

## Review

**Cite this article:** Dean MRU and Asen MC (2024). The contribution of global waste picker organizations in responding to the plastic pollution crisis. *Cambridge Prisms: Plastics*, 2, e29, 1–9

<https://doi.org/10.1017/plc.2024.24>

Received: 06 March 2023

Revised: 13 June 2024

Accepted: 26 June 2024

### Keywords:

circular economy; plastic pollution; plastic waste recycling; informal waste sector; waste pickers

### Corresponding author:

Mohseen Riaz Ud Dean;

Email: [mohseen.dean@undp.org](mailto:mohseen.dean@undp.org)

# The contribution of global waste picker organizations in responding to the plastic pollution crisis

Mohseen Riaz Ud Dean and Marissa Corinna Asen 

Accelerator Lab, UNDP Pacific Office in Fiji, Suva, Fiji

## Abstract

The world is facing a global plastics crisis with more than 50% of plastics produced only being used once and then discarded. If nothing is done to put an end to plastic pollution, it is projected that by 2050, there will be more plastic (by weight) than fish in the ocean, affecting natural ecosystems, biodiversity and human health. While solutions often target governments and corporations, a crucial group is frequently ignored: informal waste pickers. Despite the limitations of recycling alone, waste pickers significantly impact the plastic recycling chain. This review addresses the gap in our understanding of their role. It argues that waste pickers are an essential component of the larger portfolio of solutions for the plastic crisis but face significant challenges.

## Impact statement

By synthesizing existing research, this review aims to shed light on the valuable roles that waste pickers play, their vulnerabilities, and how they organize within the evolving plastic crisis. This knowledge can inform strategies for better integrating waste pickers into formal waste management systems, improving their working conditions and recognizing their importance.

## Introduction

Plastics have become ubiquitous in everyday life. Plastics are used to manufacture a diverse range of goods, from simplest items such as plastic utensils, to life-altering products such as heart valves and artificial joints. Its use has become essential to many industries, including medical, food and transportation. Despite the countless life enhancements that plastic has provided in modern times, global mismanagement of plastic waste has led to serious negative consequences on the environment, natural ecosystems, biodiversity and human health (Kibria et al., 2023).

As populations grow and global demand for plastic products increases, waste management systems are struggling to keep up with growing waste generation. A global shift toward a more circular economy is crucial to end plastic pollution. As new ideas continue to nurture, gain traction and recognition, the creation of a circular economy as a solution for mitigating the impacts of plastic waste, for instance, has also attracted global attention (McGinty, 2021). The circular economy aims to minimize waste and promote the sustainable use of natural resources through smarter product design, longer use, recycling and the regeneration of nature (Halog and Anieke, 2021).

The Circularity Gap Report (2023) encompasses four major circular economy principles that underpin solutions to the current ‘take-make-waste’ model – these are (i) a reduction in the use of virgin material, (ii) longer use of materials, (iii) replacing fossil fuels with renewable energy and toxic materials with regenerative ones and (iv) reuse of materials. Unfortunately, this shift is far from being achieved; the same report found that the world is only 7.2% circular, a drop from 9.1% in 2018, indicating that, on average, countries are becoming less circular as production and consumption increase. In fact, current consumption patterns far exceed the world’s recycling capacity (Kalali et al., 2023). However, recycling is still an important component of the larger Circular Economy agenda – although capacity varies greatly between countries.

In many low- to middle-income countries, the only form of waste recycling rides on the work of informal waste pickers, partly because the opportunity is greater in countries that have limited formal waste management and resource recovery systems (Cook and Velis, 2020). In these countries, people involved in informal waste collection can be major stakeholders in a circular economy (Zisopoulos et al., 2023). There are approximately over 20 million people in the world who work in the informal sector as waste pickers and make a living through such a trade. In structurally weak economies, such as those found in the global south, this form of occupational

© The Author(s), 2024. Published by Cambridge University Press. This is an Open Access article, distributed under the terms of the Creative Commons Attribution licence (<http://creativecommons.org/licenses/by/4.0>), which permits unrestricted re-use, distribution and reproduction, provided the original article is properly cited.

 Cambridge  
Prisms

 CAMBRIDGE  
UNIVERSITY PRESS

engagement can also benefit the countries as the last line of defense in stopping plastic leakage into the environment.

In many countries, advocates of informal waste picking have often been referring to waste pickers as ‘invisible environmentalists’ or ‘environmental guardians’ due to their significant contributions to recycling recovery rates and the subsequent environmental benefits that result from reduced plastic waste ending up in landfills, oceans and open burning (Cowing, 2013). In recent years, the management of plastic waste has been seen to rise on the priority list of the global development agenda, due in part to the increased awareness on drastic implications of marine plastic pollution (Cass Talbott, 2022).

As populations grow and global demand for plastic products increases, waste management systems, particularly in the global south, are struggling to keep up with growing waste generation. Similarly, while informal waste pickers are gaining more recognition for their contribution to curbing the plastic crisis, their role in the circular economy remains to be equitably utilized, as they continue to work in unsafe conditions, receive low income and have limited access to social protection, legal services, health and education. This review will focus on assessing the role of the informal sector in managing the plastic crisis and the various ways waste pickers organize at the local, national and global levels.

## Methods

Before preparing the manuscript, we had taken cue from Cooper et al. (2018) – a highly cited study, and sought advice from an expert in online trial search. Two key advices were sought from the expert: (i) to determine if there were any on-going or existing reviews in similar scope of research or if a new review was already available and (ii) to develop an initial literature search strategy to estimate the volume of available literature, as well as to indicate the resources required for the review of the literature.

A comprehensive review of online documents that could be accessed, from 2010 to the current date across databases and websites, containing focused key texts, such as ‘circular economy’, ‘plastic pollution’, ‘plastic waste recycling’, ‘informal waste sector’, ‘waste pickers’, ‘plastic crisis’, ‘waste picker organization’ (WPO), ‘global’, were identified and extracted. These literatures obtained were then reviewed and linked to four significant factors often connected to the informal waste management sector: health, social dynamics, regulatory frameworks and economic aspects, especially within the context of the global south. The databases searched were SCOPUS, SAGE, ScienceDirect, Springer, Nature, Sustainability, Taylor and Francis Online, Academia and Google Scholar.

The focused key texts identified were additionally based on their relevance to the review topic, accessibility to, and prominence within the global literature review practice. The search also included synonyms and controlled typescripts of the key-focused texts to ensure robust search of literature, including accessing websites of prominent organizations that, among many other things, operate, support, influence and engage on the topic of interest. Moreover, social media sites such as Twitter, Facebook and LinkedIn were also searched for. Such an approach acted as guidance for retrieval of online available documentation and developing narratives.

