



Targeted Measures to Reduce Plastic Pollution in Marine-Protected Areas, Cambodia

Findings & Recommendations from Community Consultations in Koh Rong & Koh Sdach Archipelagos

Acknowledgement

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About FFI

Established over a century ago, **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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1. Introduction

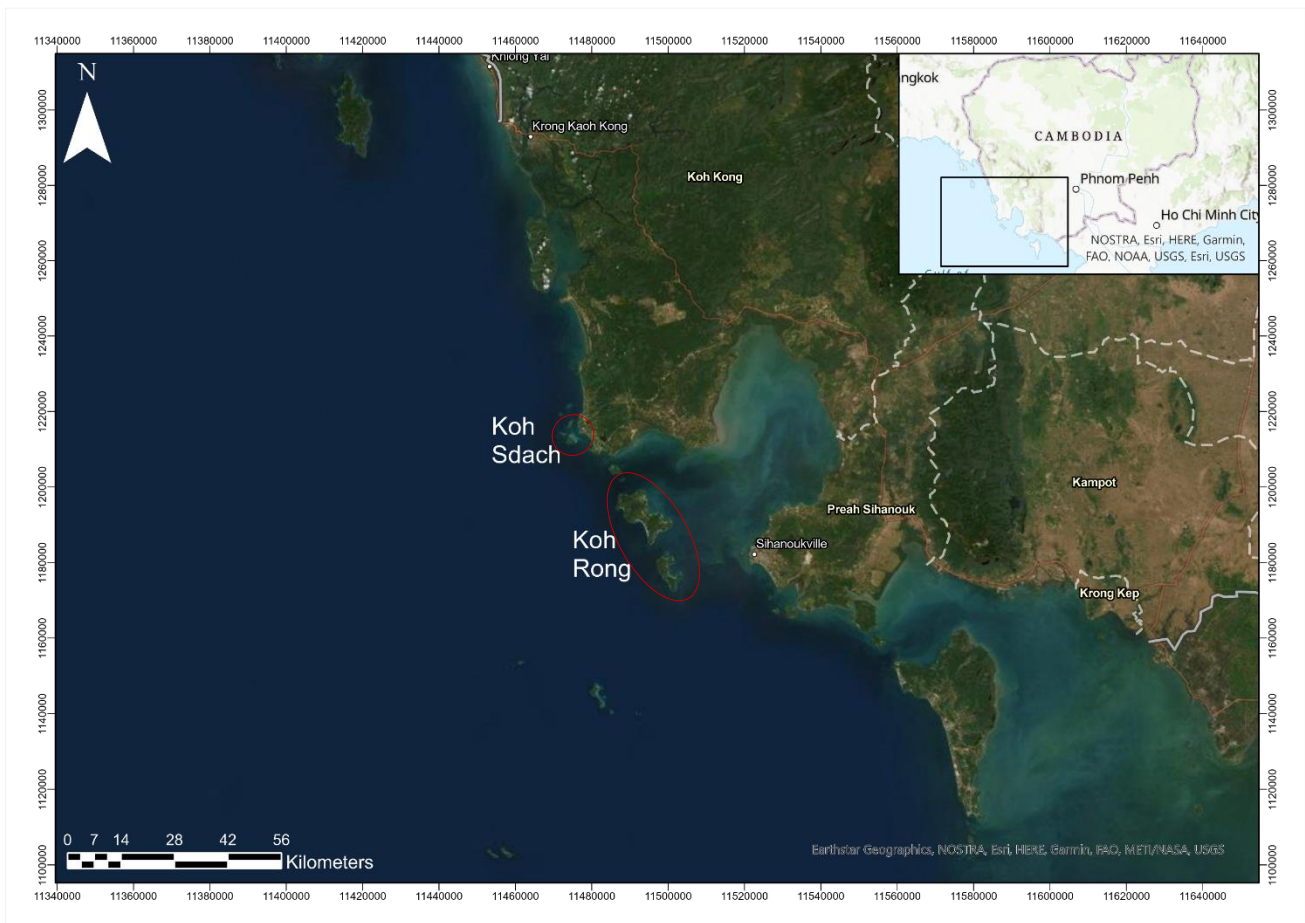
Koh Rong and Koh Sdach archipelagos, respectively situated in Preah Sihanouk and Koh Kong provinces south of Cambodia (figure 1), are two of the country's most important biodiversity sites home to rich marine ecosystems and resources, including wide seagrass beds, diverse coral reef and fish species, and mangrove forests [1, 2]. The seas of these archipelagos also function as refugia for rare species, like the super-sized *cliona patera*, more commonly called Neptune's cup sponge, which had long been considered "extinct" until its first global rediscovery in Singapore waters in 2011 [3]. Furthermore, these archipelagos play an indispensable role in supporting local livelihoods, offering various income-earning opportunities in the fisheries and tourism sectors [4, 5].

In 2016, Koh Rong Archipelago (KRA) was officially designated as Cambodia's first, large-scale marine

fisheries management area (MFMA), alternatively known as national marine park (NMP) or marine protected area (MPA) [6, 7]. Currently, similar effort led by the national government in partnership with FFI is underway to officialise Koh Sdach Archipelago (KSA) as another MFMA in the country [8].

Over the last or so decades, the marine environment of the KRA and the KSA have come under increasing threats such as (mangrove) habitat loss (caused by deforestation and unsustainable crop and aquaculture farming practices), overfishing and illegal fishing activities, and large-scale development projects [9, 10]. More recently, marine plastic pollution has been identified as another pressing threat not only to the marine life of these archipelagos, but also to the local economies and the health and wellbeing of local inhabitants [11, 12].

Figure 1. Location of Koh Sdach & Koh Rong Archipelagos



To date, Cambodia has several sub-decrees on municipal solid waste management and one sub-decree (sub-decree 168) on plastic bag and its management that has been in effect since October 2017 [13, 14]. However, the country faces significant challenges related to infrastructure and, in particular, solid waste management (SWM), including, but not limited to, lack of financial resources and capacity for effective operation [15, 16]. Rural and/or remote areas across Cambodia, including island sites like the KRA and KSA, have limited infrastructure and inadequate or no SWM system in place. This, combined with the high plastic consumption, undesirable disposal behaviours and strong reliance on plastic, have led to accumulating plastic pollution across the two archipelagos [17, 18].

1.1 Current Status & Knowledge of Marine Plastic Pollution in the KRA & KSA

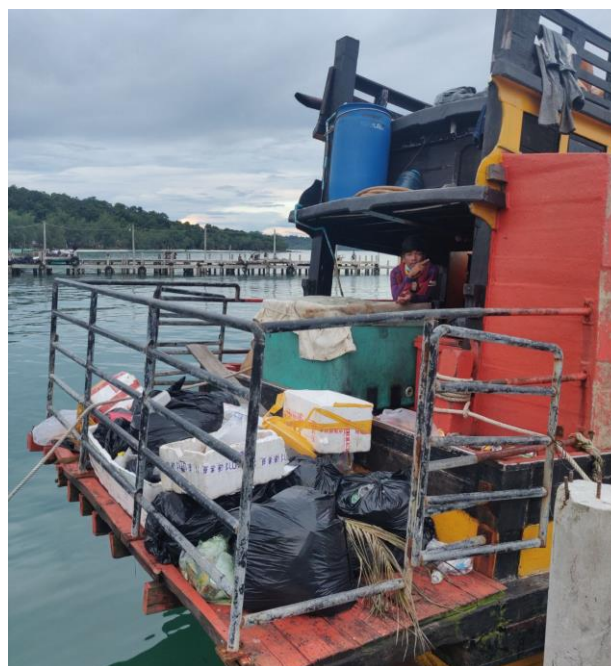
Since 2018, FFI has been conducting primary research in KRA and KSA to gain a comprehensive understanding of the status and drivers of plastic pollution in these locations, as summarized below:

- *A 2018 scoping research [19].* The research selected Koh Sdach as the primary study site (with additional data collected in Sihanoukville and Koh Touch village, KRA). Specifically, the research aimed to identify gaps, opportunities and barriers to addressing marine plastic pollution in Cambodia, and to develop evidence-based and contextually viable recommendations to reduce marine plastic pollution; &
- *A 2021 solid waste management (SWM) system assessment study in the KRA [20].* The study included the two most populated and tourism-dense villages, Koh Touch and Kong Rong Sanloem, and consisted of three core research components, including: 1) waste quantification & characterization, 2) assessment of SWM system, and 3) assessment of socio-economic impacts of mismanaged waste on local communities & the economy.

In the KSA, the scoping research found that 96.5% of all surveyed HHs disposed of their waste directly into

1.2 Objectives

This community consultation was conducted with the main goal to explore specific, locally appropriate measures for tackling marine plastic pollution in the



Boat carrying goods & solid waste, Koh Touch, KRA (Jul 2021)
Credit: Majel Kong / FFI

the ocean or on the shoreline (due to lack of other disposal alternatives), with 27% of the total waste being plastic—the majority of which being bag (57%) and bottle (35%) [21]. Fisheries waste (i.e., nets and lines) were also found in large proportion (78% of all marine debris recorded).

In the KRA, the SWM systems assessment study estimated that in pre-COVID time, the whole archipelago generated between 4.9 and eight tonnes of waste a day (which were closely in line with local-authority-estimated figures, between five and eight tonnes/day), with businesses and HHs respectively accounting for 57% and 43% of the total waste [22]. Plastic (predominantly SUPs like bag, PET water/drink bottle/cap, and packaging material) made up 23% and 30% of business and HH waste, respectively. A small brand audit of PET bottles found in the waste characterization revealed that 63% of all the bottles audited were local or Cambodian brands and 2% imported brands, with 80% of the bottles being less than 500mL in size. Moreover, the study showed at least 70% of all surveyed HHs had strong dependency on one or more of these plastic products to meet their daily food/water needs, and that customers or guests of all the surveyed businesses consumed an average of one to two SUP items per person per day.

