

EXPLORING SOLUTIONS TO
OCEAN PLASTICS:

Supporting Southeast Asia's Informal Waste Sector



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EXECUTIVE SUMMARY

Although ocean plastic pollution is a global challenge, its solution requires local action. In places where the plastic crisis is most acute, formal municipal solid waste management systems are insufficient against the vast amount of uncollected plastics (like plastic bags and films) that wash into sewers and through waterways into the ocean. The informal sector, however, is already collecting and processing similar waste and could be a frontline solution to address this crisis.

At the end of 2019, Ocean Conservancy commissioned a research team to investigate the potential for microfinance to incentivize the informal sector to collect more plastic waste. Through conversations with experts and waste workers on the ground in Indonesia and Vietnam (two of the countries most impacted by plastic pollution), the team discovered that the informal sector is more pervasive than generally acknowledged in solid waste management. However, the sector lacks access to appropriate financing that could strengthen the plastic waste value chain and provide incentives to collect more of the low-value plastic waste that so often ends up in the ocean.

While additional research is needed, this analysis recommends a three-pronged approach to fully engage the capacity of the informal sector to prevent plastic waste leakage to the ocean:

1. Provide the informal sector workforce with information, skills, technology, and equipment through existing support organizations;
2. Expand informal sector processing capacity by financing equipment; and
3. Stabilize the prices paid for low-value plastics at a level that will encourage collection.

All three are required simultaneously to harness the potential of the informal sector to reduce ocean plastics. Ocean Conservancy is working to build a broad-based partnership to further explore this initial insight, as well as test the findings of this report.

THE INFORMAL WASTE SECTOR AND THE OCEAN

Waste Management and Ocean Plastic Pollution

In recent years, plastic pollution has emerged as one of the most visible, most discussed threats to the health of our ocean. Plastics have been found everywhere from Arctic ice to the bottom of the Mariana Trench, from remote island beaches to our dinner table in the form of microplastics in seafood, salt, beer, and drinking water. At least 800 marine species have been documented to interact with plastic in some way – primarily through ingestion or entanglement.

Governments, the private sector, and the public alike are looking for answers. While a suite of solutions will be necessary to tackle this crisis, one solution emerged out of a seminal paper published by Jambeck et al. in 2015. According to the study, more than 50% of the plastics entering the ocean originate in five Asian countries: China, Indonesia, Vietnam, the Philippines, and Thailand.¹ A subsequent Ocean Conservancy report, *Stemming the Tide*, found that one of the main drivers of this plastics leakage is a lack of waste collection altogether or poor solid waste management (SWM) systems that leak plastics even when waste is collected. Indeed, the World Bank estimates that for every metric ton of uncollected waste near waterways, about 2% (18 kilograms/40 pounds) will leak out as plastics into the ocean; and even where waste is collected, 7 kilograms/15 pounds of plastics per ton of waste leak into the ocean due to improper management.

Other drivers of plastic leakage include the low current residual value of certain types of plastic waste (such as plastic bags and films)² and the lack of local buyers (wherein the closest buyer is located too far away to make the sale worth the transportation time and cost). As a result, these items are often passed over by collectors. The combination of low value and inaccessible buyers means 80% of plastic waste is destined to accumulate in landfills or – at worst – the ocean.

Beyond ocean plastic pollution, there is also a human dimension to inadequate SWM systems. The World Bank describes it this way:³

In urban low-income neighborhoods in developing economies, up to two-thirds of solid waste is not collected. Waste is often dumped or burned, releasing toxic airborne chemicals and liquid runoff that contaminates water sources. The dumped waste can also be a source of food and shelter for rats, mosquitoes, and scavenging animals, which carry diseases such as dengue fever. In areas with poor service coverage, the incidence of diarrhea is twice as high and acute respiratory infections are six times higher than in areas with frequent waste collection.

Recognizing the environmental and socioeconomic benefits of improving waste management, Ocean Conservancy has invested significantly in researching ways to improve waste collection. Two years after publishing *Stemming the Tide*, Ocean Conservancy released a second report, *The Next Wave*, further examining waste management systems in Southeast Asia. The report showed that these systems generally operate at a net cost and explored some of the mechanisms available to cover the finance gap and improve collection. In late 2019, Ocean Conservancy released the *Plastics Policy Playbook*, an in-depth analysis of public- and private-sector interventions to tackle the scourge of plastic pollution, focusing on the five focus countries from the original Jambeck paper: China, Indonesia, the Philippines, Thailand, and Vietnam.