Given the approach mentioned above, it is worth noting there exist limited published information on the topic of interest; approximately 107 credible studies could be obtained, despite the

authors also conducting a comprehensive search on unpublished reports (23), grey literature (26), conference (13) and workshop proceedings (6), bearing in mind both the significance of database searching versus an approach or strategy deployed for database searches. However, we do acknowledge that there may be more studies available.

A recently published paper by Harfadli et al. (2024) stated that between 2012 and 2016, research predominantly examined the role and positioning of informal recycling systems within waste management frameworks. Subsequently, from 2017 to 2018, attention shifted toward formalizing the informal waste sector and exploring its implications and associated risks. However, studies in the past five years have started to concentrate on plastic waste and recyclables, evaluating their economic significance and identifying hazards prevalent in the informal waste sector.

## Increasing recyclable plastic recovery rates

The informal recycling sector (IRS), which is made up of individuals and groups that partake in peripheral collection and sorting recyclable materials, is often the only form of recycling in some developing countries (U.S. Environmental Protection Agency | US EPA, 2020). Prevalent in the Global South, waste pickers are a major part of the IRS, often providing the only form of plastic waste management (Velis, 2017). Despite their contribution to the recovery of valuable recyclable materials, the pressure to manage the plastic crisis has seen public authorities adopt innovative solutions such as new technology and privatization of the waste management which excludes informal waste pickers and stripping away their sources of income (International Labour Organization, 2019). This has led waste pickers to organize and protest against exclusive waste management practices like incineration and waste privatization (Demaria and Todt, 2020).

WPOs are crucial in increasing recycling rates and play a major role in helping to manage the global plastic crisis (Gutberlet and Carenzo, 2020). While it is not possible to recycle our way out of the plastic crisis, the efforts of informal waste pickers have a substantial impact in the recycled plastics supply chain. For instance, in the city of Pune, in the western Indian state of Maharashtra, waste pickers manage approximately 1,000 tons of waste every day and recycle more than 70,000 metric tonnes of materials annually (Parsons et al., 2019). In this particular case, their success in bridging the municipal service delivery gap was largely credited to how they organized themselves as a worker-owned cooperative of self-employed waste collectors. In India, the informal sector (small enterprises, groups and self-employed individuals) recovers 90% of PET bottles, which is higher than the formal recycling rate in Japan, Europe and the United States. While in Indonesia, 70% of the 1 million tonnes of plastic per year collected by the country’s 3.7 million waste pickers is recycled (GRID-Arendal, 2022).

A study by the Philippine Institute for Development Studies, a government think tank in the Philippines, reported that individual waste pickers collected an average of 16.6 kg of plastics a day, diverting this waste from dumpsites and waterways (PIDS, 2023). Quantifying the exact quality of materials that these waste pickers deliver to recycling is challenging due to difficulty in tracking and monitoring given the informal nature of the collection and sorting process. However, research has shown that integrating waste pickers into formal waste management systems can significantly

enhance their ability to collect and sort, resulting in the recovery of better-quality recyclable materials (Buch et al., 2021).

Waste pickers' contribution to curbing the global plastic crisis includes managing a multitude of environmental consequences, such as lessening greenhouse gas emissions (by diverting waste from decay in dumps/landfills, substitution of virgin materials through recycling, use of less energy-intensive transportation, less energy intensive sorting and diverting waste from open burning) (WIEGO, 2019), decreasing the amount of plastics being open burned or leaked into the ocean, and reducing debris that clogs waterways and causes flooding (Barford and Ahmad, 2021).

For many low- and middle-income countries, informal waste pickers are the only link between plastic waste and recyclables recovery. In fact, waste pickers have been at the heart of resource recovery long before the idea of circular economy gained popularity (Gutberlet and Careno, 2020), and many of these informal workers earn their main source of income by salvaging recyclable materials and channeling them through the recycling and/or reuse economy.

Waste pickers divert almost 60% of plastics from landfills and open burning, significantly contributing to a healthier and more sustainable environment (WIEGO, 2022). Despite this, they continue to remain largely unrecognized for their contributions to managing the plastic crisis, are commonly stigmatized for their work, and are often not consulted when local governments set up new waste management programs or recycling centers (Gutberlet and Careno, 2020).

In addition, Governments in some countries often view informal waste pickers as a problem – seeing their activities as a disturbance if garbage bags are rummaged and waste is scattered, or because these workers put their health and safety at risk while working in dumps/landfills – and often respond by putting restrictions on informal waste picking activities. However, this situation poses further socio-economic issues for informal workers because it affects their incomes and living conditions (Medina, 2011).

As nations and businesses transition towards greener, climate-neutral economies, a 'just transition' means this should be done in a fair and inclusive way to ensure the creation of decent work opportunities and that no one is left behind (International Labour Organization, 2021). The integration of informal waste pickers and their experience, skills and organization they bring will be an important consideration in a just transition to circular economy (Schroder, 2020).

### Extended producer responsibility and waste pickers

With growing awareness around the urgency of the plastic crisis, not only have governments been putting increased pressure on companies (plastic producers and users) to take more responsibility for the waste their products generate, but WPOs have become more involved and are paying attention to the growing discussion on extended producer responsibility (EPR). Governments are now looking to companies to follow EPR policies, which are based on the 'polluter pays' principle, emphasizing onus on producers to manage the waste generated from their products/services (Johannes et al., 2021).

The International Alliance of Waste Pickers (IAWP) is a support network for WPOs mainly covering countries in Latin America, Africa and Asia (Talbot et al., 2022). With 34 countries part of the alliance, they are also a close ally of Women in Informal Employment: Globalizing and Organizing – a global network aiming to empower the working poor in the informal economy

(particularly women) for improved and sustainable livelihoods (WIEGO, 2022). In recent years, members of the International Alliance have expressed concerns of informal waste pickers being excluded in EPR policies and implementation in their respective countries (Bonner and Carré, 2013). This led to the establishment of an EPR working group and a global campaign that supported waste pickers in their advocacy to be integrated into EPR policies (Cass Talbot, 2022), declaring that no EPR system could be considered just, effective, or socially inclusive if waste pickers and their organizations were not participating in the system (GlobalRec, 2021).

A recent initiative called the 'Fair Circularity Initiative' was signed by big multinational plastic packaging companies such as Coca-Cola, Pepsico, Unilever and Nestlé, which would commit them to improving the rights of people involved in the informal waste sector who recover plastic to make recycled packaging. The initiative has the potential to lead to fairer compensation and improved health and safety standards for informal waste pickers (O'Hare and Fernandez, 2022).