KRA and KSA. As such, findings of the consultation are used to provide relevant recommendations for implementing actors looking to introduce these measures in contexts like the KRA and KSA to help achieve long-term success.

2. Methodology

Community consultation took place in the months of February and March, 2022, in the KSA and KRA, respectively. The consultation followed a qualitative-research approach. Individual in-depth interview (IDI) was conducted with different community members in local (Khmer) language. In some cases, interview was done with more than one member of the same

household or business who happened to be present and willing to join. Participants were explained the purpose of the consultation interviews, and verbal consent to participate was obtained at the beginning of each interview. Mask wearing was strictly practiced throughout the data-collection period, for COVID-19 safety purpose.

2.1 Participant Sampling

To capture a diverse range of behaviours, attitudes, perceptions and recommendations to refine the proposed measures, HH and business participants were purposively selected, using maximum variation sampling. In other words, the sampling took into consideration relevant variables such as gender, occupation, type of house (as proxy or indirect indicator for income level), type of business, location of house and business (e.g., along shoreline or beach, within, middle or end of village), and the like.

The number of HH and business interviews was determined using a “saturation point” method. Simply put, interviews continued until saturation was reached and no new information would arise from additional interviews [23], and so the interview for each consultation group stopped. In general, there were

more HHs consulted in Koh Sdach than Koh Touch. This was mainly because the majority of the community members in Koh Touch operated at least one kind of business, either at home or in the (street) market, which would qualify them more as “business” than “HHs.” There were few HHs who were without any business in Koh Touch, hence fewer number of HHs consulted than in Koh Sdach.

A total of 45 community members (24 HHs and 21 business owners) participated in the consultation interviews across the two sites. In Koh Sdach, 17 HHs and nine businesses were interviewed. Whereas in Koh Touch, seven HHs and 12 businesses were interviewed (table 1).

Table 1. Total number (& percent) of HHs and business owners consulted by location

Location	Number & percent of HHs consulted	Number & percent of business owners consulted
Koh Sdach (KSA)	17 (71%)	9 (43%)
Koh Touch (KRA)	7 (29%)	12 (57%)
Total	24 (100%)	21 (100%)

Overall, more than half of all HHs consulted were fishers or worked in the fisheries sector (53% in Koh Sdach, 71% in Koh Touch). There were also more women than men included in the consultation interview across both sites. Female participants respectively represented 76% and 57% of all HHs consulted in Koh

Sdach and Koh Touch. This was because most men, particularly those in Koh Sdach where fishing was one of the most prominent occupations, were away at sea for fishing activities during the day. Table 2 shows a detailed summary of HH participants in both sites.



Table 2. Summary profile of HH participants by location

Koh Sdach (n=17)	Gender	Male	4 (24%)	17 (100%)
		Female	13 (76%)	
	Primary occupation	Fisher	9 (53%)	17 (100%)
		Housewife	5 (29%)	
		Landlord	1 (6%)	
		Shop assistant	1 (6%)	
		Sugarcane drink vendor	1 (6%)	
	House type	Brick wall with zinc roof	5 (29%)	17 (100%)
		Wood	10 (59%)	
		Wood with cement floor & space under the house	1 (6%)	
		Wood with frontal space	1 (6%)	
	House location	Above ocean	5 (29%)	17 (100%)
		On shoreline	3 (18%)	
		Across street from shoreline	6 (35%)	
	House ownership	In village	3 (18%)	17 (100%)
		Yes	13 (76%)	
	Type of residency	No (rented)	4 (24%)	17 (100%)
Permanent		0 (0%)		
	Seasonal	17 (100%)	17 (100%)	
Koh Touch (n=7)	Gender	Male	3 (43%)	7 (100%)
		Female	4 (57%)	
	Primary occupation	Fisher	5 (71%)	7 (100%)
		Housewife	2 (29%)	
	House type	Brick with zinc roof	1 (14%)	7 (100%)
		Tarp (small, makeshift)	5 (71%)	
		Wood	1 (14%)	
	House location	On shoreline (end of village)	4 (57%)	7 (100%)
		In village (uphill)	3 (43%)	
	House ownership	Yes	2 (29%)	7 (100%)
		No (living for free on public land)	5 (71%)	
	Type of residency	Permanent	2 (29%)	7 (100%)
		Seasonal	5 (71%)	

Similarly, all the consulted businesses in Koh Sdach were either run by women exclusively or co-run by both husband and wife. In Koh Rong, only two business consulted was male-run, and the rest were either managed by women alone or by couple. Moreover, 56% of all businesses consulted in Koh Sdach, and 33% of those in Koh Touch, were classified as “multi-business,” meaning the owners offered at least two different kinds of services (i.e., running a cafe & E-money transfer). Resorts, hotels or guesthouses that

had restaurants were also included in the multi-business group. On the other hand, those businesses that offered a variety of goods within a single service (i.e., groceries shop, food shop) were classified as “single business” (44% in Koh Sdach, 67% in Koh Touch). Finally, school was grouped in “business” because of the similar features between the two (i.e., large amount and number of waste and people producing it). Table 3 presents a detailed summary of business participants in both sites.

Table 3. Summary profile of business participants by location

Koh Sdach (n=9)	Gender	Female-run		4 (44%)	9 (100%)	
		Male-run		1 (11%)		
		Co-run		4 (44%)		
	Business type	Multi-business (56%)	Guesthouse, groceries & drinks		1 (11%)	9 (100%)
			Guesthouse & cafe		1 (11%)	
			Mini-mart & cafe		1 (11%)	
		Single business (44%)	Street food (noodle / rice porridge) & drinks vendors		2 (29%)	
			Groceries shop or vender		4 (44%)	
			Above ocean		1 (11%)	
Business location	Along shoreline		2 (22%)	9 (100%)		
	In village		6 (67%)			
Koh Touch (n=12)	Gender	Female-run		6 (50%)	12 (100%)	
		Male-run		2 (17%)		
		Co-run		4 (33%)		
	Business type	Multi-business (33%)	Resort & restaurant		2 (17%)	12 (100%)
			Pharmacy/healthcare provider & drink vendor		1 (8%)	
			Groceries shop & laundry service		1 (8%)	
		Single business (67%)	Groceries shop or vendor		3 (25%)	
			Noodle shop		1 (8%)	
			Beauty salon		1 (8%)	
	Business location	School		1 (8%)	12 (100%)	
		Traditional wine seller		1 (8%)		
		Café		1 (8%)		
		Beachfront (middle of village)		2 (17%)		
		Beachfront (end of village)		3 (25%)		
		Beachfront (middle of village, next to bridge)		2 (17%)		
Uphill (within village)		5 (42%)				

2.2 Data Collection & Analysis

Two data collection tools were designed for HH and business consultations. Each data collection tool contained a list of statements with answer options and comments (initially intended for group-meeting format) that were then converted into open-ended IDI questions, as adapted change in data collection approach had to be made due to ongoing presence of COVID19.

In total, there were 27 and 28 key questions included in HH and business interviews, respectively. Targeted measures were defined and developed before the consultations, focusing on the following thematic areas:

- Amount & composition of daily waste (with a particular focus on plastic);
- Current waste management practices, including storage, separation & disposal methods;
- Willingness to adopt or integrate desirable practices (e.g., waste cleaning) aimed at improving waste management and recyclability rate;
- Willingness to use and/or pay for waste collection;
- Willingness to learn and start using 3-Rs (reduce, reuse, recycle) methods to prevent and reduce the amount of plastic waste generated;

- Willingness to use public or community waste facilities (e.g., bin, dumpsite, compost site, waste bank, etc.) to ensure proper disposal of waste and reduce the total amount of waste to be dumped in the open/ocean, burned and/or transported to mainland;
- Willingness to use (subsidized) single-use-plastic alternatives such as refillable bottle, reusable bag, etc.;
- Willingness to provide water refill to guests in the food and tourism sectors (if the approach is subsidized or financially supported);
- Willingness to adopt and implement a fee-charging approach to deter use of SUPs by guests or customers;
- Knowledge/awareness of existing laws or sub-decrees on (plastic) waste disposal, including burning or dumping in the open/ocean;
- Challenges HHs & businesses may face in joining community-based training or workshop;

Interview data were grouped according to the broad themes or topics defined above, and were thematically analysed. In what follows, findings were presented according to HH and business groups.

2.3 Study Limitations

- **Smaller number of HH participants in Koh Touch than in Koh Sdach.** As explained earlier, HHs that did not run any kind of business in Koh Touch were few in number, compared to those in Koh Sdach. That said, HH interviews in both sites showed consistent themes and answer patterns. This likely suggests that the much smaller HH sample in one site (Koh Touch) has negligible impact on the reliability of the findings as a whole.
- **Higher number of female participants than male participants.** Across both sites, there were more women participating in the consultation interviews than men, as women tended to be home in the day more frequently than men due to their expected roles in the family and business. Also, most of the men, particularly those working in the fisheries sector, are usually away at sea during the day. This led to a smaller proportion of male participants than female participants. However, similar to the previous point, both male and female participants shared a number of similar answers and thoughts in the interviews, suggesting that a smaller size of the former group likely had a minor limitation on the study.
- **The COVID-19 pandemic.** Due to the emergence of the new COVID-19 Omicron variant in Cambodia at the time of the consultation, data collection approach had to be adapted from focus-group discussion (FGD) to individual interview to minimize risk exposure for both staff and local communities. However, the same data collection tools were employed, and a number of survey

questions were asked open-endedly instead (i.e., without providing answer choices, such as “agree,” “disagree” or “don’t know”, and having the villagers answer in their own words) to fit the change. As anticipated, the one-on-one, deep-dive interview format offered the interviewer more time and space to elicit as much detailed answer as could be from participants, allowing for rich conversations with communities (which could have been more challenging to achieve in a group meeting due to the bigger number of people and time



3. Results

3.1 Household Findings

Reported amount & composition of daily waste and dependence on plastic products

59% of all consulted HHs in Koh Sdach, and 89% of those in Koh Touch, agreed that, on average, they and their family members produced between 0.5 and 0.7 kg of waste per person per day. The vast majority (94% in Koh Sdach, 71% in Koh Touch) also reported their dependence on one or more plastic products to meeting their daily food and water needs, with the three most common plastics being single-use type such as bag (from groceries shopping), water bottle and Styrofoam food container.