While the *Playbook* offered a number of policy ideas, it also highlighted prerequisites for success, including the need to engage the informal waste sector in developing solutions. This report begins to explore that prerequisite, and how finance could provide incentives to the informal sector to collect and process more of the plastics that end up in the ocean.

Methodology

Initially, Ocean Conservancy sought to investigate the role that microfinance could play in improving collection capacity of informal sector waste collectors (ISCs) through, for example, microloans for better collection carts.⁴ A financial inclusion expert was engaged to determine if a microfinance product would be feasible. The initial finding was that informal sector collectors are not attractive microfinance customers due to, among other factors: their itinerant

nature; marginal position in society (sometimes with no official identification); and irregular working schedules (they may collect waste only during certain times of year).

However, this initial exploration also identified a much larger informal sector presence in the waste value chain. It includes not only collectors but also junk shops, waste banks, transporters, and landfills. Thus, while microfinance was not an attractive financing channel, Ocean Conservancy saw the potential to strengthen the informal sector's contribution to the waste value chain through other types of financial incentives. A less fragmented value chain coupled with targeted incentives could drive more collection of low-value plastics and subsequently less leakage into the ocean. To this end, a scoping trip was organized to Vietnam and Indonesia to meet with actors in the value chain. Ocean Conservancy was joined by Thread International for its experience working in plastic waste value chains.

The team interviewed a number of intermediaries who work directly with informal sector workers, including ENDA Vietnam, CECR, GreenHub, and the Ocean Plastic Prevention Accelerator (OPPA). These organizations facilitated contact with informal sector businesses and workers themselves, who were also interviewed. Some of the informal sector workers interviewed included: ISCs; waste collectors who are members of cooperatives; waste collectors with municipal and/or private contracts to collect waste from households and businesses; and informal and semi-formal waste banks and aggregators, such as Surabaya's Central Waste Bank and Bakti Bumi. The team also visited aggregators, junk shops, and landfill operators that may collect, transport, and process waste, such as the Thai Dinh Cooperative in Vietnam. Government bodies interviewed include the Indonesian financial services regulator OJK and the cooperatives regulator Dinas Cooperativa (unfortunately the team was not able to meet with Vietnamese government bodies). The team interviewed recyclers, mostly in the formal sector, including RePal and Langgeng Jaya (the team was not able to meet any informal sector recyclers). Finally, consultants Revival Waste and Upcycling Vietnam, working to strengthen the value chain for plastics, were interviewed. While both urban areas and communities on the outskirts of urban areas were visited, time did not permit venturing into rural areas.

A convening was organized by The Circulate Initiative in Singapore as part of the trip, bringing together 20 additional stakeholders. A day-long workshop focused on developing a consensus theory of change, soliciting examples of work with the informal sector in SWM, and exploring the financial incentives

to the informal sector that could reduce plastic leakage into the ocean.

The findings in this report are based on desk research, interviews during the trip, observations in urban areas in Surabaya, Hanoi, and Ho Chi Minh City, as well as what interviewees reported about other areas. They are a starting point for additional research and action into the role of the informal sector in combatting ocean plastic pollution.

FINDINGS

The Informal Sector Plays a Sizable Role in SWM Systems

It is hard to generalize about the informal sector. Waste collection is mostly a local affair, with local municipalities determining the way solid waste is handled and the interaction, if any, between the formal sector and the informal sector. Information sharing between recycling groups is low and the sector is not transparent. In Indonesia in particular, barriers are reported between the aggregation “cartels” and the nonprofit ocean plastic prevention groups. Local standards, preferences, and norms drive decision making, as well as the availability of private sector solutions. All of these factors influence the nature of the informal sector locally.

Typically, the informal sector is described as “waste pickers” or “rag pickers” – those that do the unenviable job of picking up what others leave behind to sell for whatever small price they can get. Often, this sector is seen as operating marginally and without clear links to the formal waste value chain.