In some cases, it has been observed that when EPR is introduced, there is a risk of informal workers having to compete for valuable materials, interfering with their incomes and livelihoods. However, an inclusive EPR can present benefits, including more effective waste management operations (utilizing informal workers experience in waste sorting and management), achieving recyclable rate targets, as well as opportunities for informal workers by providing improved health, social protection and sustainable livelihoods (OECD, 2016).

### Gender disparities

According to Bonnet et al. (2019), the percentage of women workers who are informally employed in developing countries is significantly higher than the percentage of men. In many countries, this can also be seen in the IRS too, where there is a high participation of women in informal waste picking (Wittmer, 2022). Female waste pickers face particular challenges, such as those associated with gender inequalities. Some of the major sources of these gender inequalities have been found to be linked to gender disparities in access to education, cultural and patriarchal practices that restrict women's mobility, unbalanced distribution of unpaid domestic work, higher occupational health and safety risks and a lack of access to start-up capital and credit (Ogando et al., 2017).

Recognizing and exploring the gender divide within waste picking is crucial. Women often collect different materials than men, which can affect the overall quality of recycling efforts. Generally, in the informal waste management sector, women are often found in the lower tier. Women are more commonly found working in waste picking and separating at landfill sites, while men dominate higher-income and decision-making roles such as truck drivers, scrap dealers and repair shop workers. This disparity in division of labor also means that women are often left behind when waste management initiatives are formalized. Stronger organizations can help to address these disparities to ensure equitable access to education, training and benefits and empower women waste pickers to be included in decision-making in the waste management systems. It is crucial for all waste pickers, regardless of gender, to be recognized as knowledge holders in the waste management space and that they are included in national, regional and international negotiations to safeguard a just transition to end plastic pollution (O'Hare and Nøklebye, 2024).

While gender-based discrimination is faced by all women to some degree, due to the intersectionality of gender inequality, not all female waste pickers face the same types and levels of hardships, as some suffer increased hardships based on other factors such as race, religion, nationality and caste, as in the case of India (Mlotshwa et al., 2022). Ramolelle and Xweso (2022), in their case study of female waste pickers in Mashaeng, Free State, South Africa, found that the ability of female waste pickers to nurture their children was limited by their involvement in waste picking. The study found that female waste pickers left their young children home alone or had to take them along while waste picking, suggesting an imbalance in domestic responsibilities between male and female waste pickers, such as that related to childcare. Regardless of the hardships and challenges female waste pickers face, they continue to remain in this space as the production and consumption of plastic products continuously rises and provides an opportunity for these already marginalized groups to make a living by collecting, sorting and recycling valuable discarded plastics.

### Waste picker organizations

Waste pickers have been observed to organize themselves in various ways (Gutberlet et al., 2021). These can be in the form of associations, cooperatives, gender-specific groups, community-based organizations, networks, youth groups and microenterprises (Kain et al., 2024). The ways waste pickers organize themselves are crucial for the creation of enabling platforms that can bring about better working conditions, improve quality of life through access to basic services such as health and education, and for influencing policies (Ezeah et al., 2013). By reviewing how waste pickers organize themselves around the world, we can grasp more completely how improved organization leads to for example better sorting facilities and training, resulting in waste pickers securing higher-quality recyclable materials for the formal sector.

WPOs can help informal workers increase their chances of receiving financial, technical or infrastructural support, where they may be provided machinery, personal protective equipment, operating space, or professional and technical training from governments or nongovernmental organizations (NGOs) (Kain et al., 2024). One of the most common types of WPOs are cooperatives, which are enterprises that are democratically controlled and member-owned and can help informal waste pickers transition to the formal economy by boosting their collective voice, enhancing their representation, securing safer working conditions and incomes, and creating pathways for accessing social protection and basic services (International Labour Organization, 2019).

In countries such as Brazil, Colombia, Argentina, South Africa and India, cooperatives have been key in formal waste chains recognizing waste pickers (Medina, 2008). In Brazil, Waste Picker's Cooperatives and Organizations have played key roles in the formal recognition of waste pickers. For example, in Brazil, the Association of Collectors of Paper, Cardboard and Reusable Material (ASMARE) was established in 1990 in Belo Horizonte. The group has worked unflinchingly to ensure that its members' concerns are included in national and municipal waste management planning.

In 2001, when the mandatory upgrading of disposal sites resulted in waste pickers being prohibited from accessing dumpsites, ASMARE organized stakeholder consultations to raise waste pickers' concerns. This led to a more inclusive resolution that mandated municipalities to create job and income opportunities for affected waste pickers (International Labour Organization,

2019). Additionally, in 2001, the country recognized waste picking as a profession in the Brazilian Occupation Classification (CBO) (Dias and Vera, 2017). These types of enabling policies help WPOs' better advocate for the rights of their members. Waste pickers roles are also now stated in Brazil's Law on the National Policy of Solid Waste, which was approved in 2010, with much credit to WPOs in the country (Da Silva and Bolson, 2018). These unprecedented and innovative legislations are, however, underpinned by decades of initiatives of integrating waste pickers into the recycling chain, propelled by waste pickers organizing themselves into cooperatives (Pisano et al., 2022).

There are also many instances of waste pickers being organized into trade unions or cooperatives, which have helped formalize their work (Colombijn and Morbidini, 2017). For example, in 1993, a trade union named Kagad Kach Patra Kashtakari Panchayat (KKPKP) was established for waste pickers in Pune, India (Chikarmane and Narayan, 2005). The trade union piloted a program that built the capacity of 1500 waste pickers to undertake door-to-door collection. In 2007, KKPKP set up the Solid Waste Collection Handling (SWaCH) Cooperative, which was made up of waste pickers and itinerant waste buyers and was contracted by the Pune Municipal Council to provide door-to-door waste collection services where households were required to pay a user fees (Chikarmane, 2012).

The workers earned income from both the user fees and the sale of the recyclables they collected. Using the skills and expertise of these informal workers, the union/cooperative was able to set up a more formal system where members paid a fee to the cooperative, as well as for insurance coverage, while the municipal council provided identification cards that offered members access to other basic services (Tangri, 2012). The success of this operation further led to all Indian cities being mandated to register waste pickers, provision of identification cards, and their inclusion in decision-making as well as plans and activities of the cities that affected them (Moora and Barde, 2019; Harhare, 2022).