In Koh Sdach, reliance on plastic-bottle water appeared pervasive across consulted HHs. One HH suggested that “80% of all [villagers] consume[d] up to four bottles of water” a day. Reported reasons found to influence HHs’ dependence on bottled water were: limited access to “quality” drinking water on the island (33%), preference for drinking cold water (22%), cheap price of and easy access to bottled water (22%), lack of preference for boiling water to drink (11%), and perceived medical need for bottled water (11%). HHs explained that in Koh Sdach, there were few water sources, with all having “poor quality” and therefore “not fit for drinking,” and that water became even more scarce in the dry season. For some, this low water quality led to the belief that although water taken from local sources could be boiled to drink, it was “not suitable to consume with medicine,” presumably believing that such “unclean” water could interfere with the efficacy of the medicine.

Likewise, in Koh Touch, bottled water appeared to be HHs’ most-dependent plastic product to access daily drinking water, with the bottled waters sized 500 mL or smaller being most consumed. The main reasons found to influence HHs’ dependence on small bottled water were lack of access to drinking water (including the 20L bottled water¹) and absence of adults at home to go purchase and transport the water to their houses.

“[We] use small-bottled water; [we] have no adult at home in the day but children, and they cannot carry big bottled water (20L) from the market. Water suppliers don’t transport big-bottled water to this end of the village.” (Answer from a female fisher, Koh Touch)

A small proportion of HHs (n=1, 1% in Koh Sdach; n=2, 29% in Koh Touch; all fishers) reported having no dependence on plastic products to meet daily food/water needs. In all three cases, there was a common reliance on natural-source water such as rainwater (Koh Sdach) and spring water located uphill behind the village (Koh Touch), which they tended to consider “clean” and thus suitable for drinking. For non-drinking purposes, the Koh Sdach HH also reported buying water (i.e., ground water collected locally and carried in septic tanks to sell within the village or community) from local supplier to use within the household

That said, all three HHs mentioned that SUP products like bag, bottled water, and sometimes Styrofoam food container became unavoidable for them when they went out to sea to fish. Fisheries HHs in Koh Touch reported bringing their waste back to land to dispose of. However, fisheries HHs in Koh Sdach said they threw their waste in the ocean during fishing activities

¹ The big-bottled water (20L) system is one of the most popular and least expensive ways for households across rural and urban Cambodia to access drinkable water. This water consumption practice, which costs between US 4-5 dollars for first purchase, generates little amount of plastic waste, since the empty bottle is returned to suppliers for low-cost refill (approximately one-fifth

of the first purchase, depending on location) and the only piece of plastic waste born out of each consumption round is the clear plastic wrap of the bottle for extra sanitation and leakage prevention.

instead of carrying it back to land because the waste would eventually end up in the ocean, given the common practice of waste disposal in the ocean or shoreline there.

“We rely on rain water for [drinking] and water supplied by island supplier for other uses [in the house]. [We] only need to depend on these plastic products when going out to sea to fish. [We] use plastic bag to package things and bottled water [for drinking]. All fishing boats do the same.” (Answer from an old male fisher, Koh Sdach)

Current Waste Management Practices of HHs

Waste Separation

Waste separation was found to be low in HHs' waste management practice across both sites, with 94% of all HHs consulted in Koh Sdach and 57% of those in Koh Touch saying they did not do it. However, most of the HHs in both places (76% in Koh Sdach, 71% in Koh Touch) stated that their waste was properly packed prior to disposal, meaning no leakage took place during transport to disposal point. Those who reported not properly packing their waste (24% in Koh Sdach, 29% in Koh Touch) tended to also be HHs living above the ocean who would dispose of the waste immediately after it was produced.

Where waste separation was reported to take place, the categories of separation were between food and non-food waste, and in Koh Sdach in particular, “burnable” vs. “unburnable.” In other words, waste separation was primarily done to allow HHs to choose the appropriate methods (i.e., dumping or burning the waste) they could use to get rid of their waste, rather than for “recycling” or “reuse” purposes. As such, waste separation appeared to be a rather temporary process, as a few HHs explained, in that once the bags or bins storing different waste types were full, all the waste would be mixed together again in one big bag to be burned or dumped according to HHs' preferred disposed method.

Willingness to separate waste into different categories (e.g., recyclable, non-recyclable & compostable) was significantly high among consulted HHs in Koh Sdach (94%), but was very low among those in Koh Touch (29%). HHs who were unwilling to separate their waste often mentioned lacking sufficient time, knowledge and tools as their constraints to follow the practice (88% in Koh Sdach, 86% in Koh Touch). Additionally, almost all HHs consulted agreed that receiving training or instructions on how to correctly separate could help encourage them to want to do it more often.

“[I] don't know if [I] want to separate waste. If [I] had time, [I] might do it.” (Answer from a middle-aged housewife, Koh Touch)

“If there were trainings to show [us] how to separate waste, [we] would be interested in doing it.” (Answer from a middle-aged, male fisher)

Waste Burning & dumping in the ocean

The rate of waste burning was quite considerable among HHs across both locations (65% in Koh Sdach, 86% in Koh Touch). Decision whether or not to burn waste was first and foremost driven by the availability of open space to “safely” do it, followed by the amount of waste. HHs living close to such spaces (i.e., along/near shoreline, at the back of the village, or uphill away from others) and/or those having a smaller amount of waste were more likely to opt for this disposal practice than those living within the village or directly above the ocean (where houses were tightly clustered together and predominantly made of wood) and/or with a lot of waste.

Fear of causing fire when burning waste in a crowded space was the most cited reason demotivating HHs from this practice, followed by the readily available option to throw waste into the ocean (especially for HHs living above it).



Presence of marine plastic pollution in Koh Sdach Archipelago (Feb 2022)
Credit: Majel Kong / FFI

"[I] have no space or place to burn [our] waste. [I'm] afraid it could burn other people's houses." (Answer from a middle-aged, male seller of sugarcane juice, Koh Sdach)

"Yes, [I] have space [around the house] that makes it easy to burn waste." (Answer from a middle-aged, male fisher, Koh Touch)

Here, it may be important to discern the stark contrast in waste disposal in the ocean between the two sites. Although direct waste dumping into the ocean was widely practiced in Koh Sdach (100% of all HHs consulted), it was not in Koh Touch (0% of all HHs consulted). This could be partly because of the existing waste transport services and partly because of the understanding and need to keep the island as trash-free as could be to continue attracting tourists, considering how crucial tourism was in providing income for the villagers. Paradoxically, anecdotal evidence from a number of HHs across both sites showed that some local and foreign tourists tended to follow improper disposal behaviour while visiting the islands (i.e., littering their waste on beaches, roadsides, and so on).

"[We] bring [our] waste back to land whenever we come back from the sea." (Answer from a fisher couple, Koh Touch)

Lastly, some specific groups (i.e., single young fishermen) in the community may be more predisposed to littering in public and/or throwing waste in the ocean. This was an interesting finding, also observed during the week-long data collection in each site when several clusters of young fishermen, more in Koh Sdach than in Koh Touch, were seen to partake in drinking on consecutive days around late afternoon (likely after they had returned from sea). According to some HHs, this community member group should also be targeted to engage in the effort to prevent and reduce waste from going into the marine environment. One couple in Koh Sdach explained that this group of the community generally appeared to have less economic incentive or motivation to store any sellable waste like their aluminium beer cans because they were alone, whereas married men were more inclined to do it because they had their wife to perform the task. This explanation underscores, again, the indelible contribution women provided their household, including managing its waste. But it also speaks to the connection between presence of women in the household and waste-management behaviours, suggesting that households with women, particularly wife figures, were more likely to see storage and less disposal of (at least) certain waste types than those with men only.

"Single, unmarried, young fishermen who drink alcohol a lot [...] they don't see the incentives to keep any waste for any purpose, including selling to Etchay, so [they] always throw waste in the ocean. Whereas married fishermen who drink may keep aluminium cans for their wife to sell to Etchay." (Answer from a fisher couple, Koh Sdach)

Willingness to clean hard-material waste, including plastic

Although nearly all consulted HHs in Koh Sdach were unwilling to clean their waste (94%), a surprising proportion of those consulted in Koh Touch not only were willing to, but had been doing it already in their household (86%). Waste cleaning was most frequently done with glass and thick-plastic jars or containers whereby the cleaned products were reused to store cooking ingredients such as salt, sugar and the like. One fishery couple further mentioned cleaning and reusing grocery plastic bags to store fish they sold at the market to help reduce cost of buying new plastic bags. Similarly, another HH reported giving used water bottles (sized 1.5L) to some gasoline sellers, who would clean the bottles to fill gas to sell, in return for some snacks for her grandchildren. However, according to these HHs, plastic bags or bottles need to be in very good condition for them to want to reuse.

"[We] clean & reuse plastic bag to store fish we sell at the market to cut cost for buying new plastic bags." (Answer from a fisher couple, Koh Touch)

"[I] clean hard plastic & glass for reuse to store cooking ingredients and so on. [I] give water bottles (1.5L) still in good quality to [some] gas sellers here and get free snacks for [my] grandkids." (Answer from an old housewife, Koh Touch)

Waste cleaning was found to be uncommon for small water bottle (sized 500 mL) and other thin SUPs (e.g., cup, lid, straw, etc.), which were disposed of immediately after use. Storage of small water bottles (sized 500 ml) were not common either, mainly because they were hard to compress and required a lot of storage space.

"For aluminium cans [we] store to sell; plastic bottles are too cheap, and [we] don't have space to store because they're not as easy to compress as aluminium cans and take up a lot of space to store." (Answer from a fisher couple, Koh Touch)



Presence of marine plastic pollution in Koh Touch, KRA (2022); credit: (left) Enrico Barilli / FFI; (right) Majel Kong / FFI

HHs unwilling to clean waste in both sites (94% in Koh Sdach, 14% in Koh Touch) similarly referred to their lack of experience doing it and the immediate-disposal habit as explanation for their unwillingness.

