People and Plastics

The profile, vulnerabilities, and role of informal waste workers in addressing marine plastics pollution

Synthesis report from country studies in Indonesia, the Philippines, and Viet Nam

WORLD BANK GROUP

PROBLUE

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June 2023

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Case Studies


U.C.L.A.

Acknowledgments

This report is produced by a World Bank team led by Sophia Georgieva and Maria Manuela Faria and consisting of Hannah Rosenthal and Tuan Anh Le. Nina Bhatt led the study from its initiation through the completion of country fieldwork. Espelia consultancy team conducted the field research in Viet Nam and produced the Viet Nam background country report. Their core team consisted of Thierry Le, Marie Lan Nguyen Leroy, Ombline De Saint Leon, Thao Trinh, and Trang DoThiThu. Urban Emerge consultancy team produced the Philippines background country report. Their core team consisted of Andreas Beavor, Nils Gradek, and Samia Khan. Field research in the Philippines was conducted by Plastic Credit Exchange Inc., whose team was led by Ilusion Farias and Richard De Guzman. Primary research in Indonesia and the Indonesia background country report were led by Christopher Rosado with a team consisting of Eri Trinurini, Eveline Kurniati, and Fahra Amiroeddin. The report is part of the programmatic analytical and advisory work Waves of Change: Tackling Marine Plastics Pollution in East Asia and Pacific, which is led by Daniel Mira-Salama and Tao Wang and financed by PROBLUE. PROBLUE is a multi-donor trust fund, administered by the World Bank, that supports the sustainable and integrated development of marine and coastal resources in a healthy ocean.

The study was produced under the overall guidance of Benoit Bosquet, World Bank Regional Director for Sustainable Development in East Asia and Pacific, Ingo Wiederhofer, Practice Manager for Social Sustainability and Inclusion, and Mona Sur, Practice Manager for Environment, Natural Resources, and the Blue Economy in East Asia and Pacific. The report benefited from peer review comments by Anjali Acharya, Katelijn Van den Berg, Klaus Sattler, and Margaret Arnold. The report was edited by Lauri Scherer, and its design is by Claudio Mendonca. Photos in the report are courtesy of Espelia and Urban Emerge companies.

The team is grateful to all individuals who participated in or supported the organization of interviews, focus group discussions, and consultation workshops in Indonesia, the Philippines, and Viet Nam.


MOISTURE

Executive Summary

The challenge of containing plastics leakage to the ocean is a high priority for member states of the Association of Southeast Asian Nations (ASEAN). Globally, 10 rivers account for 88–95 percent of plastic debris that makes its way to the ocean, of which eight are in Asia (Gray 2018). Six out of the top 20 countries that contribute most to the plastics leakage into the ocean are in Southeast Asia: Indonesia, Malaysia, Myanmar, the Philippines, Thailand, and Viet Nam (Meijer et al. 2021).

Addressing marine plastics pollution in the ASEAN region requires, among other aspects, a comprehensive and multisectoral solid waste management effort. Reducing leakage of plastics into the ocean involves multiple stakeholders, including citizens, local and national governments, private and nonprofit sector actors, and international organizations that—through regulations and specific investments and actions—can contribute to the reduction, reuse, and recycling of plastics and their overall diversion from waterways and the sea.

The present study focuses on a particular group of actors along the plastics collection and recycling value chain—informal waste workers (IWWs)—on whom limited information has been collected at the country level. Specifically, the study examines two questions: (i) what is the profile and vulnerabilities of informal waste workers in the three countries including gender-specific vulnerabilities; and (ii) what livelihood opportunities and community-based innovation models have been piloted in the selected countries, and can be used as case study examples in future policies and interventions, with the objectives of reducing vulnerability of IWWs and contributing to improving solid waste management and recycling value chains.

There is growing recognition that informal waste workers are essential contributors to the plastics recycling value chain and, as such, to curbing marine plastics pollution. This is especially true in developing countries, where over 90 percent of waste is disposed in open dumps and less than 4 percent is recycled (Kaza et al. 2018). An estimated 20 million waste pickers across the world are involved in collection and resale of recyclable materials facilitating the diversion of plastics from the environment and the ocean (Cass Talbott 2022). Due to

their prominent role in plastics collection, sorting, and resale, among other functions, IWWs can be involved more systematically as part of the solution toward cleaner environment and oceans. Moreover, the employment in waste collection, recycling, and related work streams can occupy a prominent place in countries' expansion of "green" jobs and industries as part of their journey toward low carbon development.

As reported by the Ocean Conservancy (McAllister 2020) the informal sector plays a sizable role in solid waste management systems. With rising awareness of the marine plastics pollution crisis, increase in waste generation, and formal waste management systems struggling to keep pace (Cass Talbott 2022; Kaza et. al. 2018), creative and inclusive solutions to waste management at the local level are gaining greater attention. Globally, waste pickers are estimated to collect and recover up to 60 percent of plastic waste, which is then recycled, preventing its leakage into the environment (O' Hare and Fernandez 2022).

Despite their contributions, IWWs are among the most marginalized workers in most economies. Some global studies suggest that informal waste workers are responsible for over half of the global plastic waste collected and recycled globally (Reddy and Lau 2020). They are exposed to unsafe and often hazardous work conditions, lack safety nets and health care, are highly vulnerable to natural disasters and extreme weather events, face income uncertainty, as well as social stigma and isolation. Women are highly represented among the IWW workforce and face specific vulnerabilities. Children are involved in informal waste work as well, which has lasting and negative impacts on their health, education, and lifelong opportunities.

Support for the recognition and professionalization of informal waste work, and overall policy attention on how to integrate IWWs into waste management and marine plastic solution solutions, can offer both environmental and social benefits. It can provide medium-term solutions for improving waste collection and management in areas where modern solid waste management systems may be costly and take time to develop. Additionally, recognizing the contribution of the informal sector and supporting social enterprises and cooperatives with IWWs, local government, and/or private sector collaboration can significantly improve the livelihood security, health, and safety of this group and expand green job opportunities.

Attention to livelihoods and working conditions of informal waste workers is increasingly recognized as an imperative for a just transition in plastics management and circularity. With the advent of new policies and regulations as well as greater investment and innovation aimed at curbing plastic pollution, IWWs can face a range of negative impacts, losing access to plastic materials and to their main livelihood sources. They can also benefit from this transition if supported to build their skills, organize, and access jobs in the sector.

Integrating IWWs into formal schemes of collaboration around waste management or plastics collection is challenging due to a range of factors, including scarcity of data on IWWs' profile, skills, vulnerabilities, and contributions to the plastic waste management at their locations. IWWs often work independently. Many lack formal education, skills, or sufficient incentives to participate in formal enterprises. Social enterprise models, which

require formalization and IWWs' cooperation, require meaningful engagement with and understanding IWW needs and priorities, and a strong commitment from all parties involved—IWWs, local governments and communities, the private sector, donor organizations where relevant—to establish systems that bring benefits to both waste workers and the broader community.

This report presents primary research data collected from IWWs in three countries in Southeast Asia—Indonesia, the Philippines, and Viet Nam—shedding light on the profile and characteristics of IWWs. Generating primary data on IWWs is an important contribution to the "just transition" in the plastics management sector, as data on informal plastic collectors is scarce. The data demonstrates the diversity of IWWs, key risks and vulnerabilities they face, their needs, priorities, and aspirations as expressed by them that can underpin policy and operational initiatives to address their needs. The surveys and findings include a gender- and age-specific focus to highlight the needs of specific groups such as women and children waste workers.

The report also presents an overview of selected case studies of livelihood and entrepreneurship models piloted in these countries. These are examples of successful cooperation between informal waste workers, local government, local communities, and private sector and/or local nongovernmental organizations (NGOs) to support local waste collection and processing. While there are multiple donor-driven projects aimed at improving the livelihoods and working conditions of IWWs, relatively few demonstrate potential to be scaled up into more sustainable cooperation between IWWs and local governments to address waste management challenges in the medium and long term. Moreover, most of the case study examples have been piloted within the last 5 years (with notable exceptions such as the community-based waste banks model in Indonesia, which has evolved for more than 15 years). Further monitoring and evaluation of lessons learned from such cases will be needed, as well as investment in new programs, to inform successful collaboration between IWW and local governments.

Profile of IWWs in Indonesia, the Philippines, and Viet Nam

The study includes IWWs who are engaged in waste collection and resale and lack formal contracts with any public or private entity. The three countries were selected based on preliminary discussions with PROBLUE team, considering their high contribution to marine plastics pollution in the ASEAN region. The research locations within each country were determined in collaboration with the local research teams considering criteria such as major urban areas with large daily generation of waste (including plastic waste), potential impacts of waste on the marine environment, and presence and accessibility of IWWs in the selected location.

The survey of IWWs presented in the report included 1,222 respondents: 100 from Indonesia, 809 from the Philippines, and 313 from Viet Nam. The average age of respondent was 45 years old, with a slightly older sample in Viet Nam (average age of 52) and slightly younger sample in the Philippines (average age of 39). On average 67 percent of all interviewed IWWs were women, with the share of women being the highest in Viet Nam (84 percent), and lower in the Philippines (46 percent) and Indonesia (34 percent). This share reflects the higher predominance of women engaged in informal waste work in Viet Nam relative to the other two countries, although the gender distribution varies depending on the role in the waste collection and processing, and on the specific location.

Findings from the three countries show that more than half of the IWWs have completed primary education, and about a quarter have completed secondary education, while a share of the IWWs have completed no education. In Indonesia, 56 percent reported attend-

ing some primary school and 6 percent did not attend school at all. The rest had completed different levels of schooling, with the highest being junior high school. In the Philippines, 38 percent had completed primary school, 25 percent had completed lower secondary, and the rest reported either having no education. In Viet Nam, most of the surveyed IWWs have attended some secondary school but left before age 14 (free public education being offered until age 13). About a tenth of the respondents in Viet Nam had attended junior high school, and approximately 15 percent reported that they were illiterate.

Lack of formal secondary education was cited by participants as an important impediment to finding a formal job. Among the interviewed households whose children were also involved in waste picking, early school dropout was highlighted as a risk due to a combination of factors: cost of schooling, social isolation and stigma, distance from schools, and children seeing waste collection as a direct and easy way to make income and thus lose interest in continuing school.

IWWs' background and the circumstances that draw them to waste collection work are quite diverse across the three countries and locations. In Viet Nam, the majority of IWWs were found to be seasonal migrants from rural areas who derive cash income from waste collection in the cities and return home for the agricultural season to help with the harvest. In Indonesia, more than half of the IWW respondents were migrants from other towns or rural areas, yet they were more permanently settled in their new locations, near Greater Jakarta area and Bali, and involved in waste picking year-round. In the Philippines, the wide majority of IWW respondents were from the area where they were interviewed and were more likely to be involved in waste picking across generations.

The housing conditions of IWWs vary, consistent with their background and place of residence. In Viet Nam rural migrant IWWs rent temporary premises in the city, which they share with other IWWs. They generally live in solid or semipermanent quarters that are connected to basic services, but face overcrowding. IWWs in the Indonesia and Philippines surveys are more likely to be settled close to the landfill sites and live in makeshift housing lacking basic services. In the case of Indonesia respondents, housing is sometimes provided by recycling intermediaries who charge for rent or deduct it from the cost of recyclables collected by the IWWs. Lack of formal address registration in the cities, in which they perform waste collection, is a common challenge for all surveyed IWW. This prevents them from accessing basic services. social service programs, and some employment opportunities.

Waste collection is the main source of income for all IWWs included in the study. On average they have been involved in this work between 14 and 18 years. IWWs in the survey earn on average US$86/month in Indonesia, US$105/month in the Philippines, and US$189/month in Viet Nam. However, there are important variations in the incomes earned depending on the role and hours worked. Women IWWs across the three samples reported lower earnings than men. Women and children in the household may also contribute to sorting and cleaning plastics without actually earning anything individually. Earnings also vary according to location; for example, in Viet Nam IWWs in Ho Chi Minh City earned more compared to the other three cities, because of the higher purchasing price of plastics there.

Key Risks and Vulnerabilities of IWWs: Health, Access to Services, Income Security, Indebtedness

Despite their important role in the recycling chain, IWWs face some of the hardest labor, health, and safety risks relative to other formal and informal occupations. Common injuries during waste collection and sorting involve cuts from metal and glass. More serious infections and disease may occur from contact with improperly disposed hazardous materials, medical waste, needles, or fecal matter. Road traffic, dog bites, dengue or other mosquito-borne diseases are frequent risks from working in the open. Many IWWs develop back injuries and backache. The majority of IWWs have no health insurance or pension. While this is also the case with all informal workers, the higher hazard level of waste work makes it particularly problematic in the case of IWWs.

Weather-related hazards are an important constraint in terms of IWWs' health, safety, and income security. During extreme weather events and floods, which are common in all three countries, IWWs are not able to work nor earn any income. Extremes in rainfall and heat increase their risk of health problems and disease. Heavy rains pose additional obstacles to IWWs' incomes, as they are not able to sell wet materials. They must spend extra time and secure appropriate space to adequately store and dry the waste needed to sell collected recyclables.

Price fluctuations strongly affect the livelihood of IWWs. They have no control over or predictability of their earnings. Prices may vary due to international market prices, number of available intermediaries/buyers, and the specific demand of buyers. In Viet Nam, IWWs

report that prices may be set day to day, and when they approach a buyer at the end of the day they may find that prices have dropped from the morning or previous day. COVID-19 restrictions also affected prices, although by the time of the research IWWs reported that prices had begun to stabilize.

Indebtedness and dependency on buyers and intermediaries are an important vulnerability particularly reported in the Philippines and Indonesia. Junk shop owners and recyclables resellers are the most common source of finance for IWWs for any additional or emergency needs such as household, education, health, or other basic expenses. About a third of IWWs in Indonesia reported being in debt to an intermediary. IWWs may inhabit housing provided by the middlemen/intermediaries. Due to the physical distance from services and other job opportunities and markets, and lack of formal address registration, IWWs living near landfill sites have very limited opportunities to improve their living or working conditions and escape a cycle of dependency on specific buyers.

Access to social safety nets, health insurance, and other forms of government support is limited for IWWs due to the informal nature of their work, lack of identification, or formal address registration. Still, in the Philippines, 75 percent of respondents reported they had received some central or local government support, either financial or in the form of transportation equipment, protective equipment, and so forth, and many had access to health services. In Viet Nam, most IWWs were not able to take advantage of any government services or support, and see lack of health insurance or pension as a key challenge. In Indonesia, most IWWs could not access the government support system as their dwellings are in waste collection sites, either self-made or compounds provided by recyclable buyers, and not officially recognized residences.

Entrepreneurship and Livelihood Models Engaging IWWs

The report presents selected case studies that support organized waste collection and recycling while improving the livelihoods and working conditions of IWWs. These include a range of models championed by local governments, private sector, international organizations, civil society, and/or community groups. In Indonesia, the study included a survey with representatives from 57 community waste banks on their main objectives, operating model, sources of funding and revenue, and potential sustainability.

The formalization of the status of informal waste workers may be met with resistance, particularly from the waste workers themselves, who value the independence and flexibility of informal employment. A common feature of the successful entrepreneurship and livelihood models is that they were developed in a participatory way with local governments, stakeholders in the recycling value chain, and waste pickers. They also carry strong emphasis of social recognition—raising awareness of the role and contributions made by waste collectors in society—and offering of concrete benefits to IWWs such as adequate and steady income, support with equipment, personal protective equipment, access to health care, insurance, access to finance, improvement of education and skills, among others.

The support from local government or community residents in social enterprise models is essential for their financial sustainability. While many social enterprises are started with grants by local or national NGOs, most would not be sustainable without a successful collaboration between waste pickers, intermediaries, and local authorities and communities. A few such examples are listed below.

The "Women Waste Workers" initiative in Quy Nhon, Viet Nam, aims to improve the working conditions of IWWs through an integrated approach, combining community-based models of collecting, sorting, composting, and plastic waste reduction. It was

started with a small United Nations Development Programme/Global Environment Facility grant, and actively supported by the local Women' s Union. The project provides equipment, loans, and training. Women IWWs were provided with bicycles and handcarts and access to no-interest loans for a period of 24 months. Once repaid, the money is reinvested to help other collectors. In addition to providing support for waste pickers, the project targets behavioral change for all residents of the city and includes an awareness campaign on composting and recycling, partnership with restaurants to reduce plastic use and promote recycling and composting, providing households with knowledge and tools for composting, and school modules for children.

A cooperative model has been supported by the local government of Ho Chi Minh City, Viet Nam, since 2019. In January 2018, Ho Chi Minh City People' s Committee issued an Official Dispatch on the organization and arrangement of independent waste collection activities, aiming to transform waste collection groups into organized cooperatives or companies with legal status. This would give independent waste collectors access to basic social benefits and formalize some of the waste collection agreements between households and independent collectors. Local authorities were directed to assist the independent waste collectors in this effort. After three years of operation, the model manages waste collectors in 14 wards of the city. The cooperative has about 70 members, 80 percent of whom are women, and is open to more members. The average waste collector' s income has increased to approximately US$464.80/month. Cooperative members pay a fee of 5–10 percent of their income to the cooperative. In addition to income from the resale of materials, independent waste collectors continue to receive waste collection fees from households, with whom they are also allowed to sign legal contracts (an arrangement which was previously informal). They are also supported with uniforms and protective clothing. A similar model was later re-created by a private company in Ho Chi Minh City.

Eco Kolek is a community-based enterprise and platform in the Philippines that aims to equip IWWs to play a role in developing a safer, more organized method of waste collection and disposal for their community. The initiative combines door-to-door collection of recyclable waste with pickups facilitated via an app. It also supports the creation and provision of upcycled products, which are then sold to private or government clients. IWWs are supported with training and leadership skills, increasing their recognition in the community as "Eco Warriors," as well as with more stable income and equipment, health and safety materials, and training.

Waste banks in Indonesia are a community-based social enterprise model that has become prevalent across the country. Most of the waste banks reviewed in this study do not have standard legal status but use a local government authorization letter as legal recognition to implement activities. Others are established as associations, nonprofits, private companies, or cooperatives. Waste banks rely almost exclusively on revenues from selling recyclables. They use volunteer labor from their members, and the collected funds are used as community savings or for community expenditures. Outside of collecting, sorting, and selling recyclables, and managing their accounts, waste bank**s** occasionally conduct other community programs such as recycling or composting within the community, growing veg-

etables, keeping small fishponds, and so forth. Waste banks do not specifically involve IWW (some may purchase materials from IWW), yet they are a good example of a sustainable and replicable community-based model that generates revenues for the community while also creating environmental benefits.