In reality, the informal sector is comprised of a wide variety of actors, some working individually, some collectively, some with contracts, and some without. Not only does it comprise collectors such as scavengers, pickers, and itinerant buyers, but also includes larger scale collectors, including those with private- and public-sector contracts to collect household and municipal waste. Similarly, there are a range of aggregators, materials recovery facilities (MRFs), and landfills which may be considered informal, semi-formal, or formal.⁵ It is not always easy to tell where formality begins. There are informal

sector collectors with uniforms, trucks, and equipment, and some formal sector workers with none of these. Aggregators with storefronts may be formal or informal. In some localities there are informal sector workers who have joined to form a cooperative, but still work independently, and who may themselves hire laborers. Neither the “bosses” nor the “workers” are covered by minimum wage, pension, or workplace safety laws, even though they may be working under a municipal or private sector contract. Figure 1 shows a variety of informal sector workers. It is important to recognize that those working in the informal sector may not want to be formalized. Some of the collectors interviewed prefer the freedom that informality brings. They may only work at certain times of the year or may not trust the government or the formal sector.

While only an estimated 1% of the urban employed population in emerging economies is engaged in the sector, ISCs collect virtually all the waste in urban low-income neighborhoods and rural areas in developing countries.

Figure 1: The Informal Sector Can be Hard to Identify



They are often vulnerable people who occupy the lowest rungs of the socioeconomic ladder, with limited education and sometimes precarious access (and rights) to life’s basic necessities: work, healthcare, housing,

and education. They tend to be members of a “closed group” – a particular ethnic, religious, or other group that insulates its members in what is sometimes considered a shameful profession. And they are among the highest at risk of financial exclusion – without bank accounts, payment cards, mobile money, or insurance.⁶ By the same token, they are vulnerable to the decisions of others in the value chain. For example, street waste pickers in Hanoi barely have enough working capital on hand to purchase recyclable materials for resale on a daily basis and frequently fall into long-term debt.⁷ ISCs often subsist on survival wages while aggregators and processors further up the value chain keep profits resulting from any increase in the price of plastics.

Unsurprisingly, ISCs focus primarily on those items they can sell easily and quickly, including PET bottles, paper, and metal. This was exemplified during the scoping trip. Plastics most at risk of ending up in the ocean are those that command the lowest prices from recyclers and other factories: low-value plastics like lightweight single-use bags and films. Plastic bags, films, straws, and food containers were seen aggregating around the sewer entrances on every street corner, susceptible to being swept by rain, wind, or brooms into the sewer and eventually out to sea.⁸ Noticeably absent from the streets were high-value plastics like PET bottles and containers.



With appropriate incentives, ISCs can collect more low-value plastic waste and keep it out of the ocean while improving livelihoods and quality of life in disadvantaged communities. Models exist that recognize the value the informal sector plays. For example, in Vietnam, where the minimum wage is \$8.77 per day, waste pickers on staff at the Thanh Vinh Cooperative are paid \$10.92 daily. This demonstrates that, at least in some cases, profits can be shared more equitably between processors and collectors. Expanding these models would both decrease plastic waste leakage to the ocean and improve the quality of life for a marginalized and vulnerable population.

The Informal Sector Lacks Access to Formal Finance Tools

Most ISCs do not have access to financial institutions. However, they do borrow money for a variety of needs: health care for themselves or a family member, education for children, or cultural and religious needs (undertaking a journey to Mecca for Muslim ISCs was cited as one such example). It is probable that they also engage in savings and some forms of insurance outside of formal banking channels.⁹ Microfinance institutions (MFIs) tend to lend primarily for business purposes and only secondarily for these other financial needs, so it is unlikely MFIs would consider ISCs as clients. Indeed, none of the ISCs interviewed for this project were customers of an MFI and the microfinance sector experts consulted had never heard of MFIs serving these populations. The source for such loans is, instead, a person of influence within the community, often the aggregator that the ISCs sell to. The aggregator is also part of the “closed” ethnic, religious, or cultural group the ISC belongs to. In this way a multi-layered cultural, business, and financial relationship is created outside the market. Other informal sector workers, particularly aggregators, require working capital to purchase feedstock and also rely on informal finance.

