PLASTIC ATLAS

Facts and figures about the world of synthetic polymers 2021

ASIA EDITION

HEINRICH BÖLL STIFTUNG
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#break free from plastic

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INTRODUCTION

Plastics are everywhere in Asia: from Japanese supermarkets where every piece of fruit is separately wrapped in plastic packaging to the erstwhile pristine beaches of the Maldives where each new wave covers the sandy beaches with waste microplastics (fragments less than five millimetres in length) from the surrounding sea.

Indeed, they are found all over the planet. Plastics have been discovered at altitudes of over 8,000 metres on Mount Everest and at an ocean depth of more than 10,000 metres in the Mariana Trench.

Plastics and microplastics are not only an environmental hazard but an issue affecting every one of us. They are found in our seas, soil, and air. They are present in our water, food, and clothes as well.

Plastics' robust ability to endure is also what makes their production, usage, and disposal a problem. They persist even when no longer serviceable, or thrown away after being used only once – a culture driven by globalisation and encouraged by multinational profit-seeking corporations. Plastics pollute at all stages of their life cycle, starting from the extraction of their fossil fuel-based raw materials through to their disposal in landfills, incinerators, rivers, and oceans.

In November 2019, Heinrich Böll Stiftung and Break Free From Plastic published the first Plastic Atlas, a compilation of hard data and informative analysis to highlight the scale of the plastic crisis globally. Comprehensive in scope, the volume tackled head-on the impacts of ever-increasing plastic production, consumption, and disposal issues, and their relationship to other key global challenges, including human health and climate change.

In doing so, Plastic Atlas also highlighted how the narratives crafted by the plastic industry sector – putting the blame largely on the consumer – obscure the realities of these materials and the mega environmental and social costs linked to them.

Global plastics' production totalled close to 370 million tonnes in 2019, up from two million tonnes in 1950. It is projected that production and usage will quadruple by the early 2050s. And today more than 50 percent is produced in Asia.

To highlight the large and rapidly growing role of Asian economies as plastic producers, consumers, contributors to the plastic refuse deluge, and dumping ground for the world's plastic waste, Heinrich-Böll-Stiftung's Asia Global Dialogue Programme and Break Free From Plastic Asia Pacific have now produced this special edition of Plastic Atlas focused on the particular challenges facing the region, along with potential solutions.

How have plastics and a convenience lifestyle become so widespread in a part of the world that traditionally adhered to a refill, reuse, and recycle mindset and where natural materials for packaging and refillable containers were the norm? How has the drive for economic development and adoption of a throwaway culture impacted people and the environment in this densely populated part of the world? Why are women more likely to be impacted by plastic pollution than men? What are the implications for climate change?

In Plastic Atlas Asia Edition, answers to these questions and many more are explored through a series of succinct articles and infographics providing an overview of the key issues behind the plastic pollution crisis.

Topics in this edition include: the history of plastics in Asia; regional issues surrounding production, use, and disposal; spotlights on food, clothing, and tourism, all key economic sectors in Asia; health; regulatory measures; and snapshots on Zero Waste solutions and other initiatives driven by civil society and local communities. In addition, there is a new assessment of the COVID-19 effect that shows how the on-going pandemic is affecting some of the hard-fought gains achieved in recent years.

Citizens across Asia must continue to demand effective action and appropriate solutions from policy-makers.

With the global demand to decrease greenhouse gas emissions, the petrochemical industry is increasingly nervous about a battle over plastics, a key downstream product. Plastic manufacturers and global consumer brands are also beginning to respond. Some companies have started to acknowledge their responsibility to act. However, there is still a very long way to go.

The Editors
Kevin Li, Clemens Kunze, Joseph Edward "Jed" B Alegado, Judith S Juntilla
Heinrich Boell Stiftung Hong Kong Office and Break Free From Plastic Asia Pacific

12 BRIEF LESSONS

ON PLASTIC AND THE PLANET

1 The massive expansion of plastic began in the second half of the 20th century, with the discovery that a **WASTE PRODUCT FROM THE PETROCHEMICAL INDUSTRY** could be used to make PVC.

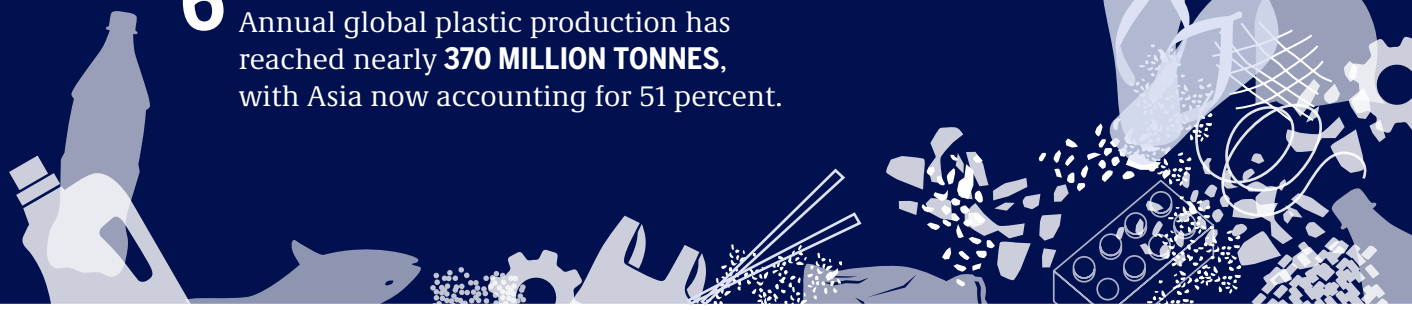
2 Between 1950 and 2017 a total of **9.2 BILLION TONNES OF PLASTIC** were produced. That is more than one tonne for each person now living on Earth. The biggest share consists of single-use products and packaging. Less than ten percent of all plastic ever produced has been recycled.

3 In 1978, Coca-Cola first decided to replace its iconic glass bottles with plastic ones. Now, **DISPOSABLE CUPS, PLASTIC PLATES AND OTHER UTENSILS** have become an indispensable part of our fast-paced daily lives.

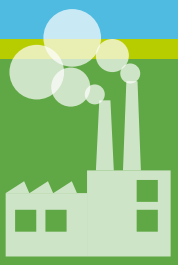
4 Plastic generates many **HEALTH RISKS**. An array of chemicals is added to the base plastic to give it desirable characteristics. But these chemicals are hazardous to health, and they accumulate in indoor air and house dust.

5 Plastic waste and microplastics floating in the world's oceans are a much-discussed problem. But few realize that **PLASTIC POLLUTION OF THE SOIL** can be between 4 and 23 times higher than in the seas.

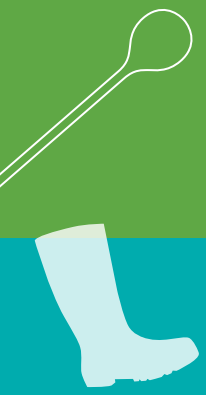
6 Annual global plastic production has reached nearly **370 MILLION TONNES**, with Asia now accounting for 51 percent.



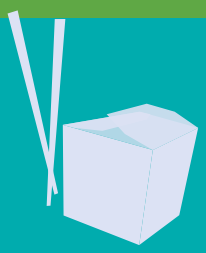
7 We wear plastic. Polyester and other synthetic fibers are made from petroleum or natural gas. Making a **POLYESTER SHIRT** may emit between **3.8 AND 7.1 KILOGRAMS OF CO_2**.

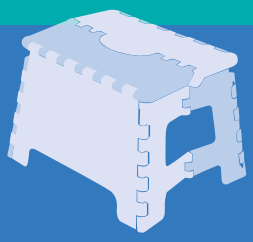


8 Plastic fuels climate change. If current trends continue, plastics will have caused around 56 gigatonnes of CO_2 emissions by 2050. In other words: making plastic could cost **10 TO 13 PERCENT OF THE REMAINING CARBON BUDGET** to keep global warming below 1.5 degrees Celsius.



9 Break Free From Plastic's 2020 Global Brand Audit shows the top three global plastic polluters are multinational food and beverage companies, but **ASIAN COMPANIES** are increasingly responsible for plastic pollution in their countries.





10 At 117.3 kilograms and 98.2 kilograms respectively, the **HONG KONG SAR AND SOUTH KOREA** are among the world's highest plastic waste producers per capita annually. Other parts of Asia are fast catching up.

11 In 2018, China banned the import of plastic waste. Other countries are also refusing to act as the world's garbage bin and are sending waste back. The four **BIGGEST EXPORTERS** are the USA, Japan, Germany and the UK.

12 The global **BREAK FREE FROM PLASTIC** movement holds consumer-goods companies and plastic producers accountable for the waste they generate and champions zero waste communities and lifestyles. In Asia, 1,528 individuals and organisations have joined this movement.

A PLASTIC PANDORA'S BOX

The first plastics produced by scientists and industry in the west imitated ivory and silk, and attracted a limited market. Cheaper production led to the rise of mass popularity globally. Today, Asia has become the largest plastic producer and consumer in the world.

Plastics are now a part of everyday life for billions of people. They are also extensively used in industry. Some 368 million tonnes are produced annually, with Asia accounting for more than half of global plastics production.

But what exactly are plastics? The word refers to a group of synthetic materials made from hydrocarbons. They are formed by polymerisation, a series of chemical reactions on organic (carbon-containing) raw materials, mainly natural gas and crude oil.

Various types of polymerisation make it possible to produce plastics that are hard or soft, opaque or transparent, flexible or stiff. In addition, plastics can be manufactured to be lightweight while retaining many of their other useful properties. This makes them highly popular for packaging.

The first plastic was presented at the Great London Exposition in 1862. Called Parkesine after its UK inventor, Alexander Parkes, the organic material was derived from cellulose, and could be shaped when heated and retained its shape on cooling.

Since then, plastics have undergone numerous stages of development. At the outset, the materials began by replacing ivory and tortoiseshell in billiard balls and combs. This then led on to the creation of synthetic plastics that were cheaper than silk and other natural fibres.

Next came the popularisation of polyvinyl chloride, better known as PVC, or vinyl, which did not contain any naturally occurring molecules but proved a good insulator and a durable, heat-resistant material.

Wide adoption did not occur immediately, with plastics occupying a relatively small market niche until the mid-20th century. The trigger for the mass spread of PVC was the discovery that it could be made from a petrochemical industry waste product. World War II also created significant demand as PVC was used to insulate cables on navy ships.

These key events marked the start of the rapid and uninterrupted rise of PVC for a huge range of industrial and household products. Alongside, two other plastics gained broad acceptance: polyethylene for making bottles for drinks, shopping bags, and food containers; and polypropylene, which became popular in the 1950s and is used today for packaging, child seats, pipes, and other everyday products. PVC, polyethylene, and polypropylene are now the most widely used plastics in the world.

In Asia, plastic factories were already present during World War II. After the global conflict ended, the civil war in mainland China forced the country's plastic manufacturers to relocate to Hong Kong, where they started the first plastic factories in the mid-1940s. Meanwhile, Japanese companies began to scale up PVC product production.

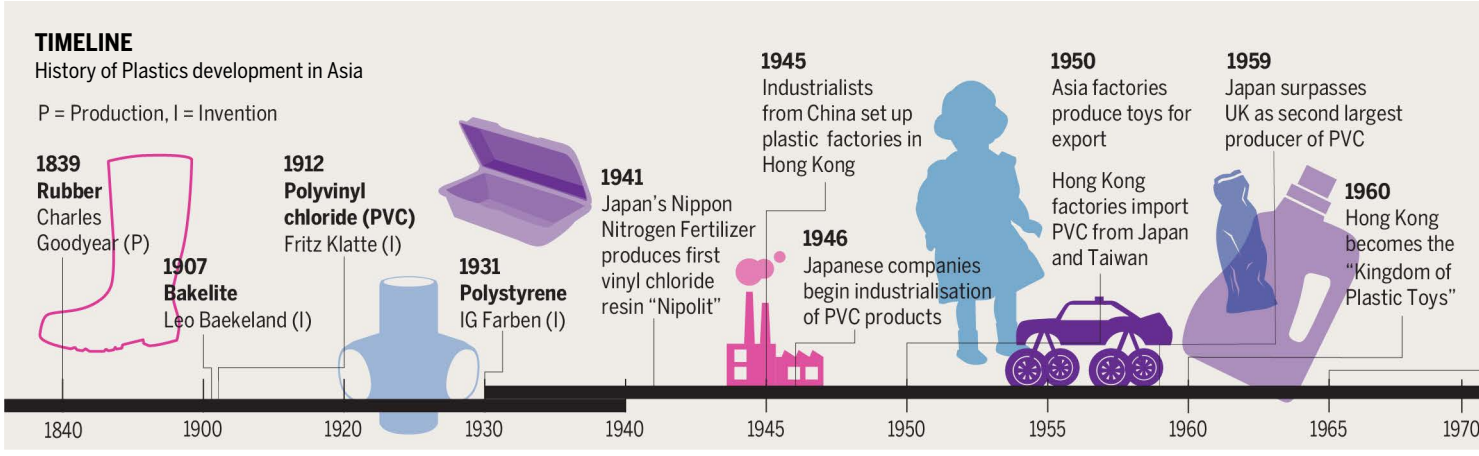
In the 1950s, Hong Kong began producing plastic toys and flowers, mostly for export to Southeast Asian countries, and Japan became the world's second-largest producer of PVC.

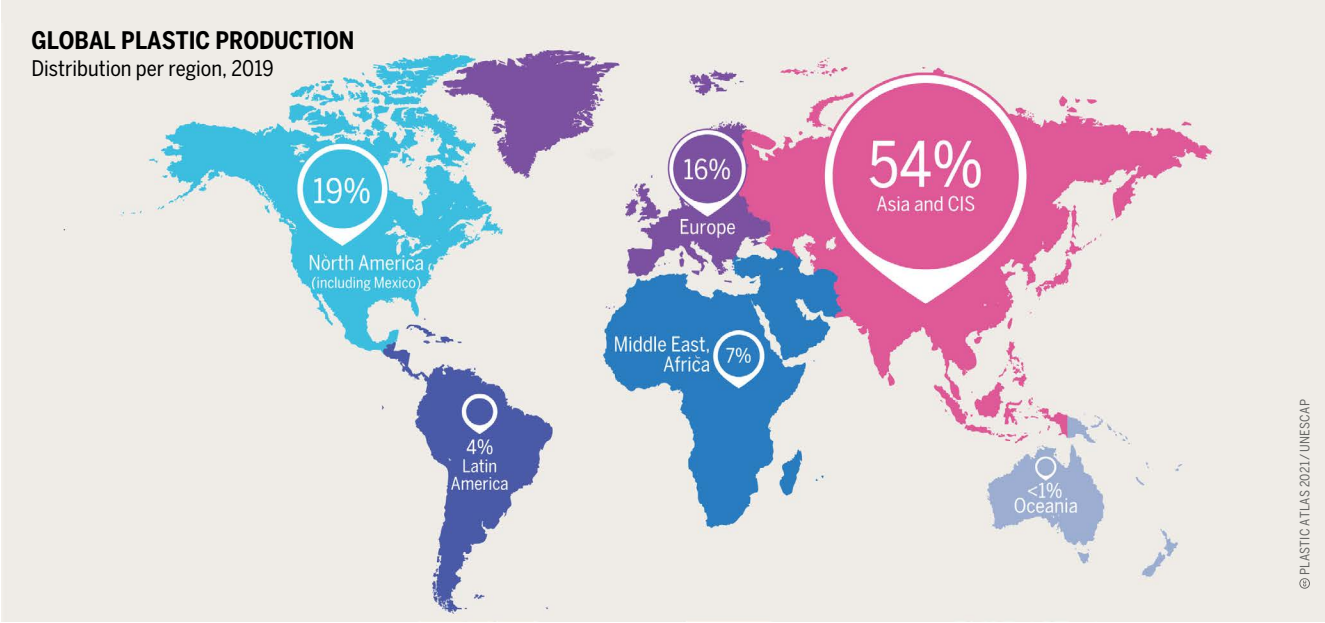
By the end of the 1960s, Hong Kong's factories were making toys for US giants Hasbro and Mattel, and by 1972, the city had become the largest exporter of plastic toys in the world. Following economic reforms in China in the late 1970s and early 1980s, Hong Kong-based manufacturers started moving production back to the mainland but still maintained offices in Hong Kong.

While China and Japan lead the way in plastic production in Asia, Vietnam, Malaysia, Thailand, Indonesia, and the Philippines have all seen rapid growth in the past decade, exporting plastic products to Europe, China, Singapore, Japan, and other countries and regions.

Efficient business processes combined with lower la-

The manufacturing of plastics in Asia has increased after WWII, following the path of industrialisation and urbanisation in the region.





Asia is the region with the biggest plastic production in the world, where both China and Japan are the major players.

bour and production costs have made these factories highly competitive, enabling Asia to garner 51 percent of global plastics production capacity by 2018, and plastic products to become one of the region's top export industries.

Down the decades, a positive image of plastics contributed to the boom in use worldwide. Plastics were seen as trendy, clean, and modern. They squeezed out existing products and muscled their way into almost all areas of life.

In the 1970s, an enterprising businessman from India pioneered the use of plastic sachets for selling fast-moving consumer goods in micro-retail quantities. Products sold in plastic sachets are now widely used in the region, marketed by both multinationals and Asian companies.