### Waste pickers organizing by region

While there are WPO in the Global North, informal sector activities are more prevalent in the Global South (Velis, 2017). Across Latin America, cooperatives are the prevailing form of WPOs. While the majority of organizations in this region are formalized, Kain et al. (2024) highlight that apart from many of the difficulties organizations face, a key difficulty includes, for example, maintaining and keeping their legal documents current, as it can be costly and takes time to obtaining one. Gutberlet et al. (2023) also point out how waste pickers' movements in Latin American countries such as Brazil stem from the social and solidarity economy (SSE), which is an economic development approach that places importance on people and planet welfare over profit and growth.

Although Latin America has long had strong SSE organizations that support informal waste pickers, and enabling national and regional policies, many waste pickers are still not part of any organization and choose to carry out their work autonomously. There are various reasons some choose not to join WPOs, including not wanting to work in a group or report to a supervisor where they may be required to conform to certain rules/guidelines, preferring more freedom in how they carry out their activities (Samson, 2009), or not wanting to commit to a cooperative due to certain requirements such as formal documentation, which some workers may not have.

Nevertheless, cooperatives have also been seen to open innovative opportunities for waste pickers as well as create pathways for the discovery of local solutions to the plastic crisis (Kain et al., 2024). For example, *Reciclando Sueños* (English translation: Recycling Dreams) is a cooperative in Argentina that works with university researchers and has developed an innovative way to turn nonmarketable recyclables such as multilayered plastics and expanded polystyrene into marketable products. Innovative developments such as the initiatives developed by *Reciclando Sueños* in the recycling sector, which includes and builds on the work of waste pickers, highlights informal workers' value and contribution in the shift toward a circular economy (Gutberlet et al., 2017).

In Asia, more than half of the plastic waste entering the ocean originates from the five Asian countries of China, Indonesia, the Philippines, Thailand and Vietnam. While China banned imports of plastic waste in 2017, this led to a redirection of plastic waste to other countries in Asia, such as Indonesia, which saw plastic waste imports double in the year after China's ban (Hicks, 2023). Prior to this, China was the largest importer of recyclable plastic waste, importing approximately 55.7% of global plastic waste (Wen et al., 2021). Much of the plastic leakage from these countries is connected to the inefficient waste management systems and waste collection efforts by governments and other authorities (Ocean Conservancy, 2019).

Informal waste pickers in Asia organize themselves in many different forms, such as associations, self-help groups, cooperatives, community-based organizations (CBOs) and NGOs (Gutberlet et al., 2017). For instance, India has the Alliance of Indian waste pickers, which ensures waste pickers and informal waste collectors were included in India's 2016 solid waste management (SWM) policies (Zisopoulos et al., 2023). In the Philippines, an NGO called the Women's *Balikatan* Movement established a program – *Linis Ganda* – which started as a system to formalize waste pickers (known as 'Eco aides' in this group) is now a composition of cooperatives that service all 17 cities and towns of Metro Manila (Medina, 2005).

This Philippine example of WPO is relatively structured, with each *Eco aide* having an assigned route to schools and households from which recyclables (separated at source) are collected (Medina, 2005). In comparison, waste pickers in Indonesia have received considerable support from their central government, which supports the establishment of cooperatives for waste pickers through enabling national legislations. This includes a government-imposed duty on imported waste items to try to increase waste pickers financial return and private banks also provide loans to these waste picker cooperations (Sasaki et al., 2014).

Informal workers in many developing countries, particularly in the global south, rarely have access to finance or even own bank accounts, but as more countries in regions such as Africa, Asia and South America, try to curb the plastic crisis, the role and contribution of waste pickers is being increasingly recognized and formalization of their work helps to increase their access to social and economic opportunities (Morais et al., 2022).

Within the African continent, traditional indigenous knowledge has long underpinned the respect and preservation of its unique ecosystems, with the belief that anything taken from the earth should be without harm and be able to be repurposed and returned (Global Alliance for Incinerator Alternatives (GAIA), 2021). Unfortunately, due to a combination of factors such as high mass consumption, growing populations and poor waste management

systems, many parts of Africa have turned into wastelands that are inundated with toxic plastic wastes. A case study on the Social, Environmental, and Economic Benefits of Partnering with Informal Recyclers (GAIA, 2021) found that waste pickers in Africa are crucial to mitigating the plastic crisis, with countries such as South Africa having an estimated 80–90% of postconsumer packaging recovered by waste pickers.

Over 90,000 people living in South Africa make a living as waste pickers, and over 1000 are registered with the South African Waste Pickers Association (SAWPA) (Friends of the Earth Europe, 2020). While this is only a minuscule percentage of South Africa's 60 million total population, it is still more than 8 times the total population of, for example, the Pacific atoll nation of Tuvalu – a nation that is urging larger countries to take responsibility for climate change impacts and encouraging circular economy activities.

Established in 2009, SAWPA has a strong focus on promoting human rights of waste pickers (GAIA, 2021). The association has been vital in enabling waste pickers to become key stakeholders in policy discussions majorly around national waste management (Department of Environment, Forestry and Fisheries and Department of Science and Innovation, 2020). This has further ensured the prevention of false solutions, including expensive technology that is not sustainable, such as for waste to energy incineration, which not only further exacerbates the climate crisis, but also threatens waste pickers' livelihoods (GAIA, 2021).

In Ghana, waste pickers also benefit from organizing through NGOs, such as the Green Youth Organization. Founded in 2014 and based in Accra, Ghana, the waste pickers implemented Ghana's first community-led circular economy waste management project – Sustainable Community Project – to help mitigate pollution concerns such as the plastic crisis (Boateng, 2022). Waste pickers in other countries within the African continent, such as in Tanzania, Kenya and Morocco, also face similar challenges and organize themselves in similar groups to create more supportive and enabling environments that allow them to make a living by being at the frontline of the plastic crisis (Morais et al., 2022).

In comparison to the way cooperatives structurally organize themselves to improve working conditions for waste pickers, NGOs usually operate by providing support in creating platforms for knowledge sharing, advocacy, or capacity building. For example, the Pacific Recycling Foundation (PRF) – an NGO-style structured organization in Fiji work very closely with people involved in informal waste picking and have provided support through financial literacy training and health checkups (Pacific Recycling Foundation, 2023). They are in the process of extending their set-up in other parts of the Pacific as well.

The plastic crisis is a major concern for Pacific Island Countries that are dependent on the ocean as a source of livelihood, food, transportation and cultural significance for the Pacific peoples (Farrelly et al., 2020). In the Pacific, waste management is underdeveloped, and municipal SWM services often do not reach far beyond urban areas. This leaves many Pacific Island Countries inundated with plastic waste that cannot be properly managed locally.

