economic status and livelihood diversity, underrepresentation and insufficient capacity to meet these complex and interconnected challenges. Further, based upon initial scoping studies, it is suspected that these communities may rely more heavily on and use a greater volume of plastic due to WASH deficiencies and food insecurity, with many goods being transported in plastic to these sites, including potable water, hygiene and food products. This is particularly prevalent at isolated island locales that are off the grid, difficult to access and/or are faced with water security challenges. For example, initial data collection in Koh Sdach Village found that 27% of HH waste was plastic – higher than the Phnom Penh average of around 20% (111,124). Plastic water bottles were one of the most common forms of plastic found in HH waste at this site (by weight) (111). Additionally, many coastal and island sites rely on fishing as the primary livelihood, with the

fisheries sector not only contributing to marine litter but also being undermined by it. Estimations from scoping data suggest that nearly 5,000 nets are entering the ocean from Koh Sdach Village annually (111).

Riverine waste flows and sites exposed to flooding are likely to play a significant role in plastic pollution leakage into the marine environment given the sheer size and complexity of Cambodia's freshwater systems and the number of communities living on or near freshwater bodies. Topographically Cambodia is characterised by lowland floodplain swamps or flooded forests, which are either permanently or seasonally inundated (99). The Mekong River is known to be one of the most polluting in the world, and in Cambodia the Mekong flows from north to south, over a distance of about 480 km² with the river's drainage basin covering around 86% of the country. The rainy season in Cambodia occurs from May to October and the Mekong River brings yearly floods, flowing downstream into the Tonle Sap lake and Bassac rivers (27,99). The Tonle Sap River dwarfs all other lotic bodies in the Indo-Burma biodiversity hotspot, and is the only river in the world that flows in multiple directions, reversing its direction of flow twice a year (99). Much of Cambodia's population lives on or near these great freshwater bodies, and have limited or absent SWM systems, likely resulting in high levels of direct disposal into the environment (27). As such it is anticipated that waste leakage is occurring from freshwater systems into the ocean, however further study is needed. Last, though certainly not least significant, most if not all coastal and island communities have **inadequate waste management systems**, amplifying the aforementioned drivers of marine litter hotspots. Overall further data collection in Cambodia is needed to analyse waste leakage, sources and flows, as well as accumulation and impacts. This is an important consideration for marine litter planning and management, as well as the development of a monitoring programme, which will be supported by this Situation Analysis and the SEA circular initiative

4.2 Research and evidence gaps

Little published data could be found on marine litter in Cambodia and the published data that exists represents the early stages of investigation for the Nation (i.e. it is initial or

scoping data). In many ways, this shortage of evidence exists as a legacy of conflict, which negatively impacted social, economic and educational outcomes. Disruption of education systems and continuing barriers to improved educational outcomes have impacted technical capacity in key areas, including the sciences (93, 94). FFI's scoping research investigating marine

plastic pollution was some of the first conducted in Cambodia, along with studies led by The World Bank investigating top 10 most abundant plastic items (111,112). The information gaps are considerable, and a number of opportunities for further study have been identified, including:

- Marine litter composition, volume, sources, sinks & hotspots, including clearer articulation of the impacts of marine litter in Cambodia.
- Mapping of litter flows and leakage, including transboundary waste flows, waste travelling via freshwater ecosystems and off-land. It is noted that the Mekong river flows through Cambodia and into Vietnam, and transboundary cooperation would be required to assess how waste is carried through the Mekong delta and into the ocean.
- Brand information and life cycle assessments for plastic, including plastic and waste value chains, which presents opportunities for private and public sector engagement to foster accountability and support circular economy and EPR initiatives.
- Data collection investigating microplastics⁴.
- Quantifying and characterizing waste from key sectors of economic growth in Cambodia, as a means to engage these actors in marine litter reduction strategies, for example, the construction, tourism, garment and agri- and mari- culture sectors. And;
- Plastic use behaviours and disposal practices, including social and culture norms that impeded SWM systems operating at their full potential; and the articulation of essential versus non-essential plastic use as a means to reduce unnecessary and wasteful plastic consumption.

Table 2. Inventory of current marine monitoring in Cambodia

⁴ Hull University and Newcastle University started data collection in South-East Asia pertaining to microplastics in

In order to bridge these gaps an array of support is needed, including resourcing to fund research, technical support that focuses on building local capacity, and regional and international guidance that outlines best practice methodologies and sets out consistent indicators and guidelines. Further, as these evidence gaps are bridged, an array of dissemination strategies will be crucial to ensure research is freely available, actively shared and fully utilised, especially to inform action and heighten Cambodian representation at regional and international fora. For information regarding related research activities that are currently under way in Cambodia see Section 5.3.

4.3 Other coastal and marine biophysical monitoring

Given the dearth of evidence relating to marine litter, a broader review was conducted to inventory coastal and marine monitoring and biophysical research in Cambodia. The following marine research and informal, citizen science activities may be leveraged to inform marine litter interventions and support the establishment of a national marine litter monitoring programme.



Credit: Bianca Roberts / FFI

freshwater ecosystems, however the global pandemic has hindered their data collection efforts.

Data Type	Data contained	Site	Year initiated	Organisations involved*
Biophysical	Seahorse Surveys	Koh Rong	2016	FFI, SSF, SCML
Biophysical	Seagrass	Koh Sdach	2018	FFI, KD
Biophysical	Seagrass	Koh Rong	2013	FFI, SSF, SCML
Biophysical	Coral Reef	Koh Sdach	2013	FFI, PA, KD, SW, SSF
Biophysical	Coral Reef	Koh Rong	2010	FFI, CCC, SSF, KD
Biophysical	Neptune's cup sponge	Koh Sdach	2018	FFI, KD, SCML
Biophysical	Seahorse Hotspot Surveys	Koh Sdach	2019	KD
Biophysical	Coral Reef mapping (including depth data)	Koh Sdach	2019	KD
Biophysical	Species sightings	National	2019	FFI
Biophysical	Sea Turtle sightings	National	2015	FFI
Social	Socio-economic	Koh Rong	2015	FFI
Social	Socio-economic	Koh Sdach	2019	FFI

***Key:** FFI = Fauna & Flora International; SCML = Save Cambodia's Marine Life; KD = Kuda Divers; SSF = Song Saa Foundation; CCC = Coral Cay Conservation; PA = Projects Abroad; SW = Shallow Water

Table 3. Informal marine litter data collection & citizen science

Activity	Data collected?	Site	Organisations involved*	Notes
Beach clean-up	Occasionally	Various, including KSA & KRA	• FFI • SSF • KD • Dive shops & tourism businesses • CFIs • Coastal Communities • Six Senses	It is noted that beach cleans take place at multiple locations and times each year normally linked to global awareness days, such as International Coastal Clean Up Day or World Oceans Day. These activities are typically targeted at awareness raising and education and whilst data is occasionally collected it is not readily available. There is scope for these activities to be used for more rigorous data collection, and many organisations expressed interest in training to enable them to do so.
Community clean-up	Yes	Various, generally focused on urban areas	• Go Green • Coconut School • Liger Leadership Academy	Go Green is a Cambodian NGO that was working with the MoE and urban communities to promote better waste management, reduce littering and lead community clean ups. A mobile app was created and data was collected by the MoE, though it is not known if data collection is still taking place.
Under water clean-ups	Occasionally	Various, including KSA & KRA	• Dive shops, including Kuda Divers • SSF	Kuda Divers is utilising the GGGI methodology to collect data during under water cleans ups. FFI is working with Kuda Divers and other dive shops to support them to collect consistent data regarding underwater debris using the GGGI methodology.