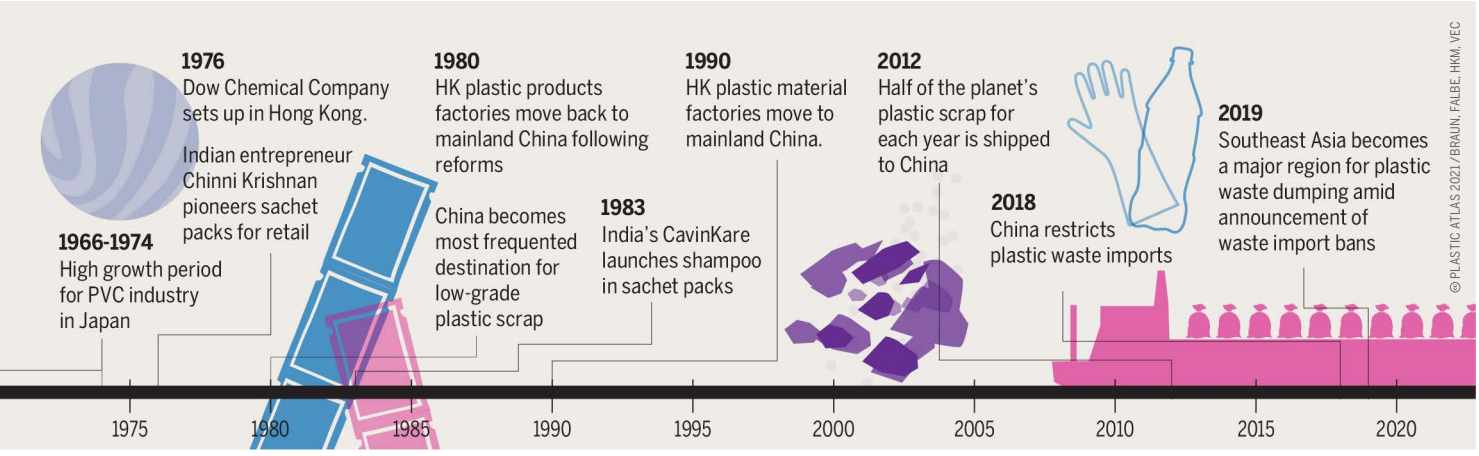
However, the same properties that make plastic appealing to producers have also created problems. To make a single plastic bag takes 13.8 millilitres of crude oil. With eight billion plastic shopping bags being disposed of in landfills each year, that amounts to US$28 million of crude oil literally going to waste every year.

By 2016, plastics also made up 12 percent of global solid waste by mass, with plastic waste rising to 15 per cent in Asia. About half of all plastic waste that ends up in the oceans comes from just five countries: China, Indonesia, the Philippines, Thailand, and Vietnam.

This mountain of plastic waste is bringing disastrous consequences to Asia, which is compounded with the surge in the use of single-use plastic during the COVID-19 pandemic, and needs to be tackled. A further problem is that Southeast Asian countries continue to be inundated with plastic waste imports from within and outside the region.

Along with reducing and reusing plastic products, the three current approaches for managing municipal solid waste in Asian countries are recycling, waste-to-energy conversion, and disposal at landfills. All have their limitations.

More optimistically, a new generation of bioplastics – made from materials such as sugarcane and cassava – may contribute to solving the plastic crisis. In addition, a novel production process that creates a polymer known as chitosan from crustacean shells is being used to make a biodegradable plastic. However, with little track record as yet, whether such materials can make a substantial difference remains to be seen.



THROWAWAY CULTURE

A WORLD WALLOWING IN WASTE

Refill, reuse, and recycle used to be the norm in Asia, where people threw little away. Life today is totally different, especially during and after the COVID-19 pandemic, with plastic rubbish threatening to overwhelm the region.

Varied as people's lifestyles are across Asia, a throwaway culture has traditionally had little place in any of them. Instead, thrift and conscientious consumption were more the rule than the exception.

The Japanese mottainai mindset abhorred waste. Filipinos bought items in micro-retail amounts, using reusable containers. The Myanmar tradition of Yea Ku Tho, where water is given away to gain spiritual merit, led to free water refill stations all over the country. Packaging at traditional Asian markets was invariably biodegradable and minimalist.

But after World War II, global economies started to be driven by the need to consume ever-increasing quantities of resources. When plastic packaging was introduced, manufacturers saw a chance to save money and simplify supply chains. By the early 1960s, billions of plastic items were starting to enter dumps, landfills, and incinerators in the western world.

The shift to throwaway packaging was gradual at first, until Coca-Cola introduced a single-use plastic PET bottle to replace its iconic glass bottle in the late 1970s. Plastic then took hold globally.

By the mid-1980s, single-use plastics were widespread in more developed economies all over the world, propelled by the desire of food and beverage producers to consolidate new markets in distant locations and just as emerging economies in the region were starting to follow the development model pioneered in the western world. A throwaway lifestyle was seen as a sign of modernity, with single-use plastic straws, plastic bags, polystyrene plates, and polypropylene utensils for takeaway food forming the material basis of daily life. Everything could be acquired quickly, was easy to consume, and what was left could be dumped in the bin.

Japan led the way in extensive use of one-time plastics, while other Asian countries' buying habits also began to change. In the Philippines, the tingi system centres on the sale of small quantities of a product to make items affordable to minimum wage earners. Sachets, made from plastic, soon became a marketing strategy for selling to consumers who could not afford to buy in bulk. India was an even earlier adopter of sachets for the sale of fast-moving consumer goods.

However, mini-portions result in a drastic mismatch between the packaging needed per product unit. In addition, they boost consumption. With no solution available for the disposal or recycling of sachet packaging, the litter that ensued has grown into a massive problem in many Asian countries.

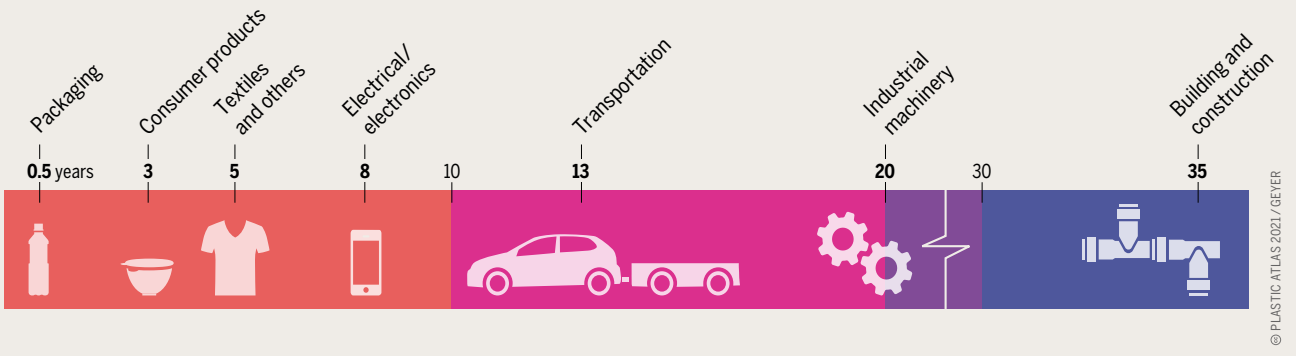
Bottled water is another example. This can be a catastrophe in places where drinking water supplies are inadequate and people resort to buying plastic bottles of water. Without a functioning waste disposal system, communities drown in a flood of plastic refuse. Producers offer no solutions for disposal or recycling the plastic bottles. There is little incentive for recyclers to collect them, and even fewer ways to dispose of them in an environmentally responsible way.

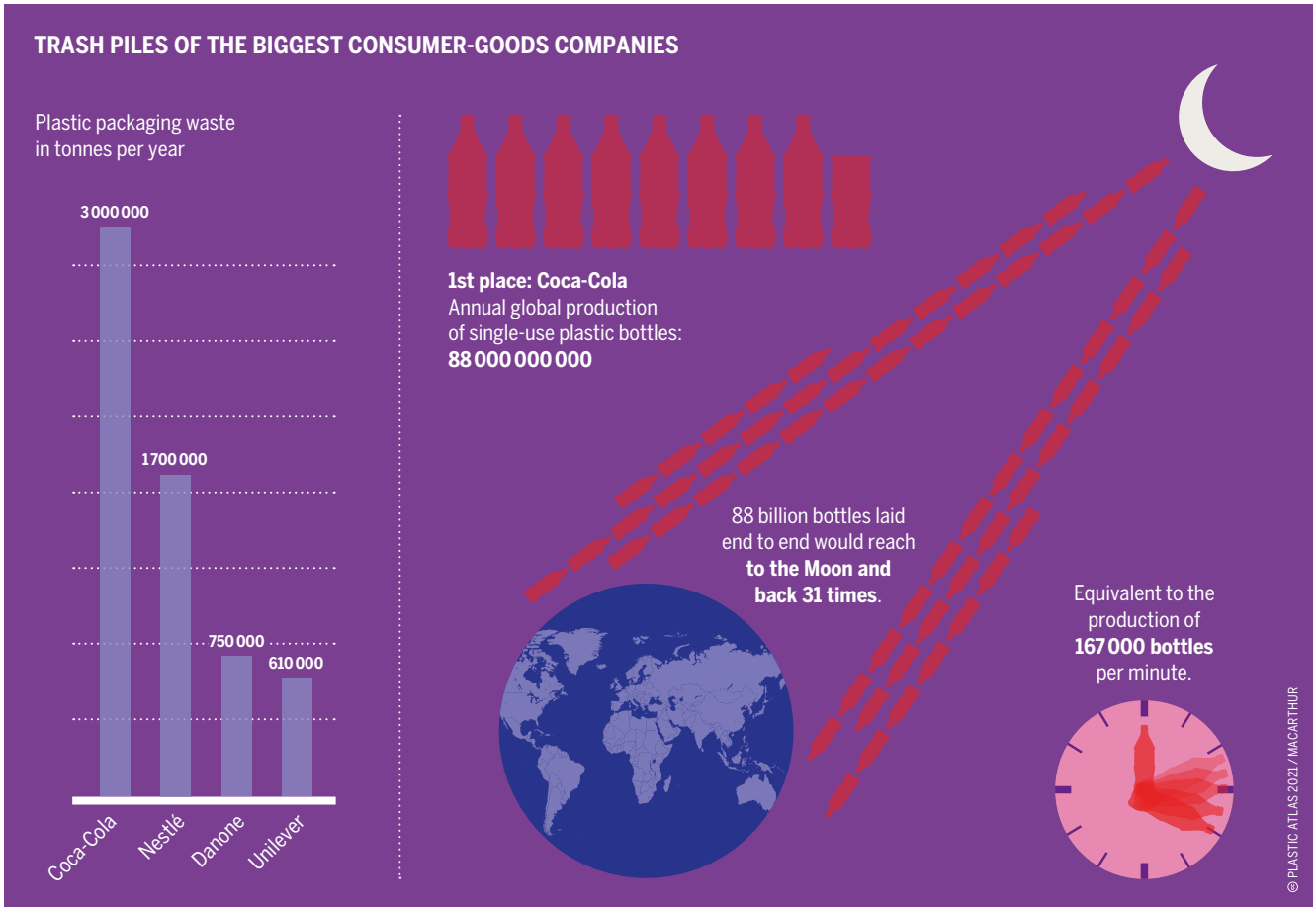
Rapid globalisation, urbanisation, and economic growth have thus brought a lifestyle driven by convenience to Asia. The resulting plastic waste problem is aggravated by the lack of effective law enforcement, and collusion of political and business interests. In the case of Myanmar, legislation is still dominated by the belief that nature takes care of waste in rural areas. This has led to a neglect of such areas in national and regional waste management strategies and forced rural communities to develop their own waste mitigation solutions.

Not all plastic is created equal. Some items have a lifetime measured in decades. But packaging makes up the largest share and typically has a very short useful life.

LIFE IS SHORT

Average useful life of various plastic items, by industrial sector, in years





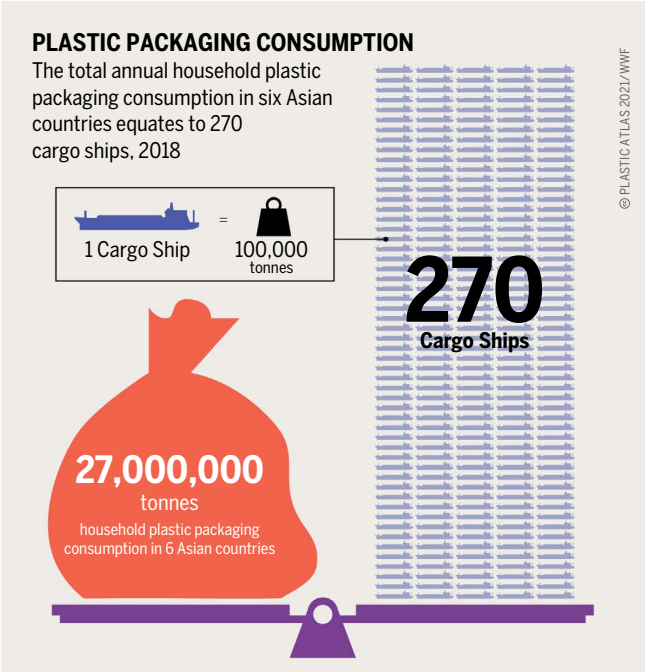
In 2019, along with 31 other companies, Coca-Cola published its plastic figures for the first time. The data show how much waste is generated by relatively few firms.

Recognising the scale of the problem, some Asian countries have started to respond, with commitments ranging from reducing consumption of single-use plastics and bans on single-use plastic bags to action plans on marine litter and attempts to address plastic use at the design and production stage. However, the COVID-19 pandemic has hindered these efforts, making it even more urgent for countries to start or restart plastic reduction campaigns.

Attempts at more fundamental changes with long-term impact focus mainly on behaviour. Japan's national Behavioural Science Team initiative applies insights from behavioural economics, including nudges, to help people make more sustainable everyday choices. Civil society across Asia also continues to campaign for the reduction of single-use plastics.

In Hong Kong SAR, Greeners Action, an environmental organisation, has sought to discourage the default provision of plastic umbrella bags, cutlery, and packaging in shopping malls and restaurants, and reward conscientious establishments with environmentally friendly badges. In South Korea, there are now more than 20 Zero Waste shops where consumers can buy goods with minimal packaging or household consumables in bulk using their own containers. In the Philippines, a local food manufacturer has set up a kiosk where consumers can bring their own bottles and buy refills of frequently used condiments.

While these endeavours may help to move consumers away from a throwaway mindset, it is supportive policies and legislation that would help them grow to a scale that delivered a large and lasting impact.



Plastic packaging has become a major plastic waste in Asian countries, which urgently requires action to reduce.

FROM A BLESSING TO A CURSE

Plastics have made life convenient for the world, but exponential growth and misuse have brought problems to Asia, a region unprepared for the resulting deluge of plastic waste.

Since the 1950s, when plastics started to take off in the mass market, over nine billion tonnes of these materials have been produced globally – a total equivalent to over a tonne per person alive today.

Durable, lightweight and inexpensive, the properties of plastics have made them ideal for use in many different products and everyday items, being found in cupboards and dressers, smartphones and cars, buildings and roads, and even aeroplanes.

Plastics are impermeable to gases and liquids. This has enabled the type of plastic known as polyethylene terephthalate (PET) to become the material of choice for soft drink bottles. The versatility of polystyrene, which can be stiff, brittle, clear, or made into a foam, makes it highly suitable for protective packaging and food containers.

Heavy industry has found plastics equally adaptable. Plastic materials can be created to tolerate wide changes in temperature while their resistance to corrosion and certain chemicals enable them to be used in everything from marine vessels to aircraft. Plastics' long service life and their resistance to mould and corrosion make them practical for the construction sector. Their flexibility, ability to withstand vibration, and the fact that they do not rust have also seen them become important in car production.

In 2019, more than half of the global plastics production of 368 million tonnes took place in Asia, with China accounting for 31 percent and the rest of the region collectively (India, Japan, and other Asian economies) for 20 percent of plastic production. In 2018, 20 percent of global plastic products were consumed in China.

Although plastics' original use was as a high-quality material providing an alternative to ivory or horn, packaging and single-use products are now key business streams.

Packaging accounted for almost one-third – or 115 million tonnes – of global plastic production in 2015, with durable applications for building and construction, transportation, and consumer and institutional products representing only around half of the amount of plastics that goes into packaging.

Production and consumption of plastic packaging do not solely encompass downstream consumer use. Appliances and car parts, among other products, may also use plastic packaging. However, it is litter comprising plastic bags, plastic bottles, and single-use sachets that has become the most obvious image of plastic waste in Asia.

Waste disposal has been a growing problem for many countries in Asia. The increasing volume of plastic waste and lack of waste management infrastructure are causing environmental problems ranging from congested dumpsites to plastic pollution in natural environments.

Hong Kong SAR and South Korea generate the most plastic waste per capita in Asia, at 117.3 kilograms and 98.2 kilograms respectively in 2018. They are among the highest per-capita plastic waste ratios in the world. Meanwhile, plastic consumption in other Asian countries, namely Malaysia (78 kilograms), Thailand (64 kilograms), China (63.5 kilograms), and Vietnam (40 kilograms) are catching up while Indonesia (18 kilograms) and India (11.6 kilograms) remain at the lower end of the scale.