There is a need to further study and test operational models that may successfully mitigate plastics pollution, support circular economy, while creating social and economic benefits to marginalized waste workers. As many of the entrepreneurship and livelihood initiatives in the region and relatively recent, further evaluation and assessments of lessons learned are needed to allow drawing conclusions about their sustainability. Many of these examples, though involving local governments, have been initiated with grants from international organizations or NGOs. The objective of these projects is to incorporate and institutionalize such models of cooperation with IWWs into mainstream local government and private sector activities in waste management. Still, successful examples of such sustainable cooperations are limited. Insights and lessons on IWW cooperation can also be drawn from prior solid waste management operations, which have sometimes supported productive integration of IWWs as part of their social risk mitigation activities.

Conclusions and Recommendations

A growing body of research globally and within Southeast Asia suggests that informal waste workers are significant contributors to the recycling of plastics and the circular economy. They have a role to play in solutions to the broader marine plastics pollution crisis and in supporting better solid waste management within their cities and communities.

At the same time, being amongst the most marginalized groups in society and working mostly independently, IWWs have limited opportunity to initiate and propose models to scale up their contribution and improve their livelihoods, living, and working conditions. Such approaches require coordination and support from national and local policymakers, regional and international organizations, as well as civil society, and a commitment toward engaging with IWWs in a meaningful way.

Several key messages can be distilled regarding the role, vulnerabilities, potential impacts on, and opportunities for IWW in the evolving agenda of tackling marine plastics pollution in the ASEAN region. These can be derived from the primary data collected through this research, as well as from emerging regional and global studies on informal waste workers:

- The urgency of the marine plastics pollution crisis in Southeast Asia combined with the large scale of informality in the region, including in the waste management sector, makes it imperative to explicitly consider and identify policy actions to mitigate potential impacts on IWWs and to expand opportunities for them as countries adopt new legal requirements and invest in programs to curb plastic pollution.
- There is a significant data gap on the IWW workforce in terms of their total numbers, profile, level of cooperation, and scope of contribution to plastic waste collection (e.g., volume of waste collected, type of waste collected, locations of work, etc.) at the national or subnational level. Policies and programs should systematically fill such gaps in data to ensure that IWWs are meaningfully engaged. The present report contributes toward this objective, providing primary data on the profile and vulnerabilities of IWWs in Indonesia, the Philippines, and Viet Nam; yet the scope of data collection on IWWs should be substantially expanded in the process of developing specific projects and policy reforms.
- Findings from the three country studies presented in this report indicate that IWW are a diverse group in terms of their background, education, gender, age, and aspirations. Common characteristics that put IWWs at a disadvantage in relation to the general population include relatively low education level (mostly primary), lack of formal registration and access to social services, high health and occupational safety risks, a dependency on a limited number of buyers for their main livelihood, and fluctuating price of recyclable materials.
- While IWWs face significant risks in their occupation, their incentives and motivation to participate in cooperatives and/or in more secure formal employment schemes should not be underestimated. The multidimensional vulnerabilities faced by IWWs call for comprehensive incentives to attract them to formal employment. These may include, among others, support with health care, occupational health and safety, education (for children as well as adults), upskilling training and opportunities, support with transportation, and more.

- Getting recognition and removing stigma associated with waste work is of high importance to IWWs. This can be promoted systematically through public awareness and communication campaigns, national and local policies, and in specific project interventions.
- Integrating IWWs into programs and projects that aim to tackle marine plastics pollution has some limitations. Informal waste workers are more likely to be involved in the collection of higher-value plastics and recyclables. Their contribution to preventing leakage of other materials such as single-use plastics and packaging is more limited. IWWs tend to concentrate in large urban centers and/or near landfill sites. Hence, their ability to contribute to service provision in other locations, such as remote areas where formal waste management services are lacking, would be more limited.
- Along with identifying opportunities to expand mutual benefits for local governments and IWWs through collaborative solutions, such as through cooperatives and social enterprises, it is important to assess and mitigate potential negative impacts on IWWs from evolving regulations, such as the rollout of extended producer responsibility (EPR) systems. Without adequate information and representation, IWWs are likely to be excluded from policy consultations on such schemes. There is a risk that impacts on IWW livelihoods will not be properly evaluated.

Based on the aspirations expressed by IWWs in this three-country study, and examples from ASEAN and beyond, the report offers some recommendations to advance a more inclusive and socially sustainable policy dialogue in tackling marine plastics pollution. These can be summarized at the regional level (for ASEAN and for regional donor programs aiming to support ASEAN' s policies and regulations), at the country level (with a focus on Indonesia, the Philippines, and Viet Nam), and as recommendations for specific projects and investments.

Regional Recommendations

The World Bank, through the Southeast Asia Regional Program on Combating Marine Plastics, is supporting ASEAN to strengthen policies and regulatory frameworks and promote innovative solutions to reduce plastic pollution in Southeast Asia. This and other regional efforts provide a mechanism by which systematic attention to needs of IWWs can be integrated into regional policy. Regional recommendations include the following:

- **Promote recognition for waste work, including informal waste work, through awareness-raising and communication via regional ASEAN materials**. ASEAN is in the process of establishing guidelines and regulations to curb plastics leakage into the ocean. These include awareness and communication materials to influence national and subnational regulations, as well as broader societal awareness and behavior in an all-of-society model to address marine plastics pollution. Promoting the recognition of waste sector workers, including IWWs, in solid waste management policies can reduce the stigma related to waste work and enable better integration of waste workers into more formal or mainstream plastics collection and processing schemes.
- **Collect data on, map stakeholders, and consult with IWWs and their representative organizations on new policies and regulations.** Regional policies and programs should commit to and support systematic data collection and identification of stakeholders who represent interests of the IWW population. This may include, among others, supporting more precise estimates on the numbers and volume of IWWs' contributions to reducing marine plastics pollution. Stakeholders representing IWW voices should be consistently included in consultations on new policies and guidelines.
- **Harmonize policies and regulations relating to IWWs.** International and regional institutions can play a key role with guidance on key provisions within such regulations that would promote recognition, prevent livelihood loss, and expand opportunities for IWWs. Harmonization and knowledge sharing across laws and regulations in the region would support consistent and just transition in the sector.
- **Engage IWWs and IWW representatives and enterprises in innovative investments.** Regional programs aim to support initiatives toward promoting technological innovations and investments. Incorporating windows of support for social enterprises, a focus on supporting women-led enterprises as well as those who employed improve working conditions and incomes for women waste collectors can be targeted for such support.
- **Promote equitable working conditions for men and women and prevent child labor.** Due to the high risks and prevalence of women and children in the informal waste collection work, which may contradict regional and country-level labor and social requirements, explicit attention and commitment in regional policy documents to these groups is recommended.

Country-Specific Recommendations

The regional recommendations shared above are relevant at the country level as well. Improving data collection on IWWs and their involvement in the waste management sector, identifying and supporting formation of IWW associations and organizations representing their voice and interests, and including IWWs and their representative organizations in consultation on policies and regulations that may affect them are all important steps toward reducing the vulnerability and enhancing the contribution of this group.

Specific country-level recommendations therefore include the following:

- **Promote representation and inclusion of IWWs in national and local consultations.** With rapidly evolving legislation, IWWs need to be consulted on the development of new waste management reforms, especially on the EPR system and the integration of circular economy mechanisms. Representatives of the informal waste collection sector should be able to participate in the debates and consultation processes leading to the writing of laws and regulations that affect them.
- **Integrate actions for engagement of informal waste workers into national policies and plans tackling marine plastics pollution.** To improve the enabling environment for local governments and local organizations to seek cooperation with IWWs, national policies and action plans should explicitly integrate waste pickers. EPR, environmental protection laws, waste management laws, and circular economy strategies may seek to integrate specific objectives toward integrating workers from the informal waste sector.
- **Establish or strengthen social, health, and safety protection measures for informal waste workers.** Policies and measures to strengthen labor and working conditions, social benefits, access to health care, and more stable terms of negotiations with clients (buyers, city and household clients, etc.) will significantly reduce IWWs' vulnerability. Good international practice should be sought as a benchmark to policies relating to IWWs to ensure that such policies lead to fair and safe employment, eliminate child labor, and are overall socially and environmentally sustainable.
- **Increase recyclable waste collection by facilitating the work of IWWs.** To increase the collection of recyclable waste, it is important to facilitate linkages between the formal and informal waste collection sectors, such as allowing IWWs access to public waste collection areas, having greater tolerance for the temporary occupation of public space for waste sorting and collection, or officially promoting the donation or sale of recyclable waste to IWWs. This would also support the recognition of IWWs to be seen as an effective workforce that contributes to sustainable waste management.
- **Provide training, capacity building, and build skills of IWWs so they can benefit from future jobs in recycling.** Capacity empowerment is essential to improving IWW livelihoods. It enables IWWs to develop competencies and skills so that they gain greater control over their activity. Training on waste collection, waste sorting, and recycling process will provide IWWs with the knowledge to improve their work. Training and capacity-building efforts can also support the formation of IWW networks and their integration within the EPR systems, for which improved professionalization of waste collection is needed.

Project- and Investment-Specific Recommendations

As countries develop operational interventions to prevent pollution, promote innovation, and strengthen local waste management systems, the following actions would help to promote integration of vulnerable IWW groups as contributors and beneficiaries to such projects:

- **Include waste worker livelihood components in investments and operations that address the prevention of marine plastics pollution.** Incorporating components and targets for IWW livelihood improvement and engagement in project investments that aim to provide solutions to marine plastics pollution and improve solid waste management will generate further evidence and opportunity for impact evaluation of models for scaling up IWW contributions. These need to be preceded by site-specific assessments and cost-benefit analysis.
- **Conduct feasibility studies, consultations, and research in specific project locations to propose the best models for engaging IWWs**. The involvement of IWWs in local municipal waste management schemes is context-specific and should be tailored to the specific needs and incentives of the location and actors involved. For example, remote touristic islands where modern solid waste management systems are costly to operate may benefit more from social enterprise models and cooperation with waste pickers and private sector. In other locations, IWWs' contribution may be more marginal. IWWs can be engaged in the assessment and data collection process, building on their specific skills and social networks as well as providing additional employment opportunities.
- **Provide adequate package of benefits and incentives for IWWs as part of formal cooperation schemes.** Projects and interventions involving IWWs often result in formalizing their activities and encouraging the formation of semiformal IWW groups and cooperatives. As IWWs value the flexible and independent nature of their work, sufficient incentives should be provided for them to accept a more structured and formal employment.
- **Implement microcredit schemes for waste workers.** During their activities, IWWs usually face situations where recyclable waste is available, but they do not have sufficient funds to buy it, or the equipment to transport it. IWWs often have to turn to junk buyers and middlemen for a loan, while many such buyers are already pressuring IWWs to lower the price of materials. Establishing a microcredit facility, managed ideally by an association of IWWs, would allow them to invest and increase their income.
- **Combine social and livelihood benefits to IWWs with broader awareness and behavioral change interventions.** Investments and operations that involve IWWs in improving solid waste management are also an opportunity to promote broader social awareness and behavior change. Designing such interventions with strong elements of education and awareness targeted at the broader public will support environmental objectives as well as contribute to the social inclusion of waste workers in their communities.

Abbreviations

ASEAN	Association of Southeast Asian Nations
BSI	Bank Sampah Induk (central waste bank that absorbs waste from BSUs, Indonesia)
BSU	Bank Sampah Unit (waste management facility serving a neighborhood or village, Indonesia)
CSO	civil society organization
D	Viet Namese dong (approximately US$1 = D 23,000)
DOST	Department of Science and Technology (Philippines)
EPR	extended producer responsibility
FGD	focus group discussion
IWW	informal waste worker
KII	key informant interview
MSW	municipal solid waste
MT	metric ton (1 MT = 1,000 kilograms)
NAP	National Action Plan on Marine Plastic Debris (Indonesia)
NGO	nongovernmental organization
NPAP	National Plastic Action Partnership
₱	Philippine peso (approximately US$1 = ₱24)
PCX	Plastic Credit Exchange
PET	polyethylene terephthalate
Rp	Indonesian rupiah (national currency, approximately US$1 = Rp 15,000)
SD	standard deviation
SWMP	solid waste management plan
UNEA	United Nations Environment Assembly
USAID	U.S. Agency for International Development
WWF	World Wild Fund for Nature

Introduction

This report summarizes the profile and vulnerabilities of informal waste workers (IWWs) in Indonesia, the Philippines, and Viet Nam, and ways in which their contribution to curbing marine plastics pollution can be amplified while also providing them with safer and more secure livelihoods. This report is being published as part of broader research on addressing the challenge of marine plastics pollution in the member states of the Association of Southeast Asian Nations (ASEAN). It is financed by the PROBLUE trust fund.

The informal recycling sector comprises all kinds of unregistered workers engaged in the collection, recovery, and recycling of waste. The sector is typically characterized by small-scale and unregulated recycling activities, providing a source of income for poor and marginalized workers who typically work independently. However, it is increasingly recognized as consisting of entrepreneurs and established microbusinesses that are highly skilled within their occupations and constitute a value chain for informally recycled plastics. This report primarily focuses on the experiences and livelihood conditions of poor, informal workers who typically work independently. However, junk shop owners and other entrepreneurs further along the value chain are considered, especially in context of their connection to informal waste workers. The diversity of the informal recycling sector across sociopolitical and geographical contexts should be acknowledged and accounted for in the design of policies and strategies to combat plastic pollution.

IWWs contribute substantially to the collection and sorting of recyclable materials, and collect virtually all waste in urban low-income neighborhoods and rural areas in developing countries. Their contribution meets a threefold economic, social, and environmental demand. It has been estimated that systems based on informal waste collection may recycle up to 45 percent of the generated waste (Linzner and Lange 2013); other studies estimate that up to 60 percent of plastics globally are collected and sold for recycling by IWWs (O' Hare and Fernandez 2022). It is estimated that open dump areas account for about 93 percent of waste in low-income countries versus only 2 percent in high-income countries (Kaza et al. 2018). Much of the difference in municipal solid waste (MSW) treatment is due to different

standards of living, available technologies, economic development, human resources, and public education (Kaza et al. 2018).

Waste picking provides important sources of income for an estimated 15–20 million people worldwide, many of whom have few or no marketable skills and education (Morais et al. 2022). However, the work does little to elevate their social mobility or improve their economic position above the poverty line. In general, IWWs experience "deplorable" working and living conditions (Morais et al. 2022). As a labor force, they are not organized and tend to work individually, making it difficult to achieve self-advocacy or bargain for benefits that would provide livelihood improvements.

Solving the marine plastics pollution crisis requires fundamental changes to waste management and recycling. IWWs have an important role to play in waste sector improvement and in the implementation of waste management solutions. They can provide unique insights and perspectives on waste management practices in their communities to ensure that these solutions are practical and effective. Furthermore, the integration of IWWs into formal and community models poses a twofold opportunity for environmental and social sustainability, by reducing plastics pollution and improving the livelihoods of millions of poor people (Velis et al. 2022).

Social enterprises have an important role to play in the enabling environment for waste management reform because of their familiarity with local contexts and needs, which is necessary to facilitate extensive social impact. Many waste management models currently promoted in the study countries are market-oriented initiatives that pursue social aims and prioritize locally driven initiatives around recyclables, marine debris, and plastic.

The creation of new jobs can formalize and improve the working conditions of IWWs, and in turn improve their economic stability and promote more sustainable livelihoods through legal recognition, safe working conditions, and fair bargaining mechanisms (Morais et al. 2022). The term "just transition" is seldom used in the context of IWWs, but aptly describes how marginalized individuals can be integrated into solutions that empower them and achieve climate goals. In the long term, the social development effect of including IWWs into waste management solutions is to promote social equity and economic inclusion. It is estimated that community and circular models of waste management have the potential to create between 9 and 12 million new jobs worldwide (Buch et al. 2021).

There are several challenges associated with meeting the dual goals of IWW empowerment and waste management reform. Lack of data on the working conditions, demographics, and experiences of IWWs in Southeast Asia make it difficult to acutely understand their needs and vulnerabilities. IWWs comprise the workforce for a shadow waste collection system, which serves an important but understudied role in increasing the share of recycled plastics in these countries.

Effective waste management policy will require knowledge of the number, volume, and types of plastic waste produced (GAIA 2019). There are gaps, however, in existing data, particularly in the Southeast Asia region. These sources typically do not distinguish between the different types of plastic waste that are disposed of.

Despite substantial gaps in data, there is a rich literature on the complex nature of waste networks and IWWs beginning in the 1970s and 1980s, when researchers began to examine the social and economic conditions of IWWs in developing countries. This research highlighted the challenges faced by these workers, including poverty, poor working conditions, and limited access to resources and services. They also found that IWWs have developed complex networks of waste collection and use. The legacies of these waste systems are evident today, and understanding them can help to design context-specific policies that are effective in reducing leakage.

There is growing recognition of the important role of IWWs in providing critical waste management services, particularly in cities with limited formal waste management systems. There is an interest in integrating IWWs into formalized positions, but there are known challenges with formalization. In general, policymakers are still seeking best practice examples for how to integrate IWWs into formal waste management systems. Researchers are now exploring ways to formalize and support the work of IWWs, as well as ways to improve the overall effectiveness and sustainability of waste collection and management systems in context of the climate crisis.

In part because of a lack of understanding of IWWs' specific experiences, needs, priorities, and aspirations, efforts to integrate them into formalized waste collection and management roles have been met with challenges, failing to achieve either desired livelihood outcomes or strengthened waste collection objectives (Morais et al. 2022). Operationally, IWW formalization efforts have struggled to engage IWWs and deliver a model of formalization that is suitable for their income generation and livelihood needs. In turn, IWWs are unable to fully contribute to efficient and sustainable waste management systems because of their marginalized social status, lack of recognition by authorities, and disconnection from the formal economy (Buch et al. 2021).

It is therefore necessary to develop a better understanding of IWWs' experiences and needs. Understanding their livelihood conditions and broader systemic connections is a priority for local and national governments because they represent a skilled workforce that has already created sophisticated and efficient networks to collect and manage solid waste. Local and country context, as well as the existing roles, hierarchies, and informal waste collection systems, will dictate what solutions are feasible and what success might look like. Systemic reform will require legal, political, and social buy-in of stakeholders on the production and collection ends of the plastics life cycle.