While some private companies, such as Waste Recyclers in Fiji and Recycle Corp in Vanuatu do take recyclable wastes, the collected recyclables must be shipped to other countries, such as Australia, which have proper processing facilities that Pacific Island Countries lack. This becomes a costly exercise given the low

recovery rate of plastic recyclables, as well as Pacific Island Countries distance from main markets (Farrelly et al., 2021).

While most Pacific Island countries do not have organized waste picker cooperatives as they do in Latin America, Asia and Africa, informal waste pickers are usually loosely organized according to the areas within which they collect recyclable waste. In Vanuatu, a group of waste pickers in the Etas community have found value in materials that have been discarded by others (Dean et al., 2022).

A report published by the Pacific Region Infrastructure Facility (2018) found that there are no sanitary landfills for example in Solomons Island, with the largest disposal site being the Ranadi landfill, which is situated in Honiara, the country's capital. While there is no segregation at the landfill, a group of informal waste pickers recover valuable recyclable materials, and the landfill site has a warehouse and baler that allows for compressing and storing of PET bottles (Pacific Recycling Infrastructure Facility, 2018).

While informal waste pickers are key to increasing recyclables recovery rates, their sporadic collection and lack of collective organizing makes it difficult to influence significant impact and hinders their ability to gain access to better working conditions (Medina, 2008). In Fiji, the PRF, for instance, has been working with a small group of informal waste pickers, most of whom are women and/or members of the LGBTQIA+ community, to create recognition for their valuable work as 'environmental guardians', end societal stigma against informal waste pickers, and transition them to a more formal working system where the informal workers can have access to basic services such as legal aid and healthcare, provision of bank accounts and capacity building trainings such as financial literacy (Romanu, 2022).

In 2022, Fiji also became the first Pacific nation to formally recognize waste pickers as environmental heroes/champions and were coined a new name – collection pillars of recycling – to eliminate stigma associated with the term 'informal waste pickers' (Kleck, 2022; Burgess and Souisa, 2022). These efforts are aimed at creating a supporting environment for the betterment of waste pickers' livelihoods and enable them to continue to curb the plastic crisis through their work in collecting, sorting and recycling plastic waste.

## Global plastic treaty

In 2022, the fifth session of the United Nations Environment Assembly (UNEA 5.2) was held in Nairobi, Kenya. It was at this session that governments formally agreed to negotiate a legally binding instrument on ending plastic pollution by 2024. Given this groundbreaking agreement, WPOs are pushing to ensure that their voices are heard and that they are fairly represented in the global plastics treaty. Specifically, the IAWP urged for negotiations to include dialogue on just transition of informal workers in plastic production, packaging and recycling (Arora et al., 2022). This was outlined in the position paper submitted for the first intergovernmental negotiating committee meeting on plastic pollution which was to be held in November 2022, in Uruguay (GlobalRec, 2022b).

During the fifth UNEA Plenary session, a representative of the Alliance also presented the group's priorities for a global plastics treaty through a declaration that included recognition of informal waste pickers as part of the solution to plastic pollution and as important stakeholders in the planning of national waste management laws and regulations. Fair compensation and provision of safe

working conditions were also put forward as priorities, including a pathway for just transition of informal waste pickers to formal roles.

Following this session, a delegation of waste pickers from the IAWP was invited to participate in an open-ended working group in Dakar, Senegal in May 2022. The working group emphasized the importance of ensuring safer plastic waste management by eliminating carcinogenic and toxic materials from plastic production, and urging member states to design and implement EPR policies that require polluting producers/companies to collaborate with waste pickers and WPOs for effective plastic waste management (GlobalRec, 2022a). As representation of the informal waste sector at global meetings increases, it reinforces the importance of waste pickers on the larger agenda to end plastic pollution.

## Conclusion/recommendations

Waste pickers have long played an important role in managing the plastic crisis. Today, they are still the only form of solid waste collection and plastic waste management in many developing countries in the global south. While some countries, such as Brazil and India, have made progressive moves to integrate waste pickers into formal waste management systems, others are still leaving them behind with exclusionary policies.

WPOs, such as cooperatives, associations and self-help groups, and inclusive national policies on waste management are crucial to ensuring that the roles of waste pickers are recognized for their widespread contribution to environmental sustainability and public health and safety. By significantly increasing plastic recyclable rates, waste pickers subsequently reduce the number of toxic plastics that end up in landfills, oceans, and being openly burned. However, the majority of waste pickers around the world continue to face poor working conditions, live in marginalized conditions, battle public stigmatization and lack access to many basic services such as health and education.

The plastic crisis is a complex challenge that will require widespread efforts to curb, and waste pickers play a key role. It would greatly benefit countries to develop and implement enabling policies that help waste pickers to continue to use their experience in collection, sorting and recycling to help combat the plastic crisis. These include policies that support WPOs, inclusion in municipal and national waste management planning, formal recognition of waste pickers, fair remuneration and access to social and health services.

International recognition and support are equally important for enabling waste pickers to continue their efforts to curb the plastic crisis. With current ongoing negotiations to establish a global plastics treaty, it will be opportune for waste pickers' knowledge, skills and rights to be included and formally recognized at the international level. Ideally, through the development of a just transition plan that safeguards waste pickers' rights and fully incorporates their key role in the plastics value chain, a more inclusive approach can be established in the fight to end plastic pollution.

Additionally, there appears information and data on the topic that has not found its way into the mainstream literature databases, mostly sitting as grey literature, majorly with organizations who work with waste pickers or engage with these very vital community. This was evident during literature search where a number of literature were found unpublished and held with organizations working in SWM and the waste picker space, as in the case of the

Pacific. Since it is an emerging field of study, there is an opportunity to continue to highlight through research and published information and datasets the contributions of the waste pickers to the economy, environmental and sociocultural pursuits of each country, especially those in the global south.

**Open peer review.** To view the open peer review materials for this article, please visit <http://doi.org/10.1017/plc.2024.24>.

**Author contribution.** The authors confirm sole responsibility for the following: study conception and design, data collection, analysis and interpretation of results and manuscript preparation.

**Financial support.** The authors acknowledge the support of Germany and Qatar funding for the Global UNDP Accelerator Labs.

**Competing interest.** The authors declare none.

**Disclaimer.** The views represented in this article are those of the authors and do not represent the views of their past or present employer(s).