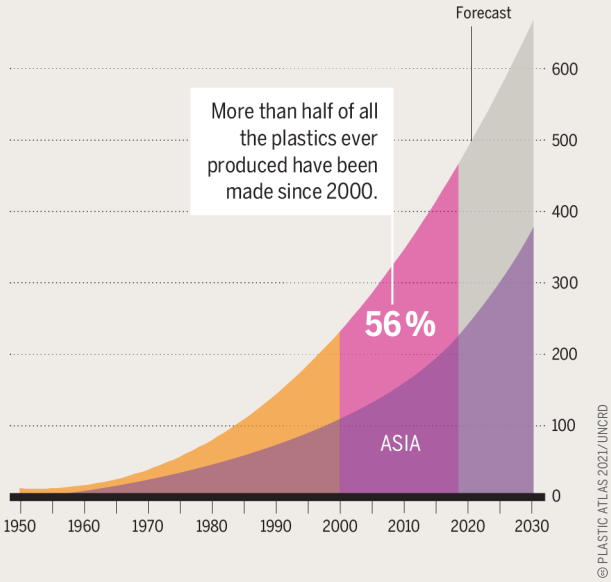
With plastic production expected to reach over 600 million tonnes per year by 2025, current recycling systems simply cannot cope.

Several countries in Asia have considered ramping up recycling in response to the plastic waste problem. However, even highly developed economies such as Japan and South Korea have not fared well with recycling plastics. The majority of plastic waste in the region is still burned or buried, and since a 2018 ban on plastic waste imports by China, a former major importer, such wastes have been increasingly exported to other countries in the region.

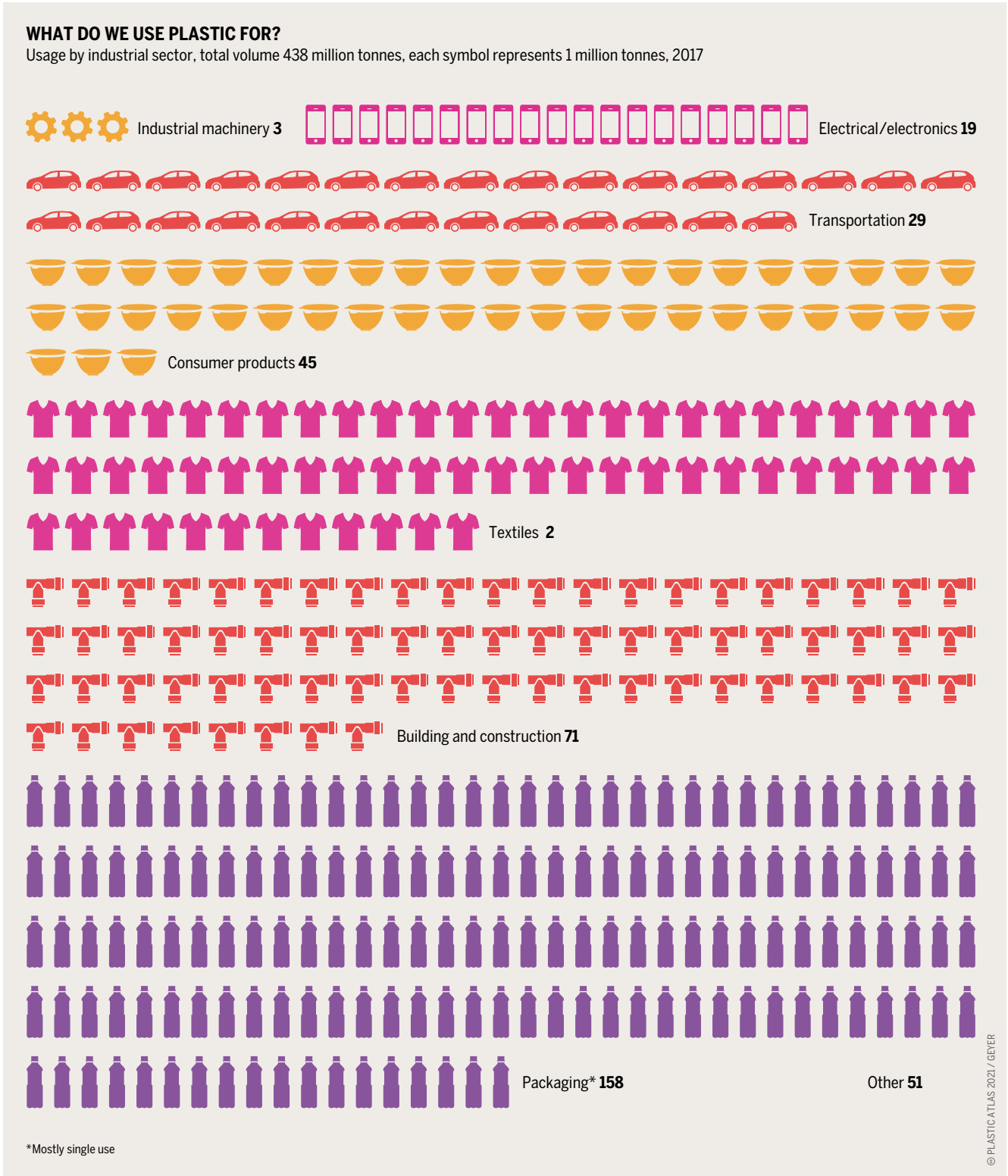
Some Asian countries have now imposed or strengthened bans and levies on selected single-use plastic products; and Southeast and South Asian nations have started following China's lead in stopping plastic waste imports from entering their ports.

PLASTIC PLANET

Global and Asian plastic production in million tonnes



Since 2000, more plastics have been produced than in the 50 years before. The output of plastics continues to explode.



Worldwide, over 400 million tonnes of plastics are produced each year. Packaging accounts for more than a third of all plastics produced.

Unfortunately, the COVID-19 pandemic has compounded the plastic pollution problem, bringing increased demand for single-use items and more than 10 percent increases in plastic waste generated in Thailand, South Korea, Malaysia, and Hong Kong SAR, among other Asian countries and cities. The increase in plastic packaging produced by the e-commerce and express delivery industry in the region is another concern.

Usage has turned what was first viewed as a blessing into a curse. Current estimates indicate some 40 percent of plastic products become litter after less than a month, an unworthy end for an invention that was supposed to improve modern life.

Given that only 10 percent of the more than nine billion tonnes of plastics produced since the 1950s have been recycled, the best solution appears clear: don't produce so many plastic products in the first place.

HARMFUL AND PERSISTENT

Plastics have critical and irreversible effects on human health, from the extraction of the raw materials needed to create them to the disposal of end products. The ubiquity of plastics in modern life is compounding this.

From production to use, and finally to disposal, plastics interact with the environment and human health in multiple intersecting and overlapping ways.

Plastics are derived from fossil fuels, namely oil and natural gas. During extraction of these fuels, especially through the controversial fracking technique, toxic substances are released into the air, water, and soil.

Over 170 substances used in fracking are known to cause cancer, reproductive and developmental disorders, and damage to the immune system. People living near fracking wells are especially affected by these substances, as well as by pollution from the many diesel trucks used for transportation in such areas.

Plastics produced as a result of fracking in the United States are destined mostly for export markets, including Asia. While Asia has vast reserves of shale gas of its own, the region's fracking boom has yet to match that of the USA and Europe.

What is already prevalent in Asia is the petrochemical industry, which brings its own health hazards. Scientists from Mahidol University in Thailand have studied people living near petrochemical facilities, and found significant associations between exposure to industrial air pollutants and adverse effects on residents' health, including shortness of breath, eye irritation, dizziness, coughs, nose congestion, sore throats, phlegm, and general weakness.

Most humans today ingest, breathe, and come into skin contact with harmful chemicals from plastics. Absorption of plastics and their additives has been linked to cancer and hormone disorders. Plants such as lettuce and wheat absorb plastic nanoparticles from contaminated soil and water, incorporating them into the food chain. Microplastics have been found in honey and beer. On land and in the sea, wildlife often mistake plastics for food and ingest them.

Fish and crustaceans that are eaten whole (without removing the gut) – for example, sardines, anchovies, shrimp, urchins, and mussels – are of particular concern. Microbeads and microfibres accumulate in these animals, exposing humans to the toxins when the creatures are consumed. Microplastics have even been detected in human placenta, carrying substances that could cause long-term effects on foetuses.

A report in 2017 by the Food and Agriculture Organization of the United Nations said that salts used in products from Asia have been found to contain more microplastics than those from Europe, North and South America, and Africa, with Indonesian sea salt having the highest amount of microplastics.

Separately, tests in Hong Kong SAR found that 20 percent of commercially available sea salt samples contained microplastics, with many attributable to disposable polypropylene packaging. Meanwhile, studies conducted on soil around a large open dump in Cambodia's capital Phnom Penh revealed high levels of dioxins, ascribed to the burning of plastics that comprise 15 percent of total municipal waste.

Plastics continue to affect human health even after being thrown away. As plastics degrade in dumpsites and landfills, the additives they contain leach and eventually percolate into the environment, leading to contamination of soil and water.

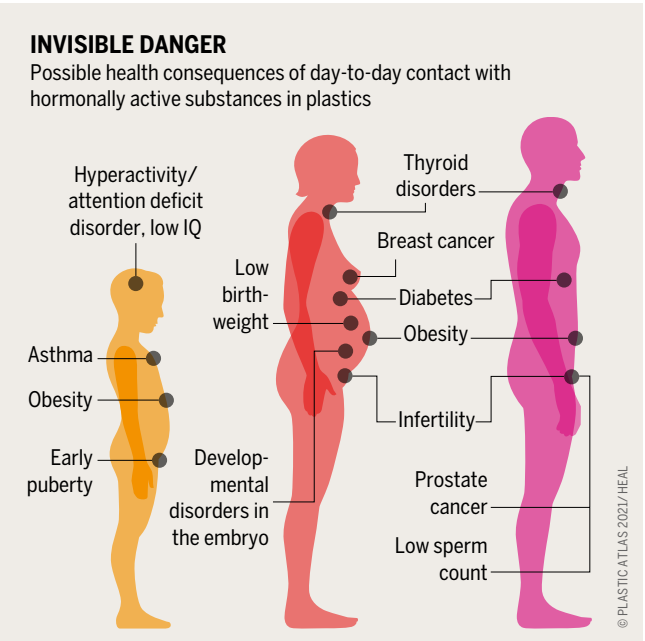
Even in open dumping conditions where they are exposed to the sun, plastics release methane and ethylene, two deadly greenhouse gases. Polyethylene is not only the most commonly produced and discarded type of plastic, it is also the most prolific emitter of these gases.

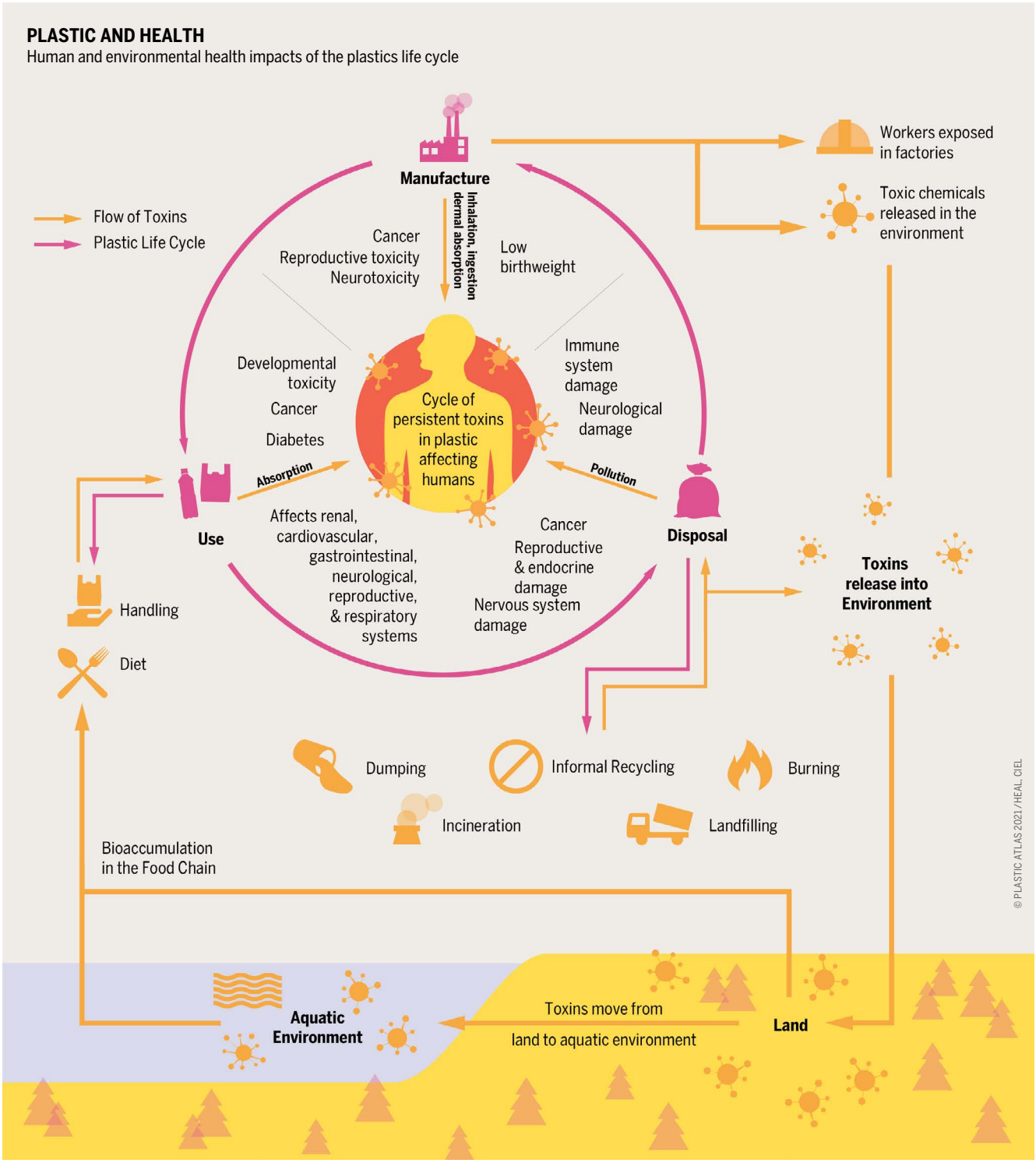
When burned in the open, plastic products release pollutants which cause respiratory disorders if they are inhaled. Some of the chemicals released in the fumes easily convert to vapour and disperse over areas beyond the immediate vicinity of incineration or burning sites.

Soot and ash settle on plants and the soil surface, while rainfall washes down these toxic chemical compounds into the soil and water. Some of the chemicals then react when in soil or water, altering chemical properties and affecting the functioning of ecosystems.

Open burning is often used by low-income neighbourhoods in Asian countries to deal with poor waste collection

Many of the chemicals in plastic have an effect on human health. The consequences may be both serious and long-term.





Even if you try to avoid coming into contact with plastics, you will still be exposed to them. The body has no mechanism to protect itself against harmful toxins.

services. In addition, in many Asian cities, municipal staff burn waste in open dumpsites to reduce the quantity.

In Sri Lanka, many households do not have waste collection services and have resorted to burning their plastic waste. Informal waste pickers burn plastic layers of e-waste to retrieve the metal components within.

In Kolkata, India, where municipal waste is regularly burned, high levels of dioxins were found in the breast milk of mothers in the area due to the consumption of fish from a local pond.

In the Philippines, open burning was practised until it was banned under two landmark national laws: the Republic Act (RA) 8749 or Clean Air Act; and the Republic Act (RA) 9003, otherwise known as the Ecological Solid Waste Management Act of 2000.

Despite the growing amount of information on the adverse effects of plastics on human health, the full extent of the impact remains unknown. Meanwhile, businesses are not mandated to fully disclose the chemicals in their plastic products and packaging, limiting consumers' ability to make informed choices.

GENDER

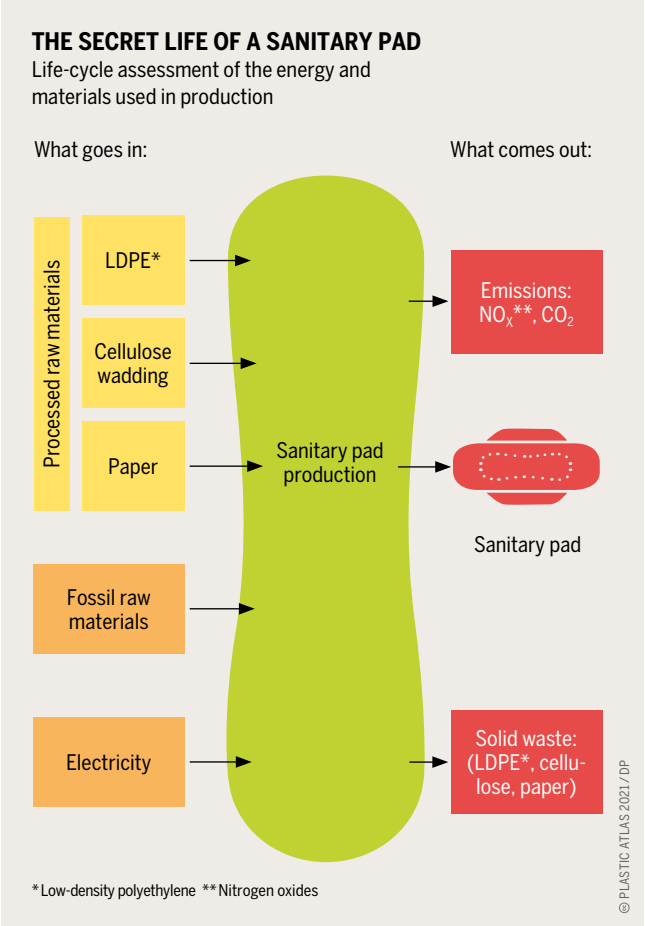
UNEQUAL EXPOSURE

Biologically, women are more likely to be adversely affected by the toxins in plastics. Traditional roles, inequality, and a throwaway culture further amplify these harmful effects, especially in Asia.