Marine Plastic Waste in the ASEAN Region

The overproduction of plastic, combined with low solid waste management capacity, has driven a collective goods crisis. The proliferation of plastic waste is a growing global concern. Individuals, civil society, governments, and international organizations have begun to create momentum to improve waste management systems at every stage (Buch et al. 2021; Jambeck et al. 2020). Over 9 million tons of plastic waste enters the world' s oceans every year (WWF 2020). The annual leakage of plastic waste into the ocean is expected to reach 29 million metric tons (MT) by 2040 (Briley 2020). Low- and middle-income countries are responsible for a large proportion of plastic waste leaking into the environment due to a range of challenges and failures in waste collection, disposal, and recycling. Only 71 percent of global solid waste is collected, and of this, 33 percent is disposed of in open landfills. By 2050, waste production is projected to be 73 percent higher than in 2020 (WBG 2021).

The production and disposal of plastics produces far-reaching negative externalities that impact multiple dimensions of human, environmental, and economic well-being. Marine pollution causes biodiversity loss, human health impacts through contaminated soil, water, and food sources, economic impacts on tourism and fishing industries, and contributes to climate change through greenhouse gas emissions. The United Nations Environment Assembly (UNEA) has adopted resolutions in its four consecutive sessions, recognizing the need to stop the discharge of plastic litter and microplastics into the oceans.

The plastic waste problem is particularly concentrated in Southeast Asia, which is at the receiving end of a broken global recycling system and has limited capacity for waste management on this scale. Of the top 20 countries with the highest rate of plastic waste mismanagement, six are in Southeast Asia (Jambeck et al. 2016). Collectively, these countries contribute between 1.4 and 3.54 million MT per year, out of 8–12 million globally (Jambeck et al. 2016). Indonesia ranks second, followed by the Philippines and Viet Nam. The economic impact of plastic pollution on the region' s industries is estimated to reach US$1.3 billion per year (WWF 2020).

Marine plastics pollution is largely a collective action problem because of its transboundary nature. Even within national borders, plastics pollution is a cross-sectoral issue that requires coordination across different levels of governance. Many countries in the ASEAN region have fragmented solid waste management value chains. Waste collection is made more difficult by complex geographies, such as in nations with multiple islands. Informal waste picking is an important means of livelihood for the urban poor that provides benefits to regulatory and governance bodies that are expected to fulfill and implement waste management activities. IWWs help to reduce greenhouse gas emissions by playing a role in the circularity of plastic waste, thus reducing the demand for virgin plastic production.

The extent of the plastic waste issue is expected to grow throughout the ASEAN region and is exacerbated by population growth, urbanization, and corruption. The constant challenge for functioning solid waste management systems is that while the amount of waste is growing, financial and human resources to manage the systems is lacking and regulations for the recyclable materials market are poorly implemented (WWF 2020).

Regional Cooperation on Marine Plastics

The shared challenges of addressing marine plastics pollution cannot be effectively addressed at the national level; it requires regional cooperation. In the context of Southeast Asia, ASEAN provides a platform through which its member countries can share experiences and approaches to reducing plastics leakage and strengthen waste collection and recycling systems. Member states have begun to develop policy responses as well as measures to strengthen global governance structures. Individual member states have introduced legislation to address policy challenges at both the production and disposal ends of plastics life cycles, introducing the concept of circularity.

The *ASEAN Regional Action Plan for Combating Marine Debris in the ASEAN Member States (2021–2025)* proposes the phased implementation of a systematic and integrated response to guide regional actions to address the issue of marine plastics pollution in ASEAN over the 2021–25 period (ASEAN 2020). The Framework of Action on Marine Debris, published in 2019, outlines actions to be taken by governments, civil society, and other stakeholders, and has four main pillars: strengthening national and regional policies and legal frameworks; enhancing the knowledge and understanding of the issue; reducing the generation of marine debris at source; and enhancing removal and management of marine debris. To be impactful, the plan needs to be translated into a concrete regional plan of action through a legally binding mechanism with clear milestones and stakeholder roles (Agustina and Purba 2021).

ASEAN member states have also engaged in workshops and policy efforts outside of the ASEAN network. The 2020 Regional Policy Workshop organized by the World Wide Fund for Nature (WWF), which was attended by 14 delegates from Southeast and South Asia, discussed potential global policy approaches to addressing marine plastics pollution and collectively outlined a set of shared goals and approaches. The countries represented were Lao PDR, Maldives, Myanmar, the Philippines, Thailand, Timor-Leste, and Viet Nam (WWF 2020). They determined that by 2030, they strive to eliminate plastic leakage into the ocean, based on realistic targets linked to Sustainable Development Goal 14.1 (reduce marine pollution). The countries also seek to establish a sustainable circular economy that includes a reduction of plastic use and phase-out of single use plastics.

Indonesia

Plastic waste is a national priority in Indonesia, due to recognition of the challenges around the management of marine debris and the economic value of Indonesian maritime assets (World Bank 2021). Indonesia' s National Action Plan on Marine Plastic Debris 2017–2025 (NAP) involves at least 16 ministries, local governments, the private sector, and nongovernmental organizations (NGOs) (GoI 2018). The NAP set out a bold target of reducing marine plastic debris by 70 percent by 2025. The plan has five main pillars: (i) behavior change; (ii) land-based leakage reduction; (iii) sea-based leakage reduction; (iv) reduction of plastic production and use; and (v) funding mechanism, policy reform, and enhancement. Funding comes from regional and national budgets, though it is expected that international organizations and partner countries will also contribute (GoI 2018).

The five pillars of the NAP encourage collaboration at local, national, and international levels as well as among private sector, academia, and civil society organizations (CSOs). Local-level strategies include river catchments, municipal waste management, behavior change, and integrated coastal waste management. National-level strategies prioritize harmonizing agencies that manage upstream landfills, as well as education and enforcement of regulations. International collaborations are encouraged to work around transboundary marine debris and fundraising for pilots on municipal waste management. The industrial sector is encouraged to engage in the circular economy principles, including foreign investment and innovation on biodegradable plastics. Academic and CSO stakeholder priorities are targeted toward innovations in plastic use research, campaigns, and waste banks.

The Global Plastic Action Partnership, a multistakeholder initiative set up by the World Economic Forum, partnered with the Indonesian government to launch the National Plastic Action Partnership (NPAP) (WEF 2020). The NPAP supports Indonesia' s NAP on marine debris and pursues a more ambitious goal to reach near-zero plastic pollution by 2040. The NPAP also aims to involve multiple stakeholders, such as government, industry, and civil society, to work together to reduce marine plastic.

Being the world' s largest archipelagic country, Indonesia has the challenge of translating national polices into improved MSW services equitably at the local level. Indonesia is administratively divided into 34 provinces with approximately 465 municipalities that are responsible for MSW management (Damanhuri and Padmi 2012; Lyons et al. 2020; Shuker and Cadman 2018). The decentralized nature of Indonesian governance, coupled with overlapping and fragmented responsibilities spread across multiple levels of government, generates a lack of clarity and accountability (WEF 2020). MSW management is delegated to local governments, which typically have limited resources, technical knowledge, and implementation capacity.

Competing budgetary responsibilities of local governments lead to under investment in MSW, which is typically allocated around 3–5 percent per capita/per annum (Hendiarti 2018; Lyons et al. 2020; Shuker and Cadman 2018). Annual budgets must account for a range of issues and mandates, including road construction, education, health care, and irrigation (WEF 2020). National systems to collect payment for waste management services could al-

leviate some of the burden on local budgets. Overall, insufficient investment in the sector eventually leads to severe inefficiencies and much higher operating costs.

Local governments in Indonesia have historically relied on landfills to absorb most of the waste (EGSA UGM 2019), yet utilizing landfills without sorting as a method of waste management negatively impacts plastic materials recycling potential. Nearly all the plastic waste collected by the local government is combined with other waste streams, going directly to landfills or official dumpsites without being sorted. The combination of different types of waste leads to high contamination rates, resulting in lower value for recycling and higher chance of post-collection leakage (WEF 2020). Waste that is not collected and disposed in landfills is burned, buried, or dumped in community waterways.

The Philippines

In the Philippines, cities and barangays struggle with solid waste management due to a limited understanding of regulations and lack of technical know-how, as well as limited financial resources (Premakumara, Gilby, and Kataoka 2016). The Philippine Ecological Solid Waste Management Act of 2000 (Republic Act 9003) mandates local governments to implement waste avoidance, materials recovery, and recycling in order to reduce waste disposal and to enhance residual waste management through alternative technologies or sanitary landfills. Waste management is delegated from local government units to the barangay level. There are over 42,000 barangays in the Philippines with their own Barangay Captain, coordinating the collection and transportation of solid waste to the municipality level in line with the local solid waste management plan (SWMP). One- to two-thirds of MSW generated is not properly collected and is often dumped indiscriminately, leaking into waterways and the ocean (Premakumara, Gilby, and Kataoka 2016). Despite being one of the main contributors to marine plastics pollution in the world, there are currently no existing national research programs or scientific research frameworks dedicated to basic studies on plastics in the Philippine marine environments (Abreo 2018).

The Philippines has a large recycling capacity gap across high-value plastic resins (85 percent in 2019). This means that there is a very low capacity to process plastic waste in the country, such as via extrusion to create recycled plastic pellets, which can become feedstock for manufacturing (WBG 2021). The amount of mismanaged plastic waste is expected to almost double to 9 million MT by 2040 and over 11 million MT by 2060 (Schachter and Karasik 2022). A study conducted by the Global Alliance for Incinerator Alternatives covering 21 sites in the Philippines found that sachets comprised 52.29 percent of plastic waste (GAIA 2019). These single-use, single-serve materials are common to the marginalized sectors of the country, estimated to be at least 19.99 million Filipinos (18.1 percent) living below the poverty threshold based on the 2021 Family Income and Expenditure Survey of the Philippine Statistics Authority. The Duke Nicholas Institute study in 2022 found that the Philippines recycled about 28 percent of the key plastic resins in 2019, but overall 78 percent of the material value of plastics is lost to the Philippines economy each year. While there is a high recovery rate, at around 90 percent, for high-residual-value plastic products such as polyethylene terephthalate (PET) water bottles, most plastics have much lower recovery rates, particularly the low-value thin plastics or multilayer plastics, such as those used for sachets (McKinsey Center for Business and Environment 2015).

Due to these challenges, there is heavy reliance on the informal waste sector to extract recyclable materials along the waste value chain from source to landfill or as part of recycling activities (Paul et al. 2012). IWWs play a critical role in resource recovery and reuse.

The National Solid Waste Management Commission is in charge of coordination across different government departments, including the Department of Environment and Natural Resources, the Department of the Interior and Local Government, and others. This results in unclear lines of authority and management and poor implementation of waste management. As of December 2021, 1,171 SWMPs were approved, representing 68 percent of the nationwide target (DENR 2021). The quality and effectiveness of these plans are also unclear, as SWMPs from different local government units are not well harmonized or aligned with each other. It is generally observed that compliance is limited, and most solid waste collected is still unsorted and ends up in landfills (WWF 2020).

Many municipalities in the Philippines have implemented policies that target single-use plastics, with varying degrees of success. However, as of 2017, 5 of the 18 cities in Metro Manila, the most densely populated region of the country, have yet to implement regulations or bans on plastic bags (Schachter and Karasik 2022). The successful implementation of these policies has varied widely, with some municipalities seeing only a 4 percent decrease in total plastic and polystyrene trash after implementation, while others have seen compliance of up to 90 percent.

Viet Nam

An estimated 3.1 million MT of plastic waste is disposed of annually in Viet Nam. At least 10 percent of this goes into the ocean every year (Jambeck et al. 2015). Plastic waste accounts for 8–12 percent of domestic solid waste (MONRE 2020). The packaging industry contributes up to 70 percent of the flow of plastic materials into waterways of Viet Nam (IUCN, EA, and Quantis 2020). Daily waste generation increased by 46 percent between 2010 and 2019, to nearly 65,000 tons (MONRE 2020). The amount of produced waste is predicted to double in less than 15 years (ITA 2022).

Economic growth, population growth, and fast-paced urbanization has driven increased consumption and rapid growth of daily waste generation (Lampard 2020). Urban areas produce more than 35,600 tons per day compared to 28,400 for rural areas. Ho Chi Minh City and Hanoi are among the cities with the highest waste generation, producing 9,400 tons and 6,500 tons per day, respectively. Viet Nam has a high proportion of virgin plastic use (36 percent) (VPA 2021).

Managing this volume of waste is challenging on multiple fronts. Landfilling is the most widely used method, despite the heavy pollution it generates. Most waste is sent to landfills (71 percent) or incinerated (13 percent). Landfilling produces heavy pollution, and it is estimated that 80 percent of landfills do not meet the standards for seepage of leachate and polluting gas emissions (MONRE 2020).

Urban centers are struggling to ensure a sustainable and reliable waste management system, as many are reaching a saturation point and alternatives are associated with other negative externalities. As a result, interest has turned to incineration and technologies that allow the conversion of waste into energy. Pilot projects are currently underway throughout the country. One of the first was built in Can Tho in 2018 with a capacity of 400 tons per day. The outlying commune of Nam Son, Hanoi, is currently completing the largest power plant for the recovery of waste with an announced capacity of 4,000 tons per day. Despite recovering energy, incineration is a polluting technology that releases toxic parti-

cles into the environment during waste combustion. Technical challenges limit the degree to which pollution can be mitigated (high moisture content of waste limiting the rise in temperature of the furnaces, difficulty to treat the filters once in use and the treatment of clinkers, or solid residues from the combustion of waste).

High demand for recycled plastics in Viet Nam and a desire to limit the import of raw materials means it is essential to encourage collection and recycling channels. An integrated and environmentally friendly plastic waste management approach is necessary. This will require multiple overlapping solutions at points of production, use, and disposal. Plastic recycling must be promoted, particularly since not enough plastic is produced in Viet Nam to satisfy market demand. The Viet Nam Plastics Association reports that the country needs to import more than 80 percent of virgin and recycled materials. Recycled plastic collected in the country meets only 10 percent of the industry' s needs (VPA 2021). According to the association, if recycled plastic materials can be used at 35–50 percent per year, businesses will be able to reduce production costs by more than 15 percent, meeting 50 percent of raw materials for the plastic industry.

IWWs contribute to reducing demand for materials and preventing waste. IWWs are an essential link in the recycling process in Viet Nam as they collect 20 percent of recyclable household waste produced (Fanchette 2022). High recyclable value plastics such as PET and high-density polyethylene are prioritized by IWWs over low-value plastics such as single-use plastic cups, shopping bags, or confectionary wrappers. They also take a leading role in reusing discarded plastic items, by collecting and selling them as such to households or shops. Polystyrene boxes, reusable plastic boxes, and packaging thus have their lifespan extended. IWWs' activities also meet the needs of Viet Namese businesses for recycled materials, which are cheaper than virgin raw materials.

Estimating the population of informal waste collectors is difficult due to the lack of official data. It is estimated that there are between 6,200 and 16,000 people in Ho Chi Minh (IUCN and ISPONRE 2021; Nguyen 2022) and 10,000–20,000 in Hanoi (Mitchell 2008). These numbers refer only to collectors and do not take into account other employment in the entire collection network. In Hanoi, including junk shop employees, middlemen, transporters, and village sorting and preprocessing jobs, the number of people working in the entire collection network can be estimated at 85,000 (Fanchette et al. 2021).

In recent years, Viet Namese legislation on waste management has undergone major changes. The new Law on Environmental Protection, which was approved in 2020 and went into effect in 2022, provides a legal basis for implementing a circular economy model to reduce the extraction of natural resources. The law promotes waste reduction, reuse, and recycling and introduces mandatory waste sorting at the source. As sublegislative texts are being drafted, stakeholders are now waiting for concrete criteria, plans, and a roadmap to implement this model. Extended producer responsibility (EPR) policies for plastic packaging waste, which are set to be implemented in 2024, will make producers and importers responsible for managing the waste generated by their products. Combined, these measures have the potential to meaningfully impact the recyclable waste sector, reshape its dynamics, and redefine its role in the current waste management system.

Figure 1. Study Locations

Source: Authors.

Methodology

Three country studies, in Viet Nam, Indonesia, and the Philippines, were commissioned by the World Bank in 2022. A mixed method approach was applied to understand the profile and vulnerabilities of IWWs as well as identify entrepreneurship and livelihood models piloted in these countries, which have the potential to be scaled up in future interventions. These studies produced primary data about IWWs that fills a prior gap in existing literature across the three countries. As such, the study aims to inform policy and operations directed toward addressing marine plastics pollution in the ASEAN region, specifically, efforts to better integrate IWWs in such solutions at the local level.

In Indonesia, primary research data was acquired through a semistructured survey with IWWs, key informant interviews (KIIs), and focus group discussions (FGDs). Appropriate inquiry techniques were applied with waste pickers, identified experts, and practitioners, who are well-positioned to share their experience with research involving IWWs. Based on the social ecological model, questions were divided into three levels to diagnose vulnerability: individual waste worker vulnerabilities; interpersonal vulnerabilities; and community vulnerabilities. A snowball sampling method beginning with key informants nominating other sources of data was used to gain understanding of contributing factors to vulnerabilities in IWWs in Bali and the Greater Jakarta area (Jakarta, Bogor, Depok, Bekasi Tangerang) in Indonesia (see figure 1). Semistructured interviews were administered to 100 IWWs. Additionally, representatives from 19 social enterprises and 57 waste banks were interviewed.

In the Philippines the study involved literature review and survey among IWWs in four locations (see figure 1). The locations were selected with the following criteria in mind: (i) urban and provincial areas, (ii) coastal and inland areas, and (iii) areas close to landfills. Following the selection of the four sites, an initial screening and site visit helped provide an understanding of the opportunities and limitations of each specific site. The selected sites were Happyland, Tondo Manila; Baseco, Manila; Rodriguez Rizal Provincial Landfill and Payatas Dumpsite. The survey questionnaire was administered to 809 IWWs.


FPT Shop
APPLE - ĐIỆN THOẠI - LAPTOP
SAMSUNG

Four groups of study subjects were included for both the quantitative and qualitative approaches: (i) IWWs, including women and children working at the sites, (which are formal and informal dumpsites and recycling sites, often coexisting with informal settlements) within the waste value chain; (ii) local businesses at or around the sites involved in the waste management value chain, and who are engaging with informal sector workers; these businesses might be informal themselves; (iii) civil society organizations and NGOs working at the sites and are working directly with informal sector workers; and (iv) local administrators at the sites. This includes private companies and the local government responsible for the activities and conditions at the sites.