Section II. Marine Litter Management in Cambodia

5. Stakeholder landscape

Marine litter is an unprecedented threat occurring at a scale and scope that necessitates multi-stakeholder engagement and productive

collaboration locally, nationally and regionally. An array of actors will be required to embrace change and lead novel interventions to address the many drivers of marine litter. Ongoing collaboration is paramount to support consistency and accountability, enhance impact and avoid duplication of effort. In Cambodia, momentum has rapidly increased in recent years, and across private, third and public sectors stakeholders are demonstrating their commitment to address plastic pollution and marine litter. The current stakeholder landscape is promising but is also crowded and complex, with an array of needs and differing levels of agency, transparency and representation. This landscape presents opportunity but also risk if collaboration is not fostered. There is a strong need for inter- and inner- ministerial coordination across mandates, and cohesion between donors and/or development partners is essential to ensure coherent marine litter planning and accountability across sectors.

5.1 Government entities

The **MoE**, established in 1993, is the main governing body with the mandate to protect coastal and marine environments. Of particular relevance to marine litter in Cambodia is the MoE's leading role in SWM and plastic bag management as mandated under sub-decrees 27, 36, 113 and 168. Further, protected area and National Park management falls within the remit of the MoE (31).

Established in 2015, the **National Council for Sustainable Development (NCSD)** is an inter-ministerial council chaired by the Minister of Environment. The NCSD is a policy-making body focused on promoting sustainable development and ensuring economic, environmental, social and cultural balance within the Kingdom of Cambodia. The mandate of the NCSD is to *"prepare, coordinate and monitor the implementation of relevant policies, strategies, legal instruments, plans, and programmes in all areas of sustainable development and to monitor and report on Cambodia's implementation of its international commitments to the respective international bodies"*(113). With regards to SWM and marine plastic pollution the key strategies of the MoE and NCSD are:

1. To raise awareness, including through environmental education and targeted campaigns;

2. To develop policy & regulations, including on SUP and to promote plastic alternatives;
3. To improve overall waste management practices and promote recycling and waste-energy options; and
4. To build a strategic coalition.

A National Taskforce Against Plastic has been formed by the MoE and the National Council for Sustainable Development (NCSD) with support from the Government of Sweden, The World Bank, the Global Green Growth Institute and the UNDP. The taskforce focuses on three priority areas: 1) policy and regulatory reviews on plastic, 2) plastic waste communication and outreach, and 3) engagement of private sector actors in support of reduced plastic use.

The **Ministry of Agriculture, Forestry and Fisheries (MAFF)**, is responsible for managing coastal mangrove forests, wildlife and fisheries, with the key agency for coastal and marine resource management being the FiA. Established in 2006, the FiA is responsible for fisheries resource management and whilst other ministries and agencies also have fisheries management within their remit, it is the primary responsibility of the FiA.

In addition to the NCSD, two other national inter-ministerial groups are particularly relevant to coastal zone management, though historically marine litter has not been a focus of these groups:

1. **National Committee on Management and Development of the Coastal Zones (NCMDC)** is an inter-ministerial committee, including the MoE, MAFF, and MoT, that acts as national advisory committee on the development of coastal areas; and
2. **National Technical Working Group for Fisheries (TWG-Fi)** is chaired by the Director General of the Fisheries Administration and consists of members from relevant Government agencies, NGOs and development partners. It focuses on coastal and marine fisheries, includes collaborative planning and updates for a range of topics including IUU fishing, the fisheries law, national action plan development, CFi support, post-harvest strategies and aquaculture development.

5.2 Intergovernmental agencies, development partners and civil society

A number of development partners, intergovernmental agencies and civil society organisations are engaging on marine litter and plastic pollution in Cambodia, with the primary actors detailed below. Strategic coordination is growing and more recently regionally focused organisations have demonstrated their desire to support Cambodia. To date the backdrop for marine litter interventions in Cambodia has been characterised by collaboration and information sharing with the goal of reducing duplication across focal agencies and supporting coordination of effort.

The World Bank is engaging with the RGC, including the MoE & the Ministry of Economy and Finance (MEF), to build technical capacity, support data collection and enable policy development. In coastal areas of Cambodia, The World Bank's ProBlue project focuses on *"charting a coastal blue economy development path for Cambodia"*. ProBlue is supporting marine resilience assessments and protected area management, coupled with sustainable ecotourism, fisheries, and energy sector development (114). The project has three main components:

1. Review of relevant public sector policy and institutional frameworks;
2. Improving coastal tourism development planning; and
3. Formulation of a coastal blue economy development roadmap.

Within the Blue Economy Road Map, a National Plastics Action Plan and Roadmap is also being developed. This intervention aims to foster private sector engagement and present a series of policy recommendations to prevent plastic pollution entering Cambodia's rivers and coastal zones. FFI is working with The World Bank to deliver the ProBlue project, including collecting data to inform the National Plastics Action Plan and Roadmap.

The **UNDP** is also working with the RGC, including the MoE and the NCSD, to build their technical capacity and support action that addresses plastic use and pollution in Cambodia. To date UNDP's work has included SBC campaigns targeting plastic disposal behaviours, educational forums focusing on addressing plastic pollution, and investigating

innovative methods for waste management, such as waste-to-energy and circular economy approaches.

With support from the Embassy of Japan, the UNDP launched their Marine Plastic Project in early 2021. This project aims to *"prevent and minimize plastic waste pollution on land and in the ocean through promotion of a 4R (Refuse, Reduce, Reuse, and Recycle) framework"*. The project will focus on policy development and regulation, awareness raising, reducing plastic waste, and the promotion of new technologies, for example, recycling and plastic alternatives. Target provinces include Siem Reap, Sihanoukville, Phnom Penh and Kep, with the goal of effectively reducing marine plastic pollution at source. Building on earlier efforts, the project has five key outputs:

1. Key enabling policies and regulations are developed to promote 4Rs and the use of multi-use plastic, recycling, and plastic alternatives;
2. Improved awareness about the plastic crisis and its solutions among citizens and the private sector through environmental education and awareness-raising activities;
3. Plastic waste reduced in Phnom Penh, Siem Reap, and Sihanoukville through education and private sector-led best practices and innovations;
4. Priority business models for plastic recycling and alternatives supported and tested; and
5. Best practices disseminated and shared.

The UNDP is engaging with other projects and actors nationally to support cohesion and collaboration.

FFI – Cambodia Programme, specifically the Coastal & Marine Conservation Programme (CMCP) has been operational for over 10 years. The CMCP supports the FiA and MoE to protect coastal and marine biodiversity, sustainably manage fisheries resources and improve the livelihoods of coastal communities. Focused on building community, Government and local partner capacity for biodiversity conservation the CMCP has supported the design and management of an MPA network, whilst tackling key threats such as IUU fishing and most recently, plastic pollution. In response to significant evidence gaps, FFI's Marine Plastic Project began scoping studies in 2018 to quantify and characterize marine plastic

pollution in Cambodia. From these scoping studies five key objectives have evolved:

- To quantify and characterise marine litter, including impacts on biodiversity & coastal communities;
- To reduce the amount of plastics used and waste generated, focusing on unnecessary and wasteful plastic consumption;
- To foster an enabling environment for reduced marine litter through governance strengthening & capacity building;
- To support community-led interventions that reduce marine litter, including addressing factors that drive improper disposal;
- To strengthen diverse, sustainable livelihoods and enable market-based solutions that reduce marine litter and support wellbeing.

FFI's Marine Plastic Project now acts as the in-country technical partner for **COBSEA's SEA circular initiative**, engaging the MoE in capacity building, research and policy reform. In Cambodia the SEA circular initiative currently focuses on enabling the establishment of a marine litter monitoring programme, enhanced marine litter planning and supporting Cambodia's commitments under the 2019 Regional Action Plan on Marine Litter (RAP MALI).

5.3 Research focused actors

A number of organisations were contacted to ascertain what past, current or planned marine litter research they were undertaking, covering thematic areas directly and indirectly related to marine litter, including:

- data collection during beach and in-water clean ups;
- research related to plastic use, disposal behaviours and plastic pollution;
- research pertaining to coastal and marine ecosystems;
- research to inform environmental policy & governance; and/or
- research related to solid waste and SWM.