## References

- Arora K, et al. (2022) *Global plastics treaty: Waste pickers ready to talk*, WIEGO. Available at <https://www.wiego.org/blog/global-plastics-treaty-waste-pickers-ready-talk> (accessed 5 March 2023).
- Barford A and Ahmad SR (2021) A call for a socially restorative circular economy: Waste pickers in the recycled plastics supply chain. *Circular Economy and Sustainability* 1(2), 761–782. <https://doi.org/10.1007/s43615-021-00056-7>.
- Benosa S (2023) *On the Ground: Stories of Waste Workers and Waste Pickers in Asia*. Rep. GAIA.
- Boateng A (2022) The third sector's role in driving urban climate governance: Evidence from two major small and medium sized cities in Ghana. *European Scientific Journal ESJ* 7(1). <https://doi.org/10.19044/esjpreprint.7.2022.p243>.
- Bonner C and Carré F (2013) *Global Networking: Informal Workers Build Solidarity, Power and Representation through Networks and Alliances*. WIEGO Working Paper No. 31. Available at <https://www.wiego.org/sites/default/files/migrated/publications/files/Bonner-Global-Networking-Informal-Workers-WIEGO-WP31.pdf>. (accessed 5 March 2023).
- Bonnet F, Vanek J and Chen M (2019) *Women and Men in the Informal Economy – A Statistical Brief*. Manchester, UK: WIEGO.
- Buch R, et al. (2021) From waste pickers to producers: An inclusive circular economy solution through development of cooperatives in waste management. *Sustainability* 13(16), 8925. <https://doi.org/10.3390/su13168925>.
- Burgess A and Souisa H (2022) *Fiji becomes first Pacific nation to recognise waste pickers as the world's invisible environmentalists fight to be seen*. ABC news. Available at <https://www.abc.net.au/news/2022-08-08/fiji-waste-picker-recognition-plastic-recycling-asia/101262142> (accessed 5 March 2023).
- Chikarmane P (2012) Integrating Waste Pickers into Municipal Solid Waste Management in Pune, India, WIEGO Policy Brief (Urban Policies) No. 8. Available at <https://www.wiego.org/publications/integrating-waste-pickers-municipal-solid-waste-management-pune-india>.
- Chikarmane P and Narayan L (2005) Organising the unorganised: A case study of the kagad kach patra Kashtakari panchayat (trade union of waste-pickers), WIEGO. Available at <https://www.wiego.org/resources/organising-unorganised-case-study-kagad-kach-patra-kashtakari-panchayat-trade-union-waste> (accessed 5 February 2023).
- Circle Economy (2023) *The circularity gap report 2023* (pp. 1–64, Rep.). Amsterdam: Circle Economy.
- Colombijn F and Morbidini M (2017) Pros and cons of the formation of waste-pickers' cooperatives: A comparison between Brazil and Indonesia. *Decision* 44, 91. <https://doi.org/10.1007/s40622-017-0149-5>.
- Cook E and Velis CA (2020) *Global Review on Safer End of Engineered Life*, 34–36.
- Cooper C, Booth A, Varley-Campbell J, Britten N and Garside R (2018) Defining the process to literature searching in systematic reviews: A literature review of guidance and supporting studies. *BMC Medical Research Methodology*. 18(1), 85. <https://doi.org/10.1186/s12874-018-0545-3>.
- Cowing MJ (2013) *Health and Safety Guidelines for Waste Pickers in South Sudan*. Rep. UNEP.
- Da Silva CL and Bolson C (2018) Public policy for solid waste and the organization of waste pickers: Potentials and limitations to promote social inclusion in Brazil. *Recycling* 3, 40. <https://doi.org/10.3390/recycling3030040>.
- Dean MRU, Asen M and Baniuri A (2022) *The Under-the-Radar Informal Waste Pickers of Etas Community in Port Vila*. UNDP Pacific, April. Available at <https://www.undp.org/pacific/blog/under-radar-informal-waste-pickers-etas-community-port-vila>.
- Demaria F and Todt M (2020) *How Waste Pickers in the Global South are Being Sidelined by New Policies*. The Conversation. Available at <https://theconversation.com/how-waste-pickers-in-the-global-south-are-being-sidelined-by-new-policies-132521> (Accessed 5 February 2023).
- Department of Environment, Forestry and Fisheries and Department of Science and Innovation (2020) *Waste Picker Integration Guideline for South Africa: Building the Recycling Economy and Improving Livelihoods through Integration of the Informal Sector*. DEFF and DST: Pretoria.
- Dias, SM and Silva, VAC (2017) “8. Waste Pickers in Brazil: Recognition and Annual Bonus”. *Informal Workers and Collective Action: A Global Perspective*, edited by Adrienne E. Eaton, Susan J. Schurman and Martha A. Chan, Ithaca, NY: Cornell University Press, 178–199. <https://doi.org/10.7591/9781501707964-010>.
- Ezeah C, Fazakerley JA and Roberts CL (2013) Emerging trends in informal sector recycling in developing and transition countries. *Waste Management* 33(11), 2509–2519. <https://doi.org/10.1016/j.wasman.2013.06.020>.
- Farrelly DT, Borrelle DS and Fuller DS (2020) *Plastic Pollution Prevention in Pacific Island Countries: Gap analysis of current legislation, policies and plans*. Rep. Environmental Investigation Agency (EIA). Available at <https://report.s.eia-international.org/wp-content/uploads/sites/6/2020/09/Plastic-Prevention-Gap-Analysis-2020.pdf>.
- Farrelly TA, Borrelle SB and Fuller S (2021) The strengths and weaknesses of Pacific Islands plastic pollution policy frameworks. *Sustainability* 13(3), 1252. <https://doi.org/10.3390/su13031252>.
- Fraser M, Haigh L and Soria AC (2023) *Circularity Gap Report*. Rep. Circle Economy. Available at [https://assets-global-website-files.com/5e185aa4d2bfc348400ed82/63ecb3ad94e12d3e5599cf54\\_CGR%202023%20-%20Report.pdf](https://assets-global-website-files.com/5e185aa4d2bfc348400ed82/63ecb3ad94e12d3e5599cf54_CGR%202023%20-%20Report.pdf).
- Friends of Earth Europe (2020) *Stories of solidarity under coronavirus*. Available at <https://friendsoftheearth.eu/news/south-africa-helping-vulnerable-waste-pickers-survive-covid-19-covid-solidarity/> (accessed 15 December 2023).
- Global Alliance for Incinerator Alternatives (GAIA) (2021) *Strengthening Waste Picker Organising in Africa*.
- GlobalRec (2021) *Position on Extended Producer Responsibility (EPR)*. Rep. Available at [https://epr.globalrec.org/files/2021/12/EPR\\_GlobalRec\\_ENG.pdf](https://epr.globalrec.org/files/2021/12/EPR_GlobalRec_ENG.pdf).
- GlobalRec (2022a) *Call for recognition of waste-pickers in international legally binding instrument on plastics pollution, International Alliance of Waste Pickers*. Available at <https://globalrec.org/2022/02/22/declaration-wastepickers-inclusion-unea/> (accessed 5 March 2023).
- GlobalRec (2022b) *GlobalRec seeks meaningful participation of waste pickers in the first negotiations of plastics treaty in Uruguay, International Alliance of Waste Pickers*. Available at <https://globalrec.org/2022/07/15/globalrec-participation-waste-pickers-plastics-treaty-uruguay/> (accessed 15 February 2023).
- GRID-Arendal (2022) *A Seat at the Table: The Role of the Informal Recycling Sector in Plastic Pollution Reduction, and Recommended Policy Changes*.
- Gutberlet J and Carenzo S (2020) Waste pickers at the heart of the circular economy: A perspective of inclusive recycling from the Global South. *Worldwide Waste: Journal of Interdisciplinary Studies*, 3(1), 1–14. <https://doi.org/10.5334/wwwj.50>.
- Gutberlet J, et al. (2017) Waste picker organizations and their contribution to the circular economy: Two case studies from a global south perspective. *Resources* 6(4), 52. <https://doi.org/10.3390/resources6040052>.
- Gutberlet J, Sorroche S, Martins Baeder A, Zapata P, & Zapata Campos MJ (2021) Waste pickers and their practices of insurgency and environmental stewardship. *The Journal of Environment & Development* 30(4), 369–394. <https://doi.org/10.1177/10704965211055328>.
- Gutberlet J, Mantovani Martiniano de Azevedo A, Morais L, Bacic MJ, & Silva de Mesquita M (2023) Social movements in the context of crisis: waste picker organizations as collaborative public partners in the context of the COVID-