Over-indebtedness is a factor for many ISCs. ISCs themselves, and the organizations that support them, indicate that many have heavy debts to moneylenders which they are unable to fully pay off. Periodic expenses such as school fees, housing at temporary locations, or transportation between their work areas and where their families live may lead to permanent indebtedness. They also may have periodic health care expenses for themselves or a family member that they are unable to pay with savings, resulting in either borrowing from moneylenders or extended periods of non-work while they recuperate or care for a family member. Helping the informal sector meet their financial needs could be a powerful incentive for increased plastic waste collection.

The Informal Sector Needs Access to Recycling Facilities

The presence of a recycling facility to purchase this material drives the market for both high- and low-value plastics. But the facility must be accessible to ISCs and aggregators who have very limited transportation options – lack of a

nearby facility is one barrier to collection. Mostly, these facilities are located in and around urban areas. In rural areas without such facilities, only high-value plastics are collected. It is simply too costly for most informal sector actors to store, process, and transport lower value plastics. At higher volumes, economies of scale can support the added transportation costs. The team heard of containers of dirty plastic bags being shipped to facilities within Indonesia, and dirty waste plastics are also being imported by recyclers.

OPPORTUNITIES

While there are many efforts afoot to improve collection and treatment of plastics in the five target countries, they are mostly medium- to long-term solutions and do not adequately address the role of the informal sector. The focus of this report is what can be done in the short term to strengthen the value chain and reduce plastics leaking into the ocean.

Incentives that can be quickly implemented are grouped around three pillars: **Workforce, Processing Capacity, and Prices.**

Supporting the Workforce Through Frontline Organizations

ISCs have been organized in many geographies by frontline organizations (mostly NGOs) that have built trust with the sector. They are critical to the success of any programs targeting the informal sector because of the difficulty of reaching ISCs directly. The vulnerability and possibility of ISC exploitation make inclusion of this workforce in any solution a primary concern but a logistical challenge. These support organizations have helped ISCs negotiate with intermediaries, thereby increasing the purchase price of their collected waste. In other cases, they have helped ISCs gain social recognition. Formal recognition allows informal workers to gain job stability and acknowledgement of their work. Cooperative members consistently report a higher standard of living as well as improvements in self-esteem and self-reliance than when they work independently. In



addition, organized workers are more productive and are healthier when provided with guaranteed collection routes and safe working conditions outside of dumpsites.

To engage the workforce in increased collection and processing, the capacity of frontline organizations to support the sector must be strengthened. These organizations can effectively promote ISC engagement in the value chain and improve ISC access to important services outside of their closed groups. They supply information on market prices, capacity building in health and safety and financial management, technology to access services, and improved equipment. These enable the informal sector to better engage with government, private sector, and NGO bodies that could link them to better prices and markets for plastics. This solution mostly relies on philanthropic support to target and increase the capabilities of the informal sector actors.

Increasing Processing Capacity

Plastic bags and films are extremely lightweight and recycling them requires a very high volume. As a result, a large amount of space for storage is required for economically viable recycling. The capacity to aggregate these plastics, which are often dirty and fetid, is limited among ISCs and the aggregators and MRFs that they work with. Physical collection and treatment capacity therefore need to be addressed to harness the power of ISCs to collect these plastics most at risk of ending up in the ocean.

Areas with a factory that uses low-value plastics in its production can drive more collection, but may require added capacity in transportation, storage, or processing. Some municipalities have embraced a greener image and have implemented or seeded efforts to reduce plastic pollution, such as community waste banks. Waste banks facilitate the collection and sale of plastics by households (which sell their plastic waste to the waste bank) and the informal sector (which collects plastics from households and public areas).

Cleanliness of the plastic is also important. Dirty plastic must be cleaned which adds to the cost of collection and processing and reduces profit, but there is limited existing capacity to wash, dry, and shred it. There may also be opportunities to bolster infrastructure to provide additional value to the recyclables, such as baling or compressing the materials.

As more emphasis is placed on low-value plastics by government and producers of plastics themselves through Extended Producer Responsibility

(EPR) regimes and Producer Responsibility Organizations (PROs), increased capacity to transport, store, and clean will be critical to establishing an efficient value chain.