Women and men can be exposed to plastic products and packaging. Both can work as formal waste collectors, informal waste pickers, or work in factories that make plastics. Both can unwittingly ingest or breathe harmful chemicals from plastics and disrupt their endocrine system, eventually suffering from infertility, obesity, diabetes, and neurological diseases, among others.

However, there is evidence that the toxins contained in plastics have different effects on women and men due to biological differences including body size and proportion of fatty tissue.

Phthalates, commonly used as a plasticiser, have been shown to block thyroid hormone action and reduce both testosterone and oestrogen levels. In addition, they have been identified as reproductive toxicants for both women and men.



The production of a modern sanitary pad is not possible without using fossil raw materials and plastics.

Yet women's bodies contain more fat than men, and therefore accumulate more phthalate plasticisers and other oil-soluble chemicals. The female body is also especially sensitive to toxins during life stages such as puberty, pregnancy, lactation, and menopause.

In 2017, the Nordic Council of Ministers drew up a list of 144 hazardous substances actively being used in plastics for functions varying from antimicrobial activity to colourants, flame retardants, solvents, and plasticisers.

Exposure to these endocrine disruptor chemicals can occur over the entire lifespan of plastic products, from the manufacturing process and consumer contact to recycling, waste management, and disposal.

For at least four decades of their lives, women are consumers of specific plastic products supplied as feminine hygiene items, and the major marketing targets for others, such as cosmetics. The world's feminine hygiene industry is expected to hit US$53 billion in sales by 2023.

In the UK, it was found that the average woman will use more than 11,000 menstrual products over her lifetime, amounting to over 200,000 tonnes of waste ending up in the country's landfills and waterways every year. With store-bought sanitary pads comprising 90 percent plastic, mass-produced feminine care products come with a hefty environmental footprint.

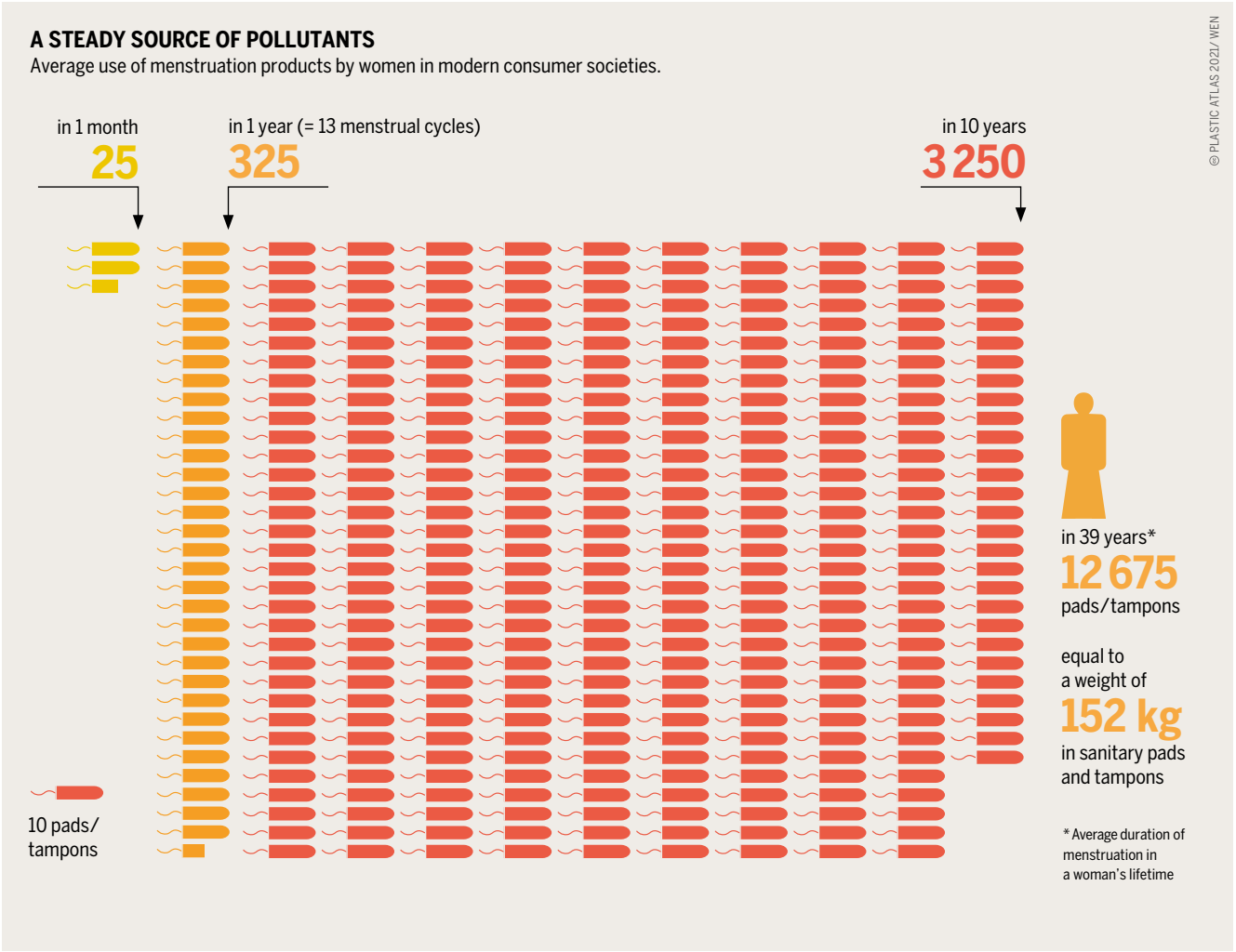
By 2015, Asia-Pacific alone accounted for half of global demand for single-use feminine hygiene products, with cities in the region grappling with the enormous quantities of such items discarded in waterways, buried in the soil, or burned in the open.

In addition to biology and the throwaway culture, economic and social roles have made women more vulnerable and exposed to hazards caused by plastics.

In Asia, women's traditional jobs as unpaid carers and domestic homeworkers bring daily exposure to household plastic products and waste. Meanwhile, as employees, a disproportionate number of women work in industries that expose them to toxic chemicals present in plastics.

Women account for a significant proportion of the informal waste sector in India, the Philippines, Vietnam, and Indonesia. As waste pickers, they are tasked with picking out post-consumer recyclables from dumpsites, and engaged by scrap/junk shops to sort, clean, and perform other repetitive tasks in the plastic recycling process. These types of work expose them to dust and chemicals through inhalation and contact with skin.

Moreover, garment factories in Asia employ mostly women, who become exposed to toxins from the synthetic fibres now favoured by the textile industry and widely used in fast-fashion clothes.



A woman who uses disposable menstruation products comes into contact with hazardous plastics for nearly four decades.

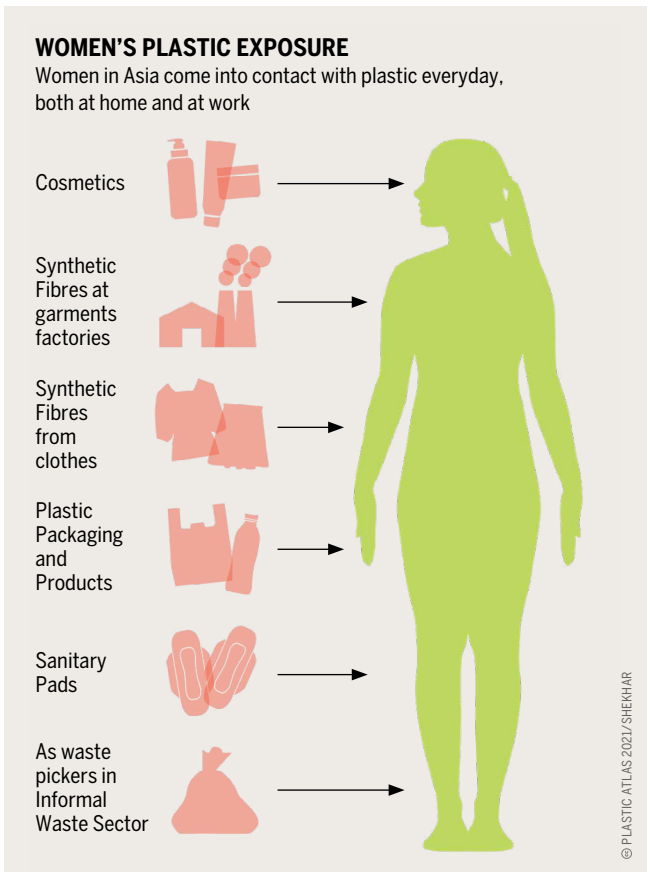
Women working in plastic manufacturing where they are exposed to dust and fumes are more likely to develop breast cancer and experience reproductive problems. They also become unwitting carriers of plastics and associated chemicals when these are transported through the placenta to foetuses.

In many communities, women lack access to knowledge and information about the chemicals in plastics and the impacts on health, and are unable to minimise toxic chemical exposure.

While legislating gender-responsive policies, such as guidelines to protect women as consumers and as workers in the formal and informal waste sectors, could help, more wide-reaching would be a reflection on the role that gender plays in society overall.

Yet even these measures can only mitigate the adverse impacts of plastics and are insignificant in the context of the ubiquity of plastics and persistence of the chemicals they contain.

Women are exposed to a whole range of plastic products every day, which make them more vulnerable to health hazards.



TASTY PLASTIC MORSELS

Plastics go beyond packaging for convenience food and takeaway meals. They have invaded farms, fish, and even drinking water, and now exist throughout the food value chain.

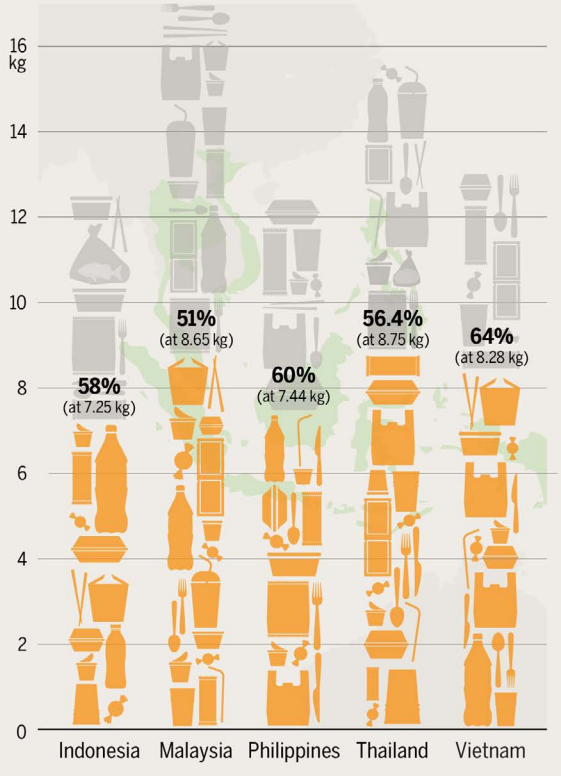
Preparing or buying a meal has never been more convenient. Supermarkets are stocked with plastic-wrapped fresh food. Ready-to-eat meals are just a phone tap away. With more people in cities leading ever-busier lives, the food and retail industries have responded with tasty morsels packaged in shiny, single-use plastics.

Plastics allow supermarkets to offer the same groceries to consumers all year round and regardless of where the fish, meat, or produce originated. These materials guarantee the food is clean when it is delivered, while disposable cutlery promises the convenience of not having to do the dishes.

The cost efficiency of plastics means that individual plastic-wrapped food items are marketed throughout both the developed and developing world. In high-income Japan, a packet of biscuits typically contains individually plastic-wrapped biscuits inside. In the Philippines, a rising income nation, vinegar is sold in micro-retail stand-up packs made of low-density polyethylene.

ALL WRAPPED UP

In 2018, food and beverage wrappers and containers comprised the highest percentage of plastic packaging waste per person in the countries shown



Plastics are also widely used in the fast-growing online food delivery industry. Researchers from the National University of Singapore found that an average delivered meal uses about 2.8 single-use plastic items, equivalent to about 54 grams of plastic. By comparison, an average restaurant meal yields only 6.6 grams of plastic, usually in the form of chopstick sleeves or bottles.

Amid the COVID-19 pandemic, there were as many as 800 million additional online food delivery customers in Asia.

Initiatives to minimise food delivery-related waste, such as adding a no-cutlery option and sourcing non-plastic takeaway packaging, hardly make a dent. Food containers are made from polypropylene and similar polymers, and while these are recyclable, they need to be washed first. As a result, most takeaway food packaging ends up in landfills or incinerators.

Even if a conscientious consumer says no to plastic cutlery and avoids plastic-wrapped food, plastics can still make their presence felt in the food itself. When ingested, plastics and their additives can be carcinogenic and cause hormone disorders.

Plastics can travel upwards through the food chain through crops that absorb plastic nanoparticles from contaminated soil and water, and through seafood that accumulate plastics. Even after plastics are thrown away and degrade in the soil, the additives they contain leach into the environment and contaminate soil and water, eventually making their way back into the food chain.

In 2019, researchers from the University of Newcastle in Australia found that people ingest up to five grams of plastic every week – about the weight of a credit card.

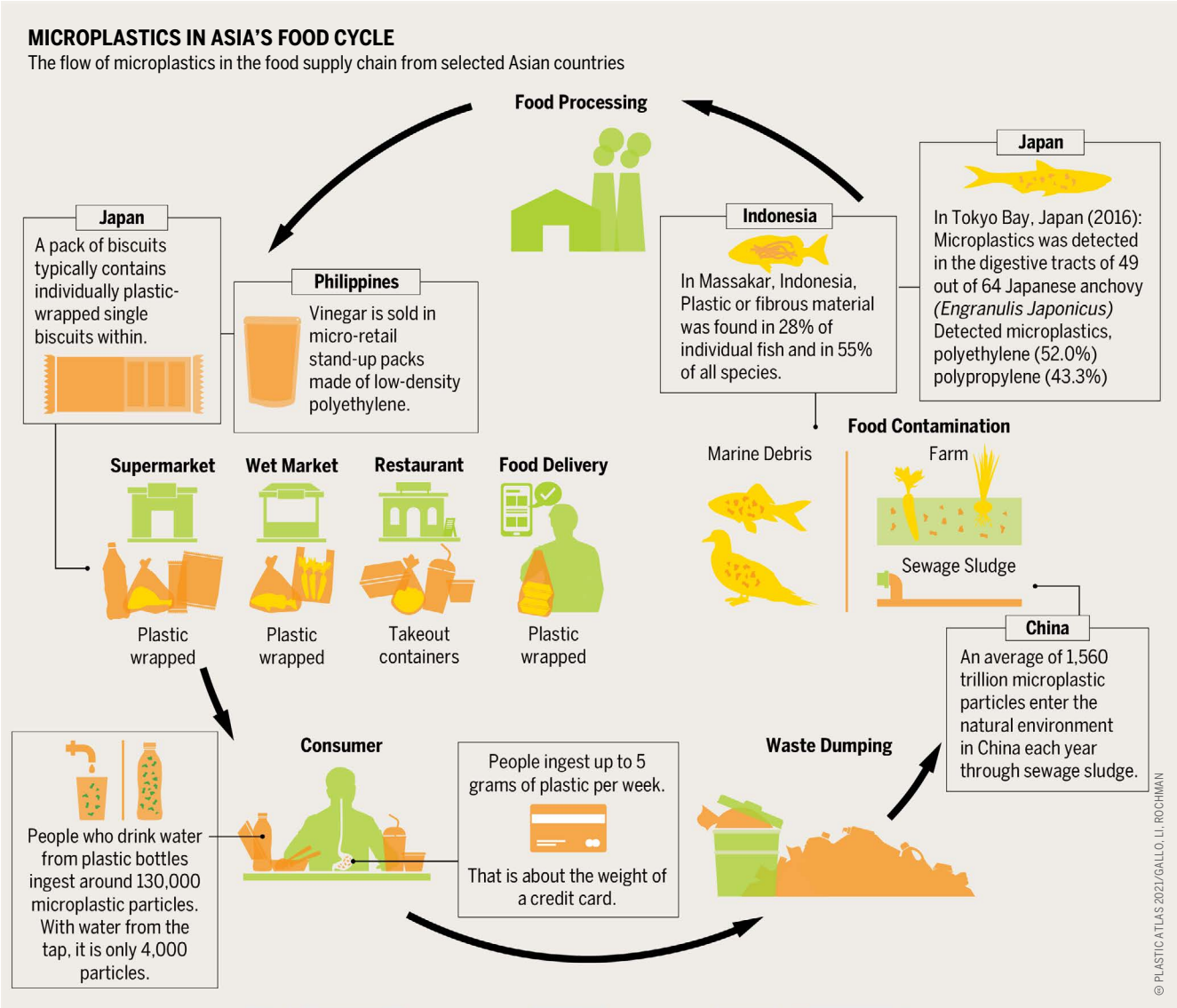
Researchers in Canada found that people who drink water from plastic bottles wash around 130,000 microplastic particles (those less than five millimetres in length) down their throats every year. With water from the tap, it is only 4,000 particles.

Meanwhile, Asian populations are the world's biggest consumers of seafood. In Bangladesh, Indonesia, and Sri Lanka, for example, seafood accounts for more than half of people's animal protein intake.

Marine debris – three-quarters of which are plastics – has affected more than 800 species since 2012, often through ingestion or entanglement. These discarded materials fragment into microplastics, which are consumed by various marine organisms, including seafood.