Twenty-four organisations were contacted, including civil society organisations, private businesses, educational institutions and Government ministries. Of those contacted, four organisations reported data collection related to marine litter as described below:

As set out above **The World Bank's** focus under the ProBlue project is to develop a Blue Economy Roadmap, which includes a National Plastics Action Plan. To inform these key outcomes The World Bank has led the following research:

- plastic surveys, including data collection related to plastic imports and sellers, and an assessment of plastic alternative products available in Cambodia;
- a legislative review, framed by lessons learnt in the international context and feasibility in the Cambodian context; and
- an assessment of the top 10 most common plastics in Cambodia, utilising novel techniques such as aerial drone surveys to assess floating macroplastic waste in riverine and coastal areas.

Planned research activities include:

- quantifying waste leakage into river systems and the expansion of pilot studies;
- assessing the socio-economic impacts of absent or deficient SWM on coastal and island communities; and
- waste characterisation studies at coastal and island sites.

FFI – Cambodia Programme began scoping studies in 2018, engaging a number of research partners to quantify and characterize marine plastic pollution in Cambodia, including the Royal University of Phnom Penh (RUPP) and Prek Leap Agricultural University. The primary study, conducted in an island community within the KSA, included HH surveys, waste characterisation analysis and stakeholder mapping. The second complementary study took place in Sihanouk Province, and included KIIS to articulate waste management practices and perceptions, and waste characterisation to quantify coastal debris.

In addition to this, reef health checks are conducted as part of FFI's programme of work to monitor and protect marine biodiversity. These are supported by community partners, including the Song Saa Foundation and Kuda Divers. FFI is working with partners, communities and other key actors to expand data collection efforts, build local research capacity and ensure that data collection is consistent and comparable across sites. More recently, **Kuda Divers**, has utilised the Global Ghost Gear Initiative's (GGGI) data cards to collect data during dives and under water clean-ups. FFI and Kuda Divers are now collaborating

with other dive shops to utilise the GGGI data card to support consistent underwater marine litter data collection across sites.

The **Cambodian Coral Reef Monitoring Network** (CCRMN) was established in December 2019. This network has compiled reef monitoring data from surveys conducted in Cambodia over the last nine years by different organisations into a central database. The insights from in-water reef surveys are worth noting, however discrepancies in number of surveys, survey design, dive sites and nature of data collection thus far make comprehensive conclusions tenuous. With the CCRMN formally established, future marine monitoring will be standardised allowing for more comprehensive analysis and the ability to monitor change over time. Members include:

- Marine Conservation Cambodia (NGO);
- Wild Earth Allies (NGO);
- Centre for Biodiversity Conservation (CBC) & the Royal University of Phnom Penh (RUPP);
- Private sector diver shops, including Kuda Divers and the Khmer Dive Group;
- Liger Leadership Academy (student-led marine research team);
- Song Saa Foundation (NGO / Foundation);
- MaFREDI (see below);
- Royal University of Agriculture (RUA);
- Fisheries Administration (part of MAFF); and
- FFI.

Federal research bodies

The Cambodian Fisheries Law places a legal mandate on the FIA to conduct fisheries research. Two federal research bodies, the Inland Fisheries Research Division (IFReDI) and the Marine Fisheries Research Division (MaFReDI), are responsible for providing scientific information, technical support and fisheries statistics for the sustainable development and management of inland and marine resources in Cambodia (95). To date no data on marine litter has been collected by MaFReDI, but their remit presents an opportunity for data collection and monitoring that supports marine litter reduction. Further, collaboration between IFReDI and MaFReDI could be leveraged to investigate

marine litter flows through freshwater systems and into the ocean.

The National Institute of Statistics (NIS) of the Ministry of Planning is responsible for the collection, analysis and dissemination of official national statistics, with oversight of the Census and Survey Department, the Social Statistics Department and the Economics Statistics Department (95). Again, the NIS has not historically collected data on marine litter but their specific mandate and technical expertise could be leveraged to support data collection that informs marine litter interventions.

Educational institutions and academia

Science, Technology, Engineering and Mathematics (STEM) fields & research in Cambodia have been severely hampered by conflict, leading to a shortage of trained biologists and reliable data. Support of educational institutions is crucial to build an evidence base for sustainable development, foster local technical capacity and create a pipeline of national expertise. For example, through a partnership between the RUPP and FFI, Cambodia's first Master of Science degree in biodiversity conservation was established in 2005. RUPP's Centre for Biodiversity Conservation also produces the Cambodian Journal of Natural History, which was launched in 2008 and is the first and only scientific periodical in the country.

As part of compiling this Situation Analysis, 11 national and international educational institutions were contacted (international institutions were contacted based upon their historic engagement in Cambodia). Of these, three had collected data regarding marine litter in Cambodia, that is, Prek Leap Agricultural College and RUPP (which supported FFI's scoping research in 2018); and the National University of Singapore, which is partnering with COBSEA to build a regional marine litter research database. Others have expressed interest and/or halted data collection due to the global pandemic, including Hull & Newcastle Universities, Warwick University and the University of Southampton.

Table 4. Research focus area of educational institutions

Education Institution		Marine Litter	Plastic (Waste & Pollution, Use, Disposal)	Coastal & Marine Ecosystems	Environmental Policy & Governance	SWM
	Royal University of Agriculture (local)			X		
	Royal University of Phnom Penh / Centre for Biodiversity Conservation (local)	Marine plastic pollution (with FFI)	X	X		X
	Prek Leap Agricultural College (local)	Marine debris characterisation in Sihanoukville (with FFI)				
	National University of Singapore (international)		X	X	X	
	University of Warwick (international)			X		
	Hull University in partnership with University of Newcastle (international)		Conducting research on microplastics in fresh water ecosystems of the Mekong delta.			
	University of Southampton (international)		X	X		
	Liger Leadership Academy (Local secondary school, Liger Marine Research Team)		X	X		

5.4 Private sector

Private sector actors play a crucial role in combating marine litter, with scope to support innovative approaches, enable EPR and sustainable production and consumption, support improved waste management and pursue novel investment opportunities. Accountability and transparency is crucial, especially in the Cambodian context, and for many of the sectors listed below the relationship with marine litter is inter-connected, that is, they are both contributors to, and undermined by, marine litter. The below sectors are defining the marine litter landscape in Cambodia:

Tourism sector: Steady growth of Cambodia's tourism sector has led to it becoming an important driver of socio-economic development, supporting investment and employment opportunities. In 2018, Cambodia received nearly four million tourists, making up approximately 17% of the GDP, with coastal regions representing 12% of the tourism market

in that same year. More recently, the COVID-19 pandemic has impacted the Cambodian economy, with a projected lasting increase in the poverty rate (106). The international tourism sector has been particularly affected (140), and whilst the impact on coastal and island communities has not yet been quantified, these areas were emerging as growth zones for tourism prior to the pandemic (141). The most recent Tourism Statistics Report shows a 4% drop in domestic tourism at coastal sites between June 2019 and June 2020 (105). Whilst domestic tourism decreased at coastal sites, they have been less impacted than other areas, for example Siem Reap and Phnom Penh which saw a 98.7% and 45.6% drop in domestic tourism in the same period, respectively. Overall the national average of domestic, internal travellers decreased by 40.6% between 2019 and 2020 (105).

Prior to the global pandemic the beaches of Sihanoukville were attracting growing numbers of domestic and international tourists. Though tourism sector development presented

economic growth opportunities for this coastal city, serious environmental and social issues were arising due to absent regulation of the construction sector, under-investment in infrastructure development, and land-use and titling conflicts (108). Data collected in Sihanoukville in 2018 found the hospitality and tourism sectors to be both generators of, and impacted by, mismanaged waste and marine litter. KIs demonstrated a high level of enthusiasm from these sectors towards reducing marine litter, with a number of businesses owners in Sihanoukville, and the nearby KRA, leading their own initiatives to reduce plastic use and clean-up marine litter (111). Coastal debris studies conducted in Sihanoukville found that the main source of macroplastic pollution was from land (i.e. Sihanoukville city) as well as washed ashore from other areas; possibly the popular tourism sites situated in the KRA. More recent anecdotal observations from FFI staff indicate a severe impact to the tourist economy in the KRA, with some businesses permanently ceasing operations. In the neighbouring KSA, ecotourism was found to be an aspirational livelihood, with residents expressing the desire to diversify their income sources beyond fisheries (111).