In Viet Nam the study was conducted in four cities—Hanoi, Quy Nhon, Ho Chi Minh City, and Can Tho—(see figure 1) and included a survey with IWWs, FGDs, and KIIs with plastics intermediaries and social enterprises. The four cities were selected to represent the diversity of the country' s characteristics based on defined criteria, such as being a major urban area with large daily generation of waste, the potential impacts of waste on the environment, major rivers traversing the city, the typicality of regional socioeconomic and cultural life and demographic aspects that allow comparing within case patterns across the cases and the typicality of the operation of waste collection in the value chain.

Validation workshops were held in each of the three countries with a wide range of stakeholders. These included national and local governments, civil society, academia, and international organizations, and representatives of informal waste workers. Comments and suggestions from these workshops were integrated into the country reports and informed the final recommendations.


Premium
Broiler Grower

Profile and Vulnerabilities of Informal Waste Sector Workers

This section highlights the specific vulnerabilities faced by IWWs in the informal plastic waste and recycling sectors in Indonesia, the Philippines, and Viet Nam. There are common themes across the experiences and specific vulnerabilities among IWWs. However, there is also variation across country and city context, which should inform policy responses.

Profiles of IWWs

Participation in the informal waste sector is driven by migration to urban areas, low education, and a lack of other employment opportunities (Wilson, Velis, and Cheeseman 2006). Informal waste work has minimal barriers to entry and tends to attract workers with low education and limited marketable job skills from vulnerable groups, including recent migrants to urban areas, the disabled, women, children, and the elderly. Workers fill various gaps at different levels of an established hierarchy of workers within the informal waste system, which tends to consist of at least six levels (Ezeah, Fazakerley, and Roberts 2013; Zolnikov et al. 2021).

Many IWWs are temporary or permanent migrants who tend to face different kinds of livelihood challenges and bureaucratic barriers to accessing basic services such as public health care, education, and employment support. Temporary migrants, who comprise much of the workforce in Viet Nam, occupy urban informal waste work as an additional earning opportunity during the low agricultural season. Similarly, in Indonesia, waste workers were also likely to be migrants seeking employment opportunities. In the Philippines, IWWs were much more likely to settle around work sites and occupy waste work as a primary livelihood activity.

BOX 1

Environmental and Social Risk Management Considerations in the Formalization of Informal Waste Workers

The World Bank's Environmental and Social Framework contains 10 Environmental and Social Standards (ESSs), all of which may be relevant to programs addressing needs of informal waste workers (IWWs), depending on the context. These ESSs are as follows:

ESS1. Assessment and Management of Environmental and Social Risks and Impacts

ESS2. Labor and Working Conditions

ESS3. Resource Efficiency and Pollution Prevention and Management

ESS4. Community Health and Safety

ESS5. Land Acquisition, Restrictions on Land Use and Involuntary Resettlement

ESS6. Biodiversity Conservation and Sustainable Management of living Natural Resources

ESS7. Indigenous Peoples/Sub-Saharan African Historically Underserved Traditional Local Communities

ESS8. Cultural Heritage

ESS9. Financial Intermediaries

ESS10. Stakeholder Engagement and Information Disclosure

Additionally, the World Bank's Environmental and Social Policy for Investment Project Financing and Directive on Addressing Risks and Impacts on Disadvantaged or Vulnerable Individuals or Groups includes requirements so that risks and impacts do not fall disproportionately on vulnerable groups and that they can benefit equally from project benefits.

Due to intersectionality, certain characteristics of IWWs might make them even more vulnerable to negative impacts or contribute to their exclusion of specific project benefits. This concerns, for example, IWWs who are women and children, part of an ethnic minority, indigenous group, are refugees or migrants, are LGBTQI, or other.

A detailed environmental and social assessment process would aim to identify such risks and ensure that mitigation and benefit sharing measures are integrated into projects' design, are consulted with the IWWs and their representative groups, and are adequately resourced.

Sources: World Bank 2016, 2021.

Demographic Information

Table 1. Age, Household Size, Gender Composition, and Housing Status of IWWs in the Research Sample

	Indonesia	Philippines	Viet Nam
Average age	44 min = 12 max = 73	39 min = 6 max = 83	52 min = 10 max = 88
Average household size	4.5 min = 3 max = 6	5.4 min = 1 max = 25	5
Proportion female (%)	34	46	83
Female-headed household (%)	n/a	34	49
Temporary residential status (%)	61	17	61

Note: In Indonesia, the female informal waste workers interviewed often join the waste sector as part of a family with their husband. The unmarried women who were interviewed were single without children and homeless. n/a = not applicable. Sources: Espelia 2022; UrbanEmerge 2022; World Bank 2022.

Age

A broad range of ages work in informal waste work, including children and the elderly, though the mean age tends to be older than the average workforce (see table 1). The mean age of research participants from three countries is 44.7 years (n = 1,222), with highest mean age in Viet Nam and the lowest in the Philippines. Independent waste collectors tend to be younger. For example, in Viet Nam, independent waste collectors have an average age of 44.3, around

7 years younger than the overall average age of waste pickers. The lowest average of IWWs in Viet Nam, in Ho Chi Min City, may speak to the particular demands of heavy urban waste work and the need to work quickly in streets with high volume of traffic.

Migration Status

In Indonesia and Viet Nam, many IWWs are migrants who leave their children and family in search of work, driven by lack of job opportunities in their home province. For instance, in Indonesia, 61 percent of IWWs are migrants. Of these, around half originate from villages on the outskirts of cities and the other half are from neighboring provinces. In Viet Nam, 85 percent are seasonal migrants who move to the two largest cities (Ho Chi Minh City and Hanoi) to work and go back to their hometown for harvest and to visit their children. In Can Tho, migrants only account for 17 percent of IWWs. In the North, IWWs call the cities where they work "the waste market" and return home at important times, such as the rice harvest, when a large workforce is needed. In Viet Nam, most IWWs have only temporary residential status at their workplace (60 percent); temporary status is highest in Ho Chi Minh City (92 percent) and Hanoi (85 percent), and lowest in Quy Nhon (46 percent) and Can Tho (19 percent).

In the Philippines only 17 percent of the sample had moved to Manila from other provinces, but most have relocated to live at or close to their work site. For example, 38 percent of IWWs live within the landfill site, 28 percent live outside the landfill site, 26 percent live in a community close to the landfill, and only 8.5 percent live far from the site. This finding is contradictory to Sapuay (2014), which finds that informal waste sector workers in the Philippines are generally migrants from provinces and rural areas who come to urban areas seeking new economic opportunities.

Living Conditions

Many IWWs experience various forms of housing insecurity. Most IWWs live in shared housing situations and have little ownership of residential or agricultural land, either in their current place of residence or in their place of origin. Though nearly 70 percent of Filipino IWWs own their homes, only around 17 percent possess ownership documentation. Similarly, 58 percent of Viet Namese IWWs risk physical relocation in the future because their residence is subject to urban planning that may require resettlement. Migrant IWWs often have little to return to, as most households (85 percent) do not have farmland in their hometown. Only 15 percent live on their own at their current residence and are renting a house to live. In Viet Nam, migrant IWWs struggle to find housing and often rent temporary houses in areas with lower quality living conditions and limited security. Migrant IWWs who are unable to find housing independently or through employment become homeless and face

unique challenges from living on the streets. In Indonesia, 11 percent of IWWs interviewed were homeless. To avoid conflict, homeless IWWs seek areas less prone to eviction by public authorities and utilize fee-based public restrooms for bathing and sanitation.

Many IWWs live directly at or near collection sites. Migrant housing is often linked to their employment. In Indonesia, the majority of informal waste collectors live at or near waste processing sites. Migrant IWWs often receive housing from intermediaries, typically small single rooms or shared homes, in return for meeting material collection quotas. This housing is typically small single rooms or shared homes for IWWs and their families, with access to electricity, water, and communal facilities.

Housing is often low quality and consists of shared rooms and dwellings. Most Vietnamese IWWs live in semipermanent, small dwellings with brick walls and metal roofing sheets, without reinforcement or foundations (79 percent). In Indonesia, IWWs who live at landfill sites often build their own shacks with either government provided or improvised electrical wiring, water, and sewage access. In the Philippines, just over half of IWWs live with their families and 38 percent share their home with other nonfamily members.

Education

Most IWWs have minimal education (primary school), though this varies by country. The percentage of research participants completing primary school is lowest in sample for the Philippines (38 percent), followed by Indonesia (56 percent) and Viet Nam (most completed secondary school, 60 percent).

In Indonesia, some primary school is the highest educational attainment for 56 percent of IWWs, and 6 percent had never attended school. Just under 80 percent of IWWs had some junior high school or less.

In the Philippines, 6 percent have no education, 16 percent have not completed primary school and only have a basic literacy level, 38 have only completed primary school, and 25 percent have completed lower secondary school.

In Viet Nam, questions about respondents' educational background and household members were removed from the questionnaire following the pretest due to sensitivity. Focus groups and in-depth interviews suggest the level of education of IWWs is low, but the majority has been to secondary school and can therefore read and write. Though the small number of people interviewed does not allow for an accurate estimate, approximately 15 percent of IWWs are illiterate and the majority of IWWs left school before the age of 14 (secondary school). Only about 10 percent attended high school.

Working Arrangements

IWWs work long hours, struggle with price instability, have limited negotiation power, face competition, and sometimes need to diversify income sources by working multiple jobs. Most IWWs have been engaged in informal waste work for a long time. For instance, Filipino IWWs surveyed had been working in the sector for an average of 18.7 years (min = 0, max = 73, standard deviation [SD] = 13.1), and in Viet Nam for an average of 14 years (min = 1, max = 60, SD = 10.2). Comparative data was not available for the Indonesia sample.

IWWs work long, difficult hours. The amount of time spent working is determined by personal ability, equipment used and ambition to earn income. IWWs in Indonesia, the Philippines, and Viet Nam often work long hours, dedicating a significant portion of their time and effort to waste collection and sorting. Most IWWs begin working in the morning, through the most valuable waste is collected in the evening as this is when households and businesses sort out the day' s waste. Waste is collected during the day and recyclables are sorted at night. They may work 6–7 days a week and for extended hours, reflecting the demanding nature of their work. At least in Indonesia, for particular waste collection arrangements, independent waste collectors must work every day to ensure continuity in the collection of household waste, and they must hire another person to do the work on their behalf if they wish to take a day off.

- In Indonesia, it is common for waste collectors to work up to 13 hours a day, for 6 or 7 days a week, resulting in a 70–90 hour workweek.
- In the Philippines, half of the IWWs report that they work 7 days a week and 15 percent work 6 days a week.
- In Viet Nam, IWWs work an average of 8 hours per day, with high variability in survey responses ranging from 1.5 to 18 hours. They typically work 14.5 days per month.

IWWs often combine waste collection with other activities to diversify income and ensure greater economic stability and security. Some IWWs prioritize working longer hours collecting recyclables rather than diversifying income through other sources, while others sort waste part-time, around 3–3.5 hours per day, while working other jobs.

In Indonesia, some IWWs work part-time in the waste sector, while working other jobs such as hotel staff, driver, security guard, beach vendor, gardener, and construction worker.

In the Philippines, 32 percent of respondents have access to a source of income other than waste collection, such as from casual labor, fishing, private business, government employment, and private employment.

Nearly one-fifth of Viet Namese IWWs work as housemaids in private homes or offices, a predominantly female occupation that is mainly accessible to recyclables collectors who are considered cleaner than landfill waste pickers. Other IWWs supplement their income through jobs such as street vendor, itinerant lottery ticket seller, or motorbike taxi (primarily a male occupation).

IWWs sell their collected materials to intermediaries or junk shops, which can result in fluctuating prices and reduced control over their income. Individuals or small groups work independently and have direct and regular contact with the offtakers or junk shop buyers but are faced with price instability. A system that courses through several middlemen usually means rapidly decreasing prices for waste plastic further down the value chain resulting in very low prices for the waste collectors. IWWs are also prone to economic exploitation because the lack of regulation protecting them from unfair practices puts them at a disadvantage. They have difficulty negotiating better prices and maintain exploitative or dependent relations with buyers.

The typical Indonesian waste management network consists of waste collectors, waste collector crews, junkmen (waste traders), intermediaries, dealers, and brokers. Within the recycling network, the hierarchy begins with scavengers collecting and selling materials to higher levels. The purchase and selling price of recyclable materials increases at each level, with larger profit margins at the top of the hierarchy. From a sample of 100 IWWs interviewed who work in one of the major urban centers of Bali and Greater Jakarta area, 72 percent identified as individual waste collectors, 23 percent as waste collector crew, and 5 percent as intermediaries. IWW study participants self-identified their position on the waste worker hierarchy based on their activities and nature of work.

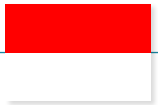
In the Philippines, many collectors work mainly with a single aggregator, in a relationship based on trust and exchange of information on price and market needs. Over three-quarters sell to the same buyers every day. Nearly 80 percent stated that the price they receive changes often and 62 percent said that they do not have the opportunity to negotiate on prices with the buyers. Junk shops rely on *suki*, or "loyalty," by building trust and loyalty in the IWW community. Some partnerships between junk shop owners or between IWWs and junk shop owners allow for *bale,* or cash advances that IWWs pay with recyclable materials.

In Viet Nam, 82 percent of respondents note that their incomes are directly impacted by fluctuation in prices of plastic. Some IWWs manage to develop a network of residents and intermediaries that gives them privileged access to waste deposits.

Relationships with different stakeholders consist of a mix of positive and negative interactions, and an environment of high competition is noted across country studies. Many waste collectors feel unsafe in their workplace and have negative relationships with other stakeholders, but others express that IWWs respect each other' s "territories" and are empathetic that everyone needs to earn. In the Philippines, around half of IWWs have positive relationships with other waste collectors (57 percent), organizations involved in the collection of plastics (52 percent), buyers (55 percent), and local authorities (51 percent). Relationships with barangay officials are generally positive and the IWWs are reprimanded only in cases where their collected waste is scattered in streets and impacts cleanliness of common areas. For example, barangays occasionally confiscate collections and sidecars that are not in order. Collaborations with city maintenance workers and agents of municipal waste treatment companies are often established, allowing the exchange of information on waste sources and priority access to recyclable waste (UNDP 2022). These arrangements are not formal and are made between specific IWWs and members of the formal LGU waste worker staff. Waste pickers mostly work in or close to centralized landfills or dumpsites. (Chintan 2005). In recent years, the livelihoods of waste pickers have also become increasingly vulnerable to displacement by the private sector, such as when cities establish contracts with waste management providers, sometimes as part of donor-funded initiatives (WIEGO n.d.a). Another increasing phenomenon is limited access to gated housing communities, whereby security guards will sometimes warn waste collectors not to come into their localities or else can grant exclusive access to just one individual or group (Buch et al. 2021). Filipino IWWs experience competition with others working at the site (41 percent) and with companies and organizations in general (48 percent).

Income and Access to Finance

Waste pickers live in extreme poverty and are often some of the most vulnerable and marginalized people in society (Paul et al. 2010). Their livelihoods are "characterized by income and resource instability, job insecurity, weak provision of social welfare, which creates difficulties in envisioning and planning for the future" (Morais et al. 2022; Samson et al. 2010). All respondents in the country studies derive their primary income from waste collection; these low, instable incomes make IWWs extremely economically vulnerable.



Indonesia

95% of survey participants rely on waste collection for all of their monthly income (n = 95)

Average income per month per household: Rp 1,400,000 (**US$93.65**)

The estimated average income per day per capita (**US$0.56**) is lower than the national poverty line of US$1.90 (2011 purchasing power parity) per day per capita (WBG 2020).

Philippines

On average, **75%** of respondent's monthly income is from waste collection (n = 523)

Average income per month per household: ₱5,721 (**US$105.30**)

The estimated average income per day per capita (US$0.75) is lower than the national poverty line of US$2.15 (2017 purchasing power parity) per day per capita (WBG 2023).

Viet Nam

On average, **71%** of respondent's monthly income is from waste collection (n = 313)

Average income per month per household: D 7,230,000 (**US$313**) (SD: US$188.70)

The estimated average income per month per capita (**US$56.90**) is lower than the national poverty line for urban areas of US$86.50 per capita per month.

Income from waste collection is highly variable and waste picking is generally not sufficient to provide for an entire household. Many households diversify their sources of income, either by having each family member work different jobs or by working multiple part-time jobs, which includes waste picking. In the Philippines, only 16.6 percent of households are comprised entirely of IWWs. For others, alternative sources of income comprise nearly half of total household income earned. Here, alternative sources of income include casual labor (25 percent), fishing (8 percent), private business (5 percent), government employment (5 percent), and private employment (5 percent). IWWs in Hanoi often combine waste collection with other income-generating activities such as cleaning services to increase their income. In the Philippines, however, 68 percent of respondents have reported that they do not have access to sources of income other than waste collection. Nearly 80 percent of IWWs interviewed in the Philippines reported that the availability of useful plastic varies significantly by day, week, or month.

Among IWWs, independent street pickers face greatest income insecurity and instability. In Indonesia, individual waste pickers earn less (Rp 1,380,764) than intermediaries (Rp 2,640,000). In Viet Nam, street waste pickers in Hanoi have the lowest reported salary, with a daily income of D 15,000 (US$0.70). Interviews in Indonesia suggests that the availability of plastics is not scheduled and depends on how it is dumped by trucks since waste is not separated at the source. In the Philippines, street pickers face risk of severe financial insecurity at the mercy of available supply, exploitation from waste traders, and the dynamic fluctuation of plastic waste prices. Only 68 percent of Filipino respondents have access to other sources of income than waste collection.

Instability makes it challenging to budget and manage household finances. Only 65 percent of Filipino IWWs are aware of how much their household earns from waste collection. In Indonesia, only 35 percent actively budget and forecast spending beyond their daily needs. In Viet Nam, only 3 percent of IWWs declared that their economic situation is comfortable.

IWWs have low access to banking services and loans at formal financial institutions, making it difficult to save and handle shocks. In Viet Nam, there is a strong positive correlation between households' monthly income and surplus, suggesting that the more income IWWs earn monthly, the more they save. In Indonesia, the majority of IWWs (71 percent) do not have a bank account. Studies in the Philippines and Viet Nam reveal similar findings. IWWs tighten their expenses to ensure there is a surplus to cover other family costs. In Viet Nam, there is a strong positive correlation between households' monthly income and surplus, suggesting that the more income IWWs earn monthly, the more they save. In Indonesia, lack of long-term budgeting, skepticism of banks, and preference for informal savings practices adversely impacts participation in formal banking systems. Indonesian study participants were skeptical of banks because of the administrative hassle required by formal banking and a fear of being unable to access their funds in an emergency. IWWs who budget for long-term goals or emergencies prefer to save at home or through *arisan* groups, which is a form of rotating savings where friends, colleagues, or group members take turns contributing a set amount of money on a fixed interval to a collective fund. At each meeting, one member of the group will be given the collective fund to use at their discretion. This process continues rotating at each meeting allowing all the members a chance to take home the collective fund.