- 19 pandemic. *Environment and Urbanization* 35(1), 255–274. <https://doi.org/10.1177/09562478221151110>.
- Halog A, Anieke S** (2021) A Review of Circular Economy Studies in Developed Countries and Its Potential Adoption in Developing Countries. *Circ.Econ. Sust.* 1, 209–230. <https://doi.org/10.1007/s43615-021-00017-0>.
- Harfadli MM, Ramadan BS, Rachman I, et al.** (2024) Challenges and characteristics of the informal waste sector in developing countries: An overview. *Journal of Material Cycles Waste Management* 26, 1294–1309. <https://doi.org/10.1007/s10163-024-01929-3>.
- Harhare M** (2022) *Transforming Waste Management by Empowering Informal Waste-Pickers in Pune*. Resilient Cities Network.
- Hicks R** (2023). In *Pictures: Life on Southeast Asia's Largest Landfill*, *Eco. Eco-Business*. Available at <https://www.eco-business.com/news/in-pictures-life-on-southeast-asias-largest-landfill/> (accessed 5 March 2023).
- International Labour Organization** (2019) Waste Pickers' Cooperatives and Social and Solidarity Economy Organizations. Available at [https://www.ilo.org/global/topics/cooperatives/publications/WCMS\\_715845/lang-en/index.htm](https://www.ilo.org/global/topics/cooperatives/publications/WCMS_715845/lang-en/index.htm) (accessed 5 February 2023).
- International Labour Organization** (2021) Frequently Asked Questions on Just transition. Available at [https://www.ilo.org/global/topics/green-jobs/WCMS\\_824102/lang-en/index.htm#:~:text=A%20Just%20Transition%20involves%20maximizing,fundamental%20labour%20principles%20and%20rights%20](https://www.ilo.org/global/topics/green-jobs/WCMS_824102/lang-en/index.htm#:~:text=A%20Just%20Transition%20involves%20maximizing,fundamental%20labour%20principles%20and%20rights%20) (accessed 23 December 2023).
- Johannes HP, et al.** (2021) Applying the extended producer responsibility towards plastic waste in Asian developing countries for reducing marine plastic debris. *Waste Management & Research: The Journal for a Sustainable Circular Economy* 39(5), 690–702. <https://doi.org/10.1177/0734242x211013412>.
- Kain J-H, Zapata P, Martiniano de Azevedo AM, Careno S, Charles G, Gutberlet J, Oloko M, Pérez Reynosa J, & Zapata Campos MJ** (2024) Characteristics, challenges and innovations of waste picker organizations: A comparative perspective between Latin American and East African countries. *PLOS ONE* 19(9), e0265889. <https://doi.org/10.1371/journal.pone.0265889>
- Kalali EN, Lotfian S, Shabestari ME, Khayatzaeh S, Zhao C and Nezhad HY** (2023) A critical review of the current progress of plastic waste recycling technology in structural materials. *Current Opinion in Green and Sustainable Chemistry* 40. <https://doi.org/10.1016/j.cogsc.2023.100763>.
- Kibria MG, Masuk NI, Safayet RH, Nguyen Q and Mourshed M** (2023) Plastic Waste: Challenges and opportunities to mitigate pollution and effective Management. *International Journal of Environmental Research* 17, 20. <https://doi.org/10.1007/s41742-023-00507-z>.
- Kleck M** (2022) *Fiji becomes First Pacific nation to recognise 'waste pickers' as recycling heroes*, *Global Citizen*. Available at <https://www.globalcitizen.org/en/content/fiji-waste-pickers-recognition/> (accessed 15 April 2023).
- McGinty DB** (2021) *5 opportunities of a circular economy*. *World Resources Institute*. Available at <https://www.wri.org/insights/5-opportunities-circular-economy> (accessed 20 January 2024).
- Medina M** (2005) *Waste Picker Cooperatives in Developing Countries*. Ahmedabad, India: WIEGO.
- Medina M** (2008) *The Informal Recycling Sector in Developing Countries*. Rep. Global: World Bank.
- Medina M** (2011) *Recovering Resources, Creating Opportunities: Integrating the Informal Sector into Solid Waste Management*. Rep. Eschborn: Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ).
- Mlotshwa N, et al.** (2022) Working with waste: Hazards and mitigation strategies used by waste pickers in the inner city of Durban. *International Journal of Environmental Research and Public Health* 19(20), 12986. <https://doi.org/10.3390/ijerph192012986>.
- Moor H and Barde H** (2019) *Closing the Loop: Innovative Partnerships with Informal Workers to Recover Plastic Waste, in an Inclusive Circular Economy Approach*. Asia-Pacific: UNESCAP.
- Morais J et al.** (2022) Global review of human waste-picking and its contribution to poverty alleviation and a circular economy. *Environmental Research Letters* 17(6), 063002. <https://doi.org/10.1088/1748-9326/ac6b49>.
- O'Hare P and Fernandez L** (2022) Waste pickers risk their lives to stop plastic pollution – Now they could help shape global recycling policies. Available at <https://theconversation.com/waste-pickers-risk-their-lives-to-stop-plastic-pollution-now-they-could-help-shape-global-recycling-policies-195311>.
- O'Hare P and Nøklebye E** (2024) The human face of the UN plastics treaty? The role of waste pickers in intergovernmental negotiations to end plastic pollution and ensure a just transition. *Cambridge Prisms: Plastics* 2, e12. <https://doi.org/10.1017/plc.2024.12>.
- Ocean Conservancy** (2019) *Exploring Solutions to Ocean Plastics: Supporting Southeast Asia's Informal Waste Sector*. Rep. *Ocean Conservancy*. Available at [https://pacecircular.org/sites/default/files/2021-02/FINAL-Informal-Sector-Report\\_compressed.pdf](https://pacecircular.org/sites/default/files/2021-02/FINAL-Informal-Sector-Report_compressed.pdf).
- OECD** (2016) *Extended producer responsibility: Updated guidance for efficient Waste Management*. Rep. OECD. Available at [https://www.oecd-ilibrary.org/environment/extended-producer-responsibility\\_9789264256385-en](https://www.oecd-ilibrary.org/environment/extended-producer-responsibility_9789264256385-en).
- Osando AC, Roever S and Rogan M** (2017) Gender and informal livelihoods. *International Journal of Sociology and Social Policy* 37(7/8), 435–451. <https://doi.org/10.1108/ijssp-06-2016-0077>.
- Pacific Recycling Foundation** (2023) *Name Change for Informal Waste Pickers to Collection Pillars of Recycling (CPRS) - Initiated by Pacific Recycling Foundation (PRF)*. Available at <https://recyclingfoundation.org/our-projects/informal-waste-pickers-to-cpr/>.
- Pacific Region Infrastructure Facility** (2018) *Rep. Pacific Region Infrastructure Facility (PRIF)*. Pacific Region: Solid Waste Management and Recycling. Available at [https://www.theprif.org/sites/default/files/documents/prif\\_waste\\_book\\_web\\_0.pdf](https://www.theprif.org/sites/default/files/documents/prif_waste_book_web_0.pdf).
- Parsons S, Maassen A and Galvin M** (2019) *Urban Transformations*. India, Waste Pickers Go from Trash to Treasure. In Pune. Available at <https://www.wri.org/insights/urban-transformations-pune-india-waste-pickers-go-trash-treasure>.
- PIDS** (2023) *From Waste Pickers to Eco-Partners*. Available at <https://www.pids.gov.ph/details/news/in-the-news/from-waste-pickers-to-eco-partners>.
- Pisano V, Demajorovic J and Besen GR** (2022) The Brazilian National Solid Waste Policy: Perspectives of the waste pickers' cooperative networks. *Ambiente & Sociedade* 25. <https://doi.org/10.1590/1809-4422asoc20210151r1ft>.
- Ramolelle MJ and Xweso M** (2022) Vulnerability, risks and coping: A case study of female street waste pickers in Mashaeng, Free State, South Africa. *African Journal of Social Work* 11(3), 133–141.
- Romanu V** (2022) *16 Women Receive High Accolades for their Contribution to Waste Management in Fiji*. Rep. International Union for Conservation of Nature (IUCN). Available at <https://www.iucn.org/story/202207/16-women-receive-high-accolades-their-contribution-waste-management-fiji>.
- Samson M** (2009) *Chapter 1: Waste Pickers from around the World', in Refusing to Be Cast Aside: Waste Pickers Organising around the World*. Cambridge, MA, USA: WIEGO.
- Sasaki S, et al.** (2014) Household income, living and working conditions of dumpsite waste pickers in Bantar Gebang: Toward integrated Waste Management in Indonesia. *Resources, Conservation and Recycling* 89, 11–21. <https://doi.org/10.1016/j.resconrec.2014.05.006>.
- Scheel C, Aguiñaga E and Bello B** (2020) Decoupling economic development from the consumption of finite resources using circular economy. A model for developing countries. *Sustainability* 12(4), 1291. <https://doi.org/10.3390/su12041291>.
- Schroder P** (2020) *Promoting a just transition to an inclusive circular economy*. Rep.
- Talbott, TC** (2022) "Extended Producer Responsibility: opportunities and challenges for wastepickers." *Social Contracts and Informal Workers in the Global South*, edited by Laura Alfes, Martha Chen, and Sophie Plagerson, Edward Elgar Publishing, 126–140. <https://doi.org/10.4337/9781839108068.00013>.
- Talbott C, Taylor, Chandran P, Allen C, Narayan L and Boampong O.** (2022) *Extended Producer Responsibility (EPR) and Waste Pickers*. WIEGO Technical Brief No. 15. Manchester, UK: WIEGO. Available at <https://www.wiego.org/sites/default/files/publications/file/technical-brief-no-15.pdf>.
- Tangri N** (2012) *Waste Pickers Lead the Way to Zero Waste*. Pune, India: GAIA. Available at <https://www.wiego.org/publications/waste-pickers-lead-way-zero-waste>.
- U.S. Environmental Protection Agency | US EPA** (2020) *Best Practices for Solid Waste Management: A Guide for Decision-Makers in Developing Countries*. EPA. Available at <https://www.epa.gov/system/files/docu>