Construction & property development sector:

The construction sector has boomed in Cambodia, and between 2000 and 2018 the Ministry of Land Management, Urban Planning and Construction approved nearly 44,000 construction projects, representing an estimated investment capital exceeding US\$43.3 billion (107). Along with the tourism, garment and agriculture sectors, construction is one of the key sectors supporting Cambodia's economic expansion, including at coastal and island sites (107). Whilst limited information exists, the construction sector is perceived to be a key waste generator in coastal zones, with development in Koh Kong and Sihanouk Provinces presenting a particular threat to current and planned MPA sites. Sub-Decree 113 describes how to sort and manage construction waste and outlines penalties for construction sites that fail to meet these requirements, however limited regulation and enforcement of these profitable and powerful actors takes place.

In response to a series of fatal building collapses in 2019 and 2020, including in the coastal cities of Sihanoukville and Kep a new law was ratified (116, 117). Cambodia's Law on Construction (effective 20 November 2019)

focuses on practitioner regulation and certification, security and safety. This new legislation is predicated by the Country Planning, Urbanization and Construction Law of 1994, which includes provisions to assure "*the value of natural and cultural wealth, ensuring the development of the economic and touristic sectors and maintaining the quality of the environment*", stating that "*all individuals and private institutions as well as public authority are banned from conducting any constructions on the public yard-field or lands as defined hereunder as...rivers, seas and streams including banks*". Despite this the provision of economic land concessions in protected areas continues. Further investigation is needed to develop a sound evidence base and motivate collaboration with construction sector leaders to reduce unsustainable resource use and improve management practices.

Plastic importers, producers & alternative providers:

Generally, in Cambodia most plastic products are imported with very little production taking place in country. Engaging plastic importers and alternative providers presents opportunities to minimise amount of plastic imported and reduce reliance on plastic (provided the needs of communities are taken into account). Additionally, plastic importers might be enlisted to make available plastic alternatives or to import products that facilitate reuse and recycling. There are also a number of businesses in Cambodia that sell plastic alternatives. Anecdotal discussions with these businesses highlight challenges, including the high rate of import taxes, which prevent competitive pricing, minimising uptake of plastic alternatives and threatening profitability. Water and food security and WASH outcomes are also a significant element, which needs to be addressed in order to reduce reliance on plastic, especially in rural and remote areas, including coastal and island communities.

Coastal & island MSME's: Socio-economic assessments at coastal and island sites illustrate that small businesses, including grocers and food vendors, are becoming an increasingly important income source in some communities, including to meet growing demand from domestic tourism. Given the frequent use of plastic by food vendors, grocers and at wet markets, it is anticipated that these businesses are likely to be sites of high, and increasing, plastic use (73). As such plastic streams, life cycles and use by small businesses at coastal and island sites should be

investigated as an avenue to reduce wasteful and unnecessary plastic use at a community level. Circular economy approaches and circular-centric MSME's present opportunities for sustainable, alternative income streams that reduce marine litter and support poverty alleviation. It is crucial to note, however, that a number of systemic barriers need to be addressed for such businesses to thrive.

Informal waste sector: SWM practices in Cambodia include informal waste collection networks centred on ecchay who pick waste to extract recyclables. Ecchay are often represented by the urban poor, employing vulnerable individuals, including women and children. Little is known about these informal networks, though it is estimated some 3,000 individuals are active nationally (57,59,65,66). Ecchay are also active at coastal sites, though in smaller numbers. One case study found that in coastal zones the ecchay focus on purchasing old nets and aluminium cans for resale in Thailand and Phnom Penh (other than nets, plastic recyclables were not purchased due to their low resale value (111)).

Though data collection regarding the informal waste sector is challenging, anecdotal evidence and KILs suggest that Cambodia's informal SWM systems are characterised by networks of ecchay who collect waste for larger recycling centres. These larger centres transport recyclables to Thailand and Vietnam for sale, though some evidence suggests other nations are increasingly represented in these markets, including China and Korea. Despite the presence of transboundary waste trading networks, waste export is prohibited without the proper permissions (Article 9 of Sub Decree 36); *"the export of the household waste from the Kingdom of Cambodia abroad cannot be conducted unless approved by the Ministry of Environment, and [holding an] export license from the Ministry of Trade and permit from the import country"*. It is not known whether the existing informal networks have appropriate licenses, though anecdotal evidence suggests they do not. The ecchay are vulnerable due to their tenuous legal and socio-economic status, despite this they form a crucial part of Cambodia's SWM, especially the processing of recyclables. The global pandemic has only increased the ecchay's vulnerability, including limiting their movements across borders (115). Adding to their vulnerability is the impending closure of the Thai and Vietnamese borders to the recyclables trade, which is expected to take

place in 2021 (111). The result of this would be the collapse of Cambodia's informal waste sector, and domestic solutions that empower these actors and support circular economies are essential.

Marine Fisheries & Aquaculture: A number of large, multi-national donors have expressed interest in developing Cambodia's blue economy, including market strengthening for mariculture and fisheries. This represents a vital opportunity for the Kingdom, however, it is crucial that these interventions are managed sustainably with communities and ecosystems in mind. There is scope for regulation of plastic use and disposal, especially fisheries waste, along these value chains to ensure they do not undermine the ecosystems upon which they depend.

Fisheries waste: Whilst the focus of this Situation Analysis is land sources of marine litter, ALDFG is a significant component of marine litter in Cambodia. Many coastal & island communities depend on fishing as their primary livelihood and to meet their daily subsistence needs, meaning that they are not only vulnerable to the impacts of ALDFG but are also key generators of fisheries waste. Additionally, the lasting damage of ALDFG on marine ecosystems and blue economies has impacts locally and nationally. Reef health checks conducted in KSA found that 78% of marine litter was used fishing gear, largely nets and monofilament lines. The next most common type of litter recorded was general plastic waste, making up 16% of items counted. In the neighbouring KRA, fishing nets made up 66% of the marine litter recorded (111).

In Cambodia, fishing gear such as nets, monofilament lines, ropes and buoys is predominantly made of plastic, and is typically purchased from Thailand and Vietnam. Scoping studies at one coastal site found that fishing nets were not comprised of high-quality polymers, with fishers reporting an average lifespan between one and three months before nets degraded beyond usability. At this same site, 52% of fishing HHs reported discarding of nets directly in the ocean, with an estimated 3,286-4,930 nets entering the ocean from this village each year. The main causes of fishing gear entering the ocean were reported as:

- accidental loss of fishing gear, including due to snagging on reefs;

- direct disposal of used fishing gear (and other waste) from ships;
- loss due to inclement weather; and
- illegal activities, for example, disposal of illegal fishing gear into the ocean to evade enforcement activities (111).

IUU fishing remains a major and immediate threat to marine life in Cambodia. Infractions include the use of illegal fishing gear, fishing outside of designated zones and illegal cross-border fishing from Vietnamese and Thai vessels (5,21,23,24). Trawl fishing in particular is illegal in water of less than 20 metres deep but occurs across the coastline, impacting fragile habitats and species (25). Most fishing vessels in Cambodia remain unregistered, making

monitoring and adequate enforcement challenging, and the legislation that would enable registration, remains in draft form. Corruption also remains a barrier to better monitoring and compliance with fisheries regulations (5,23). Linkages between IUU and ALDFG's are yet to be explored in Cambodia, and sit outside the focus of this report, however some actors are working to better understand this component of marine litter, including FFI.