Access & Willingness to Use Waste Collection (or Transport) Service

According to consulted HHs in Koh Sdach, in the past there was a waste collection service run by one of the resort owners there, and the service included both provision of bins in most parts of the village and collection of disposed waste for an average monthly fee of 40,000 riels (about USD 10\$). Each bin provided was said to be shared by a few HHs who split the monthly fee among themselves, leaving the end fee at around 10,000 riels a month per HH. However, bins were only installed on main streets in the village, with

HHs living above the seawater having to walk longer distances to access them. This was said to be a major discouraging factor particularly for HHs living above seawater to want to use previous service, in addition to other reported reasons for unwillingness to use service such as perceived low amount of waste for a high fee and easy/readily available access to the ocean to dump waste.

“Before [waste] collector provided waste collection service, charging 40,000 riels/HH/month. But at that time, service coverage only included HHs living on land. We, poor HH (living above the water), cannot afford to pay that fee rate.” (Answer from a fisher husband and a shop-assistant wife, Koh Sdach)

Meanwhile, in Koh Touch, there were two goods-shipping boat services that also transported HH and business waste from the village to the mainland Sihanoukville (SHV) for disposal at the city’s landfill.

The providers offered only waste transport but not collection, and all users (HHs or business) were required to carry or cart their own waste to the respective pier (serving also as collection point). A little more than half (57%) of the HHs consulted reported using existing waste transport services on the island. HHs with a small amount of daily waste (typically fisheries HHs) tended to pay per use, with the fee ranging between KH 4000 – 5000 riels (approximately 1 – 1.25 USD) for each disposal at the waste transporter’s pier. On the other hand, HHs paying a monthly fee to have their goods shipped to the island could dispose of their waste for free. The waste transport services then took all the waste to mainland SHV for further disposal at the dumpsite there. The monthly goods-shipping fee was said to be USD 50\$ a month for both HHs and businesses using the service.

43% (n=3) of all HHs consulted either did not use, or had stopped using, the waste transport service after the COVID19 pandemic hit the island. Reported reasons for not, or no longer, using the service included current waste-burning practice, service fee being perceived as “too expensive,” and seasonal lodging on the island (i.e., spending half a year back in hometown in other provinces to do rice farming).

“[We] used to use [waste transport service], [but] now no, because [it’s] too expensive. Also [we] only stay in this village half the year, and return to [our] hometown in the rainy season return to do agriculture.” (Answer from a young fisher couple, Koh Touch)

Willingness to reduce or stop using plastic waste through different approaches

All HHs consulted in Koh Sdach and Koh Touch (100%) favoured the ideas of having public trash bins, dumpsite, composting site and waste banks in the

community, and were willing to use them if they were free and easily accessible. Such infrastructures could improve their existing practices (e.g., direct waste disposal in the ocean), in turn helping to curb the amount of (plastic) waste entering the marine environment.

“This activity (composting) is good and should be promoted in communities. Some [people] currently dispose of their kitchen waste into the ocean to feed fish.” (Answer from a middle-aged, male fisher, Koh Touch)

“This is a good idea, [it] can help raise awareness for people to know how to better manage waste.” (Answer from an old, male fisher, Koh Sdach)

As some of the HHs in Koh Touch put it, the existence of these local waste infrastructures could help remove not only the need to transport waste to the mainland but also the cost of using waste transport service for poor HHs. For Koh Touch at least, this point was well reflected in the willingness to pay for current waste transport service.

“The idea is very good; it can reduce the need to take waste to the boat to transport to Sihanoukville, thus cut costs for poor HHs.” (Answer from a female fisher, Koh Touch)

The idea of introducing products made from downcycled plastic waste, such as reusable boxes to put fresh produce and meat or cool boxes to store drinking water, was also well-received among consulted HHs (94% in Koh Sdach, 100% in Koh Touch). HHs suggested that if available, these kinds of products may gain a lot of traction from the larger community as they could help decrease the amount of plastic waste produced in the first place and possibly provide a source of income for HHs who could sell them.

“This idea can help reduce waste while also providing income.” (Answer from a male fisher, Koh Sdach)

Interestingly, to drive interest on a larger scale and retain long-term use, HHs stressed “the need to educate [local] people more about the use of these [alternative] products and how versatile they are for different purposes.” That said, none of them commented on how much they were willing to pay for these products if they were sold instead of being given for free. More information on this would be needed if this approach was to be implemented.

This point is worth keeping in mind, considering that other approaches involving paying a fee, even if small, tended to receive less positive response. For instance,

in discussing their willingness to pay a small fee (e.g., KH 400 riels) for SUP items like plastic bag, less than half (41%) of HHs consulted in Koh Sdach and none (0%) of those in Koh Touch said they were willing to do it. A few of the HHs who were unwilling or reluctant to pay said they had already been carrying their own bag when going to the market, though not all the time, “in case sellers didn’t give plastic bags” to them. Some, typically those in lower-income group, elaborated that they would prefer to carry their own bag instead, to avoid having the fee incurred on them. In their opinion, any small fee could add up to become an unnecessary expense, although some higher-income HHs may find the sum negligible.

“[We] would rather use [our] own bag; some well-off HHs may not care about this, but poor HHs do and don’t want to spend on this kind of unnecessary expense even if it’s small.” (Answer from a male fisher, Koh Touch)

Several HHs in both places reminisced about past habits, e.g., carrying one’s own bag or basket and using lotus or banana leaves to package vegetables and meat bought and sold at the market, that had now fallen out of practice due to the convenient access to and widespread use of plastic. All agreed that this shift toward plastic was a direct result of “society becoming too modern, too technological,” although they themselves had “no choice but to accept this [societal] change.”

Interest in community-based training or workshop to learn ways to reduce plastic waste

All consulted HHs in both sites (100%) expressed interest in joining community training to learn more about the 3-R methods and workshops on how to reuse plastic waste materials to make new products that could be used or even sold. However, a number of them expressly raised several constraints, including time, season, family and/or parental responsibility, that would hamper their availability to participate in any of these events.

There was strong consent across the two sites that in order to maximize community participation in this kind of training or workshop, the timing of the event needs to take into consideration local people’s daily schedule and should attempt to accommodate that as much as possible. For example, the majority of HHs, particularly fishers and housewives, preferred training or workshop to be in the afternoon to allow them to first complete their daily income-earning activities and/or chores (e.g., groceries shopping and cooking) in the morning. The time of day most suggested for the event to be held was between 1 p.m. and 3 p.m., and the duration should not exceed two hours. Nevertheless, as

explained in some of the interviews, some women would simply find it too difficult to join this kind of training event at all if they had to oversee a business at home and/or look after small children at once without presence and/or support of other adults in the family.

For fisheries HHs, utilizing the rainy season to conduct training or workshop could help increase their chance to participate. According to their answers, few fishing activities occurred in the wet season due to strong wind and rain, thus fishers were more likely to remain in the village in the day during this period.

Attitudes towards impacts of plastic pollution

Attitude towards plastic pollution impacts on the marine ecosystem and the community itself differed quite significantly between Koh Sdach and Koh Touch. Whereas concerns of plastic pollution were echoed by all consulted HHs in Koh Sdach (100%), less than half (43%) of those interviewed in Koh Touch were worried at all about the problem.

In Koh Sdach, HHs' concerns were health-related (63%), SWM-related (22%), tourism-related (11%), fisheries-related (11%), and ecological-related (11%). For health concern, HHs were mainly worried about mismanaged plastic waste creating breeding grounds for mosquitoes to bite their children and infect them with mosquito-borne diseases. A small proportion also raised concern of bad odour of waste that could affect their daily life.

"[We] are worried about [plastic] waste becoming a place for mosquito breed, and mosquitoes biting children." (Answer from a fisher couple, Koh Sdach)

For SWM-related concern, most HHs underlined physical exhaustion of having to carry waste to dispose of in the ocean daily or regularly as the crux of their concern, with a small proportion of HHs suggesting to have bins available on the streets (which had been the case until the island's waste operator stopped operating some years ago).

"Carrying waste to throw in the ocean is exhausting." (Answer from a female fisher, Koh Sdach)

As for tourism-related concern, HHs' were chiefly worried about the aesthetic of the archipelago to attract tourists. According to one HH, Koh Sdach had garnered blatant criticism from tourists because of the presence of plastic pollution on and around the island.

"Some tourists criticize us, saying that, [we] bragged about our [island] being 'natural,' but trash is floating everywhere." (Answer from a female fisher, Koh Sdach)

Finally, the slow degradation of plastic debris after it enters the natural environment also surfaced in HH's concerns, as shown below.

"[We] are worried about its impact on the ocean [...] plastic doesn't decompose fast." (Answer from a male fisher, Koh Sdach)

Whereas in Koh Touch, the bulk of the concern over plastic pollution impacts was on fish catch, with HHs agreeing that plastic waste in the ocean could lower their catch rate.

"Yes, plastic waste affects catch. [We] have caught plastic waste in our gillnet instead of fish." (Answer from a fisher couple, Koh Touch)

Those in Koh Touch who had no concerns about plastic pollution and its impacts tended to focus their understanding of the problem entirely on the immediate effects of burning a small amount of waste and their measures to counter those effects. There was no mention of the larger, long-term impacts regarding their livelihood, health or the marine ecosystems of the archipelago. For example, some fisheries HHs explained their view on this as follows:

"No, [we] are not worried; [we] just burn a small amount of waste, so it's ok." (Answer from a male fisher)

"[We] burn waste only when the wind is low, so no worry about smoke. [We] also wear mask when burning the [waste]." (Answer from a female fisher)

Availability of regular cleaners paid by the municipality to clean waste on public beaches waste also contributed to this lack of worry about plastic pollution impacts in the community. That said, the cleaners were said to be laid off temporarily up until early 2022 due to the ongoing COVID19, but had been hired again to continue the work.