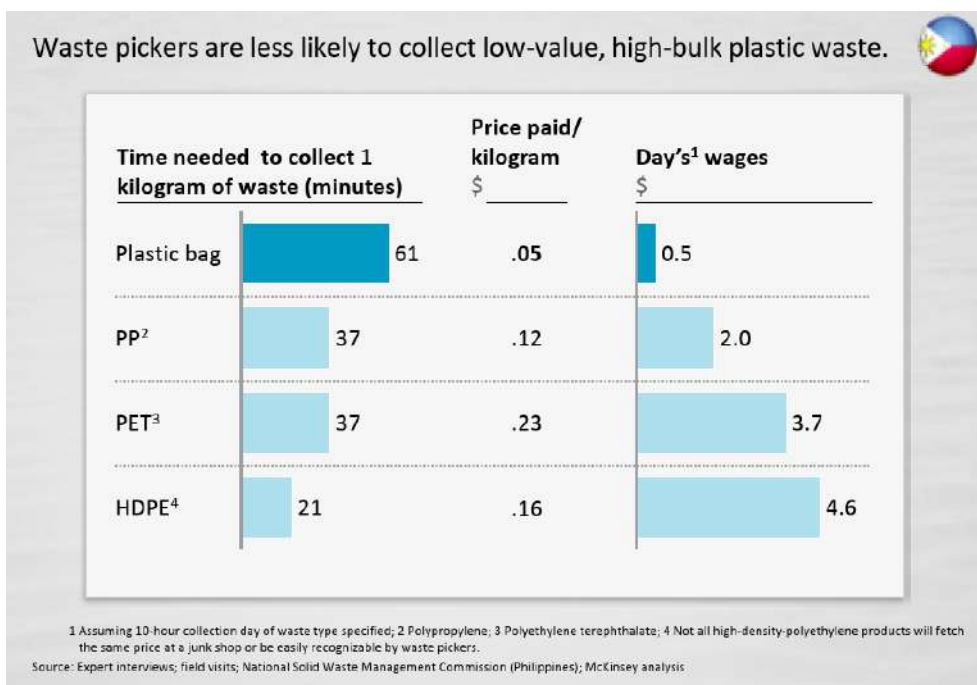
Catalytic debt and/or equity finance to actors in value chains that have proven capacity in collection and treatment will reduce plastics that end up in the ocean and contribute to the circular economy. Conveyor belts, wash stations, balers, vehicles, and shredders are some examples of equipment that could add value.

Stabilizing Prices

Solving the problem of plastics in the ocean requires more than access. The low price of certain types of plastic waste is the reason that so much of it remains uncollected. It is no surprise that plastic bags are the most prevalent form of plastic found in waterways since this material commands the lowest price.¹⁰

Increasing the price paid for plastic bags would provide ISCs an incentive to collect them. As noted earlier, one factor that depresses the price is that they are often dirty. Cleaning, drying, and shredding add value and increase the price paid for plastic bags, but require equipment that is outside the capacity of ISCs and informal aggregators to purchase and manage.

Source: *Stemming the Tide*



However, the difference between the market price and the market clearing price (sufficient for ISCs to collect all the plastic bags they encounter) is only about \$0.05/kilogram. Therefore, a subsidy of \$50.00 per metric ton to ISCs would lead to the collection of all types of plastic waste, including single-use plastic bags. According to Revival Waste, a SWM consultant, 8,000 metric tons of plastic is assumed to leak through the sewers to the ocean every year in Ho Chi Minh City and Saigon. Subsidizing the price paid for collected plastic bags by a total \$400,000 per year, therefore, could lead to the collection of all the plastic bags currently going down the sewers. This simple analysis gives an indication of the importance of price to collection. It is also a strong indication that practical solutions are affordable and can be implemented on a broad scale to have a meaningful impact on the problem.

Such a solution requires stabilizing the base price at a level that provides an ongoing economic incentive to collect and process it. Investment in select industries that require low-value plastic waste as feedstock is one way to drive prices up. De-risking such investment in the form of guarantees or side-car technical assistance (where donor funds are used to build capacity in a business that leads to positive social outcomes) could provide the necessary incentives.