5.5 Capacity gaps

Through KII's a number of areas for capacity development were identified across key stakeholder groups, as set out in the table below.

Table 5. Key capacity gaps by stakeholder group

Sector	Stakeholder Group	Capacity Development Area
		• Technical skills to assess, monitor and manage marine litter; • Understanding of existing policies, legislation and regulations of Cambodia, as well as regional and



		owners are also leading sustainable practices and are concerned about the impact of mismanaged waste, high volumes of plastic use and marine litter.
Public	Coastal Communities	• Social, economic and environmental threats of mismanaged waste and marine litter; • Risk & hazards associated with some waste treatment options, such as incineration; and • Mechanisms to drive change and accessible opportunities for sustainable consumption and resource management. Note: Whilst some communities had capacity gaps relating to the threats of mismanaged waste and marine litter, many are acutely aware and actively seeking opportunities to address these threats despite being faced with significant barriers and challenges.
Third	Civil society and NGO's	• Establishing platforms for evidence-policy interfaces; • Working with private sector to promote sustainability along value chains and strengthen market-based approaches, leverage investment or realise sustainable financing opportunities; and/or adopt cross sectoral approaches such as EPR; and • Adapting novel approaches to the Cambodian context, such as circular economy solutions.

6. Marine litter governance in Cambodia

6.1 Regional and international governance inventory

There are a number of international and regional conventions, agreements and strategies concerning the health of the marine

environment to which Cambodia is a signatory or member party, in addition to its own national legislation, policy and regulatory frameworks. The following lists various governance, legal and regulatory frameworks by geographic extent and focus area, and includes both laws and binding international agreements, as well as non-binding frameworks and strategies. Governance surrounding marine litter in Cambodia is shaped by:

Global frameworks:

- United Nations Convention on the Law of the Sea (UNCLOS, ratified end of 2019);
- Basel Convention on the Control of Transboundary Movements of Hazardous Wastes and Their Disposal (Basel Convention) (ratified 2001);
- International Convention for the Prevention of Pollution from Ships (MARPOL 73/78, ratified in 1997);
- Global Programme of Action for the Protection of the Marine Environment from Land-based Activities (GPA) & Global Partnership on Marine Litter (GPML);
- Sustainable Development Goals (SDGs), specifically the Cambodian SDGs set out below;
- Rotterdam Convention on the Prior Informed Consent Procedure for Certain Hazardous Chemicals and Pesticides in International Trade (ratified 2013);
- Stockholm Convention on Persistent Organic Pollutants (ratified 2006);
- Agenda 21, Chapter 17 (Rio Convention);
- International Maritime Organization (IMO) – Member (1961);
- International Convention on Civil Liability for Oil Pollution Damage (CLC), 1969
- Protocol of 1992 to amend the International Convention on Civil Liability for Oil Pollution Damage, 1969 (CLC PROT 1992), Cambodia ratified 2001
- International Oil Pollution Compensation (IOPC) Funds
- Convention on Biological Diversity (1992);
- Agreement on Port State Measures (PSMA, 2016);
- United Nations Fish Stock Agreement; and
- The United Nations Environment Assembly (UNEA) resolutions:
 - UNEP/EA.1/Res.6: Marine plastic debris and microplastics (2014)
 - UNEP/EA.2/Res.11: Marine plastic litter and microplastics (2016)
 - UNEP/EA.3/Res. 7: Marine litter and microplastics (2017)
 - UNEP/EA.4/Res.6: Marine plastic litter and microplastics (2019)
 - UNEP/EA.4/Res.9: Addressing single-use plastic products pollution (2019)
 - UNEA-5 resolution 2022: Resolution to End plastic pollution: Towards an international legally binding instrument

6.2 Key national legislation

The legislation and policies of Cambodia outline the leading role of the MoE in the Kingdom's SWM systems, as well as other governance frameworks pertaining to marine litter, such as national strategies and governing bodies. More recent sub-decrees identify other ministries as key actors, including the Ministry of Interior (MoI), MEF and the MoT. In 2001 and 2008, two major phases of decentralisation of governance and institutional reform led to administrative power and responsibility for waste management to be shifted away from national Government and towards sub-national authorities (see Section 6.5). This means legislation dictates that responsibilities are highly decentralised,

primarily to provincial level, with the option to further delegate to municipal, district and commune administrations. As a result, the Government actors expected to be involved in waste management can be unclear, and without clear and transparent channels for support and communication sub-national authorities may struggle to meet the commitments set out by the legislation. Although there exists a larger governance framework covering waste management in Cambodia, the below table highlights key points from various laws pertaining to the prevention and/or reduction of marine litter in Cambodia.

Table 6. Details from key national legislation

EiF	Legislation	Mandate	Relevant Points ⁵
1996	Law on Environmental Protection & Natural Resources Management	RGC and the council of Ministers, with the MoE adopting a lead implementing role.	[Note: this predates the decentralisation of governance and institutional responsibility that has occurred in Cambodia since this law was passed. It is also noted that this law is currently under review.] - To harmonise the legal instruments pertaining to natural resource management, the MoE is currently developing an overarching Environmental and Natural Resources Code; - The only section that touches upon concepts relating to plastic pollution is Chapter V on Environmental Protection, which declares that the prevention, reduction and control of airspace, water and land pollution, including of waste, will be determined by future sub-decrees; - High-level nature of this law means there's limited direct relevance to activities addressing marine litter, besides the overarching prohibition of pollution in general.

⁵ Note that details of legislation are taken from unofficial translations from Khmer to English.

1999	Sub-decree No.27 on the Control of Water Pollution	As above	• This sub-decree “<i>applies to all sources of pollution and all activities that cause pollution of the public water areas.</i>” (Article 2); • “<i>Sources of pollution</i>” covers dwelling houses, public administrative buildings, transport facilities, business areas, premises or service places “<i>from which effluent, pollutants or hazardous substances are directly or indirectly discharged into public water areas or public drainage systems.</i>”; • Includes “<i>solid waste,</i>” “<i>garbage,</i>” and “<i>solid, liquid or gaseous substances or all kind of wastes</i>” within the scope (Article 3e & f), as well as “<i>any substances that cause danger to living organisms... or adversely impact and damage the environment.</i>” (Article 3h), thereby covering plastic waste pollution of any kind; • Declares “<i>the disposal of solid waste or any garbage or hazardous substances into public water areas or into public drainage system shall be strictly prohibited,</i>” and “<i>the storage or disposal of solid waste or any garbage and hazardous substances that lead to the pollution of water... shall be strictly prohibited.</i>” (Article 8); • States that the monitoring and analysis of water pollution is the responsibility of the MoE (Chapter 4).
1999	Sub-decree No.36 on Solid Waste Management	As above.	• Governs the “<i>collection, storage, transportation, recycling and disposal of municipal waste</i>”; • The MoE is responsible for its enforcement, including monitoring SWM activities (Article 6) and establishing national standards and guidelines (Article 4); • Crucially, the sub-decree devolves responsibility to provinces and cities, which are expected to develop “<i>short, medium and long-term waste management plans for their areas</i>” (Article 5). Provincial, municipal and local authorities have responded to this by contracting waste management to private companies, although in many areas waste management systems are absent; • The sub-decree asserts that the MoE is responsible for approving any “<i>domestic investment in the construction of landfill, incinerator, storage sites or recycling plant for household waste</i>”; • The sub-decree also covers Hazardous Waste Management, which includes setting out responsibilities for the appropriate storage, transport and disposal of “<i>fibrous and clothing wastes from textile and garment industry; [and]... plastics waste from production or use of plasticizers,</i>” both of which are relevant to marine (micro)plastic pollution.
1999	Sub-decree No.72 on Environmental Impact Assessment (EIA) Process	As above.	• Principally outlines the procedures and requirements of EIAs, so limited reference to marine litter. However, the sub-decree requires waste water treatment plants, and waste processing or burning projects of any size/capacity to conduct an EIA (Annex).