"[We] are not really worried; there are currently public beach cleaners, three of them." (Answer from a female participant, Koh Touch)

Awareness of sub-decrees on SW disposal, including burning & dumping in the open/ocean

More than half of all HHs interviewed in both sites (65% in Koh Sdach, 71% in Koh Touch) said they were aware of the Cambodian sub-decrees on solid waste disposals, including waste burning and dumping in the open and/or the ocean. However, when asked to articulate what they knew, only a few of the HHs in this group mentioned anything at all, including "fine" for throwing waste in open spaces and that it "was a good

idea to do [so].” The rest of the HHs in this group, like those who reported not knowing the sub-decrees, did not articulate anything, likely suggesting that they actually didn’t know the sub-decrees. This was

perhaps unsurprising, considering public dissemination and enforcement of these sub-decrees remained limited or “not strict enough,” as some of the HHs pointed out themselves.



Credit: Majel Kong / FFI

3.2 Business Findings

Reported amount & composition of daily waste

Among the businesses included in the consultation, coffee shop or cafe was found to have the highest reported daily waste generation, at an average of 10 kg/day. Street food vendor and accommodation business generated second highest amount of daily waste, at around 5kg/day each. Waste generation was said to remain constant throughout the week for street food vendor, with the waste being wet and dry. Accommodation businesses tended to see their waste generation (mostly dry) increase on weekends when more tourists were visiting the island.

“[Our] daily waste is around of 5 kg per day on weekdays. On weekends, [it] can go up 7 kg, for example, with visitors staying at [our] guesthouse.”

Shophouses and mini-marts were found to have the lowest reported amount of daily waste generation, between 2 to 3 kg/day. Cardboard and plastic wrapping of imported products to sell in the business was said to make up most of waste.

In Koh Touch, primary school was found to have the highest reported amount of daily waste generation, between 40 and 50 kg/day.

Shophouses appeared to have the highest daily waste generation among all the businesses consulted, ranging between three and 10 kg/day. Noodle shops and pharmacies were the second highest in daily waste generation, at around 5 kg/day each. Café, beauty salon, traditional wine shop and resort businesses reported the lowest waste generation, with resorts seeing the least amount due to low number of guests as a result of the new spread of the COVID19 Omicron variant.

In Koh Sdach, 89% (n=8) of all business owners consulted (n=9) said plastic accounted for more than 20% of their daily business waste. In Koh Rong, 67% of all business owners consulted (n=12) said more than 20% of their daily business waste was plastic. Shophouses selling a mix of groceries, drinks and other consumables (e.g., body products) were found to be the biggest plastic waste producers across both sites with one business in Koh Sdach reporting the proportion of plastic in their waste to be as high as 80%, followed by mini-marts. The most common type of plastic found in these businesses were clear plastic packaging from goods (especially, canned or bottled

products like drinks, liquid soap, canned food, etc.) bought to sell in the stores, plastic bags and bottles.

Food shops, including street food, café and accommodation, were found to generate less plastic waste than shophouses, although they were observed to be a major producer of SUP waste like Styrofoam food container, cups, (half-cut) bags and straws. This could be that when reporting the amount of plastic in their daily waste, these businesses only focused on what was present in their bins or waste pile and excluded all the SUP plastic items they used to pack customers' takeaway orders.

Accommodation-only business (e.g., resort, hotel, guesthouse) had the lowest reported plastic waste, compared to the other businesses in this consultation, with one respondent reporting that most of the SUP waste in his resort stemmed from guests bringing in takeaway food and drinks to consume in their rooms or bungalows.

"Most of [SUP] plastic waste come from [our] guests who bring takeaway food and so on to eat at their bungalows, and the waste is produced like that." (Answer from a couple managing a bungalow resort, Koh Touch)

Non-tourism businesses such as pharmacies and hair/beauty salons had the lowest reported plastic waste (10% or less in the total daily waste), compared to the other businesses in this consultation. According to the pharmacy owner, most customers tended to buy medicines and other medical supplies in very small amount and not daily, compared to their other purchases like foods and drinks. This small-size purchase meant customers were less likely to demand plastic bag to store it, and this was reported to be the case by a number of HHs and businesses. Similarly, the nature of services provided at places like hair/beauty salons meant little to no plastic waste was generated on a daily basis, as the products used (such as shampoo, conditioner, make-up kit, etc.) were meant to last over a period of time before resulting in plastic-waste bottles or containers.

Average amount of plastic consumption per guest/customer per day

The majority of businesses in both sites (89% in Koh Sdach, 67% in Koh Touch) agreed that on average their customers used or consumed between one to two plastic items per guest per day. Unsurprisingly, plastic bag was the most used item across the two sites, followed by water bottles and plastic cups/lids. Again, businesses emphasized the tendency of most local customers to have their purchase stored in plastic bag, with each store visit resulting in a consumption of two

to three bags in some cases. However, some of these businesses also pointed out some customers would skip using plastic bags if their purchases consisted of one or two small things only and were convenient to carry on their own.

"Customers ask for plastic bag, but if the purchase is small, and easy to carry, [they] don't ask for bag." (Answer from a couple owning a shophouse, Koh Sdach)

Local and some foreign tourists also exhibited similar plastic-use behaviours. For example, one guesthouse owner in Koh Sdach reported that her guests consumed "at least two (500ml) bottled waters" per person per day, in addition to producing "plastic food packaging" waste. A shophouse owner in Koh Touch echoed that observation among foreign tourists, adding that some Chinese visitors tended to "use even more of [these] plastic items" than other tourists.

Lastly, primary school students were said to be among the highest SUP waste producers in these two sites. According to a school teacher in Koh Touch, each of the students there used several plastic items when at school, particularly during classroom breaks when they would go get drinks and snacks from nearby sellers.

"Each student [in this school] uses around 4 to 5 plastic items while at school; [they] would go buy snacks, drinks and so on during break." (Answer from a male teacher at Koh Touch primary school)

Current waste management practices of businesses

44% (n=5) of all the businesses consulted in Koh Sdach (n=9) and In Koh Touch 75% (n=9) of all the consulted businesses (n=12) in Koh Touch reported properly storing and packaging different waste types (e.g., organic, plastic, aluminium) in different bags or bins before disposal, with no leakage said to take place when they took the waste to dispose of.

Interestingly, the same businesses in Koh Sdach who practiced waste separation were also found to choose burning as their waste-disposal method, while the other 56% (n=5) who did not separate waste were found to throw the waste directly on the shoreline or into the ocean. This suggests that waste separation in Koh Sdach seemed to be driven, at least in part, by the disposal practice each business opted for (i.e., whether to separate and burn the combustible components of the waste, or simply store all of it together and dump on the shoreline or into the ocean).

In Koh Touch, waste burning was said to be rare. No consulted businesses burned their waste. Instead they

used existing waste transport service on the island to dispose of the waste.

Knowledge of, willingness to, & access to tools for safe and correct waste separation

In Koh Sdach, 78% of all consulted businesses reported knowing how to separate their waste, with 100% of all the consulted businesses showing their willingness to do so. In Koh Touch, knowledge of waste separation was equally high (75%). However, willingness to separate waste was less, with a little over half (58%) of all the consulted businesses agreeing to it and the rest (42%) was either unwilling to do it or unsure about doing it.

Notwithstanding the reportedly high knowledge of waste separation, description of the practice was rarely given in the consultation. Only 14% and 25% of all businesses with reported knowledge of the practice in Koh Sdach and Koh Touch respectively provided some detail on how they did it. On the whole, the focus of the separation seemed to be between “organic” or “wet” waste and “inorganic” or “dry” waste, with the former usually kept for animal feed and/or dumped as “compost”, and the latter stored together to be disposed of. There were occasional mentions of reuse of certain waste types such as cardboards, aluminium cans (to sell to *Etchay*) and/or hard-plastic containers (although this seemed a more common practice for HHs). Medical waste, such as used needles and syringes, was separated and stored by itself using “standard” safety boxes before disposal to prevent potential hazard, as explained by one licensed health provider.

“[We] separated wet and dry waste [...] [we] save cardboard boxes from our products and reuse to pack other products.” (Answer from a male owner of a shophouse selling bottled drinks and small groceries, Koh Sdach)

“[We] separate medical and non-medical waste; [we] store non-medical waste [in one bag, and medical waste in yellow safety box.” (Answer a licensed female health provider and pharmacy owner, Koh Touch)

Moreover, ability and willingness to separate waste appeared to correlate with having sufficient tools (e.g., bin, physical space, time, etc.) for doing so. In both sites, the businesses indicating their ability and/or willingness to separate waste were found to have one or more of these tools, although most of them also acknowledged the gap and limitation in their knowledge and tools. For instance, when bins were absent, the businesses would by default resort to plastic bags, buckets or even old fishing nets to store

different waste types. Use of PPE was never brought up, except by one business who mentioned owning some disposable gloves (though it was unclear if and to what extent they were used in the actual waste separation process).

“[We] would use plastic bags as bins to store different kinds of waste.” (Answer from a female owner of a drinks/vegetables shophouse, Koh Touch)

“My business doesn’t have enough knowledge; [we] has some gloves...and use fishing net to store certain waste.” (Answer from a female guesthouse/shophouse owner, Koh Sdach)

Indeed, absence of sufficient knowledge and tools was a key deterrent to the willingness to and practice of waste separation. Besides trash bins, time and physical space were the other resources these businesses frequently said to lack. For a few, the unavailability of these tools, the generally small amount of daily waste, and the minimal presence of odour-inducing waste (like food and raw vegetables) could in the first place demotivate them to want to separate their waste.