Microplastics have been found inside (but not limited to) Japanese anchovy in Tokyo Bay, various fish and bivalve species in China, fish in Indonesia, mussels and rabbitfish in the Philippines, shellfish on the eastern coast of Thailand,

Nearly 1.9 million tonnes of plastics in total were used to package food and drinks in these five Southeast Asian countries in 2018. Such packaging forms the largest category of plastic packaging waste in Asia.



Microplastics are known to travel through the human digestive tract and into human organs, carrying toxic contaminants that are from the plastic itself or absorbed from the environment.

bivalves (*Perna* viridis) in Vietnam, and beach sediments in Cox's Bazar in Bangladesh.

Most of these ingested plastic fragments were made from polyethylene and polypropylene, which may have come from food packaging or from washing clothes made of synthetic fibres. Some particles were similar to microbeads often found in facial wash, toothpaste, and other personal care products.

Ingestion of plastics is likely to cause damage to the digestive tract of marine organisms, as well as undue stress. The full impact on human health remains uncertain.

Microplastics have also contaminated farmlands worldwide. In 2016, it was estimated that as much as 430,000 and 300,000 tonnes of microplastics ended up in farmlands in Europe and North America, respectively. Meanwhile, soil samples taken in Shanghai, China – which has 130 million square metres of land dedicated to 680,000 plastic greenhouses – were found to contain plastic fibres, fragments, and films, suggesting these may have come from sewage sludge and plastic mulches.

Sewage sludge is often used as fertiliser on farmland. It contains a variety of microplastics, ranging from microbeads to synthetic textile fibres. These microplastics travel from raw wastewater to wastewater treatment plants. Such treatment plants can filter up to 98 percent of particles from municipal effluents before they are released into aquatic environments. Nonetheless, most microplastics remain.

Plastic mulches are applied on large-scale farms to regulate soil temperature, manage weeds, reduce leaching of fertiliser, and maintain soil moisture. If not properly removed and disposed of, plastic mulches can degrade in the soil.

Plastic contamination of soil and water can also be a result of waste dumping. In four unregulated dumpsites and plastic recycling facilities in Malaysia – Pulau Indah, Sri Cheeding and Kapar in the state of Selangor, and Sungai Muda in the state of Kedah – soil and water samples yielded several dangerous chemicals from plastic residue.

Sadly, these cases are only the tip of the iceberg. Plastics will continue to seep into food and water sources for as long as their presence throughout the food value chain continues unabated, reflecting a throwaway culture put into overdrive by the fossil-fuel and petrochemical industries. Over-packaged food is not "cheap" at all.

CHEAP CLOTHES THAT COST

Enabled by inexpensive, versatile fabrics made from synthetic fibres, fast fashion has made clothes disposable and created problems in waste and pollution. In parts of Asia, the repercussions run deeper.

Many garments are now made in part or entirely out of polymers. Consumers often do not know that words such as polyamide, polyester, acrylic, and nylon actually refer to synthetic fibres – in other words, plastics. These synthetic fibres have supplanted cotton and other natural fibres, with their rise in garment production closely associated with the drop in the price of clothes.

The use of synthetic fibres for clothes is popular with consumers and producers alike. Consumers like such garments because they are elastic, light, dry quickly, and feel soft to the touch. Producers are happy because they solve production volume problems and make it possible to provide cheaper products with a wide range of properties.

The plastic industry is also keen as textiles make up 15 percent of the world's annual output of plastics. With polyester now accounting for more than 80 percent of all synthetic fibres produced, it is certainly big business.

Textiles made with synthetic fibres are readily available, cheap, and versatile. This has led them to become the linchpin of "fast fashion", a business model based on fast-paced design and production. It is fast fashion that enables new clothes to appear in stores every week.

The trend has encouraged factories to make more and cheaper clothes, and people to shop more frequently. It has also led to the quicker disposal of old clothes. The resulting increase in consumption has affected the entire value chain of textile production, usage, and disposal.

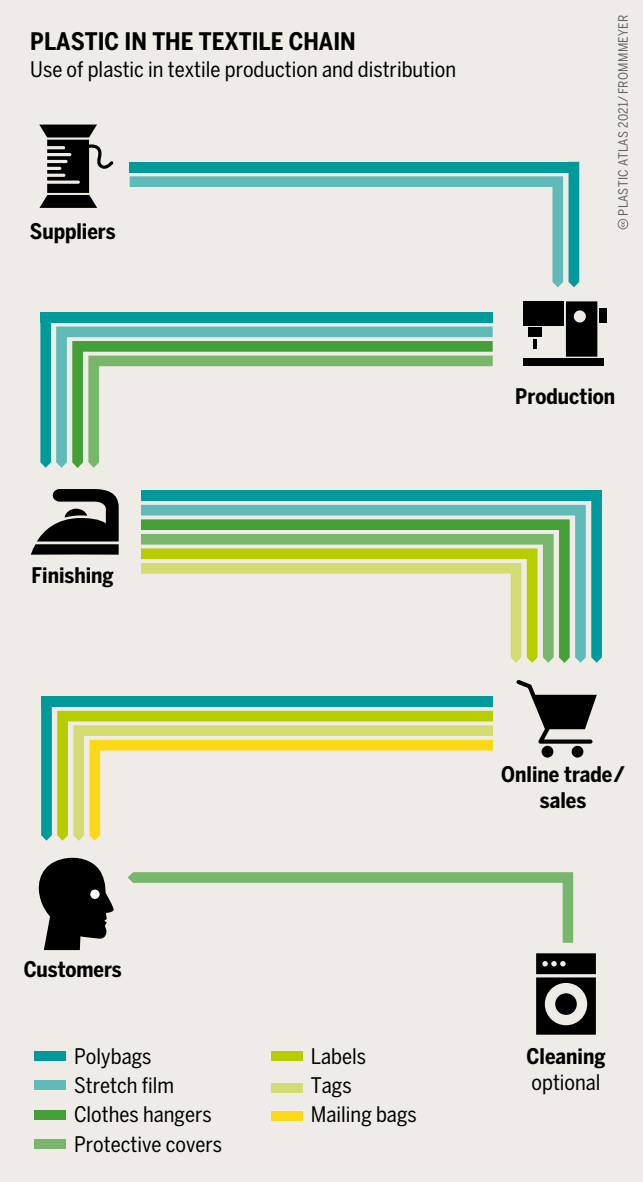
Textile manufacturing in general is among the world's most polluting industries – second only to oil. Carbon emissions for synthetic clothing are six times higher than for cotton because the production of synthetic materials is energy-intensive. Synthetic fibres such as polyester are also the biggest contributor of microfibres that pollute the oceans. When clothes made from synthetic fibres are washed, they release millions of microplastics into wastewater.

An International Union for Conservation of Nature study has shown that 35 percent of the microplastics found in the world's oceans comes from washing clothes made from synthetic fibres. These microplastics can reach the deep sea floor and damage the health of coral reefs in the Asia-Pacific region.

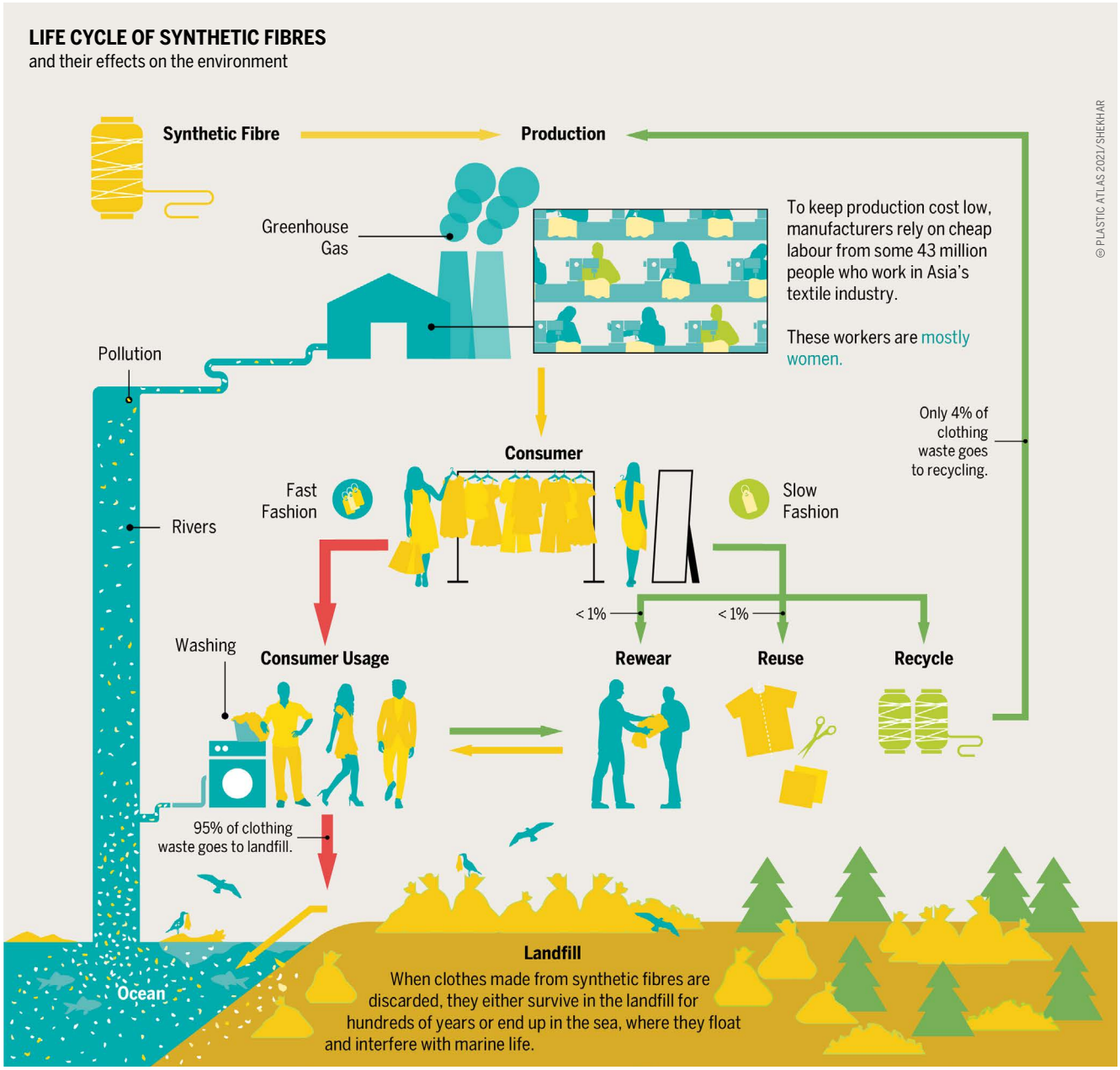
Furthermore, when clothes made from synthetic fibres are discarded, they do not decompose because they are produced from non-biodegradable plastics. Unless they are incinerated, they either survive in landfills for hundreds of years, or end up in the sea where they can interfere with marine life.

While plastic waste and pollution are the more obvious consequences of producing and using synthetic fibres, the throwaway culture encouraged by the fast fashion business model has much deeper repercussions, especially in Asia. For cheap clothes made from synthetic fibres have come at the cost of underpaid labour.

The textile market as a whole fuels much of the economy in Asia, with export value reaching US$600 billion and representing 60 percent of garment, textile, and footwear exports globally. In Bangladesh, second only to China for apparel manufacturing, the garment and textile business



Plastics are used in the textile industry not just in the production process, but also to protect items during distribution and marketing.



The widespread use of synthetic fibres at each stage of production in the clothing industry leads to environmental pollution in the long term.

accounts for 80 percent of the country's exports. Bangladesh is where fast fashion brands H&M, Target, Marks & Spencer, and Asian brand Uniqlo, among others, produce much of their clothing. The garment industry also contributes from 15 to 17 percent of the GDP of Thailand, Vietnam, and Cambodia.

The speed and economy with which factories in these countries can churn out clothes for fast fashion labels are crucial if they are to compete and win work orders from other factories in the free trade zones across Asia. To keep production costs low, the major players in the region – China, Bangladesh, Cambodia, India, Sri Lanka, and Vietnam – rely on cheap labour from some 43 million people who work in Asia's garment, footwear, and textile industry, mostly women.

Exploitation in sweatshops across Asia is the human cost of the fast fashion frenzy. It is how the stream of cheap new clothes keeps flowing into boutiques. Moreover, such treatment is enabled by the ready availability and convenience of synthetic fibres, which the plastic industry will increasingly supply as petrochemical companies seek to find new uses for their products.

In the shift to a circular economy, there is a push towards "slow" fashion that embraces enhanced product durability, resale and rentals, and a reduction in resources and waste. However, only a handful of brands have committed to phasing out the use of synthetic fibres and reducing waste.

Instead, global and regional fast fashion brands have created initiatives to promote so-called sustainable fashion through monitoring their environmental footprint, including the plastic waste produced.

Yet these measures simply delay disposal, and only marginally mitigate the negative impacts of fast fashion in particular, and disposable plastics in general. Unless brands proactively eliminate the throwaway culture of fast fashion, the root causes will not be addressed.

BLUE SKIES, WHITE SANDS, AND PLASTIC

The travel industry provides much-needed revenue to many countries in Asia. It also brings a lot of plastic waste.

Tourism in Asia comes at the cost of plastic waste. While the industry accounts for more than 10 percent of the global economy and contributed US$2.97 trillion to the total GDP of the Asia-Pacific region in 2019, the plastic waste that accompanies the sector is now a challenging problem.

Single-use plastics in particular have become part of modern travel. Plastics are cheap and lightweight while single use is perceived as hygienic and safe for travellers in an unfamiliar location.

From the plane to the hotel, a day at the beach, or that trek up a mountain, plastics are seemingly unavoidable. One pilot audit by an Asian airline found that plastics accounted for 16.5 percent of total cabin waste by weight, second only to leftover food.

Popular tourist spots around Asia have recorded quantities of plastic waste disproportionate to their population, adversely affecting wildlife and absorptive capacity.

For example, the beautiful waters around the Maldives, a group of islands in the Indian Ocean and a popular travel destination, have the highest amount of microplastic pollution in the world. In a study focused on Mount Everest and published in 2020, microplastics were also found in all of the snow samples collected from 11 locations on the mountain, at altitudes ranging from 5,300 to 8,440 metres.

In Indonesia, research findings have suggested that manta rays in Nusa Penida and Komodo National Park could be ingesting up to 63 pieces of plastic per hour of feeding. For whale sharks in Java, it could be up to 137 pieces. However, tourism along coastlines and on beaches was not the only contributing factor. The study found plastic pollution to be 44 times higher during the rainy season, as plastic debris originating from rivers in the interior washes down to the ocean.

Despite the alarming numbers, tourism continues to be encouraged in Asia, with the in-bound sector often benefitting from supportive government policies, cheap package tours, and the rise of convenient online booking systems.

The situation is further exacerbated by the fact that many places in Asia still lack plastic reduction policies in their tourism industry or enforcement of existing regulations is weak.

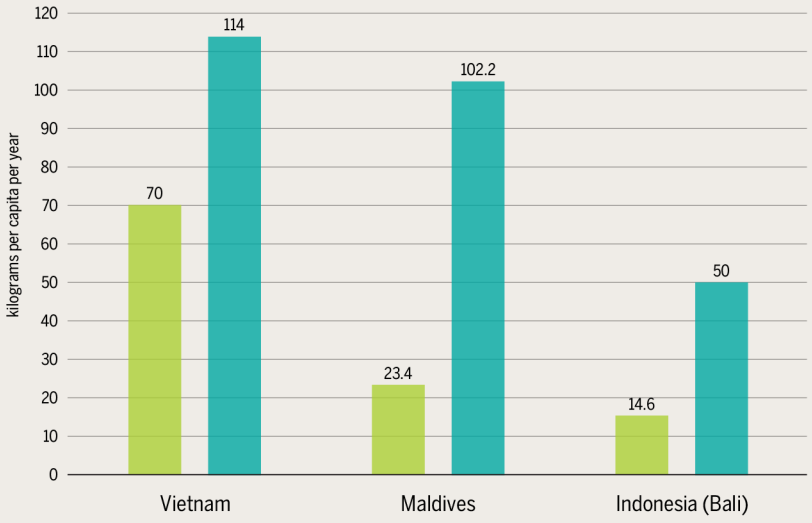
Many destinations, especially those in rural areas of developing countries in Asia, do not have the absorptive capacity to accommodate an influx of tourists and the resulting plastic waste.

Waste management technologies and practices used in developed countries may also be unsuitable, as they often require massive investments in infrastructure and mainte-

The tourism industry, which generates 1.6 times to 4.4 times more plastic waste per capita per year in three Asian countries, requires urgent action to reduce the use of plastic in its daily operation.