2015	Sub-decree No.113 on the Management of Garbage and Solid Waste of Downtowns	MoE <i>"has roles in leading and pushing operation of the management of garbage and solid waste of downtowns"</i> Builds upon Sub-Decree 36 (above) by further devolving responsibility of SWM, including to the MoI (Article 6), and delegating responsibilities to Capital and Provincial Departments of Environment (Article 8) and Municipal and District Administrations. Capital and Provincial Administrations are also given power to further delegate duties to commune and district levels as they see fit (Articles 9-13).	- Regulates SWM in urban areas with <i>"effectiveness, transparency and accountability"</i>. - Decrees how solid waste is to be sorted and managed, and outlines penalties for non-compliant HHs, businesses and construction sites. - Stipulates that a maximum service fee for waste collection is to be determined by the MoI, MoE and MEF (Article 33), and that <i>"Income generated by the management of garbage and solid waste of downtowns is personal income of municipal and district administrations"</i> (Article 34). - Decrees that municipal and district administrations may utilize their budgets to support activities related to the management of solid waste.
2017	Sub-decree No.168 on the Management of Plastic Bags	As above, with the addition of the MoT (Article 8), which is responsible for public education and identifying indicators for <i>"aesthetics"</i>.	- Addresses the <i>"reduction, import, production, distribution and use of plastic bags"</i> to improve <i>"public health, environment and aesthetics"</i>. - Outlines permissible dimensions (size, thickness of plastic) of plastic bags in Cambodia and penalties for non-compliance. - Identifies the same responsible ministries, with the addition of the MoT (Article 8), which is responsible for public education and identifying indicators for <i>"aesthetics"</i>.
2006	Cambodia Law on Fisheries	The Fisheries Law states that, <i>"fishery management shall be under the jurisdiction of the Ministry of Agriculture, Forestry and Fisheries."</i>, however, it also states that, <i>"state provides the management rights of natural protected areas to the Ministry of Environment under regulations of the law on the establishment and delimitation of natural protected areas, and the law on environmental protection and natural resources management"</i>.	- States that <i>"Disposing, discharging, dumping or littering toxic substances (solid or liquid) in fishery domains, which were determined by law and other juridical legislations of the Kingdom of Cambodia, and Conventions or International Treaties on Environmental Poisoning, and any agreements or any activities that cause toxic or harm to aquatic animals shall be prohibited."</i> (Article 22). - Prohibits the <i>"dumping, flowing, draining toxic substances, polluting or harming to aquatic animals and plants in the fishery domains."</i> (Article 98).
2016	Sub-decree No.16 on Electrical and Electronic Equipment (EEE) Waste Management	RGC and the council of Ministers, with the MoE adopting a lead implementing role.	- Covers all activities encompassing storage, disposal, collection, transport, recycling and dumping of EEE waste. - MoE has responsibility for the prevention of all activities that impact human health & the environment from all sources polluted by EEE waste. - Dumping EEE waste in landfill, public spaces, and water systems is <i>"restricted."</i>

6.3 National sustainable development strategies

Cambodia's national Sustainable Development Goals Framework (2016-2020) was adopted in 2018. The Framework was developed to inform the National Strategic Development Plan (2019 - 2021), and underpins Cambodia's long term 'Vision 2050' (118). The framework addresses all 17 global Sustainable Development Goals (SDGs) framing them within the Cambodian context (plus an additional Cambodian Sustainable Development Goals (CSDG) pertaining to landmine clearance). Action on marine litter aligns with four CSDG's:

CSDG 6: Clean Water and Sanitation, in particular Target 6.1, which presents potential to reduce marine litter generated from plastic water bottles and reduce reliance on plastic through enhanced water security, that is: *'[By 2030] achieve universal and equitable access to safe and affordable drinking water for all.'* Also relevant is Target 6.3, which refers specifically to water quality and pollution reduction: *'By 2030, improve water quality by reducing pollution, eliminating dumping and minimizing release of hazardous chemicals and materials, halving the proportion of untreated wastewater and substantially increasing recycling and safe reuse globally.'*

CSDG 11: Sustainable Cities and Communities, specifically Target 11.6, which aims to *'reduce the adverse per capita environmental impact of cities, including by paying special attention to air quality and municipal and other waste management'*. A key indicator for this is 11.6.2, that is, *'Percentage of the deduction [of] plastic bags used (reported annually)'*.

CSDG 12: Responsible Consumption and Production, including Target 12.5, which focuses on circular economy approaches and sustainable consumption and production, specifically: *'By 2030, substantially reduce waste generation through prevention, reduction, recycling and reuse.'* A key indicator is 12.5.1, that is, *'National recycling of material[s] used'*.

CSDG 14: Life Below Water, with the most relevant target being 14.1, that is, *'By 2025, prevent and significantly reduce marine pollution of all kinds, in particular from land-*

based activities, including marine debris and nutrient pollution'. Of particular importance is Indicator 14.1.1, that is, *'Percentage of the reduction of the sea pollution by the conservation activities'*. Marine litter also indirectly relates to Target 14.7, that is, *'By 2030, increase the economic benefits to small island developing States and least developed countries from the sustainable use of marine resources, including through sustainable management of fisheries, aquaculture and tourism'*, as marine litter, including microplastics entering the food chain and ALDFGs, may have adverse impacts on fisheries health and productivity.

In addition to the CSDGs a number of national sustainable development strategies exist, including the Rectangular Strategy Phase III and the National Policy and Strategic Plan for Green Growth (2013-2030).

6.4 Governance in development

Momentum surrounding marine litter, in particular SWM reform, plastic management and support for circular economies, is rapidly emerging in Cambodia and a number of governance pieces are currently in development that support the reduction of marine litter, including:

- **Cambodia's Law on Fisheries**, is currently under review, with more recent drafts including provisions on inland aquaculture and mariculture management, water quality and discharge of waste matter;
- **Environment and Natural Resource Code of Cambodia**, is also under review, and more recent drafts include provisions to support

an enabling landscape for sustainable consumption and production;

- **Circular Economy Strategy and Action Plan**, aims to create an enabling environment to support the systemic transformation required to realise a circular economy in Cambodia;
- **National Plastics Action Plan and Roadmap**, aims to create realistic and effective plastic policies to reduce plastic pollution; and
- **Sub-decree on Plastic Management**, which is likely to include provisions to manage and reduce SUP, reduce and management plastic imports and address micro-plastic pollution

6.5 Governance in practice: decentralisation

Throughout Cambodia's history many approaches have been taken towards the Kingdom's administration. Steps towards a centrally controlled democratic government is relatively new and movement towards democracy and citizen participation in the subnational administrations is even more novel, and some argue is still developing (109). The

term "local governance" has been in use in the development context of Cambodia since 1996, and the Seila Program, which evolved from earlier development projects was key to the decentralisation of governance and community-led planning (31). Under the Seila Programme, initiatives were undertaken to support decentralized commune planning, financing, and monitoring and evaluation systems with the goal of equitable economic development (31,109). The Law on Commune and Sangkat⁶ Administrative Management (2001) was also of

⁶ Sangkat is the Khmer word for commune.

fundamental importance as it saw the inception of local-level democracy, albeit with limited provision of authority, clear functions or funding (109, 110). This legislation saw the first Commune Councils elected in February 2002. The objectives of decentralization reforms were to promote participatory, locally led democratic processes and support socio-economic development and poverty reduction. The Commune Councils are required to prepare community and investment plans, including strategies for local development prioritising the needs of residents (110).