“[We] have no time [...] and [we] don’t know what [categories] to separate [waste] into.” (Answer from a female owner of a beauty/hair salon, Koh Touch)

“[We] never do this (waste separation). [Our] waste is small and mostly clean, [with] little or no kitchen waste, [so] it doesn’t smell.” (Answer from a female owner of traditional wine shop, Koh Touch)

Similarly, for businesses unwilling or reluctant to separate waste (only in Koh Touch), absence of first-hand experience with the practice often came up as the main reason influencing their decision to not want to do it. A handful of these businesses also flagged the likelihood of separated waste getting mixed together again by collectors or at the final dumpsite or landfill, thus making their own effort futile in the end. *“[We] can separate [our] waste, but the waste will get mixed up again at the collection point or dumpsite.” (Answer from a male owner of Western café, Koh Touch)*

Willingness to clean and reuse hard-material waste, including plastic

Overall, willingness to clean waste appeared very low among consulted businesses in Koh Sdach (11%) and moderate among those in Koh Touch (67%). Similar to HH findings, waste-cleaning practice seemed to be linked to the desire to reuse the waste products. For example, all the businesses in this group reported washing empty glass waste (e.g., bottle or jar) for

reuse within their own household. Cleaning of plastic waste was found to apply primarily to hard or sturdy plastic products that were usually big in size (again for reuse purpose in the household), with a few businesses (i.e., those selling gasoline or traditional wine) also found to collect and clean SUP water bottles to store the gas (mainly sized 1.5L) and wine (sized 1.5L & 500mL) supplies to sell in their shops. Typical SUP waste (e.g., food container, cup, etc.) and plastic bottles from toiletry products (e.g., shampoo, conditioner, liquid-soap & lotion) were disposed of unwashed after consumption.



Credit: Majel Kong / FFI

“For hard plastic & glass, [we] wash and reuse in the house. [For] light or thin plastic like cups, [we] throw away without cleaning, after use.” (Answer from a female owner of a shophouse selling groceries/vegetables, Koh Touch)

Like some interviewed HHs, a few businesses remarked that carrying reusable baskets or bottles to put one’s own purchases in used to be a commonplace practice before SUP products became ubiquitous, and that waste cleaning, especially SUP, among villagers could be better motivated among villagers if *Etchay* (a Khmer term commonly used to refer to informal waste pickers) were still willing to buy plastic waste. Purchase of plastic waste was said to have mostly disappeared in the two archipelagos for some times now due to lack of profit resulting from high transportation cost and cheap selling price (with the purchase and import of plastic waste to neighbouring-country buyers coming to a standstill at the height of COVID19 outbreak in Cambodia).

“In the past, customers used to come with their own bottle to put the wine, but now they no longer carry their own bottle, with plastic bottles being so easy and convenient to have.” (Answer from a female owner of a traditional wine store, Koh Touch)

“If [plastic] waste was still bought, people [here] would likely be willing to clean the waste. Before Etchay used to plastic waste; now they don’t buy anymore because transportation cost from the island is as high as aluminium/metal, but plastic is way cheaper to sell.” (Answer from a female owner of a guesthouse, Koh Sdach)

Unwillingness or reluctance to clean waste (89% in Koh Sdach, 42% in Koh Touch) was once again expressed in terms of lack of time and actual experience, with a few businesses perceiving the practice to be “hard to do” or seeing “no point in doing [it].” In addition, some of the more high-end accommodation businesses stressed the difference between HH and business settings in relation to waste cleaning and reuse, and were seemingly apprehensive about the response their guests could have when learning that products in their services were not new but reused. When reuse of plastic products was observed among tourists, it was more often Western tourists who practiced it; local tourists were rarely said to share the behaviour.

“Guests will not want to reuse cleaned products, but new products; in household context, we can clean and reuse hard-plastic & glass, and toss light/thin plastic, but not in business.” (Answer from a couple managing a bungalow resort, Koh Touch)

“Some western tourists even reuse coffee cups from [my] shop whenever they come back to buy coffee.” (Answer from a female owner of a coffee shop, Koh Sdach)

Willingness to reduce or stop using plastic waste through different approaches

Willingness of businesses in the food and accommodation group to provide water refill stations for their guests was equally low in Koh Sdach (n=1, 25%) and moderate in Koh Touch (n=5, 56%), with all the businesses being unanimously sceptical about the success of such approach to encourage less consumption of SUP bottled water on the part of tourists, especially Cambodians. In fact, this kind of provision was not new in these places. In Koh Sdach, the one guesthouse owner who showed willingness for this approach had, since the start of her business, been providing big-bottled water (sized 20L) for guests to refill for free (in addition to the small, 500mL bottled water). In Koh Touch, owners of local food shop echoed such practice by providing free tea and water to guests.

As explained by businesses in both sites, the main issue was the strong preference of guests or tourists, especially local ones, to consume small-bottled water (sized 1.5L, 500 mL or smaller). Some of the businesses in Koh Sdach noted that there was distrust of the quality and safety of both big-bottled water and local water supply on the island that bolstered local tourists' preference for small bottled water (which was often viewed as having higher “standard” and thus “safer” or more “sanitary” to drink). This concern for hygiene and safety in food and drinks was also suggested to intensify the already pervasive use of SUP products like straws and cups for tourists and local customers alike.

“But guests don't want to drink big-bottled water & prefer small-bottled water; only villagers drink big-bottled water.” (Answer from a female guesthouse owner, Koh Sdach)

“[We] provide free water & tea for dine-in customers, glass cup, but also plastic straw as customers seem to want [them] for hygiene purpose.” (Answer from a couple owning a noodle food shop, Koh Touch)

Perhaps this deep-seated customer preference also explains why willingness of businesses in both sites to reduce or charge customers a small fee (e.g., KH 400 riels) for requested SUP items (like bags, Styrofoam food containers) were low to moderate. In Koh Sdach, although 43% of all consulted businesses were willing

to reduce SUPs in their services, only 11% were willing to charge their customer a small fee for requesting any SUP item. In Koh Touch, 60% of all consulted businesses were willing to reduce SUPs in their services, but 0% was willing to follow this fee-charging approach. Regarding willingness to reduce SUP waste, a small proportion of businesses appeared to be taking some initiatives on their own, including surveying markets in the capitol for alternatives to currently used SUP items, avoiding plastic use in the first place when possible, and providing as few plastic items (or parts of items) as could be to customers and only when asked.

“[I'm] currently thinking of options to reduce the straw [we] use. [I've] asked [my] daughter studying in the city to keep looking for cups with open lid that don't need straw.” (Answer from a female owner of a coffee shop, Koh Sdach)

“[We] doesn't use straw, just lid for paper cup.” (Answer from a male owner of a Western café, Koh Touch)

The common thread running through businesses' unwillingness or reluctance to follow small-fee-charging approach was the likelihood of customers' refusal to accept this change. Because SUP items like bags, food containers and the like had always been included free of charge in their services, businesses worried not only about customers' complaint regarding new fees, but also about the possibility of losing these customers to other businesses that didn't charge it. Most of the businesses in both sites similarly contended that such approach may have a higher success rate in their settings if all existing businesses there agreed to implement it, leaving customers no options but to pay the introduced fee or bring their own bag/basket to store their purchase. A few of the businesses further alluded to the importance of ensuring customers' understanding of the real purpose of this approach to prevent misconception that it was done to increase business profit.

“[we] worry that customers won't accept [the fee]. If this was implemented, then all businesses have to do the same to have chance of success. [We] businesses don't want this fee, but want to create a habit of using less plastic [through this fee].” (Answer from a female owner of a shophouse selling drinks and groceries, Koh Sdach)

However, some businesses cautioned that some people would always consider carrying their own shopping bag or container a hassle and were thus likely willing to pay the fee to avoid dealing with it. A few of them also believed this kind of approach was

more likely to succeed among poor or low-income HHs to whom the accumulation of small fee like this could mean a big expense over time.

“Some people don’t seem to care or want to do this (carry own bag/container) and are likely willing to pay the fee to keep using plastic.” (Answer from a female owner of a guesthouse, Koh Sdach)

“Some poor customers might stop asking if there’s fee charged for plastic bag.” (Answer from a male owner of a shophouse selling soft drinks, Koh Sdach)

Willingness to use tools/infrastructures and participate in trainings to help reduce plastic waste

In Koh Sdach, 100% of all businesses consulted was willing to use correct trash bins, dumpsite or storage facility, and waste bank for disposal of recyclable waste like plastic, while 89% was willing to participate in composting program, if all of these were not only available but also easily accessible (i.e., in an easy-to-reach location in the community/village). In Koh Touch, such willingness was lower, with 67% of all consulted businesses willing to use dumpsite/storage facility and waste bank and 58% willing to use correct trash bins and join composting program (again, if all were available and easily accessible). Based on answers from businesses in both sites, this difference in the level of willingness to use waste-management tools/facilities or programs was in large part influenced by the extent of the problem as experienced by the businesses in their own location. Up until the time of this consultation, Koh Sdach had witnessed a much more acute marine plastic pollution than Koh Touch due to the ample amount of shoreline and sea-based plastic waste that remained uncollected and the absence of solutions to alleviate the problem. As such, a few of the businesses in Koh Sdach who were concerned about the problem were compelled to avoid

worsening it by paying others to take the waste to dump in open land uphill away from the ocean.

“[We] pay Motordop to take waste to throw uphill sometimes to avoid throwing in the sea.” (Answer from a female owner of a groceries shophouse, Koh Sdach)

The majority of businesses in both sites also commented that to retain long-term use of these infrastructures and programs, there must be careful considerations beforehand to determine the appropriate sites in the community for setting up facilities, how much total waste these facilities can handle, and how the waste disposed of there was to be managed afterward. Failure to do so could likely lead the villagers to not only discontinue their use or participation but become less inclined to consider participating in the future. Such was said to have taken place in Koh Touch where bins had, in the past, been distributed along beaches for public use, but poor and infrequent collection of waste had caused bad odour and waste overflow, and the villagers and tourists to stop using them.