- ments/2021-11/swm-guide-flyer-marine-litter-2020-08-06.pdf (accessed 4 February 2023).
- Velis C** (2017) Waste pickers in global south: Informal recycling sector in a circular economy era. *Waste Management & Research: The Journal for a Sustainable Circular Economy*, **35**(4), 329–331. <https://doi.org/10.1177/0734242x17702024>.
- Wen Z**, et al. (2021) China's plastic import ban increases prospects of environmental impact mitigation of plastic Waste trade flow worldwide. *Nature Communications* **12**(1). <https://doi.org/10.1038/s41467-020-20741-9>.
- WIEGO** (2019) Reducing greenhouse gas emissions through inclusive Recycling. Publication.
- WIEGO** (2022) *Waste pickers*. Available at <https://www.wiego.org/waste-pickers#:~:text=Waste%20pickers%20divert%20a%20significant,chain%20and%20avoiding%20plastic%20pollution> (accessed 5 March 2023).
- Wittmer J** (2022) Dirty work in the Clean City: An embodied urban political ecology of women informal recyclers' work in the 'Clean City,'. *Environment and Planning E: Nature and Space* 251484862211023. <https://doi.org/10.1177/25148486221102374>.
- Zisopoulos FK**, et al. (2023) Informal recyclers as stakeholders in a circular economy. *Journal of Cleaner Production* **415**, 137894. <https://doi.org/10.1016/j.jclepro.2023.137894>.