Later the Strategic Framework for Decentralization and Deconcentration Reforms (2005) defined the key characteristics of the new Sub-National administration system, including the elected councils as well as a board of governors, appointed by the RGC, to

support unified administration. The vision behind this approach was to develop a system that *“operates with transparency and accountability in order to promote local development and delivery of public services to meet the needs of citizens and contribute to poverty reduction.”* Revisions to the Constitution (1999) and the development of the “Law on Administrative Management of the Capital,

6.6 Governance gaps

As evidenced above, the governance landscape pertaining to marine litter in Cambodia includes instruments supporting solid waste, plastic and natural resource management, which are framed and supported by regional and international instruments. Any discussion of governance gaps must first acknowledge the existing governance mechanisms as it is crucial that these instruments are utilized to their full potential. Just as important is an understanding of why existing governance mechanisms are underutilised; not in the least to create an enabling environment for new governance instruments. Existing governance frameworks need to be operationalized to reduce marine litter, and barriers to their implementation must be articulated and addressed. Barriers to implementation of existing governance instruments have been identified as:

- Limited technical capacity that prevents data collection and research, and hinders locally led solutions. This is especially

Provinces, Municipalities, Districts and Communes (Organic Law)”, which defines these administrative & governance structures, was developed in 2008 were instrumental to decentralised governance (110).

In principle, decentralisation was a critical step in democratic practise and enhanced agency and empowerment of actors and stakeholders, especially those focused locally and sub-nationally. Successfully utilising decentralised governance requires investment in change management and operationalising governance instruments, including capacity building, intentional collaboration and coordination of action, open channels of communication and practices that uphold transparency and accountability. From a marine litter planning and management perspective, decentralised governance requires strategies and action plans that engage multiple levels of government, including nationally focused actors within the RGC, provincial departments and local authorities. Local authorities including district governors, commune councils and village chiefs have key roles in coordination, safeguarding, and conflict resolution within their administrative boundaries, and play an essential role in ensuring community needs are represented and community level change is effective and fair.

pertinent in the case of contextually and logistically challenging coastal and marine sites.

- Limited inner- and cross-ministerial coordination & collaboration, of particular concern given the decentralised governance landscape.
- Challenges surrounding transparency and accountability, which presents resourcing limitations and barriers to coordination.
- Clear communication and intentional change management, including a lack of awareness among Government employees and other key actors of the existence of laws and regulations, and their particular roles within these.
- Engagement and representation of Cambodia on the global stage to support national and subnational actors to meet their commitments under regional and international laws, conventions and treaties that frame existing national governance.
- Data collection pertaining to governance, including the absence of clear and

measurable MEL frameworks and indicators. And;

- Limited social and environmental safeguarding mechanisms, including to support community engagement and agency.

Of particular importance is the role of existing governance instruments in driving SWM reform, an essential component of reducing marine litter in Cambodia. A number of avenues exist, stemming from the existing sub-decrees, to improve SWM in Cambodia, including:

- Addressing social, behavioural and cultural norms that undermine SWM systems, such as a damaging disposal and resource use behaviours and/or refusal to pay SWM collection fees;
- Resourcing and technical support for provincial, municipal and local authorities and private contractors to better manage waste, especially at isolated and remote locales;
- Improved socio-economic status, WASH and food security outcomes for coastal communities to reduce unnecessary plastic

use (thereby reducing waste generation), and support communities to pay fees for SWM services;

- Awareness raising and strengthened enforcement of existing regulations & penalties, the proceeds of which could be utilised as an income stream to support SWM infrastructure development;
- Infrastructure development that enables improved waste collection and processing, for example, ensuring that large-scale investment and development projects utilise urban planning, adopt waste management strategies and support wider infrastructure development; and
- Improving working conditions and incentives (financial, skills development, work health and safety) for SWM workers to attract and maintain a skilled work force.

Gaps relating to novel and emerging governance instruments are set out in Recommendation 2 of the Recommendation Framework (below).

Section III. Conclusions and Recommendations

7. Recommendations

The overarching recommendation of this report is to more fully utilise existing governance frameworks; this includes addressing barriers to operationalising existing governance instruments, not in the least to ensure that new and emerging instruments are met with an enabling environment. Particularly crucial is utilising Cambodia's existing sub-decrees to drive reform of SWM systems, with a focus on sub decrees 27, 36, 113 and 168 (set out above). SWM reform is especially important for isolated and remote coastal locales, which have been largely overlooked to date and face specific vulnerabilities and barriers. By addressing Cambodia's absent and deficient SWM systems we reduce mismanaged waste and direct disposal into the environment, stemming a key source of marine litter. SWM reform also presents avenues to adopt circular economy

approaches that benefit people, planet and economy.

Another critical priority is reducing unnecessary and wasteful plastic use and reliance on plastic (focusing on SUP). Reducing non-essential plastic use stems plastic waste generation, preventing marine litter altogether. Reducing the volume of plastic used also supports the following recommendations, minimising the burden on the systems and stakeholders seeking to address marine plastic pollution. Whilst minimising preventable plastic use is crucial, it is important that this is not realised by adopting a wholly anti-plastic mentality. Plastic products themselves deliver many benefits, especially to vulnerable peoples with limited access to resources, such as clean water. It is vital that strategies to reduce plastic use and plastic pollution do not come at a cost to local communities, and that the value of plastic is considered. Reducing plastic use and reliance on plastic is addressed by a number of the below recommendations, and is linked with wider issues of poverty alleviation, livelihood diversity, sanitation and hygiene, and food and water security.

Intentional cohesion with regional and international frameworks is designed to reduce reporting burdens, avoid duplication, leverage

regional support mechanisms and open avenues for transboundary cooperation.

The specific objectives of the below recommendations are intentionally aligned to COBSEA's Regional Action Plan on Marine Litter (RAP MALI, 2019), that is, to:

- i. Prevent and reduce to the minimum marine litter pollution in the marine and coastal environment of the East Asian Seas Region;
- ii. Foster sustainable consumption and production in a multi-stakeholder whole lifecycle approach to prevent and reduce leakage at source;
- iii. Remove to the extent possible already existent marine litter by using environmentally acceptable methods;
- iv. Improve monitoring and assessment of marine litter and its impacts for a science-based approach;
- v. Enhance knowledge sharing and awareness about marine litter and its impacts amongst all stakeholders and all groups of society in the East Asian Seas Region;
- vi. Support national efforts towards adequate institutional, policy and implementation frameworks, cross sector coordination and regional and international cooperation.

7.1 Recommendation framework

The below recommendation framework sets out a pathway to implement and maximise existing governance mechanisms, adopt novel interventions and create an enabling environment to reduce marine litter. To avoid duplication and enable strategic, productive collaboration, the following recommendations align with key national strategies and emerging

governance pieces, including those being developed concurrently, such as the National Plastics Action Plan and Roadmap and the Plastic Management Sub-decree. Additionally, the below aligns with regional frameworks, including the RAP MALI and the ASEAN Framework of Action on Marine Debris, as well as encouraging links to regional partners such as PEMSEA, international conventions and laws to which Cambodia is a party

Framework / Action

Suggested Activities

Credit: Steph Baker / FFI

Governance

Recommendation 1: Mainstream & operationalise existing governance instruments



Utilise & operationalise **existing Cambodian governance frameworks**.

- **Foster and strengthen collaboration** between responsible agencies (e.g. Government ministries) and ensure responsible agencies are aware of their unique roles and responsibilities and are coordinating action in a manner that is effective within a decentralised governance landscape.
- **Operationalise key legislation**, policies and sub-decrees, in particular those focused on SWM and plastic management i.e. sub decrees 27, 36, 113 and 168.
- Appropriately **resource enforcement activities** to uphold regulations and collect penalties set out by existing sub-decrees, for example, waste separation and cleaning at HH level (sub-decree 113), and appropriate disposal by the construction sector (sub-decree 113); and utilise, with transparency, the fees resulting from enforcement as a revenue stream improve SWM systems & infrastructure.
- **Utilise existing resource and protected area management frameworks** to reduce marine litter, for example, integrating marine litter reduction strategies into MPA planning and management frameworks.
- **Collect and utilise baseline data and establish M&E frameworks** to enable reporting and monitoring of efficacy of existing instruments, including the establishment of accountability mechanisms.