Vulnerabilities and Risks Faced by IWWs

IWWs occupy a variety of roles in waste systems, particularly recyclable waste, which vary by location and duration of work, type of waste collected, and relative position in the overall waste collection and recycling system. The ways in which IWWs work, and the roles they occupy, can determine their relative vulnerability. It is important to understand the typology, experiences, and unique vulnerability of IWWs in order to accurately depict their condition and the potential to incorporate these individuals into circular economy solutions.

IWWs, particularly waste collectors at the bottom of the value chain, often do not have bank accounts, payment cards, mobile money, or insurance. For example, none of the IWWs interviewed for the Ocean Conservancy research in Southeast Asia were customers of a microfinance institution, and the microfinance sector experts consulted had never heard of microfinance institutions serving IWWs.

Social capital plays an important role in accessing financing. IWWs typically seek loans from a person of influence within the community and aggregators sometimes provide loans to IWWs to buy a significant waste stream (UNDP 2022). Aggregators generally belong to a "closed" ethnic, religious, or cultural group, to which the waste worker also belongs. Through this, a multilayered cultural, business, and financial relationship is created outside the formal market (McAllister 2020).

Many IWWs are over-indebted and struggle to pay off loans or utility bills (Buch et al. 2021). The research by Ocean Conservancy found that waste workers, and the organizations that support them, have heavy debts to moneylenders for periodic expenses such as school fees, housing at temporary locations, or transportation between their work areas and where their families live (McAllister 2020). They also may have periodic health care expenses for themselves or a family member that workers are unable to pay with savings, resulting in either borrowing from moneylenders or extended periods of nonwork while they recuperate or care for a family member.

IWWs who collect, sort, and recycle waste face occupational risks while living on the fringes of society (Cowing 2013; Schenck et al. 2019). Vulnerabilities and risks faced by IWWs include not only health and work hazards but also dependence on sellers, income and price variability, lack of social/health insurance, climate risks, social isolation, and stigma. Working conditions of IWWs range from uncomfortable to hazardous. Environmental risks include physical requirements of work, temperature variance, rain, and pollution. Social risks include COVID-19, harassment, and other unsafe social working conditions.

Individual waste collectors are considered the most vulnerable in the informal hierarchy because they work alone, lack an organized support network, and therefore have a reduced capacity to process and store materials alone. Their low income is due to their low position in the waste worker hierarchy for recycled materials and they have the least predictability and certainty about collection rates, pricing, and workplace safety. These factors, compounded, make IWWs easily exploited. As a result, informal waste work encourages families to work together to avoid exploitation and increase bargaining power by collecting larger

volumes of material. However, this family collaboration can include children, which jeopardizes their opportunity to attend formal education (Wilson, Velis, and Cheeseman 2006).

A study on waste pickers from 27 different countries found that waste pickers face social alienation and exclusion, ranging from daily mistreatment and humiliation to police harassment (Morais et al. 2022). Waste pickers are vulnerable to racial conflict, violence and infighting, theft, insecure living conditions, and substance abuse. Most waste pickers in developing countries also deal with a stigma associated with informal work being linked to criminality. Studies find that waste pickers are stereotyped by the public as being inferior. Discrimination, stigmatization, and economic exploitation faced by waste pickers can further limit access to capital, better equipment, education opportunities, and social mobility, which is needed to improve their livelihoods and opportunities for their children (Akeju 2020; Buch et al. 2021).

Health hazards range from sharp objects to chemicals and medical waste resulting in negative health outcomes such as communicable and noncommunicable diseases and epidermal, gastrointestinal, musculoskeletal, and respiratory consequences (Damanhuri and Padmi 2012; Medina 2008; Schenck et al. 2019; Zolnikov et al. 2021). Studies highlight the health outcomes listed above commonly manifest in IWWs as: Hepatitis B, cuts, bites, sunburns, dermal infections, diarrhea, nausea, back pain, obesity, and respiratory infections (Rimantho 2016; Zolnikov et al. 2021). IWWs generally prefer not to use protective equipment, despite frequent incidence of illness, infection, and injury.

Health Risks

IWWs who work at landfills report frequent slips, falls, and heavy materials shifting as they search through trash bins for valuable materials or climb on piles of trash. Trucks and heavy machinery also operate in proximity of the workers. The most common occupational hazards are cuts and punctures from unsorted waste containing glass, nails, metals, and sticks. Bruises, cuts, pricks, skin irritation and muscle are part of the daily work experience. The Philippines study found that 78 percent of IWWs had experienced injuries from waste picking, the majority of which occurred on feet and hands. In Indonesia, over 50 percent of IWWs experience muscle strain from repetitive movements and lifting heavy materials. In interviews, IWWs shared stories of accidental deaths, which happen at least once a year. An IWW at Bantar Gebang landfill in Bekasi, Indonesia, shared that "In the past two months, six people died as big stones fell from a crane and hit them on the head. What can we do? We need to earn money; I know it is safer to collect waste from trucks but there is more opportunity at the landfill." Another Indonesian IWW, at Suwung landfill in Bali, shared that she "could not move or work" for 10 days after "a large wooden log rolled on my leg as it was being moved by a bulldozer." Repeated close contact with hazardous materials like rotting meat, feces, and medical waste results in infections. Skin conditions are common from touching hazardous waste without wearing gloves or foot protection.

Working outside in a tropical climate poses risks of heat stress and sun exposure. During the rainy season, workers experience cold and additional strain from lifting heavy, wet materials. The collection processes become more difficult as the waste they collect is soaked in water, requiring the lifting and transportation of heavier loads. Collection crews managing beach waste during the rainy season report that the weight of the waste collected is quadrupled compared to the dry season. This is due to both water-logged materials and an overall increase in volume of materials washed up on beaches from waterways and ocean currents during the season.

IWWs suffer from upper respiratory infections, dengue, and typhus from living near or at landfills. After separating valuable materials at home, remaining waste is often burned because it is less expensive than transporting waste further or paying for a collection service to take away the waste that has no recycling value. Burned waste emits carcinogenic substances and heavy metals like lead, nickel, chromium, and zinc, which impacts workers and nearby residents. Research from the National Plastic Action Partnership highlights that Indonesians without an official land title are less likely to be served by government-run waste collection and are therefore more exposed to the effects of waste burning (WEF 2020). Frequent exposure to burning waste is believed to cause high incidences of upper respiratory infections among IWWs. Waste workers are also more likely to suffer from flooding caused by drains blocked by waste.

Just under 40 percent of IWWs in Viet Nam think that the risk of long-term health issues or accidents resulting from their work is high or substantial, and only 10 percent believe there is *insignificant* risk of long-term health issues related to their work. IWWs identified various health risks such as injuries from metal or glass cuts, needle-stick injuries, road traffic accidents, and dog bites. "Injuries from cuts from metal and glass scraps" are common occurrences for 70 percent of Viet Namese respondents. This highlights the need to improve vaccination for IWWs, especially for tetanus.

IWWs work in some of the most polluted parts of the urban zone, facing exposure to air pollution and other chemicals in already polluted cities. They are affected by engine emissions when they work along roads and major transport routes and by hazardous chemicals when they work at landfill sites (PRX and Airparif 2022). According to the World Health Organization, more than 60,000 deaths from heart disease, stroke, lung cancer, chronic obstructive pulmonary disease, and pneumonia in Viet Nam in 2016 were linked to air pollution. IWWs collect waste from landfills or incineration sites in hazardous environments (PRX and Airparif 2022). In landfills, waste spreads contaminants by producing heavy metal contaminated leachate and gas such as carbon dioxide and methane, released during the microbiological degradation of the waste. The settling of the waste creates an oxygen-free environment conducive to the emission of methane. Viet Namese regulations attempt to control the level of pollution, but most sites struggle to adhere. In 2016, the Viet Namese Ministry of Construction found that 76 percent of landfills did not meet national standards. At incineration sites, the combustion of waste releases toxic particles into the environment, and their combustion releases furan, mercury, or dioxins. This can cause liver problems, immune system damage, and cancer.

Low use of personal protective equipment aggravates health risks associated with handling waste. Despite the risks, IWWs use protective equipment for environmental conditions rather than work related hazards. In Indonesia, 66 percent use sandals, 46 percent wear hats, and 29 percent wear long sleeved shirts. Protective gear such as gloves (used by 22 percent), boots (used by 21 percent), and masks (used by 27 percent) are considered cumbersome or uncomfortable.

Specific Vulnerabilities Faced by Women

Women have higher risks, lower incomes, and less stability in their professional and personal lives. Barriers to female labor force participation include lack of skills, a wage gap, and gendered family care responsibilities. Women and men experience gendered differences in IWW work, including amount earned, type of work, job stability, and occupational risks associated with the work. However, this finding is not universal. For example, female waste workers in Indonesia did not express any concerns over barriers to participation in waste collecting activities. Similarly, in Indonesia, survey findings suggest that most activities within IWW households are decided by both men and women.

Female IWWs appear to earn less, for a variety of reasons. The Philippines survey found that 69 percent of respondents believe men earn more than women in the informal waste sector. This finding is supported by the higher monthly average income of male-headed households from plastics at the landfill sites (₱4,123 or US$73.30) compared to female-headed households (₱3,684 or US$65.50). In Indonesia, female IWWs who reported no income despite self-identifying as waste workers (9 percent) understood their role as supporting their husbands, and therefore viewed income earned for the family. In Viet Nam, there is a statistically significant difference in earnings between men and women across all four cities studied.

Gender differences emerge at the point of waste collection rather than sale price. Some IWWs emphasized that income earned is directly related to the amount of recyclable materials that can be collected and sold regardless of gender. Indonesian IWWs explained that any gendered differences in wages earned was due to the physical demands of waste collecting, but overall, the average monthly income across the different locations, gender and level in waste hierarchy is nearly identical, at approximately Rp 1,400,000 per month. However, the lack of a stable plastics supply has an imbalanced effect on women. Filipino IWWs prefer not to work in the dark for personal safety reasons, and men are therefore able to work longer hours. In the Philippines, male IWWs perceive greater competition over valuable plastic waste resources from other IWWs (44 percent male, 39 percent female) and from companies and organizations (52 percent male, 44 percent female).

Waste collection roles are somewhat, though not entirely, gendered. Women are generally preferred for skill- and time-intensive tasks (GA Circular 2019). Division of labor is often related to perceptions of strength required to perform certain tasks, safety in performing those tasks, and cleanliness associated with those tasks and other positions. Discussions with nonprofit organizations supporting IWWs and coordinators of waste collector crews in Indonesia highlighted that men are preferred by intermediaries for carrying heavy loads of waste, driving motorbikes with carts, and operating heavy equipment. IWWs are typically encouraged to join friends or family already working with an intermediary and the recruitment focuses predominately on men. If the recruited man is married, the wife may also be recruited to sort mixed waste collected by her husband. In Viet Nam, female IWWs work physically intense and lower paid positions, like landfill collector, in polluted environments. Higher status positions, like independent waste collection in Ho Chi Minh City, are mainly held by men. Companies prefer to work with women for collection and sorting activities because

women are considered more meticulous while male workers are preferred for loading and packing activities (GA Circular 2019). These findings are consistent with patterns of informal employment more broadly, as more female workers tend to engage in vulnerable jobs, with 59.6 percent of female workers in informal employment classified as having vulnerable jobs, compared to 31.8 percent of male workers in informal employment (GSO and UNFPA 2016).

Household responsibilities restrict the amount of time women are able to dedicate to income-generating activities in the waste sector, and the flexibility they have in doing so. Women have less time available in the day for income-generating activities because they are also responsible for household activities such as care of children and elders, cooking, and cleaning. In the Philippines, it is estimated that social attitudes about women' s household responsibilities decrease the probability of women' s engagement in the labor market by 14–22 percentage points (Buchhave and Belghith 2022). In Indonesia, female IWWs stop collecting materials when they reach a daily target (around Rp 50,000), after which they prefer to prioritize household responsibilities. In Viet Nam, women continue to be responsible for most of the cooking, childcare, eldercare, and laundry, reducing time for income-generating activities.

At the same time, women sometimes play a diminished role in household decision making and financial management. In Viet Nam, women own fewer residential certificates then men and have less authority in household decisions about money and professional activities. When it comes to waste work, female IWWs have lower access to investments that aid waste collection, and to financing. In Viet Nam, they are poorly equipped, which limits the amount of waste they can carry and their access to collection areas. In Indonesia, survey findings reported that household financial management was determined on a case-by-case basis irrespective of who earned the income or managed negotiations with buyers—responsibilities that are typically performed by men. Rather, the decision was based on which household member was most financially educated or responsible; many male IWWs claimed to give the income made from sales to their wives to manage household finances.

Waste work drives cyclical and gendered patterns of poverty, a pattern that causes men to lose out, too. For example, an interview in the Philippines suggested that working conditions in the waste sector drives some young women to marry at a young age. Girls experience discrimination in their access to educational opportunities; this affects female IWWs. This has led to the reinforcement of gender inequalities for female IWWs, especially regarding their voice in family decisions.

Though many elements of waste work disproportionately impact women, both men and women suffer from unsafe and insecure working arrangements. In Viet Nam, for example, male workers are more than twice as likely to experience verbal and physical abuse while working (32 percent male versus 15 percent female).

Specific Vulnerabilities Faced by Children

Children of IWWs suffer from stigma associated with the waste collection profession and can be affected by accidents during waste collection. In Viet Nam, focus group discussions highlighted that IWWs do not want their children work as IWWs, yet surveys indicate that many IWWs have parents who worked in the same activity. Although children are usually in school, they occasionally follow their parents to help them, especially during the summer holidays. The Indonesia study found that children are often involved in assisting women in waste sorting in the evening.

Poverty drives child labor in the informal waste sector, placing children in high-risk income-generating activities. A street material picker in Viet Nam described that she is often accompanied by "a 10-year-old girl to pick up trash. Her mother is sick so she can' t earn money. At night, she often goes with me from 10 p.m. to 6 a.m. Once, she has been robbed of D 300,000 (US$13). She was very scared and cried a lot because she was afraid that her mother would know."

Migrant IWWs are often separated from their children because attending school outside of one' s place of residence is administratively complex. In Viet Nam, for example, Hanoi' s public primary and junior secondary schools limit the admission of students who are not domiciled in the school' s assigned territory. Instead, children of migrant IWWs typically stay with extended family and attend school in their home province.

Family collaboration on waste collection deprives children of educational opportunities (Wilson, Velis, and Cheeseman 2006). Among the interviewed households whose children

were also involved in waste picking, early school dropout was highlighted as a risk due to a combination of factors: cost of schooling, social isolation and stigma, distance from schools, and children seeing waste collection as a direct and easy way to make income, and thus lose interest in continuing school. This leaves children less equipped to find stable employment outside of the waste sector and creates a positive feedback loop; lack of formal secondary education was cited by survey participants as a key impediment to finding a formal job. Poor children are also less likely to be able to afford school fees.

Children of waste pickers face marginalization and discrimination in school, which contributes to a cyclical element of generational waste work. Their overlapping identities of being low-income, migrants, and associated with waste picking contribute to their marginalization at school. The Indonesia study found that children of migrants who relocate with parents for waste work often struggle to enroll in school and are unable to attend regularly, as these families do not have a local address and/or identification. Children who are able to enroll in local school face bullying, teasing, and ridicule by classmates because of their connection to the informal waste sector and their socioeconomic status, which is often made apparent from their clothing. This social stigma pushes many IWW children to leave school early and pursue other ambitions. However, without formal education, many fall back on informal waste collection as their only career option.

Families do not want their children to work in the waste sector, but cyclical patterns are difficult to escape. FGDs in Viet Nam highlighted that IWWs do not want their children to do the same job as they do. The same is true for junk buyers (Fanchette 2022). They do this difficult work so that their children can have a better future. If their children must do this job, it will be an admission of failure for them. However, survey data revealed that it is common for IWWs to have parents who worked in the waste sector.

Aspirations of IWWs and Interest in Formalization

IWWs express mixed desire to formalize their work, reflecting preferences for part-time work that can be adjusted depending on income needs, perceptions about eligibility necessary for formal public sector waste jobs, and preference for moving up the informal waste hierarchy. There are other types of work, some formal and some not, that are more attractive to IWWs. In evaluating opportunities to improve quality of work and life for IWWs, attention should be directed at addressing the specific environmental and social conditions that contribute to the hardships associated with informal waste work.

Despite the economic and social vulnerabilities inherent in the informal waste sector, primary research shows mixed results regarding waste pickers' desire to join the formal sector. This suggests that greater buy-in will be required, and that formalized positions will need to accommodate the needs and priorities of vulnerable informal workers.

In Indonesia, informal waste work is not the first choice of profession for most workers, and IWWs have differing views on how to improve their livelihoods. More than half of IWWs want to join the formal sector because it provides financial stability and employment benefits like health care and pension, which would allow workers to save and budget for the future rather than living day to day. Intermediaries are most likely to choose to work in the informal waste sector because the waste business is profitable, the sector is growing, and they are optimistic about potential for businesses growth. Unlike the other waste workers, intermediaries encourage their children to take over the business.

In the Philippines, focus group discussions found that waste pickers did not have a specific preference for formalization; the most important thing to them was to earn income. One stakeholder raised the importance of having a legal identity, whether as an individual or a collective or cooperative, to have a voice on integration into formal employment. While formal employment would provide a legal identity and allow IWWs to have better access to social benefits and funds, the participant believed that IWWs' options should be kept open, depending on what works best for their specific context.

In Viet Nam, IWWs do not seem to be in favor of formalizing a contract with a junk shop owner or a waste management company, though there are some differences of opinion across major cities. Just under two-thirds of IWWs stated that they do not wish to have a formal contract with a junk shop owner. Recyclables collectors were the most likely to be in favor of a formalized relationship, with nearly 40 percent stating they would like a relationship with a junk shop owner. Independent waste collectors and landfill material pickers were the most likely to be against a formalized relationship with a junk shop owner. However, landfill material pickers were the most likely (47.4 percent) to be in favor of a formalized relationship with a public waste management company, and recyclable collectors were the least interested (33.3 percent).

Hesitation toward formalized waste work is driven by misinformation, preferences for flexibility, and perceptions that they may not be competitive for formal jobs. Not all IWWs found it attractive to consistently work a job for eight hours per day.