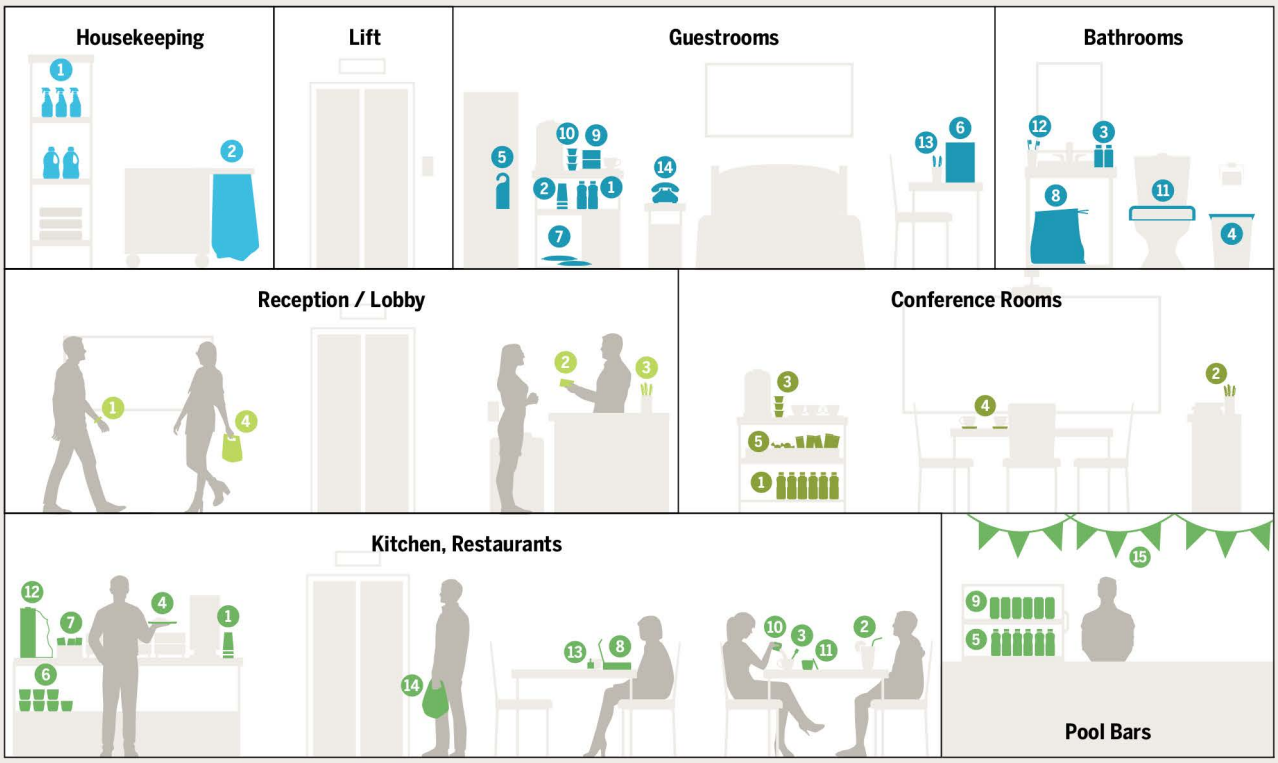
PACKAGED HOLIDAYS

Plastic waste from hotels and resorts compared to waste created by residents



PLASTIC HOSPITALITY

The most commonly used disposable items in hotels



1 Cleaning materials
2 Plastic bin-bags

1 All-inclusive wristbands
2 Key cards
3 Pens
4 Giveaway tokens

1 Water bottles/minibar
2 Plastic-wrapped single-use plastic cups
3 Amenities/toiletries
4 Plastic bag in bin
5 Door hanger
6 Hotel directory
7 Plastic-wrapped slippers
8 Laundry plastic bags
9 Tea/coffee station box and bags
10 Plastic capsules for coffee machine

11 Hygiene ribbons around toilets
12 Toothbrush
13 Pens
14 Communication materials

1 Plastic bottles
2 Plastic amenities (pens)
3 Plastic coffee capsules
4 Coasters
5 Single-packaged sweets, cookies, nuts, etc.

1 Single-use cups
2 Straws
3 Stirrers
4 Plates and cutlery
5 Water bottles
6 Pre-portioned food items (jams, honey, butter, etc.)
7 Sachets for sauces and condiments
8 Meal box & wrappings
9 Single-use drink cartons/containers

10 Single-packaged sugar, salt, pepper, sweeteners
11 Pre-portioned milk cups/sachets
12 Single-use plastic wrappings
13 Single tea bag wrappings
14 Plastic bags
15 Plastic decorations

A wide range of disposable plastic items are used in hotels in Asia.

nance, large amounts of sorting, and well-established waste management systems.

Meanwhile, halfway measures or those on a smaller scale are likely to result in uncontrolled pollution of the land, air, and sea.

Although the COVID-19 pandemic has drastically reduced the number of travellers worldwide, it is anticipated that when the tourism industry restarts, visitors are likely to use protective items such as disposable face masks and gloves. This is bound to generate more litter and put pressure on waste management capacity.

However, some local governments in popular Asian destinations are addressing the plastic problem caused by tourism. Bali in Indonesia started bans on single-use plastics in 2019 while Penang in Malaysia is set to ban them by 2023.

At the national level, the Maldives is also seeking to phase out single-use plastics by 2023. China has banned the production and sale of certain plastic items, and by 2025, hotels in the country will stop handing out free plastic items.

Meanwhile, sweeping actions in international tourist destinations such as Boracay Island in the Philippines and Maya Bay in Thailand have ranged from clean-up drives on beaches to closing off the entire area to visitors.

In addition, tourism industry associations have announced initiatives. The International Air Transport Association has tried to address cabin waste by producing a handbook outlining what airlines can do about this problem. Meanwhile, tourism stakeholders have joined the Global Tourism Plastics Initiative to mobilise the sector against plastic pollution. This includes moving away from single-use plastics, reducing overpackaging, and adopting a circular economy in the use of plastics.

However, it is too early to conclude if these community and industry initiatives will lead to a substantial reduction of plastic use. For now, results are much less visible than the impacts of plastic pollution, which remain far-reaching.

A PROBLEM FROM BEGINNING TO END

From manufacture to disposal by incineration, plastics pump huge amounts of greenhouse gases into the atmosphere.

Making, using, and disposing of plastics all have serious effects on marine ecosystems, coastal environments, and human health. While the impact on climate is less well-known, it is just as significant.

In the 2015 Paris Climate Agreement, over 190 nations committed at that time to limit global warming to well below two degrees Celsius, and to pursue measures to keep the overall rise in temperature below 1.5 degrees.

In 2018, the Intergovernmental Panel on Climate Change (IPCC) concluded that to keep warming below the 1.5-degree limit, global greenhouse gas emissions must be cut by 45 percent by 2030 and zero net emissions reached no later than 2050.

While climate policy is largely focused on the transition to renewable energy and cleaner transport, industry is also important. According to World Resource Institute's 2016 data, energy consumption is by far the biggest source of human-caused greenhouse gas emissions, responsible for 73 percent worldwide. The other top sectors are agriculture (12 percent); land use, land-use change, and forestry, such as deforestation (6.5 percent); industrial processes of chemicals, cement, and more (5.6 percent); and waste, including landfills and waste water (3.2 percent).The production of plastics is one of the largest contributors to these emissions, a contribution that is rapidly increasing.

Transport, energy and farming are the three sectors most often blamed for climate change. The emissions caused by plastics production are often forgotten.

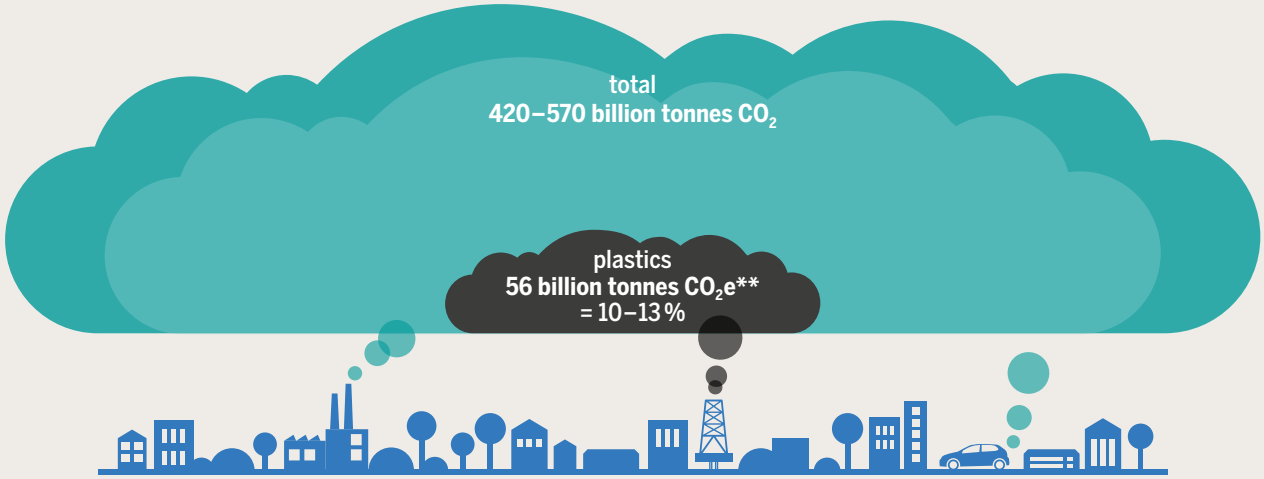
Plastics, along with many fertilisers, pesticides, and synthetic fibres, are petrochemicals, derived from mineral oil and natural gas. More than 99 percent of plastics come from such fossil-fuel feedstocks. Meanwhile, petrochemicals are the fastest-growing form of oil consumption globally. The International Energy Agency forecasts they will account for half of the extra demand for oil by 2050.

As plastic production grows, it will lock in new fossil-fuel infrastructure and increase emissions that arise from the exploration, extraction, transport, and refining of oil, gas, and coal. Global production of plastics increased from two million tonnes in 1950 to almost 370 million tonnes in 2019, with production and use of plastics nearly doubling in the past 20 years. They are expected to double again over the next 20 years, and quadruple by the early 2050s.

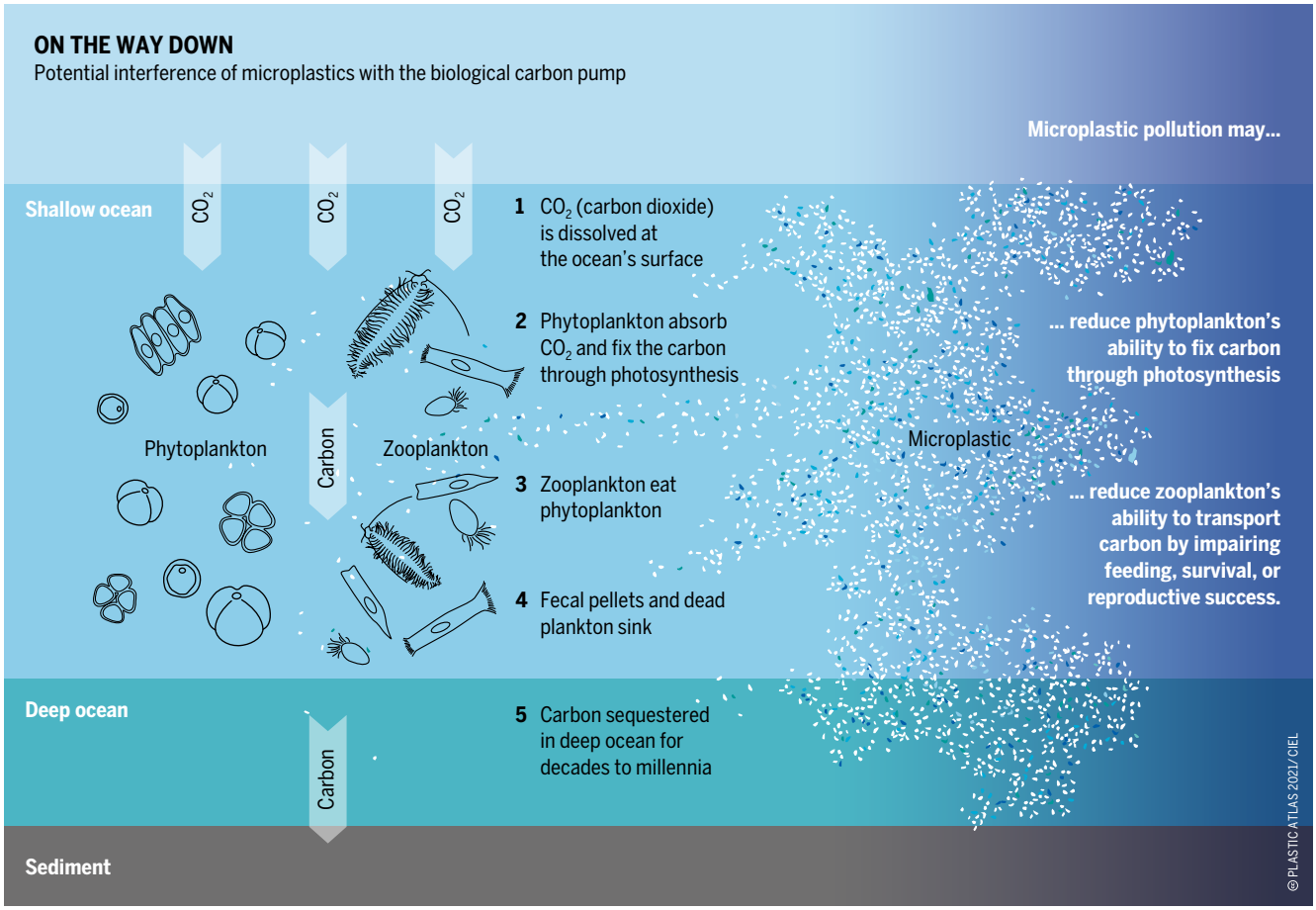
Carbon dioxide, methane, and an array of other greenhouse gases are released at each stage of the plastics life cycle, from the extraction and refining of fossil fuels and the energy-intensive processes that produce plastic resins to disposal, incineration, and potential release of waste plastics into the environment.

THE THREAT TO THE WORLD'S CLIMATE POSED BY PLASTIC

Projected share of CO_2 emissions from global plastic production, maximum budget to meet **1.5 degree warming target*** by 2050



* In 2015, the international community agreed to limit global warming to well below 2 degrees Celsius and to pursue 1.5 degrees Celsius compared with the pre-industrial times.
** CO_2 equivalents: unit of measurement for standardizing the climate impact of different greenhouse gases.



The oceans absorb a quarter of anthropogenic greenhouse emissions. Pollution by microplastics may put the biological carbon pump at risk. More research is needed.

This has major implications for efforts to meet global climate goals. To avoid overshooting the 1.5 degree target of the 2015 Paris Climate Agreement, the IPCC recommended that the total amount of carbon dioxide that the world can still emit must stay below the remaining (and quickly declining) budget of 420 to 570 billion tonnes.

However, 2019 estimates by the non-profit Center for International Environmental Law, a public interest environmental law firm, suggest that at current and projected rates of growth, production of plastics alone could generate 53.5 billion tonnes of carbon dioxide emissions by 2050. The addition of incineration of waste plastics pushes this total up to nearly 56 billion tonnes.

In other words, plastics could consume between 10 and 13 percent of the earth's remaining carbon budget for staying below a global temperature rise of 1.5 degrees.

Even assuming plastic production grows much more slowly after 2050, and incineration does not grow at all, emissions from plastic production and incineration could total nearly 260 billion tonnes of CO2 equivalent by the end of the century, potentially consuming over half the available carbon budget.

And these figures may still underestimate plastics' total climate impact, as little is known about certain aspects of the extraction, transport, and refining of fossil feedstocks for plastics in terms of their effect on emissions and other climate issues.

Moreover, emissions from plastics do not end when they are thrown away. Waste-to-energy projects that incinerate plastics are increasingly being proposed as a solution to plastic pollution. In Southeast Asia alone, the waste-to-energy market is projected to grow 15.5 percent and reach a value of US$13.66 billion by 2023.

Banks, financial sponsors, and private equity firms are expected to further tap into waste-to-energy ventures. In 2021, there were 10 waste-to-energy plants across the Association of Southeast Asian Nations member states. However, China and Japan remain the major regional players in the sector.

Given that incineration emits large amounts of greenhouse gases, the widespread deployment of waste-to-energy could lead to a large rise in emissions while simultaneously increasing toxic exposure for communities near and far from incinerators.

As such, transferring the threat of plastics from the oceans to the air while compounding plastics' climate impacts is the very definition of a false solution.

The effect on emissions may also be indirect. Growing levels of microplastic debris in the oceans may interfere with the biological processes through which plankton capture carbon dioxide at the sea surface and sequester carbon in the deep oceans.

This biological carbon pump is part of the oceanic carbon sink, contributing to the earth's climate balance. The mechanisms and extent to which microplastics may be interfering with that balance are of great importance, but remain poorly understood. More research on these mechanisms and interactions is required.

FROM THE RIVERS TO THE OCEANS

Huge amounts of marine pollution, fed mainly by plastic wastes floating down rivers and originating from land-based human activities, is an emerging transboundary issue in Asia.

Every year, some 10 million tonnes of plastic waste globally enter the oceans from land, the equivalent of a truckload every minute.

Plastics that end up in the sea tend to concentrate in five ring-like systems of ocean currents, known as gyres, in the north and south Pacific, north and south Atlantic, and Indian Ocean.

The gyre in the North Pacific, popularly known as the Great Pacific Garbage Patch, is the most famous. It covers an estimated surface area of 1.6 million square kilometres, which is half the size of India, four times as large as Japan, and around 1,500 times bigger than Hong Kong SAR.