Strengthening the Value Chain

These findings build on Circulate Capital's assessment that a holistic strategy is needed to overcome fragmentation in the value chain that currently prevents the collection, processing, and recycling of low-value plastics (see Figure 2) by providing insight on how to reach the critical, but often invisible, base of the recycling pyramid.¹¹ Treating any one issue on its own will likely lead to further problems. For example, ensuring high prices for single-use plastics may lead to increased collection, but the additional value will be captured by existing aggregators and processors who will continue to keep informal sector workers in conditions of debt and poverty, essentially undoing incentives to target those plastics. It is also possible high factory prices will lead to diversion of low-value plastics from landfills, as opposed to increased collection from streets and other public areas where it is more difficult, resulting in little impact on ocean-bound plastics. Likewise, incentivizing the informal sector to collect more low-value plastic waste without a similar increase in processing capacity could result in more illicit or illegal disposal as informal sector collectors have nowhere to store what they collect each day and no way to transport it to a processing site or further process it themselves. In fact, increased collection without capacity to manage the

collected waste is a concern of some city governments, like Ho Chi Minh City, which refuses to allow storage of dirty low-value plastics in the city limits.

Figure 2 illustrates how the value chain is currently fragmented and what types of financing are required to incentivize greater collection of low-value plastic waste (LVP):

FRAGMENTED VALUE CHAIN	WORKFORCE	PROCESSING CAPACITY	PRICE STABILIZATION
	<ul style="list-style-type: none"> • ISCs' top priority is survival • Need to align social and financial incentives without creating negative externalities (like children being pulled out of school to collect plastics) 	<ul style="list-style-type: none"> • Little existing capacity to manage higher volume of LVP • Cartels/monopolies capture profits, keep workforce in debt • Capital investment required to process more LVP 	<ul style="list-style-type: none"> • Small increase in price will incentivize collection of LVP • Price increases alone will not lead to better workforce conditions • In beginning, voluntary EPR/PRO can help; long-term stability requires gov't mandate
FINANCING NEEDS			
GRANTS	\$\$	\$\$	\$
FINANCE	\$	\$\$	\$
INVESTMENT		\$	\$\$\$

With improvements in workforce, processing capacity, and prices, however, informal sector collectors will be able to offload low-value plastic for a fair price through a system of transport, storage, and further processing, also largely informal, before finally arriving at a factory paying a sufficient price to encourage further collection.

Financial incentives can be brought to bear where affordable finance is currently lacking. For example, when collected material is delivered to a factory, there is a lag of several days until payment is made. An informal aggregator must self-finance its operations in the interim without access to lines of credit. To take another example, using equipment to wash, dry, flake, and bale plastic would increase the options for sale and allow informal processors to obtain a higher price for this value-added material. Informality, lack of knowledge of banking practices, and limited availability of services prevents informal processors from applying for financing. Connecting the informal sector participants to finance at more affordable rates, and financing the equipment they need, may provide the incentives necessary to promote collection of more low-value plastic waste. The critical hurdle is finding points of access to such finance.

The solutions will necessarily be new and innovative but build on existing structures and relationships with ISCs. All solutions have potential to scale and are designed for sustainability because the problem is extensive and urgent – solutions that rely on a specific set of circumstances or require

continued fundraising won't be able to prevent a large amount of plastic from reaching the ocean. Solutions that can be implemented quickly are preferable and some measurement should be built in to establish early on if the solution has had an impact on the problem. While ambitious, the solutions seek to halve plastics entering the ocean through targeted finance in four Asian countries by 2025.

NEXT STEPS

This initial report indicates that innovative blended finance models could provide incentives that stabilize prices for low-value plastics and increase collection, ensure sufficient capacity within the value chain to process the increased amount of plastics in the system, and improve the living and working conditions of the workforce in the value chain. Ocean Conservancy and the Trash Free Seas Alliance (TFSA) are exploring ways to strengthen the value chain for plastic waste. They believe focusing initially on learning grants (small, short-term grants to organizations already engaged in the space) will help test the findings of this scoping report. Examples of potential projects could include:

- Vietnam – Support cooperatives and individuals, including those with a focus on women, to provide workforce support valued by the informal sector (such as alternatives to money lenders, access to health and schooling, or formal registration) as an incentive for these groups to collect more street-based low-value plastic in return¹²
- Indonesia – Develop a financial product for informal waste collectors and/or processors to be delivered through the rural banking network, possibly using plastic collection as a way to reduce interest rates
- India – Work with manufacturers developing alternative products from waste plastic bags and provide loans for processing equipment at large aggregators

The lessons learned could inform a more ambitious follow-on project, if warranted. Elements of such a project could include loan and investment finance for the workforce, processing capacity, and price stabilization. Such a project should have the ambition to halve the amount of plastic entering the ocean after five years.