In Indonesia, many IWWs believe they do not qualify for formal roles. Nearly half of IWWs have only some primary school education, which prevents them from qualifying for government waste worker positions. IWWs who were interviewed believed open government positions required a high school diploma. One IWW in Bali said, "We wish we could be part of the Government Agency of Sanitary and Environment, but we are not educated and don' t have ID. How can we get work?" Other workers who prefer informal work enjoyed the part-time and infrequent schedule that allows them to manage other responsibilities such as roles in the village and family duties that would not be possible with a full-time job.

In the Philippines, the study found that greater awareness and consultation is needed to understand the needs of IWWs and offer employment that presents a positive trade-off for them. Waste pickers are often preoccupied with daily needs and may need more information to understand and choose options for longer-term benefit. Stakeholders in the Philippines shared that when a certain open dumpsite was closed (meaning the waste pickers could no longer conduct their activities there), a nearby sanitary landfill offered to employ the waste pickers as formal full-time workers. However, only 30 percent of the waste pickers decided to take up this offer.

In Viet Nam, some formal schemes (presented later in this report) were successful, yet showed the need to assess more comprehensively the support needed by IWWs when joining formal cooperatives. For example, workers from one cooperative noted that they did not receive support with vehicles that conform to current city requirements, and they would face steep costs to upgrade vehicles on their own.

Other stakeholders have noted practical challenges associated with formalization. In the Philippines, participants highlighted a lack of consistent engagement from waste pickers who are hired formally. One notable insight was from a recycler who hired waste pickers to work in their facility. The waste pickers showed lack of understanding of the regulations and rules that come with formal labor such as attendance and leave protocols. Consistent attendance was the primary challenge. The recycler explained that the hired waste pickers would not attend work when they had made sufficient daily earnings from alternative sources of income. This insight into waste pickers' behavior aligned with the consistent sentiment of the study that IWWs' main motivator is financial income and earning a daily wage.

IWWs want their working conditions and livelihoods to improve, regardless of formalization. The combination of income insecurity, social stigma, and lack of dignity in their personal and professional day-to-day experiences underlines the more fundamental shifts in well-being that IWWs desire.

Access to financing plays a key role in livelihood improvement by allowing IWWs to collect more materials, increase income, and ultimately move up in the waste hierarchy. IWWs cannot move from collector to trader without access to loans. An IWW in Indonesia commented that "we do want to work as waste traders, but we need money to start. Where can we get that money; if we borrow from the bank the interest is so high, it' s better to work as waste collector without debt to them." Independent collectors can improve their efficiency when they purchase equipment to crush or chop recyclables and vehicles such as motorbikes to transport more materials. Similarly, interviews and consultations in the Philippines

BOX 2

A Just Transition to Sustainable Plastics Reduction, Circularity, and Waste Management

A "just transition" refers to the equitable and fair process of transitioning from a state characterized by environmentally harmful or socially unjust practices to a more sustainable and inclusive paradigm. A just transition in the informal waste and recovery sector (IWRS) has been defined by the United Nations Human Settlements Programme and the Norwegian Institute for Water Research as designing and promoting the transition to sustainable production and consumption (of plastic) in a manner that is as fair, inclusive and equitable as possible to the IWRS, generating and preserving decent work opportunities and leaving no one behind.a

Such a transition process recognizes that significant shifts in industries, policies, and systems are necessary to address environmental challenges and social inequalities. A just transition emphasizes the protection of workers' rights, social welfare, and community well-being throughout. It ensures that those who are most affected by changes, such as workers in in-

dustries undergoing transformation, are provided opportunities for decent and sustainable livelihoods. By integrating principles of justice, equity, and inclusivity, a just transition approach seeks to create a more balanced and sustainable society that benefits both people and the planet.

Informal waste workers (IWWs), who often operate in marginalized and vulnerable communities, play a crucial role in waste collection and recycling, including the recovery of plastics that would otherwise end up in the ocean. This approach will also eventually be relevant to the ways that IWWs will become impacted by reduced availability of plastics materials as extended producer responsibility (EPR) approaches are expanded and less plastic packaging is used. EPR policies, which oblige producers to take responsibility for the end-of-life management of their products, represent both an opportunity as well as a risk for IWWs. Depending on the manner in which producers organize disposal, recycling, upcycling, and so forth for plastic waste, IWWs may either have an opportunity to gain safe and decent employment or be excluded from benefits and lose access to plastic waste, which is currently essential for their livelihood. The fact that there is limited information on the exact contribution and volume of plastics collected and processed through IWWs would make such impacts invisible and challenge proper responses to mitigate livelihoods loss.b

In a statement ahead of the 2022 Intergovernmental Negotiations Committee on Plastics Pollution of the UN Environmental Assembly (UNEA), the International Alliance of Waste Pickers (IAWP) proposed seven measures as a priority for nations to ensure a just transition in the plastics pollution agenda. This declaration: (i) recognizes waste pickers as an integral part of plastic pollution solutions; (ii) ensures the representation of waste pickers in the prospective UNEA Plastics Treaty and safeguards their interests in plastic waste management; (iii) facilitates direct representation of waste pickers, their organizations, and economic units as critical stakeholders in the preparation of national laws and regulations that affect them; (iv) mandates fair compensation and risk protection for waste pickers; (v) secures the legal framework for the just transition of waste pickers into newer roles and involves them in any just transition to newer systems, materials, collection, recycling, and distribution options with respect to plastics; (vi) reduces or phases out carcinogenic and toxic substances in plastics to ensure safe plastic waste management; and (v) institutes EPR norms which cause responsible producers to partner with waste pickers and their organizations in the implementation of EPR principles.c

A just transition approach, which recognizes and integrates IWWs into marine plastics pollution reduction initiatives, ensures that their expertise and contributions are valued and that their livelihoods are improved in a sustainable manner. This integration promotes social equity by addressing the needs and rights of IWWs, enabling them to transition from informal and often hazardous work to more formal and dignified employment opportunities. Moreover, it fosters a more inclusive approach to waste management, allowing communities to actively participate in addressing the challenges of marine plastics pollution. By embracing a just transition that integrates IWWs, we can achieve both environmental protection and social justice, creating a more equitable and sustainable future for all.

Sources: a. UN-HABITAT and NIVA 2022; b. Cass Talbott 2022; c. IAWP 2022.

suggest that while there is some level of demand for formalization, informal waste pickers need immediate financial security above all.

Access to financing is also critical for IWWs who wish to leave the sector. Indonesian IWWs who wish to leave the sector expressed interest in opening small general stores or food stalls. Without the initial capital needed to open a business, job skills, or time to invest, IWWs feel unable to escape the debt and educational limitations needed to pursue other employ-

ment. Beyond educational and financial constraints, many IWWs were unable to state professions outside of informal waste work that are available to them.

Not all IWWs wish to leave the sector entirely. In Viet Nam, 96.8 percent of IWWs surveyed want to continue working as an IWW in the future. In Indonesia, many IWWs who have minimal formal education and few other marketable job skills believe the waste business is a sector where they have potential to prosper through hard work.

Formalizing the status of IWWs on a single, inflexible model would be unfavorable to most stakeholders. Efforts to expand formalization should consider under what circumstances a more organized and safer form of waste collection can occur and what opportunities can be brought by supporting different models. This may include flexible employment options such as the creation of specific status for self-employed waste workers, allowing IWWs to access social benefits. There are no uniform answers because of the nature of specific relationships among stakeholders in each city.

The integration of IWWs into formal local government schemes or social enterprise models also carries some risks, which should be carefully assessed and mitigated. Funding of such schemes and projects should consider the full cost of solutions that provide equitable and safe working conditions, fair compensation, insurance, and basic services among other benefits to all employees/waste workers. Given that most IWWs work without basic protections relating to occupational health and safety, sexual exploitation, abuse, and harassment, access to media services, access to safe vehicles, safe water and sanitation, enterprises involving IWWs in their value chain need to establish such systems of protection and risk mitigation. This also entails meaningful engagement and consultation with IWWs, and establishment of cooperative or other representative structures which may not exist. It is necessary to design adequate mitigation measures for children that support their basic needs and integration into education and prohibit their involvement in hazardous work.

The World Bank' s Environmental and Social Framework (ESF), which includes 10 Environmental and Social Standards (ESSs), provides a useful benchmark for applying international good practices in projects involving IWWs. The ESF contains mandatory requirements for World Bank-financed projects yet can also serve as guidance for non-Bank financed initiatives to ensure that key protections and risk mitigation measures are in place for IWWs, surrounding communities, and the environment. Box 1 provides more detail on the relevant ESS and World Bank' s Directive on Addressing Risks and Impacts on Disadvantaged or Vulnerable Individuals or Groups.

By focusing on enhancing their working conditions and providing opportunities for skill development, IWWs can become key players in sustainable waste management practices. This transformative process presents an opportunity to not only uplift their livelihoods but also contribute to addressing the global waste management challenge. There are a number of anecdotal success stories from which policymakers and investors can gain valuable insights to guide their efforts in designing effective policies and making strategic investments. These case studies serve as powerful examples of how empowering IWWs can lead to positive outcomes for both individuals, the broader waste management systems, and the environment.

CASE STUDIES

Entrepreneurial, Social, and Community-Based Plastic Waste Business Management

Within the ASEAN region, there is growing interest in solutions that contribute to the dual goals of reducing plastic leakage while creating dignified, secure, and fairly compensated employment opportunities for IWWs. Entrepreneurial, social, and community-based plastic waste business management offers solutions to the plastic waste crisis while providing improved livelihoods opportunities.

Solving the waste crisis requires fundamental shifts in the type and amount of waste produced and consumed. Waste management and recycling certainly play a critical role in mitigating the negative externalities associated with disposal and leakage, but systemic solutions will require intervention at the point of production. The slow pace of waste management reform in the region underlines the urgency for upstream innovation to move away from single-use flexibles (Ellen MacArthur Foundation 2022). Circular economy refers to a specific avenue of transformation in waste sector, in which waste is designed to be reused from the point of its production. Circular economy models prioritize the elimination of waste and the continuous use of resources. They aim to keep materials and products in use for as long as possible and recover value from waste and other residuals. This type of model requires legal, political, and social buy-in of stakeholders on the production side. While this is a valuable model to strive toward, there are other plastic waste business management models that may offer solutions.

Many waste management models currently promoted in the study countries are market-oriented initiatives that incorporate social inclusion outcomes by prioritizing locally driven initiatives around recyclables, marine debris, and plastic. Social enterprises, some of which work with IWWs, have an important role to play in enabling waste management reform because of their familiarity with local needs.

IWWs have an important role to play in waste sector reform and the development of circular economy models to ensure that solutions are practical and effective. Their extensive knowledge and experience in the realities of waste management can provide a critical perspective. For example, a study of six cities in the Philippines found that where private sector recycling has replaced informal valorization (segregation of plastic waste), results have been inconsistent, and recycling plants have tended to show disappointing performance compared to collection and sorting by the informal sector. The Ellen MacArthur Foundation (2022) has advised that the waste management sector will benefit from including IWWs' input on legislation, planning, piloting, and implementation of waste management systems and packaging design.

The creation of new jobs in an expanded and more effective waste management sector can improve IWWs' working conditions, which in turn improves their economic and employment stability. Their incorporation could be considered part of the "just transition," in which marginalized workers and individuals are integrated into climate change solutions that uplift them and achieve environmental goals. In the long term, the social development effect of inclusion in circular economy solutions is to promote social inclusion and reduce poverty and inequality, and therefore build stronger communities and create more equitable waste management systems (see box 2).

Interest in and pilot experiences with livelihood and entrepreneurship models that integrate IWWs are growing as it becomes more pressing to find solutions to the marine plastics pollution crisis. Many such projects have been piloted over the last decade and increasingly within the last five years. Anecdotal case studies show some lessons learned and common features which appear to be indicative of effective and sustainable circular economy solutions. Successful models are characterized by those which prioritize close collaboration with stakeholders and focus on resource efficiency, supportive policies and incentives, systemic approaches, technical expertise, and effective monitoring and evaluation systems.

As IWWs are integrated into formalized and other types of work that improve livelihoods, they need improved access to financial facilities, adequate working space, professional equipment supplies, support to register or to join legal entities, and social benefits (UNDP 2022). This will require supports from a range of stakeholders, including the public sector at the national level, the private sector, and civil society and development partners, in creating a supporting ecosystem which ensures IWW inclusion, facilitates access to waste, supports capacity building, and advocates for IWW priorities.

The case studies presented in this section demonstrate win-win solutions that improve IWWs' livelihoods while increasing the proportion of plastic waste that is recycled. They introduce livelihood opportunities from plastic waste collection, sorting, recycling, and up-

cycling; and community-based innovation models to support livelihood options for the informal sector working in plastic debris collection. The case studies are organized by primary supporting body: government, private sector, and community driven.

Case studies were selected based on the extent to which they directly involve IWWs and showcase models in which diverse stakeholders (local government, private sector, civil society organizations) can initiate and/or participate in waste collection innovation and reform. In Indonesia, 19 business and nonprofit organizations and 57 community waste banks participated in the study. The Philippines study identified 15 case studies. The Viet Nam study identified 8 case studies. From these selections, individual case studies were selected for the synthesis report based on the degree to which they showcased a unique approach to IWW integration into waste management, had details available, and had features which made them scalable.

GOVERNMENT-DRIVEN

Pilot Project of "Women Waste Workers" in Quy Nhon, Viet Nam

Model Description

The "Women Waste Workers" initiative in Quy Nhon aims to improve the working conditions of IWWs through an integrated approach, combining community-based models of collecting, sorting, composting, and plastic waste reduction (UNDP 2022). The initiative began in 2020 as a United Nations Development Programme/Global Environment Facility Small Grants Programme under the project "Scaling Up a Socialized Model of Domestic Waste and Plastic Management in 5 Cities: Ha Long, Quy Nhon, Da Nang, Binh Thuan, and Binh Duong."

The project provides equipment, loans, and training. IWWs are provided with equipment (bicycles and handcarts) and access to no-interest loans with a period of 24 months. Once repaid, this money is reinvested to help other collectors. In the pilot project, 22 IWWs benefited from loans between D 7 million (US$295.80) and D 8 million (US$338.00), for a total amount of D 155 million (US$6,549.10). Loan assistance was combined with training and visits to the waste treatment center.

The integrated approach includes modeling a clean tourism beach that lacks plastic waste by installing cameras, electric posts, classified rubbish bins, and environmental sanitation boards. Households were provided with compost bins, gardening tools, and probiotics. They were also given training courses on composting. The approach also includes sorting waste at its source, partnering with restaurants to not use single-use plastics, teaching circular economy and waste classification in schools, and recycling waste into useful products. Finally, a model of "women waste workers" is promoted.

Beneficiaries and Outcomes

Combined with initiatives to raise awareness, the project accelerates waste collection by IWWs. Three types of sorting bins have been installed on beaches, in schools, and distributed to households. In Nhon Hai commune, the project helped six IWWs (two recyclables collectors and four waste collectors). During waste collection, the four members actively guide waste sorting and pick up scraps that people threw away.

The project activities are actively supported by the Nhon Hai Women' s Union, which promotes waste separation at source to the community. Through the union, those who want to sell recyclable material can contact the two collectors directly. The integrated approach gives value and benefits to IWWs, particularly women. Awareness and training is promoted for children (students), residents, commercial business owners, and of course, the IWWs.

The income of participating IWWs has increased significantly over the project' s two years of operation. The two recyclables collectors buy 100–200 kilograms (kg) of recyclables per day, of which plastic accounts for about 20–40 kg, and earn an average income of D 200,000/day

(US$8.50/day). The four waste collectors earn about D 70,000–100,000/day (US$3.00–$4.20/day) for recyclables collection activities, in addition to their waste collection income. A recyclables collector from Nhon Ly, Quy Nhon shared, "There is a Women' s group of waste collectors in the commune. From this organization, I get a loan of 7,000,000 VND (US$295.8) with no interest within 24 months. This money is very precious to me. It helps me to have the capital to buy more scrap." Another recyclable collector said, "Participating in training classes helped me know the value of the work I' m doing. Due to the support of the Women' s Union, the selling price of scrap to the collectors is stable. After receiving equipment for work such as bicycles, and handcarts, our work was much more convenient. The volume of recyclables also increases. I feel the model has really brought economic benefits to women."

The project has high environmental impact and aims to prevent pollution through education, awareness, and provision of bins in identified areas. It also focuses on coastal areas, where most plastics wash up. Communities and schools are also taught methods to recycle, reuse, compost, and upcycle, and where this is not possible, properly segregate and dispose of trash. It ensures that waste is collected and reentered into the waste value chain. The introduction of sorting bins on beaches, in schools, and in households facilitates increased volume and efficiency of waste collection and recycling for IWWs.

There are several challenges associated with this model that require consideration before implementation and scaling. First, it can be difficult to convene IWWs into cooperative groups, including reaching and communicating with IWWs who spend much time out in city districts. Effective participatory approaches should be used by local grassroots civil society organizations, where possible. Second, improving earnings and attempting to support cooperatives to add value through light processing of plastic waste can disrupt other value chain entities. For example, arranging a direct large-scale buyer from the cooperative would result in reduced earnings for middle organizations like junk shops and aggregators. This must be carefully managed in a participatory approach. General acceptance by the community and local government is needed for a similar integrated approach, as well as a good funding mechanism to ensure the longevity and sustainability of such a project. It may be preferable to pilot the same initiative in a coastal city or province at a small-scale level, prior to adapting to a larger scale. No legal barriers exist for such replication and would only serve the efforts of the local government.

It is important to consider the key role played by the Women' s Union in encouraging the restructuring and professionalization of the IWW network. Their direct contact with IWWs enables them to effectively communicate information and recommend policy measures that accurately reflect local realities and needs. This success underlines the importance of organization and initiative at the civil society and community level, particularly for the promotion of women' s inclusion given that formalized waste work roles tend to be male dominated (GA Circular 2019).

Scaling the model requires cooperation between different sectors such as local government, commercial, residential, NGOs, and the informal waste sector. The scalability of the initiative requires a funding mechanism to provide tools, equipment, and training for IWWs, as well as for the other sectors. The idea to create a fund to help informal waste collectors can also be replicated, and as such would also need a good funding mechanism.