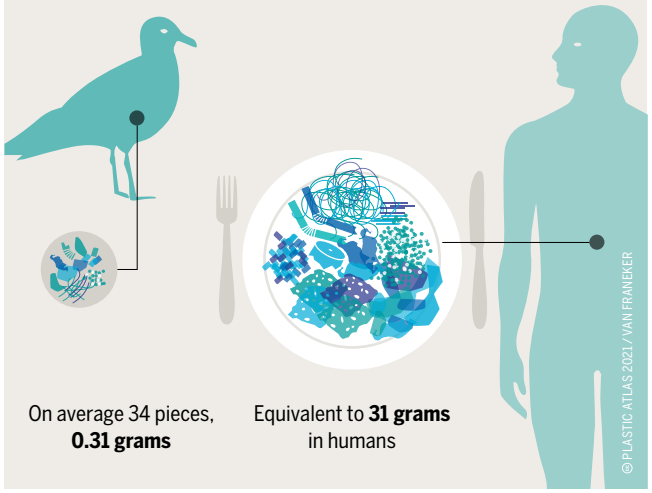
Oceanic garbage patches are not areas of consolidated plastic waste, but simply where the concentration of waste is highest. In fact, microplastics (fragments less than five millimetres in length) are now widely distributed in all of the world's aquatic environments.

In the waters around Hong Kong SAR, for example, a WWF-Hong Kong survey showed that plastics comprised 65 to 85 percent of the land-based debris floating on the coast and underwater around the city. Even areas as remote as the deep ocean and the Arctic are now known to be affected.

Marine refuse comes from a variety of sources, ranging from coastal settlements and maritime activities, such as aquaculture, fishing, and shipping, to being carried there by the wind. However, most plastics flow down to the sea through rivers.

NOT ON THE MENU

Quantities of plastic found in the stomach of an Arctic fulmar and the equivalent amount for a human



Between 1.15 and 2.41 million tonnes of plastic debris empty from global rivers into the oceans every year, with 86 percent coming from Asian rivers. The problem is attributed to rapid economic development, high population densities, urban lifestyles and consumption patterns, mismanaged plastic waste, and even the regular heavy rainfalls in parts of the region.

Fifteen of the top 20 plastic debris-polluted rivers are in Asia, and they account for more than two-thirds of the global annual plastic waste river emissions flowing into the oceans.

The Yangtze River in China contributes the largest amount of plastic flowing into the East China Sea. In Southeast Asia, Indonesia is a major contributor, with plastic waste flowing through its four major rivers, the Brantas, Solo, Serayu, and Progo. The Philippines is another significant source. The three major rivers flowing through or near the country's capital Metro Manila – the Pasig, Tullahan, and Meycauayan – are among the most plastic-emitting rivers in the world.

In the case of macroplastic (more than five millimetres in length) marine debris, lost or discarded fishing gear is a key plastic pollutant. Known as "ghost gear", such equipment is the cause of at least 10 percent of all plastic pollution, and up to 70 percent of all floating macroplastic marine debris by weight.

Chemical processes, mechanical abrasion, and photodegradation through sunlight and ultraviolet light gradually degrade plastic floating at or near the surface, breaking it down into smaller and smaller pieces. Ghost gear eventually decomposes into microplastics.

But fragments exist that are even smaller (up to one millimetre in diameter). These tiny particles do not stay at the surface. Some are washed ashore, but most lose buoyancy and sink as they degrade, or become heavier after being colonised by marine organisms. Sometimes, these tiny microplastics are eaten by marine life and then excreted.

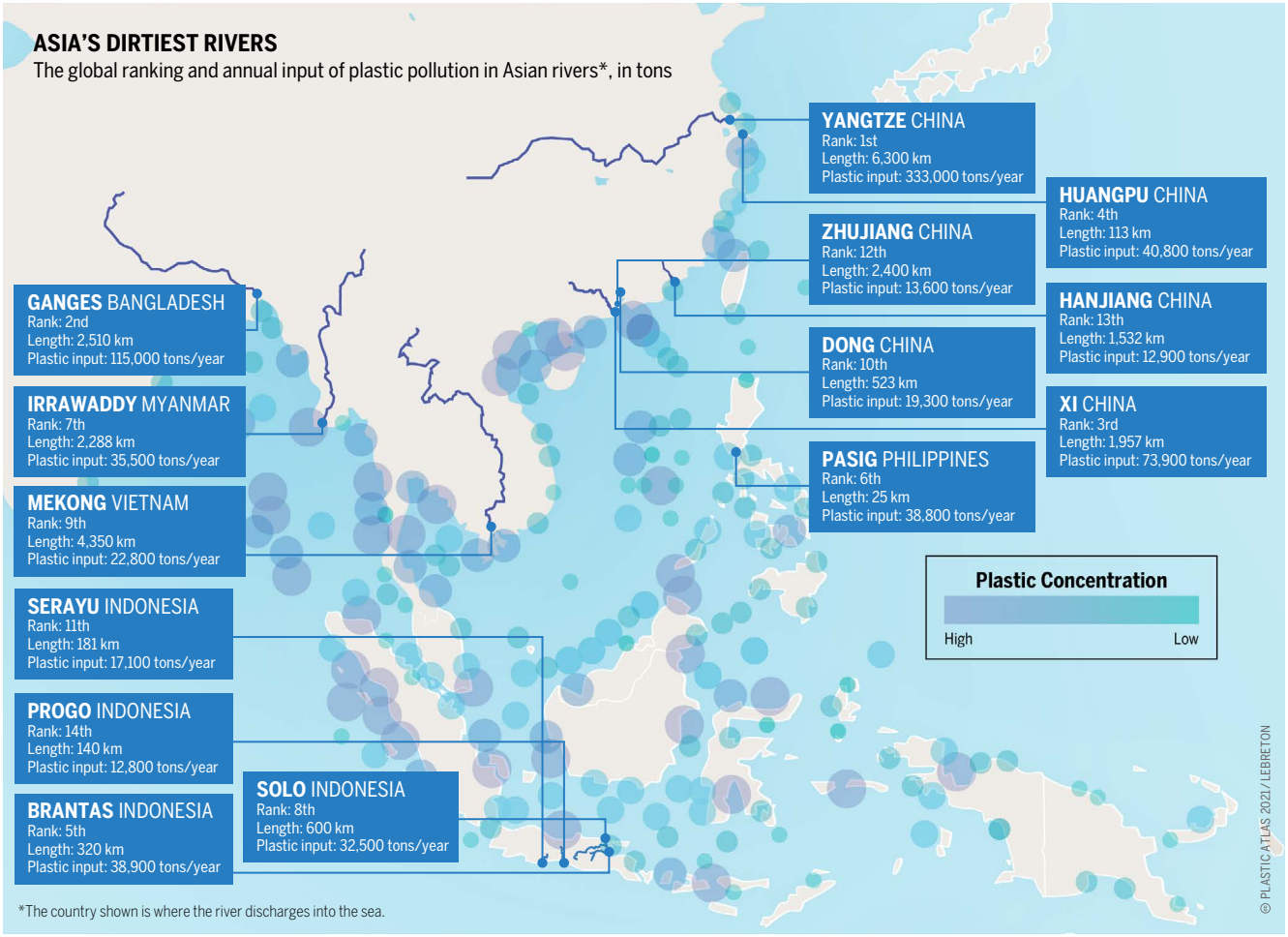
Plastic pollution is not just a blight on the world's rivers and oceans. More than 600 marine species are known to suffer from plastic ingestion, including 86 percent of all sea turtle species and about half of all seabird species.

Bottle caps, plastic bags, and fishing gear are the most harmful plastic debris to wildlife, with fish and birds often ingesting waste after mistaking such items for prey. This can cause the animals to choke or give them false satiety, leading to starvation. Marine organisms can also become entangled in marine debris.

In Indonesia, manta rays and whale sharks are among the marine species impacted by plastic ingestion. Meanwhile, research in Hong Kong SAR reported that sea creatures could be chewing on ocean plastic waste, creating microplastics at an even faster rate.

Many species of river and estuary fish in Asia have been

As they hunt, many birds cannot distinguish between a fish and a glistening piece of plastic floating in the water.



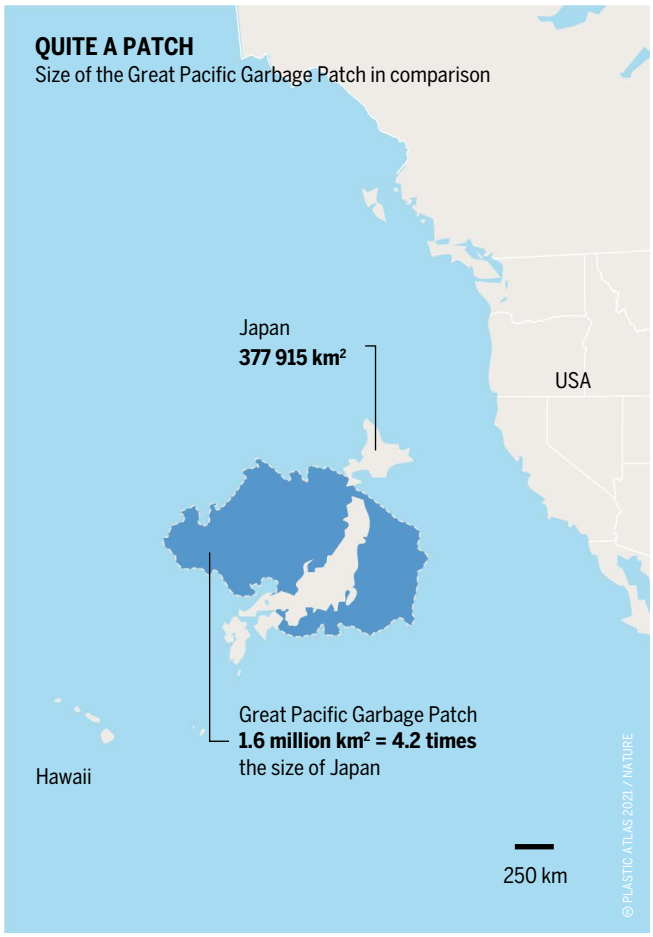
Plastic pollution is plaguing the water quality of river basins in Asia, which in turn impacts the ecosystem and human health.

similarly affected. Another Hong Kong study showed microplastics are commonly found in over 25 wild fish species in the Pearl River Estuary.

There are consequences for people, too. Fragments can be ingested by plankton, then travel up from the bottom of the aquatic food chain, until they eventually affect humans. In people, microplastics are known to move through the digestive tract and into organs, introducing toxic contaminants either from the plastics themselves or after they have been absorbed from the surrounding environment.

Adding to the challenge of finding solutions in Asia, marine debris pollution is a transboundary issue, requiring integrated regional cooperation. Initiatives such as the proposed Association of Southeast Asian Nations' Framework for Action on Marine Debris and the G20-led Osaka Blue Ocean Vision aim to address the problem through collaboration and cooperation.

But it will require civil society to continuously monitor the effectiveness of such initiatives or to propose alternative solutions to ensure useful action is not only discussed but also taken.



The Great Pacific Garbage Patch floats off the coast of California. Here, currents bring together different types of plastic trash from across the world.

SHIFTING THE BLAME

Consumers have been made the scapegoat in the plastic waste problem in Asia while the petrochemical and plastics industries, and multinational companies, continue to flood the region with single-use plastics.

It is a common perception that irresponsible consumer behaviour is behind the global plastic pollution problem.

In Asia, the blame game and steering of responsibility on to the region's consumers was made easier following a 2015 study by Jambeck, et al, which found that the largest amount of plastic leakage into the oceans occurred in Asian countries. Since then, the study's results have been cited many times in news reports, directing media attention towards Asian consumers.

In addition, a survey in Southeast Asia by the United Nations Environment Programme and Food Industry Asia showed companies to be embracing this consumer-focused perspective. The top two actions chosen by food and beverage companies as ways to address the plastic waste crisis were: consumers needed more education; and they ought to segregate their waste. Options related to government action to "Limit plastic waste imports" and "Mandate reporting on business waste" ranked seventh and ninth, respectively.

Although consumers cannot be totally absolved of responsibility in the plastic pollution crisis, putting the blame solely on them obscures the larger picture: that plastics are the downstream end of the vast petrochemical industry dominated by a handful of giant corporations.

Plastic waste analyses tend to focus on countries as the origin. The reality is that just a few dozen food and consumer goods corporations are the source of almost all the litter and more than half of all plastics that go into consumer products, mainly in the form of single-use packaging. Even fewer multinationals dominate the production of plastic resins that make the polymers that go into plastics.

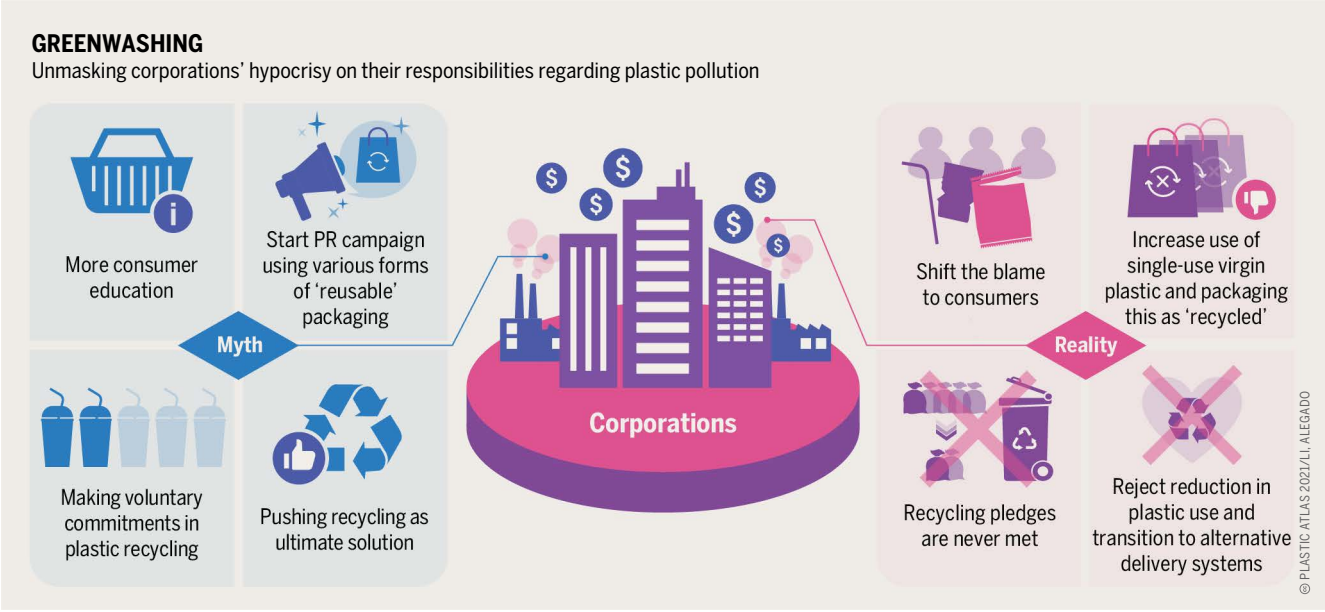
Break Free From Plastic's 2020 Global Brand Audit showed that the top three global polluters are Coca Cola, PepsiCo, and Nestlé. The rest of the brands named by the audit as the world's top polluters are also leading multinationals, manufacturing not only food, beverages, or household items, but frequently the packaging as well.

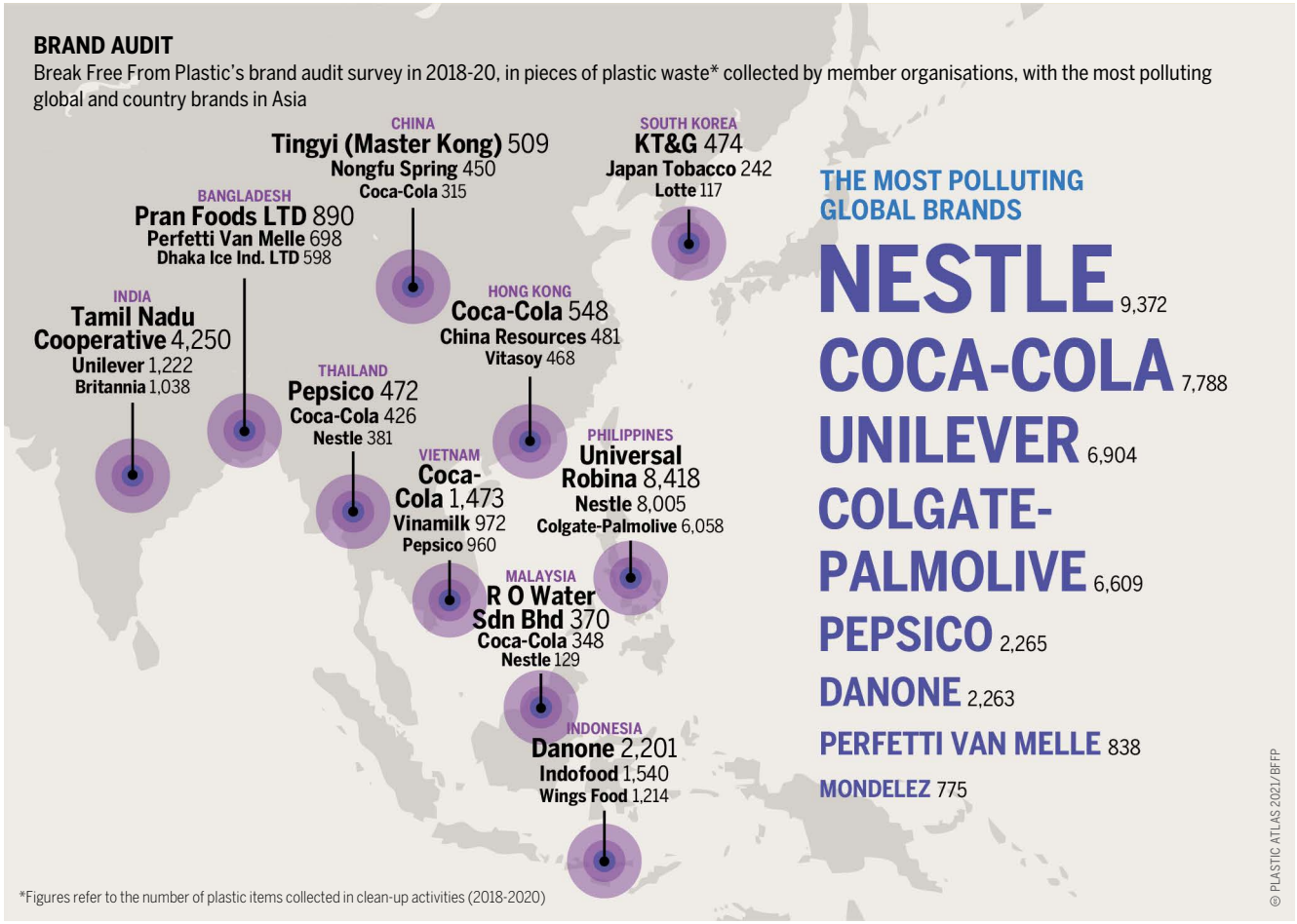
The same brand audit also found that Asian companies are responsible for plastic waste pollution in their own countries. Among the top polluters identified were Tingyi (Master Kong), Nongfu Spring (China), Tamil Nadu Cooperative (India), Indofood (Indonesia), Vinamilk (Vietnam), and Universal Robina (Philippines). A separate brand audit by Hong Kong-based NGO, The Green Earth found Vitasoy (Hong Kong SAR) to be another top polluter.