Utilise & implement **international and regional governance instruments** to which Cambodia is a party.

- **Utilise international and regional governance instruments** to support national systemic reform and action, for example, incorporating international laws and agreements into marine litter planning, monitoring and management frameworks.
- **Support the representation of Cambodia** in regional and international policy dialogues and fora.

Recommendation 2: Develop new frameworks and novel interventions to address the drivers of marine litter, prioritising reduced plastic use and waste generation

Acknowledging alignment with emerging frameworks and strategies, and the need to target the most prevalent plastics used in Cambodia, the following novel measures are recommended:

Development of **novel instruments and interventions** that bridge governance and management gaps.

- Development of an evidence based **National Action Plan** to reduce marine litter that aligns with RAP MALI & other national and regional frameworks.
- Ensuring the management and reduction of marine litter and plastic is clearly **mandated in Cambodian legislation** and policies, and that these mandates are understood by the responsible parties.
- Developing **import bans, restrictions or fees** for unnecessary and problematic plastics e.g. SUP (noting the importance of assessing community needs and understanding reliance on plastic).
- Conversely, **incentivising the import and use of plastic alternatives** (both models and materials), e.g. through import tax reductions or through the provision of potable water options that reduce reliance on bottled water.
- Develop and **implement regulatory instruments** that reduce the environmental impact of polluting and resource intensive sectors e.g. garment, construction and agriculture sectors; and beverage companies, such as Cambodian bottled water companies. Such instruments could include EPR schemes and/or the enforcement of existing regulations and penalties.
- **Tax breaks, incentives, subsidies and certification of businesses** focused on Sustainable Production and Consumption or circular economy practices.
- **Development of standards and adoption of technology** that supports integrated waste management, including to reduce high risk, unsafe waste management practices such as low temperature incineration.
- **Leverage investment and sustainable finance** opportunities that support and prioritise innovation and sustainability, e.g. to support emerging circular-centric businesses.

Recommendation 3: Bridge knowledge & capacity gaps to inform iterative, evidence-based action that is locally appropriate

Build local technical capacity to enable the marine litter evidence base to be strengthened & to encourage robust, locally-led solutions.

- Prioritise the **establishment of marine litter baselines**, standardised **indicators** and the development of actionable and accessible **Monitoring, Evaluation and Learning (MEL)** frameworks to enable iterative responses to marine litter over time.
- Establish a **national marine litter monitoring programme**, based on existing best practice protocols, global guidelines and regional guidance to ensure a harmonized approach and robust data comparability to address transboundary flows.
- **Leverage existing data collection and monitoring efforts** to enable efficient marine litter data collection, for example, build the capacity of national research bodies such as MaFReDI and IFReDI to collect evidence and coordinate their efforts across geographic and thematic areas.
- Prioritise **investment in research, training and education** in order to build a pipeline of local expertise and to bridge knowledge and capacity gaps.
- **Strengthen collaboration** between local and international academia and research focused institutions, Government, private sector and civil society actors, including to build science-policy dialogues.
- **Call on regional and international technical support** to guide best practice and establish monitoring and assessment programmes that align with regional best practice, guidelines and indicators.

Multi-Stakeholder Engagement

Recommendation 4: Strengthen collaboration and cooperation to create an enabling environment for marine litter planning and management

Support effective & inclusive **multi-stakeholder engagement**.

- **Foster dialogues and collaboration** between public, private and third sectors (national, regional and international), including those focused across differing thematic areas, for example, linking marine and freshwater focused governing bodies.
- **Engage key resource-intensive, polluting sectors** in research and action to reduce their impact, including the garment, hospitality & tourism, construction and development and agri/aquaculture sectors.
- Mainstream **private sector support** and corporate social responsibility.
- Ensure **vulnerable stakeholders** are effectively engaged, including women, youth and informal waste sector actors (more details in "local action" below).
- Establish a **science-policy interface** and enable open information dissemination & inform action.

Local Action

Recommendation 5: Foster and empower local leadership to enable action and shape upstream reform

Engagement of **vulnerable actors** and **empowerment of community-level action**.

- Support **livelihood diversification** that enables shifts from resource intensive and unsustainable livelihoods, specifically those that utilise plastic materials and generate plastic pollution.
- Support linkages and foster dialogues that enable community level **concerns to be heard upstream**, for example, feedback and grievance mechanisms that support agency and accountability.
- Utilise **participatory and consultative approaches** that engage coastal and island communities, empowering engagement and leadership in the development and delivery of marine litter management solutions.
- Support **social & behavioural change** that enables circular economies and SWM systems to thrive e.g. waste separation, cleaning and disposal behaviours at a HH level.
- Support **improved WASH, food and water security outcomes** to reduce reliance on plastic and improve socio-economic status of vulnerable communities.
- Engage communities and other local actors via **community outreach** activities, for example, build capacity to support **high-quality citizen science**.
- Build capacity of **local authorities** to enable action within decentralised governance systems.

7.2 Priority next steps

From the above recommendation framework, priority next steps are as follows:

- Support the RGC, in particular the MoE, to develop and implement a **National Action Plan on Marine Litter** that aligns with existing Cambodian governance instruments, is actionable in the local context and is framed by regional strategies, including those governed by COBSEA, ASEAN and PEMSEA;
- Build the capacity of the MoE and responsible actors at national and sub-national levels to develop and **implement a national monitoring programme, strengthen the evidence base** on marine litter sources, flows, and impacts, and **establish robust science-policy dialogues** to inform action and monitor impact over time;
- Ensure **national and regional coordination among key actors**, including development partners and Government agencies at national and subnational levels, to ensure that action against marine litter is efficient, effective and supported by regional frameworks; with the view to addressing transboundary drivers of marine litter in the future;
- Develop and implement legislation and regulations on marine litter, including **existing Cambodian governance frameworks** with a focus on sub decrees 27, 36, 113 and 168, to strengthen SWM systems and reduce the volume of waste entering the environment. Of particular importance is enabling action by the MoE as the ministry with the leading mandate on these sub-decrees. Additionally, actions to support implementation in a decentralized governance landscape will be crucial, including building understanding of key legislation among responsible agencies to ensure they are aware of their unique roles and responsibilities, and enabling collaboration for implementation.

8. Conclusion

Marine litter is an unprecedented threat that necessitates innovative approaches, national, regional and international collaboration, and large-scale reform. Marine litter in Cambodia impedes socio-economic development and poverty alleviation, destabilises community resilience and wellbeing, and threatens natural habitats and biodiversity undermining the provision of ecosystem goods and services. Although some coordination work to prevent and reduce marine litter has taken place in Cambodia to date, there are a number of gaps, barriers and challenges to address. Whilst global momentum is driving change, Cambodia faces particular barriers that hinder marine litter reduction, including systemic SWM challenges, significant research and capacity gaps, heavy reliance on plastic and high levels of plastic use, as well as, under-investment in and limited access to technology. Cambodia is at a turning point where global awareness, technological leaps, and lessons learnt in neighbouring countries can be leveraged. Cambodia has the opportunity and the desire to design interventions that align with best practice and regional and international frameworks, whilst meeting local needs and national capacities.

This report introduces a series of contextually viable recommendations, framed by broader strategies and governance instruments, to reduce marine litter. Given the ubiquitous presence and dire impact of marine litter in Cambodia, urgent action is needed. Solutions need to be iterative, responsive and optimised over time. Further, the needs of multiple stakeholders should be considered, especially those most vulnerable in the face of environmental degradation. Undoubtedly marine litter presents a significant social, economic and environmental threat to the country and its neighbours. However, just as marine litter undermines the triple bottom line, innovative solutions present opportunities for sustainable development, productive and protected ecosystems, and enhanced wellbeing and resilience. Political will, capacity building, enabling frameworks based on robust evidence, and collaboration across key stakeholders will ultimately enable successful interventions.

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