In the medium term, these innovations should tie into other local or national efforts such as Vietnam's National Marine Debris Action Plan, and bring in dedicated funds (e.g. Circulate Capital), PROs, government regulatory agencies, and other enabling actors to ensure the models are sustainable and scalable.

CONCLUSION

The challenge of reducing the millions of metric tons of plastic entering the ocean each year will not be solved by any single strategy. Finance has an important role to play in creating incentives for solutions in the value chain, and the informal sector must be a key part of any solution. A coordinated, multi-dimensional approach encompassing support for the workforce, processing capacity, and price stabilization, along with a strong research component, can reduce plastics entering the ocean significantly and provide a knowledge base to scale and expand these efforts to eventually eliminate the problem entirely.

To get involved, please contact Chever Voltmer, Plastics Initiative Director at Ocean Conservancy: cvoltmer@oceanconservancy.org.



APPENDIX

List of Potential Partners

There are a wide range of actors currently engaged in preventing ocean plastic and many more that are looking for an entry. This work can be a wide umbrella for those on both the demand and supply side of finance. Possible partners include:

Financial Partners

- Asian Development Bank
- Circulate Capital
- Financial Services Authority Indonesia (OJK)
- Kiva
- Rare/The Meloy Fund
- Rockefeller Foundation
- Sustainable Ocean Fund
- Village Capital
- World Bank Group

Informal Sector Partners

- Center for Environment and Community Research (CECR)
- Center for Marine Life Conservation and Community (MCD)
- Dow
- ENDA Vietnam
- Oxfam
- WeHasta
- Wiego
- Women's Union

Value Chain Partners

- Alliance to End Plastic Waste
- GreenHub
- Inclusive Waste Recycling Consortium (iWrc)
- Indonesian Plastics Recycling Association (ADUPI)
- Indonesian Waste Entrepreneurs Association (APSI)
- Kabadiwalla Connect
- McKinsey.org
- Plastics for Change
- Re>Pal
- Revival Waste
- Second Muse
- Surabaya Central Waste Bank
- The Circulate Initiative
- Thread
- Unilever
- Veolia
- World Economic Forum

Notes

1. Jambeck et al. Plastic waste inputs from land into the ocean, *Science*, 13 February 2015, VOL 347 Issue 6223
2. Ocean Conservancy. *Stemming the Tide: Land-based strategies for a plastic-free ocean*. 2015
3. Kaza, Silpa, Lisa Yao, Perinaz Bhada-Tata, and Frank Van Woerden. 2018. *What a Waste 2.0: A Global Snapshot of Solid Waste Management to 2050*. Urban Development Series. Washington, DC: World Bank. P. 129
4. This report refers to informal sector collectors as ISCs, whereas they may be referred to elsewhere as waste pickers, pickers, collectors, or other terms.
5. MRFs are facilities where recyclable materials are received, sorted, and prepared before being sent to a recycling facility, landfill, or other processor.
6. Among the five target countries, only Thailand has greater than 50% financial inclusion, according to the World Bank Global Findex.
7. ISCs supplement income from collecting household, business, and street waste by purchasing large amounts of valuable recyclables (metal, paper, or high-value plastic) from those who want to get rid of it. However, ISCs must pay cash on the spot so they must always have some cash with them or have easy access to a money lender.
8. Throughout this report reference is made to materials where a market of buyers and sellers was observed because that is where finance can play a role in shaping the market. No market was identified for expanded polystyrene, straws, or certain multilayer plastics.
9. For more on this topic, see Daryl Collins et al, *Portfolios of the Poor: How the World's Poor Live on \$2 a Day*. Princeton. 2010
10. See, for example, World Bank. *Indonesia Marine Debris Hotspot Rapid Assessment Synthesis Report*. April 2018. Forthcoming research in Vietnam appears to corroborate these findings.
11. Circulate Capital. *Investing to reduce plastics pollution in South & Southeast Asia: A Handbook for Action*. 2019, p. 19
12. Ideally, these would be market-based solutions, such as accepting a slightly lower contract price for certain plastic waste in return for skills training or advocacy for education benefits, as opposed to using plastic collection as "payment" for services.

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