“[E]ven if there were public trash bins, [there] would still need to be people to collect and properly dispose of all the waste afterward.” (Answer from a female owner of a coffee shop, Koh Sdach)

“[My] business will not join if these [proposed] bins are put on main road for others to use also. Before there used to be bins put in public here, mainly for tourists to use, but collection was infrequent, so the bins were overflowed with waste. If the idea of these bins is similar to the previous one, then some HHs & businesses would just keep using their own bins, as [they] don’t like bins full of waste but no collection.” (Answer from a female owner of a pharmacy, Koh Touch)

Credit: Majel Kong / FFI



Lastly, over two-thirds of consulted businesses in both sites (89% in Koh Sdach, 75% in Koh Touch) expressed interest in joining training workshops on how to reuse plastic waste materials to create new products that they could use and/or sold to make additional income. Time and absence of other adult members in the family to help run the (home-based) business and/or look after small children were the two most commonly mentioned challenges, especially by female business owners. Paradoxically, it was also women who were said to be more likely to participate community events because of their homebound roles and responsibilities, compared to men in both sites who tended to be occupied with fishing activities at sea in the day and thus absent in the village around that time. To ensure maximum participation from women without disrupting their household responsibilities, it was proposed that this kind of event should happen at least busy hours for women (i.e., afternoon after lunch and for dinner preparation, or morning before groceries shopping and lunch preparation) and not be longer than two hours.

“Men are usually out at sea in the day; only women are present and likely to join. Events shouldn’t run longer than 2 hrs, to allow women to have enough time to manage their HH responsibilities.”

Concern about impacts of plastic waste

Concern about impacts of plastic pollution was high across both sites, with 89% and 83% of all businesses consulted in Koh Sdach (n=9) and in Koh Touch (n=12) respectively voicing it. In Koh Sdach, businesses articulated concerns that emphasized an array of ecological and social impacts of plastic waste. Specifically, these included:

- Century-long persistence of plastic waste on land and/or in the ocean before decomposing (25%);

“[We] are worried because plastic lasts for hundreds of years before decomposing.” (Answer from a couple owning a street food vendor, Koh Sdach)

- Lack of alternative disposal options to replace current practice (i.e., ad hoc burning and/or direct disposal on shoreline or in the ocean) (25%);

“[W]e don’t have any other choice not to throw waste in the ocean.” (Answer from a couple owning a shophouse selling drinks and groceries, Koh Sdach)

- Fire accident caused by burning plastic waste (especially on windy days) or by the waste

catching fire on its own (especially in dry/hot season) (13%);

“In the dry season, [plastic] waste gets washed up under the house. [I’m] afraid it could catch fire.” (Answer from a male owner of a shophouse selling drinks and processed snacks, Koh Sdach)

- (Worsening) flood episode as a result of plastic waste clogging sewages and drains in rainy season (13%);

“[Plastic] waste can have strong impacts like clogging sewages in rainy season, causing more flood.” (Answer from a female owner of a shophouse selling drinks, groceries, etc., Koh Sdach)

- Increasing amount of plastic waste in the ocean (due to continual disposal of the waste) (13%); &

“More plastic waste will go into the ocean. [...] Most villagers [here] are also concerned about the waste problem on the island.” (Answer from a female guesthouse & shophouse owner, Koh Sdach)

- Bad odor induced by unmanaged or poorly managed waste (13%).

In Koh Touch, 60% of all the businesses airing their concern about impacts of plastic waste (n=10) provided additional thoughts, while the other 40% who were also concerned did not. Unlike in Koh Sdach, the breadth of concerns articulated by Koh Touch businesses tended to focus largely on plastic pollution in relation to the local tourism sector, which was perhaps unsurprising since tourism played a central role in fuelling the economy there. Specifically, these articulations included:

- The importance of keeping the environment free of plastic waste so as to avoid ruining the aesthetic appeal of the island to attract tourists (30%);

“[We] are concerned about plastic [waste] and how it can affect the island to bring in tourists.” (Answer from a couple managing a bungalow resort in Koh Touch)

- Improper or damaging disposal habits (i.e., littering plastic waste on public spaces) of local and some foreign tourists, with suggested enforcement of penalty in the form of fine to deter those unwanted practices; &

“Khmer and Chinese tourists throw waste all over the place. [It] would be good to fine this kind of [improper] waste disposal. Western foreigners don’t throw waste all over the place.” (Answer from a female shophouse & laundry service owner, Koh Touch)

- Exacerbation of plastic pollution due to the absence of solutions on the ground (10%).

“Plastic pollution here (Koh Touch) will become an [even] bigger problem without solutions.” (Answer from a male owner of a Western café, Koh Touch)

Business owners who were unworried about impacts of plastic pollution (11% in Koh Sdach, 17% in Koh Touch) seemed to derive their lack of concern from the relatively easy access to a waste-disposal facility or a waste transport service in their respective location. In the case of Koh Sdach, a business owner had her own brick-built incinerator near the shore where she burned her HH and business waste. In the case of Koh Touch, two business owners pointed to the existence of waste transporters to ship waste to the mainland Sihanoukville, with one further hinting at the seemingly clean appearance of beaches as a reason to not worry about the plastic waste problem.

“[I] am not really worried because e [my] family has [our] own incinerator to burn waste.” (Answer from a female owner of coffee shop, guesthouse, and E-money transfer business, Koh Sdach)

“Here, [we] have boat [services] to transport waste...and [there’s] no presence of messy waste on beaches.” (Answer from a female owner of shophouse selling vegetables/groceries & drinks)

Willingness to pay for waste management services

Willingness to pay for waste management service, current or future, was found to be extremely high in the two sites, with 100% and 92% of all consulted businesses in Koh Sdach and Koh Touch respectively confirming they would pay. One old business owner in Koh Touch reported being allowed to use waste transport service without having to pay because she lived alone, was afflicted with chronic back pain, and made little income from her traditional wine selling.

“[I] live alone, am old with back pain; [my] children live in different household. [...] So [I] use the service, but don’t need to pay.” (Answer from an old, female traditional wine seller, Koh Touch)



Availability & access to waste management service

While all consulted HHs in Koh Sdach informed the previous waste collector in the island was no longer operating, one high-income business owner actually said the collector was still providing service. However, the waste collector only covered on the main concrete streets he had built, with a few bins doled out per block for a monthly fee of KH 60,000 riels. The fee was to be split between households/businesses using those bins.

Waste was collected from the bins to be burnt at the collector's incinerator also located on the island.

"Currently [we] pay 30,000 riels/month, although total fee is 60,000 riels, but this fee is shared by several other HHs who also use the bins provided by the collector. The collector is still operating but only on the concrete streets he built." (Answer from a female mart owner in Koh Sdach)

In Koh Touch, on the other hand, 92% of all businesses consulted reported using the same waste transport service as HHs, either by paying direct user fee (reported to be between \$20-30 US dollars a month) or a flat rate of \$50-US-dollar monthly shipping fee that included free waste transport to Sihanoukville. This existing service model does not, however, seem conducive to providing easy access for resource-poor public settings like Koh Touch primary school. As the same teacher elaborated, the lack of adult staff in the school (other than the two teachers working there), coupled with its far, uphill location, made impossible the task of carrying heavy trash loads to the piers to be transported. And because the students were too young to be asked to perform this task, the school had no choice but to regularly burn its waste in holes dug within its compound.

"The school only has small students, and [we] cannot ask them to carry waste to pier for transport. [...] [We] just burn the waste in the dug holes outside." (Answer from a male primary school teacher)

All in all, these answers in Koh Sdach and Koh Touch strongly resonated with those provided by HHs, highlighting the disparity in access to services across different incomes and sectors, with public and/or poorest-income groups least likely to have easy access, if at all, to necessary services.

Awareness of sub-decrees on illegal waste disposal practices and penalties

Over half of all the businesses consulted (67% in Koh Sdach, 82% in Koh Touch) said they were aware of sub-decrees on illegal waste disposal practices such as burning or dumping waste in public space or the ocean. Based on their answers, the whole of the awareness was more on general messages, such as "keep[ing] trash in the bin," which the authorities had imparted to people in their village, particularly those living directly above the ocean, at occasional community meetings. In fact, several businesses in both sites agreed that their communities had limited

knowledge of marine plastic pollution despite being aware of it; that regular awareness raising could be utilized to improve villagers' understanding of the problem.

"Villagers have low understanding of [marine-plastic] pollution although they see the problem...so [we] should do community awareness every two months." (Answer from a female owner of a guesthouse, Koh Sdach)

At the same time, a few businesses reiterated the lack of alternatives to replace current disposal practices as a significant constraint hindering the success of awareness-raising effort to encourage villagers to stop burning or throwing waste in the ocean. This is especially pertinent in Koh Sdach where no alternatives were in place at the time of the consultation.

"[We] are aware of law, but [we] have no option." (Answer from a couple owning a drinks/grocery shophouse, Koh Sdach)

"Before local authorities used to raise awareness with[us] to not throw waste into the sea, but that doesn't work." (Answer from a female owner of a drinks shophouse)

Although none of the businesses mentioned any specific sub-decrees, including penalties, on waste burning or dumping in open land or the ocean, a number of them raised the lack of actual law enforcement as an issue, criticising that people who did not comply with the law were usually allowed to go unpunished. Some went so far as to suggesting that the only way to reduce and ultimately stop these illegal disposal practices was to follow strict enforcement of first warning, then penalizing whoever broke the laws. A key component of an effective exercise of law, one business couple explained, is consistency, meaning implementation cannot be one-off but needs to occur regularly.

"[We] are aware that waste needs to be kept in bin, but [we've] never seen anybody who does otherwise gets fined." (Answer from a female owner of a shophouse selling vegetables & other groceries, Koh Touch)

"Fine those who don't comply with law, but enforcement cannot be one-off as that's not effective. [Authorities] can start with a few warnings first, before implementing fine." (Answer from a couple owning noodle shop, Koh Touch)



4. Discussion & Recommendations

Findings from community consultation in the KSA and KRA show that overall interviewed HHs and businesses appear in favour of most of the targeted measures proposed for addressing marine plastic pollution in their location. At the same time, the participants shared a number of ideas and suggestions to refine these measures to bolster their chance of long-term success, if implemented. In what follows, these targeted measures are discussed, exploring specific, interconnected areas of intervention and key considerations for design, as emerged from the findings.