GOVERNMENT-DRIVEN

Independent Waste Collectors Integrating Cooperatives in Ho Chi Minh City, Viet Nam

Model Description

The initiative is a cooperative model implemented in the central district of Ho Chi Minh City. It was founded in 2019 under the mandatory regulations of Ho Chi Minh City from 2018. It has been established according to the Law on Cooperative no. 23/2012/QH13 from November 20, 2012. The initial facilities were supported by the local government (headquarters, human resources, office equipment, training, and consultancy). After 3 years of operation, this cooperative is currently managing waste collectors in 14 wards in Ho Chi Minh City. Independent waste workers from the cooperative collect on major roads as well as in small alleys. They also contribute to raising public awareness on environmental protection. They regroup independent waste workers and "line-owners" who oversaw the allocation of collection space to IWWs before the 2018 mandatory regulation.

In January 2018, Ho Chi Minh City People' s Committee issued Official Dispatch no. 129/UBND-DT on the organization and arrangement of independent waste collection activities. The target is to transform waste collection groups into an organized model of cooperatives or companies with legal status. A legal and organized model would give access to basic social benefits for independent waste collectors. Local authorities are directed to assist the independent waste collectors in this effort.

Beneficiaries and Outcomes

The cooperative is open to all independent waste collectors and has about 70 members, of which 80 percent are female. The average independent waste collector' s income is D 11 million/month (US$464.80/month). Cooperative members pay a fee of 5–10 percent of their income to the cooperative. The cooperative provides independent waste collectors and line-owners with legal status, allowing them to sign waste collection contracts with organizations and companies. Without this status, they can only work with households.

Independent waste collectors continue to receive their usual benefits, including a waste collection fee from D 20,000–50,000/household/month (US$0.90–$2.10/month per household), with extra personal income for selling recyclable materials. They are supported with uniforms and protective clothing.

Cooperative members have health insurance. Independent waste collectors with permanent or temporary residence can buy insurance directly at the Wards' People' s Committee in their residence area. Part of the fee is reimbursed by the cooperatives. In some cases, they receive assistance from local authorities (Ho Chi Minh City Cooperative Alliance or Fatherland Front of Environmental Sanitation Cooperatives) which support them with the procedures.

According to the cooperative, members experience difficulties because of the new safety standards for collection vehicles defined by the authorities. Lack of clarity in the legal decisions and financial support from local authorities makes it difficult for the cooperative to comply with regulations. An independent waste worker in Ho Chi Minh City explained, "I feel comfortable participating in cooperatives. However, shortly, I will have difficulty investing in collection vehicles even though the city has extended the time to convert vehicles until the end of 2023. With my current income, I only have enough to cover my family expenses."

Based on this directive, a company model created by IWWs in Viet Nam was founded in 2021 at Binh Tan District in Ho Chi Minh City. It was established under the direction of the Ho Chi Minh City People' s Committee in its official dispatch from 2018. Founded by two independent waste collectors, the company now works with five independent waste workers who collect waste from 500 households in the Binh Tan district. The waste collection fee is D 62,000/household/month (US$2.60/household/month). Independent waste collectors earn D 9 million/month (US$380.10/month) after the deduction of business taxes, fuel, and vehicle maintenance fees. They do not receive medical insurance. They maintain extra personal income for selling recyclable materials. On national holidays, they receive gifts and D 5 million (US$211.30).

The private sector model has faced similar challenges as the cooperative. An independent waste collector working for the company in Ho Chi Minh city shared that although the initiative has provided a stable income, district regulations stipulate that IWWs are allowed to collect D 62,000/household/month (US$2.60/household/month). This includes the transportation fee from the garbage collection point to the waste treatment facilities. However, this fee is considered very low due to the difficult economic circumstances of many families in the area.

NONPROFIT COMMUNITY-DRIVEN

Eco Kolek, Philippines

Model Description

Eco Kolek is a community-based enterprise and platform that aims to equip IWWs to play a role in developing a safer, more organized method of waste collection and disposal for their community. The project is an initiative of Project Zacchaeus, an organization that focuses on communities in need and tailors strategies to alleviate poverty in each area by training local citizens to become "service leaders" in their communities (Hood 2022). It seeks to help IWWs, who it terms "Eco-Warriors," to become community service leaders that help bridge the gaps in waste management. It has been operational since 2021 and the business model is currently supported by the Clean Cities, Blue Ocean program of the U.S. Agency for International Development (USAID) and the Department of Science and Technology (DOST) in the Philippines (Project Zacchaeus n.d.). Recyclable waste is collected efficiently through clustered door-to-door pick-up via an app and the informal waste collector' s material recovery services. Upcycled bins are registered and provided for segregation. Eco Kolek' s upcycled products are shipped to private or government clients.

IWWs gather improperly disposed waste and sell it to collectors for a profit. Through Eco Kolek, the collectors can earn income by learning other relevant skills, such as bookkeeping. With the help of the Eco Kolek program, waste collection is more than just a job—it offers a way to practice and improve leadership skills and become active voices in the community. The Eco-Warriors, many of whom are local women with leadership roles in waste management, have become integral to curbing plastic pollution in Puerto Princesa (Hood 2022).

Beneficiaries and Outcomes

The project empowers informal waste collectors through training and education and provides additional income for them. It addresses gaps in awareness or knowledge and the insufficiency of financial incentives for the informal waste sector. The project' s environmental impact is considered high for its role in collecting waste from communities and upcycling these materials. It provides a higher order of treatment for recyclable plastics but is limited to high-value plastics. The project is currently designed to expand in other parts of the Philippines to provide a platform for waste picking services to address plastic pollution and help in climate change reduction (Project Zacchaeus n.d.).

In March 2022, USAID' s Clean Cities, Blue Ocean program provided the Eco-Warriors with vehicles to make waste collection more efficient in Puerto Princesa. These vehicles are expected to support waste collection from about 3,000 households. The Eco-Warriors who drive the vehicles will also receive free training and courses on driving and vehicle maintenance (Hood 2022).

The project is in its early stages, meaning that long-term impacts are unclear. Significant efforts to ensure proper training, education, and awareness are needed to implement it at a national level.

The project is currently funded by a grant. A funding mechanism must be developed for its long-term operation and to replicate it in different parts of the country.

The scalability of the initiative requires digitalization and sufficient training of collectors. The success of the project may lead to demands for replication in more cities or provinces. With permission from Project Zacchaeus, the project may be adapted at a local government level and is already supported by the national government through DOST.

NONPROFIT COMMUNITY-DRIVEN

Partnership for Plastic Waste Recycling in Indonesia

Model Description

A new mobile app was developed to connect waste collectors like Kusbandiah with the surrounding households in Semarang, Central Java (Rethinking Plastics n.d.). Rethinking Plastics' pilot project promotes central waste collection and segregation points, called TPS-3R facilities, in which plastic is sent to be recycled, organic waste is used as compost or animal feed, and only what's left goes to landfill. Actors along the waste value chain come together at these facilities.

Through its implementing partner BINTARI, Rethinking Plastics is working with actors along the waste value chain to reorganize the flow or waste by providing information events and workshops for more than 11,000 waste pickers, waste bank operators, and community members. These workshops, and new waste management system, seek to connect different actors along the waste value chain, better understand their role in the overall waste management system, and work together. Through this, Rethinking Plastics seeks to support more efficient work that can handle a larger amount of waste, and therefore produce higher incomes for collectors. The *AMBILIN* app is a digital marketplace for buying and selling waste that connects actors along the value chain. Using this app, households that want to sell or donate recyclable materials are connected to collectors or buyers of materials. The app provides transparent pricing and tracks how much and what kind of plastic is sold.

Beneficiaries and Outcomes

The service area for the waste workers increased and benefited over 18,000 community members. In addition, the recycling rate doubled compared to the baseline. Staff at the TPS-3R facilities are financed by the revenue from selling recyclable materials and compost, along with contributions from the households. Expansion of the app and its accompanying waste collection network will require greater financial and governmental support. The project will benefit from, and be able to support, an EPR system by providing and preparing collection points for the EPR mechanism.

This techno-optimist approach to plastic waste management embraces the independent nature of IWWs' work and attempts to facilitate more efficient collection of plastic, along with developing links between workers and households.

NONPROFIT COMMUNITY-DRIVEN

Waste Banks, Indonesia

Model Description

The business activities of social enterprises surveyed in Indonesia revolve around three main overlapping models of prevention, waste collection, and monitoring & knowledge management. Each model has a general approach for managing marine plastic and waste, which is commonly implemented through a mix of related activities and face common challenges.

Waste banks are social enterprises that collect and segregate solid waste that involves a system of community "banking." Recyclable material deposited by customers is weighed and sorted by the "bank" to determine its value. This monetary value is then credited to the customer and deposited into an account, similar to traditional banking systems. Materials with economic value are then sold to factories for processing. Indonesian waste banks strive to collect waste, generate benefits for customers, and educate the communities to increase the amount of waste that is separated at the household level. Banks incentivize communities through savings based on the types and amounts of recyclable material collected by the communities.

Waste banks can be established and managed by the communities, businesses, or local governments. The Ministry of Environment and Forestry Regulation no. 14/2021 describes two levels of waste banks that work in tandem along the recycling supply chain but are differentiated in scale of service area. Bank Sampah Unit (BSU) is a waste management facility that serves a local neighborhood or village. The BSU purchases waste from customers and sorts and aggregates domestic and village waste for sale. The waste from the BSU is then transferred to a Central Waste Bank Sampah Induk (BSI) to generate income from materials sold. BSIs operate at a larger scale and service the district level. The process continues along the supply chain with the BSI purchasing materials from surrounding neighborhoods as well as BSU. Ultimately, the collected and sorted materials are sold to recycling agents and factories to generate money for the BSI.

Waste banks are highlighted because of their support from the Indonesian government and national prevalence. The Indonesian government aims to increase both the rate of segregated waste at household levels and recycling efforts by passing policies that facilitate uptake of waste banks. A recent policy, Ministry of Environment and Forestry Regulation no. 14/2021, reflects an interest in building partnerships between different levels of government and waste banks, as well as facilitating partnerships with recycling businesses and producers.

Beneficiaries and Outcomes

For this case study, 57 waste banks (5 BSI and 52 BSU) were interviewed and surveyed. Most were established between 2010 and 2022, averaging 4 years of operation. Following the issuance of Law 18 of 2008 on Waste Management, the number of BSUs has increased, espe-

cially after the issuance of a Circular Letter from the Minister of Environment and Forestry in 2019 to local governments. Most BSUs studied were formed in 2018 and 2019.

The majority of waste banks (63 percent) do not have standard legal status but utilize a S*urat Keputusan* (authorization letter) as legal recognition to implement activities. Other waste banks are established as associations (28 percent), nonprofit foundations (4 percent), private companies (2 percent), and cooperatives (4 percent). The legal form is chosen based on the understood benefits and regulations associated with expected business activities of the waste bank.

All 57 waste banks self-reported as social enterprises, implemented by and for the benefit of local communities. Waste banks operate through community-level initiatives, with a reach that is highly localized to neighborhoods and districts.

All waste banks studied rely almost exclusively on one source of income from selling recyclables. Very few (5 percent) receive income from other sources such as donations, competitions, grants, and corporate social responsibility programs. Most waste banks workers are volunteers (70 percent) and only a few are paid (30 percent). None of the waste banks surveyed have full-time staff. During interviews, informants shared that recruiting and maintaining staff to work in the waste bank is a challenge in part due to the unpaid work.

Waste banks do not have official gender inclusion policies, and data on gender of employees and volunteers is not recorded in all waste banks. It appears that 60 percent of part-time employees and volunteers are women. Waste banks are often managed by middle age (35–45 years old) women, who have responsibilities like administration, bookkeeping, sorting, and liaising with the community. Men are often given jobs such as collecting, sorting, lifting, and transporting the waste. This separation of labor is not intentional practice but reflects preferences among workers and cultural norms. Approximately half (47 percent) of all waste banks interviewed and surveyed identified similar divisions of labor.

Employment and livelihood engagement opportunities through waste banks are rare for IWWs. Approximately half (47 percent) of waste banks in the study engage with IWWs. Those that do interact simply incorporate them into their supply chain collection system as customers. Engagement is weak because IWWs have established arrangements with intermediaries that can include obligations to repay debt or meet quotas that limit opportunities to sell to other buyers. IWWs participating in the study explained that pricing at waste banks is not competitive compared to market rates offered by other buyers. In addition, IWWs are accustomed to being paid immediately for sales, whereas the waste bank model credits customers' accounts and takes longer to receive payments.

Only 26 percent of waste banks surveyed collaborate with any level of government. Even though waste banks are governed by Indonesian regulations and authorized by the government, their operation and management can be completely independent. While there is some engagement with a range of government agencies from village to ministry levels, it is limited to providing the banks with in-kind support. The in-kind support highlighted by study participants include transportation service from BSU to BSI, allocation of land to build waste bank facilities, and vehicles to collect and equipment to process waste.

Only 7 percent of waste banks partner with local nonprofit organizations. Those who do not partner with local nonprofits or the private sector (19 percent) stated that a lack of human resources to manage the waste bank and a lack of legal registration constrained their ability to engage with outside partners like NGOs.

Most waste bank activities are related to waste collection and processing. Study participants explain that about 30 percent of their time is spent sorting waste, followed by collecting (21 percent), selling (11 percent), and managing savings accounts (18 percent). They occasionally conduct other community programs such as recycling waste, making compost, and growing fish and vegetables using hydroponic techniques. Examples of innovation in community waste bank models include:

- Alstonia Waste Bank, which is located in Maluku' s Ambon. Alstonia collects inorganic waste like any other waste bank: plastic, cardboard, steel, aluminum, and glass. Customers receive 80 percent of the proceeds from the sale of inorganic waste, while the remaining 20 percent is used to cover waste bank operating expenses. Alstonia partners with PT Pegadaian Persero, an Indonesian state-owned pawnbroker, collaborating in the GADE Clean & Gold program (Pegadaian' s CSR program). This waste bank is distinctive in that customers can convert their trash into gold (Rp 6,500 for 0.01 gr gold). However, customers can still deposit trash in exchange for cash.
- The Bank Sampah Induk Aceh Tamiang, which was founded in 2019 by DLH Ace and is committed to minimizing the release of inorganic waste, particularly plastic waste, into the environment. Through plastic, they are also attempting to promote the overall concept of circular economy for citizens. They attempt to innovate by converting plastic waste into paving blocks. A kilogram of plastic can produce one paving block. The steam produced from the production of paving blocks can be used to produce fuel. The production of fuel is still limited and under development, but it can currently be used to power small machines.
- The Kenanga Waste Bank in Bogor, which manages both organic and inorganic waste. They cultivate maggot (black soldier fly) culture from organic waste. Kenanga Waste Bank won first place in the Bogor Clean City competition through its maggot program. For inorganic waste, they offer customers cash, or they can use the deposit to pay bills from the Social Security Agency of Health, for government waste or electricity, or to purchase 3 kg of stove gas.

Challenges associated with waste banks include communities' lack of awareness about the importance of recycling and difficulties coordinating with local governments. For these programs to be successful there is a need to repeatedly communicate program goals to communities and invest in education and behavior change for local residents. Lack of funding to hire staff means that banks must rely on volunteers. Banks often have limited space for waste storage and need vehicles and equipment.

PRIVATE SECTOR

Cooperation between IWWs and a Recycling Company Producing Plastic Pellet in Hanoi, Viet Nam

Model Description

This plastic waste recycling company produces polyester fiber from used PET bottles and transforms PET, polyethylene (PE), and polypropylene (PP) plastic scrap into plastic granules. The company was founded in 2005 with a head office located in Hanoi. This establishment has various factories in Bac Ninh, Vinh Phuc, and Hung Yen provinces.

The company actively cooperates with public authorities, corporations, and NGOs to support IWWs based on their intensive knowledge of scrap collection and recycling systems. They are also part of a plastics association, which takes part in consultations regarding regulations on waste management. One of its goals is to improve the livelihoods of recyclables collectors.

Beneficiaries and Outcomes

The company purchases 150 tons/month of recyclable plastic waste from junk shops, intermediaries, and IWWs from Hanoi and other provinces. It buys directly from IWWs in Bac Ninh factory only. Currently, 40 people work in each factory and earn an average income of D 7 million/month/full-time worker (US$295.80). Women comprise about 80 percent of workers and range in age from 40 to 55 years old.

IWWs comprise around 15 percent of the workforce and are paid between D 150,000 (US$6.30) and D 250,000 (US$10.60) per day. Unlike full-time workers, IWWs do not have a contract with the company, only an oral agreement. To establish transparency, their working days and hours are indicated on a table by the head of the workers. IWWs do not benefit from social security.

The company is implementing a program to enhance plastic recycling in Hanoi and seeking support from private sponsors to improve the livelihood of IWWs. This program is supported by a multinational organization to provide work protection equipment, personal hygiene products, and food to disadvantaged recyclables collectors.

PRIVATE SECTOR

Cooperation between IWWs and a Recycling Company Producing Plastic Sheets in Hanoi, Viet Nam

Model Description

This Viet Namese recycling plastic company is located in the district of Chuong My in Hanoi and was founded in 2015. The company specializes in manufacturing various types of poly roofing sheets, poly plastic sheets, polyvinyl chloride plastic sheets, and heat-insulating roofing sheets.

When the national government tightened its policy on importing plastic scrap, local companies began looking to purchase more domestic plastic waste. In response, in 2020, the company established a factory in Hanoi to produce recycled resin, as input materials for their production. The company relies on strong collaboration with junk shops and IWWs to source more raw materials for production.

The company purchases recyclable plastic waste directly from recyclables collectors, street material pickers, waste collectors, junk shops, and other intermediaries with an average volume of 260 tons/month. A space is set up outside the factory to receive IWWs who come to sell.

Beneficiaries and Outcomes

Currently, 60 people work each factory with an income of between D 7 million/month (US$295.80) and D 11 million/month (US$464.80). Among them, approximately 20 percent of the staff in charge of waste sorting and cleaning are IWWs. Their daily earnings are between D 150,000 (US$6.30) to D 200,000 (US$8.50), and they receive bonus income on Lunar New Year (D 2–5 million) (US$84.50–$211.30). They do not benefit from health care insurance, unlike long-term labor employees. However, some have the opportunity to sign long-term contracts with the company.

PRIVATE SECTOR

Plastic Credit Exchange in the Philippines

Model Description

Plastic Credit Exchange (PCX) is a private company that works with businesses, local communities, and governments to create a sustainable value chain out of plastic. Its mission is twofold: to create a platform for businesses to purchase credits and offset the plastic they cannot yet eliminate and to empower communities with a livelihood based on plastic elimination. It is a recipient of USAID' s Clean Cities, Blue Ocean grant program.

Beneficiaries and Outcomes

In the Philippines, PCX has partnered with Friends of Hope to implement the Aling Tindera waste-to-cash program. This community-based livelihood project supports women microentrepreneurs (e.g., *sari-sari* store owners) to lead a plastic waste recovery system embedded in their barangay or village. PCX buys the plastic waste collected by the Aling Tindera at a higher price, which provides incremental income to households. This project seeks to collect plastic directly from households, provide livelihood opportunities (as a waste-to-cash program), and empower women in the community. It is estimated that the program has prevented over 64 tons of plastic waste from leaking into the Philippines' oceans (USAID 2022). This project is piloted by PCX in Manila and has been expanded to include nearby cities and provinces such as Pampanga, Bulacan, and Cavite.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Conclusions and Recommendations

This research has provided a comprehensive overview of the context of plastic waste management, the role of informal sector waste workers, and the wide range of vulnerabilities that they face, particularly women and children. While the literature on this subject remains fairly thin, a range of commonly recurring vulnerabilities are raised by the literature.

It appears from the field work findings that informal waste sector work is not lifelong or generational. It also appears that a significant proportion of households are not supported solely by incomes from the waste management sector; rather this work constitutes one of several income streams. In such cases, income from waste makes up about half of the overall household income. Health and occupational hazards are extreme and most people working within the informal waste sector are regularly sick and injured from their work, with female and male workers being exposed to a similar degree.

The survey findings show that plastic waste is prioritized mainly because of the availability of materials, the availability of buyers, and the higher income potential compared to most other waste types. At the same time, the income of informal waste sector workers is not stable because the price of plastic is fluctuating, buyers set the price level, and there is not a stable supply. Furthermore, lower value plastics, which make up a larger proportion of plastic waste, is less desirable for collection.

There are many social challenges. Surrounding communities generally view informal waste sector workers in a negative light. The support they receive from central and local government is limited and access to social services is generally lacking. Overall, the COVID-19 pandemic has had a negative effect on IWWs' income, health, and access to social services, exacerbating the vulnerabilities of people who already live at the margins of society.

As a result, economic, social, and governance context matters for reforming waste col-

lection systems. A good understanding of the situation is needed because a common model cannot be applied to all cities. Each intervention needs to be tailor-made to identify the levers of action and avoid negative side effects on IWWs, whether in terms of price variation or power relations between actors. Each city has an existing formal and informal collection network that operates with specific territorial dynamics; understanding this local collection market and the preexisting relationships under which IWWs operate will inform the most logical and effective ways to formalize or expand waste collection.

Site-specific research to design interventions with IWW participation is needed, taking into account local circumstances. Such research should explore, among others: (i) the type, quality, and quantity of plastic waste produced in the area; (ii) the location and capacity of collection and aggregation areas; (iii) the needs of industries using recycled materials; and (iv) the profile, structure, and specific needs and incentives of IWWs operating in the area.

Innovation and reform in the waste sector require an integrated approach involving multiple stakeholders. IWWs are but one link in the collection chain: their relations with formal waste collectors, junk shop owners, and recycling clusters need to be studied. The previous case studies highlight the importance of consultation and consensus among stakeholders. For example, the role of the Women' s Union in Quy Nhon enabled the needs and priorities of female IWWs to be voiced at the local government level. As a first step, discussions will allow stakeholders to learn more about the role and contribution of IWWs in waste collection, which is still poorly understood and under-researched even within public authorities. Secondly, these exchanges will identify common objectives, allowing each actor to find an interest in this project. These discussions will lead to the identification of IWWs' needs, allowing them to contribute to the defined project:

- Personal needs: funding, equipment, insurance, training, and capacity building.
- Support needs from the population: awareness campaign for behavioral changes, provide knowledge on waste sorting at source, etc.
- Support needs from local authorities: open access to collection sites, cooperation with formal waste collectors, etc.

It is necessary to recognize the contribution of IWWs to the public service of waste management. IWWs are an essential link in the recycling chain, ensuring daily sorting and collection. They are local actors, as close as possible to the sources of waste. IWWs provide a territorial network for efficient and quality collection. Recognizing their role in the waste management system is very important, as it is the only retail collection system that currently exists. Official recognition of their activities by public authorities can reduce the social stigma and discrimination experienced by IWWs on a daily basis. This recognition will also be a first step to integrating IWWs into the waste collection system and promoting measures that facilitate their activities.

It is also important that plastic waste be understood in the wider context of solid waste management. In most countries throughout Southeast Asia, the activities of informal waste workers are not yet widely taken into account as part of an integrated approach to sustainable waste management, including plastic waste. Informal waste workers should be understood as a workforce that can contribute to the newly created EPR systems, like that in the Philippines and, more broadly, to the transition toward a circular economy. However, to do this, the multiple vulnerabilities experienced by waste workers must be addressed. This can be realized through a range of approaches.

Based on the aspirations expressed by IWWs in this three-country study, and examples from ASEAN and beyond, the report offers some recommendations to advance a more inclusive and socially sustainable policy dialogue in tackling marine plastics pollution. These can be summarized at the regional level (for ASEAN and for regional donor programs aiming to support ASEAN' s policies and regulations), at the country level (with a focus on Indonesia, the Philippines, and Viet Nam), as well as recommendations for specific projects and investments.

Regional Recommendations

The World Bank, through the Southeast Asia Regional Program on Combating Marine Plastics, is supporting ASEAN to strengthen policies and regulatory frameworks and promote innovative solutions to reduce plastic pollution in Southeast Asia. This and other regional efforts provide a mechanism by which systematic attention to the needs of IWWs can be integrated into regional policy. Regional recommendations are as follows:

Promote recognition for waste work, including informal waste work, through awareness-raising campaigns and communication via regional ASEAN materials. ASEAN is in the process of establishing guidelines and regulations to curb plastics leakage into the ocean. This includes awareness and communication materials to influence national and subnational regulations as well as broader societal awareness and behavior in an all-of-society model to address marine plastics pollution. For example, *Indonesia's Plan of Action on Marine Plastic Debris, 2017–2025* highlights "the significant importance of societal efforts to reduce, recycle, and reuse plastic debris to be advanced since early age" (GoI 2018). Promoting the recognition of waste sector workers, including IWWs, in policies geared toward creating environmentally conscious societies, including awareness measures and behavioral changes for all citizens, can reduce the stigma related to waste work and enable better integration of waste workers into more formal or mainstream plastics collection and processing schemes. Similarly, regional awareness and communication materials targeting behavioral changes and social initiatives can highlight the importance of engaging IWWs to reduce social stigma and motivate social entrepreneurship that includes this group.

Advance understanding of informal waste collection networks and IWW livelihoods by training and engaging IWWs to contribute to data collection. By integrating IWWs as part of the solution to the existing data and evidence gap as an additional livelihood component at the project level, project design can more accurately reflect their needs and experiences.

Collect data on and map stakeholders as well as consult with IWWs and their representative organizations on new policies and regulations. Regional policies and programs should commit to and support systematic data collection and identification of stakeholders that represent interests of the IWW population. This may include, among others, supporting more precise estimates on the numbers and volume contributions of IWWs, to reducing marine plastics pollution. Stakeholders representing IWW voices should be consistently included in consultations on new policies and guidelines. More precise estimates on the numbers and volume contributions of IWWs will lead to a better understanding of the relevance and direct impact of IWWs beyond waste management and specifically for reducing marine plastics pollution.

Harmonize policies and regulations relating to IWWs. Most key policies and regulations for curbing marine plastics pollution, improving waste management systems, encouraging plastics circularity, introducing extended producer responsibility, and so forth will be introduced at the country or subnational level. Nevertheless, international and regional institutions can play a key role offering guidance on key provisions within such regulations that would promote recognition, prevent livelihood loss, and expand opportunities for IWWs. Certain regulations, e.g., relating to plastics credit markets, would be best introduced at the global and regional level. Both harmonization and knowledge sharing across laws and regulations in the region would support a consistent and just transition in the sector.

Engage IWWs and their representatives and enterprises in innovative investments. Regional programs aim to support initiatives toward promoting technological innovations and investments. They can develop platforms for innovation and investment, which will allow waste collection businesses and organizations to learn directly from one another and access financing to expand their models. Women-led enterprises, and/or social enterprises that have the mission to employ and improve working conditions for female waste pickers, can be targeted for such support. In addition to supporting social inclusion objectives, support for social enterprises that include IWWs will help generate more evidence and examples to model for further country or local-level programs. These can also inform the participation and needs of IWWs to be integrated into specific markets, such as the plastics credit market.

Support training to develop technical and leadership skills for IWWs, including opportunities to seek careers outside of the waste sector. Providing training for IWWs can enable them to benefit from future jobs in recycling and related industries and enhances the long-term stability of their livelihoods.

Promote equitable working conditions for men and women, and prevent child labor. Due to the high risks and prevalence of women and children in informal waste collection work, regional policy documents should pay explicit attention to these groups. Such commitments could be aimed at ensuring equitable work conditions and pay for women, preventing child labor, enabling decent living conditions, and continuing children' s education.

Promote additional support measures for children of waste pickers, who represent a special category of vulnerable and disadvantaged individuals due to their engagement in waste work, which keeps them out of school and exposes them to hazardous working conditions. To ensure children stay in school and avoid social and physical hazards associated with waste work, measures could include conducting needs assessments of families whose income depends solely on waste picking and facilitate access to social programs when eligibility criteria are met.

Country-Specific Recommendations

The regional recommendations shared above are relevant at the country level as well. Improving data collection on IWWs and their involvement in the waste management sector, identifying and supporting formation of IWW associations and organizations representing their voice and interests, and including IWWs and their representative organizations in consultations on policies and regulations that may affect them are all important steps toward reducing their vulnerability and enhancing their contributions.

Additionally, as countries in the ASEAN region are in the process of defining implementation of key legislation such as EPR laws, defining regulations around plastic credit markets, among others, the potential impacts on the informal waste sector need careful consideration in the national and local government context. Indonesia has integrated EPR principles in its Waste Management Law since 2018. In Viet Nam the new Environmental Protection Law, introducing the EPR concept, came into force in January 2022, while in the Philippines EPR legislation became effective in July 2022. The introduction of EPR, which requires companies to take responsibility for their own waste, may present new opportunities for IWWs to be employed in waste collection and processing chains. However, it is also likely to generate some competition for IWWs and potentially limit their access to higher value plastics and recyclables. Specific country-level recommendations include the following:

Promote representation and inclusion of IWWs in national and local consultations. With rapidly evolving legislation, IWWs need to be consulted on the development of new waste management reforms, especially on the EPR system and the integration of circular economy mechanisms. Representatives of the informal waste collection sector should be able to participate in debates and consultation processes that inform new laws or regulations. One of the difficulties with this participation is the lack of an official representative body for IWWs. Therefore, it is important to promote the creation of IWW associations or strengthen CSOs that represent views of IWWs to make sure their needs are adequately considered in national and local regulations.

Integrate actions to engage informal waste workers into national policies and plans tackling marine plastics pollution. To enable local governments to seek cooperation with IWWs, the latter should be explicitly recognized as sector stakeholders by national policies and action plans. For example, in 2010, Brazil integrated IWWs in its National Solid Waste Management Policy, defining them as "low-income persons dedicated to the activities of recyclable materials collection, sorting, processing, transformation, and commercialization" and offering various avenues for them to be involved in formal activities in private sector EPR systems and municipality waste plans as collectors, separators, office associates, and

operational workers. Similarly, in ASEAN states, EPR, environmental protection laws, waste management laws, and circular economy strategies may seek to integrate specific objectives toward integrating workers from the informal waste sector. Analysis of social impacts must be considered within the scope of the development of such regulations. In cases where both indirect and cumulative downstream impacts are anticipated on vulnerable groups such as waste pickers, and specifically children and women, these impacts must be included in assessment and with consultation.

Establish or strengthen social, health, and safety protection measures for informal waste workers. Policies and measures to strengthen labor and working conditions, social benefits, access to health care, and more stable terms of negotiations with clients (buyers, city and household clients, and so on) will significantly reduce the vulnerability of IWWs. Such actions are mostly in the domain of labor and social affairs institutions; however, local governments and waste management policymakers may also have a role to play. Examples, particularly from Viet Nam and the Philippines, show that where IWWs are hired by municipalities or individual households for waste collection services, accompanying agreements to ensure their fair payment and occupational health and safety are effective ways to incentivize IWWs to join formal cooperatives and waste collection mechanisms to their own benefit as well as that of local government.

Increase recyclable waste collection by facilitating the work of IWWs. To increase the collection of recyclable waste, it is important to facilitate linkages between the formal and informal waste collection sectors, such as allowing IWWs access to public waste collection areas, having greater tolerance for the temporary occupation of public space for waste sorting and collection, or officially promoting the donation or sale of recyclable waste to IWWs. Thus, the IWWs are not only seen as a vulnerable category of people, but as an effective workforce that needs to be supported to work in good conditions so they can contribute to sustainable waste management.

Provide training, capacity building, and skill-building services to IWWs so they can benefit from future jobs in recycling. Doing so is essential to improving IWW livelihoods, enabling them to develop competencies and skills to become more autonomous. Training on waste collection, waste sorting, and recycling processes will provide IWWs with knowledge to improve their work. Training on financial management skills and occupational safety is also needed. Trainings can be held during the rainy season, when IWWs are less active. These courses can be set up by local authorities or associations. Training and capacity building efforts can also support the formation of IWWs' networks and their integration within EPR systems, for which formal systems for waste collection should be strengthened.

Project- and Investment-Specific Recommendations

As countries develop operational interventions to prevent pollution, promote innovation, and strengthen local waste management systems, the following actions would help to promote integration of vulnerable IWW groups as contributors to and beneficiaries of such projects:

Include measures to avoid disrupting waste worker livelihoods as part of investments and operations intended to address prevention of marine plastics pollution. Additionally, incorporating components and targets for IWW livelihood improvement and engagement in project investments that aim to provide solutions to marine plastics pollution and improve solid waste management will generate further evidence and opportunity for impact evaluation of models for scaling up IWW contributions. These need to be preceded by site-specific assessments and cost-benefit analysis.

Conduct feasibility studies, consultations, and research in specific project locations to propose the best models for engaging IWWs. Their involvement in local municipal waste management schemes is context specific and should be tailored to the specific needs and incentives of the location and actors involved. For example, remote touristic islands where modern solid waste management systems are costly to operate may benefit more from social enterprise models and cooperation with waste pickers and the private sector. In other locations, IWWs' contributions may be more marginal.

Provide an adequate package of benefits and incentives for IWWs as part of formal cooperation schemes. Projects and interventions involving IWWs often result in formalizing their activities and encouraging the formation of semiformal IWW groups and cooperatives. As IWWs value the flexible and independent nature of their work, sufficient incentives should be provided for them to accept a more structured and formal employment. These may range from provision of safe transportation, protective equipment, a more stable income that is equal to or surpasses their earnings as independent workers, and educational and skills development that provide opportunity for professional growth in higher-earning jobs.

Implement microcredit schemes for waste workers. During their activities, IWWs usually face situations where recyclable waste is available, but they do not have sufficient funds for it, or equipment to transport it. IWWs often have to turn to junk buyers and middlemen for a loan, while many such buyers are already pressuring IWWs to lower the price of materials. Establishing a microcredit facility, managed ideally by an association of IWWs, would allow them to invest and increase their income.

Combine social and livelihood benefits to IWWs with broader awareness and behavioral change interventions. Investments and operations that involve IWWs in improving solid waste management are also an opportunity to promote broader social awareness and behavior change. Designing such interventions with strong elements of education and awareness targeted at the broader public will support environmental objectives as well as contribute to the social inclusion of waste workers in their communities.

Ensure implementation of environmentally and socially sustainable practices when implementing programs with IWW participation. This would entail undertaking due diligence of environmental and social risks and impacts, putting in place systems for fair and equitable labor terms and conditions, compensation, and occupational health and safety practices, considering resettlement or livelihood impacts (if any), considering risks to IWWs and surrounding communities related, among others, to handling of hazardous materials and ensuring proper medical attention and insurance for waste worker employees. Importantly, projects should ensure prohibition of child labor and establish measures that enhance safe living conditions and education opportunities for children away from hazardous work. The World Bank' s ESF can provide guidance in this regard and includes mandatory requirements for Bank-financed projects.

As much of the literature has stressed, take a human rights-based approach to addressing marine plastics pollution. This enables planners and decision makers to understand the unequal distribution of vulnerabilities among different actors within plastic waste value chains and how to address them, leading to more sustainable and effective circular economy models. A rights-based approach also holds duty bearers, such as government institutions and private plastic production and recycling firms, accountable for ensuring the rights to decent work, health, safety, and social protection (UNEP, COBSEA, and SEI 2019).

In conclusion, integrating the informal sector remains a challenge, yet a range of models and approaches are available to help insert informal workers into a sustainable circular economy transition. There are many advantages to amplifying the potential contribution of IWWs, including their mobility, agility, and capacity to work in difficult to access areas. They are a primary workforce for sorting plastic waste that can be relied upon as well. Yet the risks and vulnerabilities they face require careful and tailored approaches and a concerted policy effort both at national and local levels. Regional organizations, national and local governments, and international financing organizations can play a decisive role over the next decade to find better models for informal waste workers while solving the growing challenge of marine plastics pollution.

Glossary

Circular economy: A model of production and consumption that aims to extend the life cycle of products by various means such as sharing, leasing, reusing, repairing, refurbishing, and recycling existing materials and products.

Extended producer responsibility: A policy which extends a producer' s responsibility for a product to the post-consumer stage of a product' s life cycle.

Informal waste sector: Comprises unregistered workers engaged in the collection, recovery, and recycling of waste. The sector is typically characterized by small-scale and unregulated recycling activities, providing a source of income for poor and marginalized workers. In contrast to the formal sector, it is not regulated or monitored by state institutions.

Informal waste worker: An individual who works in the informal waste sector. The informal waste sector comprises a large number of unregistered workers engaged in the collection, recovery, and recycling of waste. The sector is typically characterized by small-scale and unregulated recycling activities, providing a source of income for poor and marginalized workers. Informal waste workers operate independently and often use this as a main livelihood source, unlike formal waste collectors who are engaged as contracted waste collection workers by public or private waste collection companies.

Just transition: Describes a transition toward a sustainable, climate-neutral economy that leaves no one behind, and includes workers and vulnerable individuals. By empowering those most affected by the transition and engaging them in creating plans and policies for reform, the transition can be an opportunity to help marginalized populations access new economic opportunities and to redress long-standing inequalities.

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Synthesis report from country studies in Indonesia, the Philippines, and Viet Nam

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