1. Small-scale, community-based SWM tools and facilities such as public trash bins, dumpsites, composting centers, and waste banks receive strong traction from both HHs and businesses. In the contexts of the KSA and the KRA where local infrastructure remains limited and SWM system is either inadequate or absent, these tools and facilities are crucial, at least in the near future, to provide means for HHs and businesses to properly manage their waste, including separation and disposal. For example, as the findings show, a key driver enabling both HHs and businesses to separate their waste is having access to the tools to do it. Thus, ensuring that HHs and businesses, particularly those who currently do not separate waste, can easily access to these tools will be an imperative first step to propel change in waste-management behaviours.

Moreover, community-based facilities like composting center or waste bank can help counteract the problem of “not knowing what to do with the separated waste afterward” by functioning as collection or disposal point where

the villagers go to dispose of their separated waste (e.g., food waste, plastic waste, etc.). Composting centers can serve as a shared place for communities to put their food and other compostable waste types that tend to be generally heavy because of their wet content. This, in turn, can lessen the burden on waste transport to the mainland (for the KRA) and possibly diminish the habit of throwing food/organic waste in the ocean (for the KSA).

As for waste bank, it can have the potential to further engage informal waste pickers (i.e., *Etchay*) who are interested in collecting plastic waste to sell. As price of plastic waste is unprofitably cheap, having a central point like this for *Etchay* to collect the waste all at once can save them a significant amount of daily time they would otherwise spend going around the village/community to gather the waste. Given the current hiatus of plastic-waste buying by *Etchay* in the two archipelagos, creation of community-based waste bank might provide a timely opportunity to revive their interest in returning to the business, especially when implemented in conjunction with other supporting measures such as provision of tools to compress or mince plastic to increase transport volume without increasing cost.

To retain long-term use and behaviour change that can result from these measures will require implementing actors to have a clear and appropriate plan for how the waste disposed of in the provided bins, composting center or waste bank are to be managed afterward. Part of the plan will mean assessing how much waste from the village is likely to enter these tools and facilities in order to decide the suitable size of the tools/facilities to be installed. In addition, it is necessary to determine in advance regular waste-collection

schedule, specifically for public trash bins, so as to avoid waste overflow and bad smell. If poorly managed or unmanaged, these public waste tools and facilities can lead villagers to abandon their use and revert to old undesirable practices, as evidenced from answers of HHs and businesses in Koh Touch, KRA. It can also cast long-run implications for future interventions, as communities may become less inclined to participate in activities that look similar to them based on previous unsuccessful experience of past projects or interventions.

2. **Utilization of “good” SWM behaviours** (e.g., waste cleaning) that are already practiced by communities can also be highly advantageous to consider when introducing different targeted measures. While not all HHs and businesses consulted in the KRA and KSA clean their waste products (i.e., those made from glass or hard/thick plastic that tend to be durable and thus viewed as fitting for reuse), such practice was found to exist in both places. Those who clean their waste product do so for a very practical purpose—that is, “reuse,” which is one of the three components of the 3-Rs approach. Implicit in HH and businesses’ reuse of these waste products lies an economic reason to use what one already has, so as to reduce the need to buy new things. Therefore, intervention with behaviour-change (BC) component may consider tapping into existing good practices, when identified.

To expand waste cleaning from only glass and hard-plastic products that HHs reuse to those which they don’t (i.e., SUP items), BC communication messages can also avail of these good practices to frame waste cleaning as an extension of an existing task (e.g., dish washing) rather than as a brand-new activity that requires a lot of time and energy. Doing so may help sway people from the notion of having to do something new that is time-consuming and thus interfering with their other daily works or priorities. Because a number of HHs tended to explain their reluctance or disinclination to clean waste in relation to their lack of experience doing it, this effort can be achieved, for example, by allocating a session of a community meeting, training or workshop for experience sharing between participants who clean waste in their household and those who don’t, so that the latter group can learn first-hand from their fellow villagers the steps and benefits of waste cleaning. If successful, community-wide practice of waste cleaning not only helps to increase recyclability rate of plastic waste in general, but also reduce the amount of plastic waste that gets burned, dumped in open

areas or the ocean (through reuse of plastic items preferred by HHs).

3. **Single-use-plastic (SUP) alternatives** such as reusable bags, refillable water bottles or those made from downcycled plastic materials receive strong interest among HHs interviewed. However, implementing actors looking to integrate this kind of measure in their intervention in the KRA and KSA need to carefully reflect on larger infrastructural challenges, needs and attitudes in these communities. As findings from this consultation and previous research in the KRA and KSA show, lack of “quality” water-supply system remains an issue that directly affects consumption of plastic-bottled water not only among the villagers but also tourists, especially local, who do not seem to trust the local water quality. In Koh Sdach, for example, distrust of local water quality has caused reported aversion among Cambodian tourists to consuming water supplied or produced on the island (including 20L bottled water). This, along with the lack of effective SMW system and the deep-seated preference for consuming small-sized bottled water because of its cool taste and cheap price, has translated into a worrisome presence of marine plastic pollution in these places, particularly the KSA. Failure to consider these persisting challenges can render futile the provision of these alternative products.

Upping the chance of meaningful success of this measure might require the implementors in question to take a more streamlined approach. In other words, such approach may want to first identify which aspect(s) of the problem the measure can effectively address and with which group(s) of the community it will work best to drive consistent, long-term use that can lead to less and eventually zero consumption of unnecessary SUPs. When the problem is stark and alarming, it is tempting to follow the conventional approach of mass distribution of so-called solutions so as to solve it fast (even when there is no evidence to show the effectiveness of such approach). However, in the contexts of the KSA and KRA where root causes of the marine plastic pollution are beyond mere lack of SUP alternative products, such intervention is unlikely to lead to desirable impact without also addressing these root causes as mentioned here.

4. **Fee-charging approach**, similar to that currently mandated in supermarkets in Phnom Penh and other big cities to charge customers a small fee of KH 400 riels for every requested plastic bag [24, 25], is least favoured among both HHs and

businesses consulted in the KSA and the KRA. On the business side, such approach is regarded as very unlikely for deterring consumption of SUPs like plastic bag unless all the businesses present in these sites are willing to follow it. As proposed by consulted businesses in the KRA and KSA, when introducing this kind of measure, intervention needs to make effort to clearly communicate the intended purpose (i.e., to discourage unnecessary use or consumption of SUP items, not to maximize business profit) of the approach to the villagers/consumers at large in order to avoid misconception that can create hostile attitude toward it and those implementing it.

Equally important to consider are the ways in which this kind of measure affects different income groups within the community. The consultation findings imply that while the effectiveness of such measure to deter unnecessary consumption of SUPs remains questionable at scale, it can have unintended negative impacts on poor income groups in the community who rely on certain SUP products to meet daily food and water needs and would find paying any fee—albeit small—for using SUP product prohibitive, especially when considering the accumulating payment over time.

5. **Community awareness raising, training or workshop** on proper waste management practices to improve local communities' understanding, knowledge and capacity are an essential part of an intervention to address marine plastic pollution, as HHs and businesses themselves fully agreed. Yet, without the presence of appropriate and adequate local SMW system (like public trash bins, disposal site, and so on), this measure alone is unlikely to

bring about desirable SWM behaviours at local level.

Further, important considerations need to be made regarding different community groups (e.g., women, poor HHs, schools, etc.). Findings from this consultation confirm those from previous research that women are the central figure in their family to manage the HH waste, among their other HH responsibilities. This means women should be a key priority group to engage in awareness raising, training or workshop to equip them with all the necessary knowledge and skills needed to properly manage waste. In so doing, intervention should first take stock of the situation of women in the community it aims to target to fully understand their responsibilities and needs, and avoid “overburdening” them with its project activities. For example, women in the consultation report having little to no free time in the morning because of food shopping and preparation they have to do for their family, but see more free time in afternoon, between 1 and 3 p.m., after lunch hours and before dinner preparation. Therefore, intervention should aim to conduct any of its project activity in the community (e.g., awareness-raising, workshop) at a time of day that doesn't conflict with the time women need to do complete their daily works and priorities to help increase their participation.

Similar considerations should be made for HHs with low income, HHs with few adult members, HHs with old people only, and those in the fisheries sector (who are usually absent from the village in the day due to their fishing activities at sea) to find the most effective and appropriate ways to include them in the effort to reduce marine plastic pollution in their location.

Credit: Majel Kong / FFI



6. Conclusion

This community consultation sets out to explore context-specific targeted measures for addressing marine plastic pollution in Koh Sdach and Koh Rong Archipelagos, using qualitative approach for data collection and analysis. The findings suggest that in the absence of adequate infrastructure and SWM system in these locations, interconnected measures (such as provision of small-scale, SWM tools and facilities like bins, composting center and waste banks, provision of SUP alternatives like reusable bag and bottle, community awareness raising/training/workshop, and so forth) are needed to effectively tackle marine plastic pollution. Implementors can further capitalize on existing waste-management behaviours (e.g., waste separation and/or cleaning) that are desirable in order to improve and expand them within the communities. In so doing, implementors may want to emphasize not only environmental impacts of plastic pollution, but also economic value of reusing plastic waste as a way to encourage more of the aforementioned desirable behaviours and less plastic consumption in the first place. Last but not least, to increase success rate of

implemented activities, implementors may consider phasing out their interventions (i.e., by starting with a small-scale pilot project that targets specific disposal behaviours, SUP items most used or consumed, and specific community and/or tourist groups contributing most to the presence of marine plastic pollution to identify lessons learned to refine implementation on a larger scale).

Ultimately, marine plastic pollution is a complex, multifaceted problem, and there is no silver bullet to solve it. In places like the KSA and the KRA where unique logistical and contextual challenges exist, addressing this problem requires coordinated effort from all relevant stakeholders including governments at all levels, business and private sectors as well as local communities. Such joint effort needs to ensure active inclusion and participation of most vulnerable and/or underrepresented groups (e.g., poor HHs, women, informal waste pickers, etc.) in the community as so to drive long-term, equitable change.

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