Moreover, multinationals and local companies in Asia continue to sell essential food and hygiene products in single-use, unrecyclable sachets, mainly to consumers who can only afford to buy small portions at a time. The region accounts for half of the global market for sachets, with 855 billion sachets thrown away in Asia annually.

In the Philippines, while both large local and multinational companies claim to have recycling goals, they produced 60 percent of non-recyclable waste, according to a 2019 waste assessment and brand audit report by the Global Alliance for Incinerator Alternatives. Such businesses also push for stop-gap measures and false solutions, such as plas-

Corporations promote recycling and consumer education to shift responsibility onto consumers. At the same time they reject commitments to reduce their own production of single-use plastic waste.





Every year since 2018, Break Free From Plastic has released a brand audit report based on the plastic waste collected and counted by its member-organisations in their respective countries.

tic-to-roads and waste-to-energy cement kilns, thus continuing to evade responsibility for plastic waste.

Corporations have made consumers believe that recycling is the real solution to plastic pollution while hiding their own responsibilities in generating single-use plastic. There is in fact little market demand for recycled plastic. However, recycling is a convenient narrative for producers because it again redirects responsibility on to consumers.

Recycling is a complex issue in Asia facing many challenges to its successful implementation. For example, there is limited formal waste collection infrastructure in many Southeast Asian countries, and almost all recycled plastic collection is carried out by informal collectors.

Furthermore, there is little value for post-consumer plastics when producers themselves do not use recycled materials. Multinationals such as Coca Cola, Nestlé, and PepsiCo have attempted for decades to increase recycled plastic usage in their products but have failed to meet their published targets.

Meanwhile, the plastic pollution crisis looks set to expand in the wake of the COVID-19 pandemic, which has increased demand for face shields, face masks, gloves, single-use food containers, and bubble wrap for online shopping deliveries.

Coupled with the global economic crisis that the pandemic has brought, and the decrease in demand for oil, it is now cheaper to make new plastics instead of recycling them. The situation has also prompted more investment in the plastics industry, with the oil and gas industries planning to spend a further US$400 billion over the next five years to make new plastics.

Although governments and corporations have indicated an intention to move towards a circular economy, they stand to benefit economically from a thriving plastics industry. Asia contributes 45 percent to global refinery output, with plastic production being one of the major downstream industries of oil. In addition, Asia manufactures 51 percent of global plastic products.

In Singapore, for example, the energy and chemicals industry represents one-third of the country's total manufacturing output. The Singaporean government also continues to seek new investors for petrochemical refining, with Exxon Mobil set to invest in a new multibillion dollar oil refinery complex in the country.

At the same time, consumer feedback, brand audits, and a greater understanding of the waste problem in the region are propelling zero waste movements across Asia. With increased public scrutiny of the corporate role in plastic pollution, the largest multinationals continue to commit to reduce their plastic footprint. Some have set new targeted approaches to packaging, not only through recycling but also sustainable packaging alternatives.

However, criticisms of these alternatives – such as oxo-biodegradable plastics or bioplastics – have already arisen, suggesting that they actually create more microplastic pollution and may not be truly sustainable alternatives in the long term.

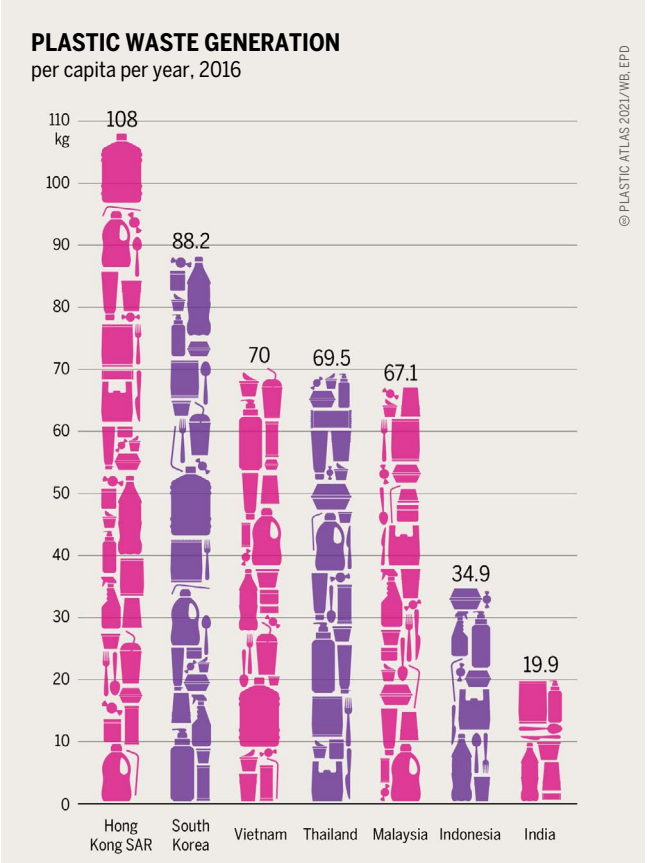
THE CHILD OF GLOBAL TRADE

Plastics are both the result of and a spur to globalisation. As Asian economies continue to develop and their sizeable, digitally savvy populations grow wealthier, online shopping has come of age, bringing ever higher mounds of plastic packaging rubbish.

Since the end of World War II, the Asian region has enjoyed rapid economic growth. Initially led by Japan and subsequently seen in many emerging regional economies, productivity has steadily risen as industries churn out consumer products in ever-increasing volumes at ever-lower prices, driven by automation and the use of energy derived from fossil fuels.

Plastics have played a key role over the years. Today, technological advances in the petrochemical industry have made plastics so cheap and flexible to produce that they can be sold as single-use items and disposable packaging, which in turn makes it possible to sell yet more products.

For shoppers, this has meant consumption anytime, anywhere, and packaging that can simply be thrown away. At the same time, supply chains have become much longer in pursuit of distant markets. Transporting goods over huge distances has made new types of packaging necessary, with plastics ready to smooth the way.



Indeed, from the invention of Bakelite – the first modern plastic– in 1907 down the decades to today's multitude of synthetic compounds, plastics have become ubiquitous. Chemical giants turn the primary constituents of hydrocarbons into intermediate chemicals, and then into numerous polymers that they mould into a huge variety of end products.

Some materials and products are designed for a specific use. For others, new market applications must be created. With the oil and gas industries threatened by the transition to green energy, plastics are a way to diversify and strengthen their markets. This in turn serves as motivation to keep on developing materials that can transport food further, offer more attractive packaging properties, and maximise durability.

As a result, the plastic industry has developed a strong presence in the product design and packaging sectors. Packaging is forecast to remain the most prominent use for plastics until at least 2025, a trend expected to be fuelled by the growth of e-commerce.

The massive expansion of single-use packaging is both a result of globalisation and a driver of international trade. When a supply chain crosses the globe and the consumer is far away from where the product is made, returning reusable packaging to the production facility is costly and complicated. The situation has been exacerbated by an oversupply of plastic feedstock, providing little need for producers to reuse materials.

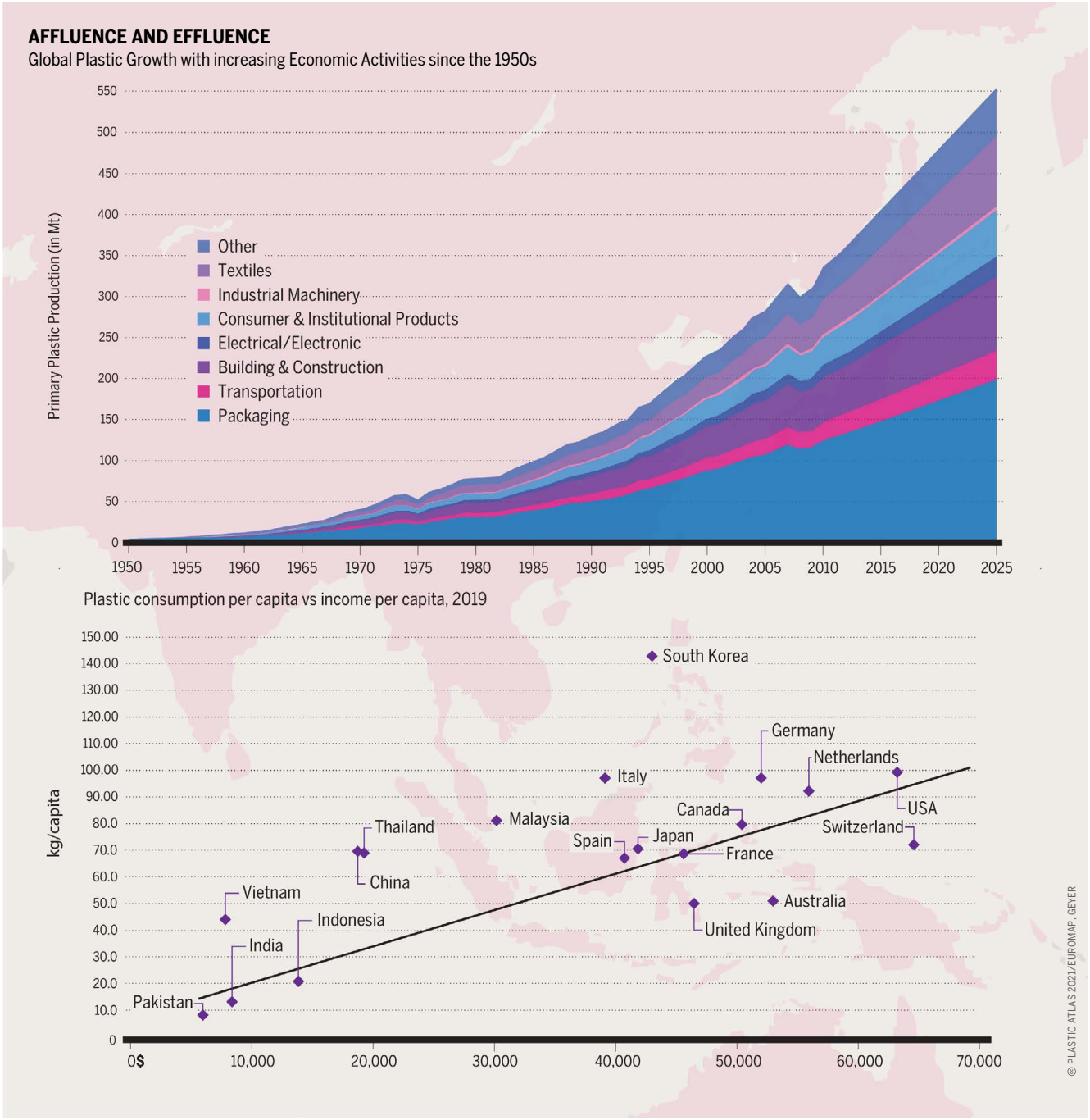
Given the convenience and cost-effectiveness of packaging products in single-use containers, such packaging has become the norm, allowing brands to shed the cost and burden of reverse logistics and ignore any responsibility for what happens to the containers after their contents have been consumed.

In the digital age, consumers have also succumbed to this type of "convenience" thinking, whereby to save time and effort, increasing numbers of people are shopping online. The COVID-19 pandemic has hastened this trend.

In Asia, e-commerce has been fuelled by giants Alibaba and subsidiary Lazada, competitors JD.com and Tencent (all from China), and regional rivals Shopee (Singapore), Tokopedia (Indonesia), Rakuten (Japan), Coupang (South Korea), Flipkart (India), Mudah.my (Malaysia), and Sendo (Vietnam).

These companies have grabbed a significant share of consumer purchases, generating sales of hundreds of billions of dollars a year. However, with huge numbers of packages now being shipped to consumers, the environmental impact of producing and disposing of plastics and cardboard has become a major issue.

Hong Kong SAR and South Korea have the highest per-capita plastic consumption per year in Asia, followed by a number of other emerging economies in the region.



The growth in economic activity mirrors plastic consumption. Increasing activity in certain sectors also reflect an increase in plastic production.

Business is now coming under increasing pressure to use reusable, recyclable, or compostable materials, as research has shown a positive correlation between environmentally sound business practices and brand equity, with consumers expressing their preference for greener options.

In 2017, the plastic pollution crisis in India led to a ban on certain single-use plastic articles. In China, e-commerce retailers, including Alibaba, Suning and JD, have initiated plastic reduction efforts in response to the country's 2018 e-commerce law. Yet, biodegradable packaging and recyclable boxes remain limited, with only cartons being recycled for now.

Eliminating single-use plastic and packaging cannot occur without drastically changing how global markets operate. Current systems for recycling of plastics have no chance of coping with the scale of the environmental challenge. Single-use plastics continue to dominate, and plastic-free alternatives are restricted to a few niche markets given that plastics are still eminently practical and super-cheap.

As such, consumer habits may have to change. The first signs of this are evident as sustainable packaging begins to play a slow but steadily increasing role in local food distribution and for other items.

The first packaging-free shops appeared in Europe in 2007, with many others following suit. There are now shops in Asia that have started selling loose items, with customers bringing their own containers to take products home. An increasing number of takeaways are also offering discounts to customers who bring their own containers. Meanwhile, bans on certain single-use plastic items are sending out a signal at the international level that things must change.

REPLACING OIL WITH SUGARCANE AND CASSAVA IS NO SOLUTION

Plastics made from renewable raw materials are supposed to be environmentally friendly. They degrade more quickly – at least according to their corporate backers. However, a closer look shows they create fresh problems.

Plastic materials' biggest advantage is also their biggest drawback. Designed to be robust, they last almost forever, with some types taking hundreds of years to break down naturally.

Today, certain renewable raw materials are being used as plastic feedstock, as alternatives to those based on fossil fuels. These so-called "bioplastics" come with the implicit assurance that they biodegrade more quickly. Yet the inclusion of "bio" in their name does not necessarily mean they are more environmentally friendly than regular plastics.

While the volume of bioplastics produced worldwide is still small, these materials are becoming more popular, helped by "greenwashing" labels such as "bio-based", "biodegradable", and "compostable".

International brands Coca-Cola, Danone, Nestlé, and PepsiCo, which have been prolific in using single-use plastic packaging, are now replacing some conventional fossil-derived plastics in their beverage bottles with bioplastics.

Meanwhile, in the Asia-Pacific region, packaging accounts for more than 80 percent of bioplastic use, fuelled by growing demand from China, India, South Korea, and Japan. The Philippines' San Miguel Corporation, Thailand's CP Foods, and 7-Eleven Japan are some of the Asian companies to have announced the adoption of bioplastics in their packaging.

Bioplastics come in two main types: bio-based and biodegradable. However, the terms can be misleading. Take bio-based plastics, which are nowadays commonly used instead of PET and PE polymers in packaging. Although conventional plastics are made from fossil fuels and bio-based plastics are made from biological materials, not all bio-based plastics are compostable or biodegradable. Likewise, not all compostable or biodegradable plastics are bio-based.

The production of bio-based plastics requires raw materials such as sugarcane, cassava, maize, and potatoes. Sugarcane and cassava are mainly cultivated in Asia. They are grown as monocultures and use considerable amounts of pesticides. Both have massive consequences for nature and people in the region.

The volume of "bioplastics" produced worldwide is still small. But it is becoming more popular as an alternative to fossil raw materials.

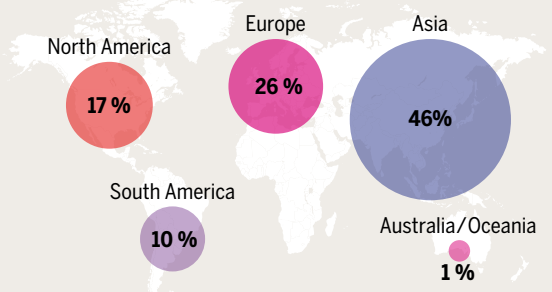
As a key hub, Asia accounts for over 46 percent of global bioplastics production in 2020, with Thailand being a major source of raw materials and thousands of companies handling different stages of the bioplastic value chain. The development of this farm-to-industry system followed the creation of Thailand's Eastern Economic Corridor (Economic Special Development Zone), which spurred the country to seek a bio-based solution to its plastic waste problem. Indonesia is also producing biodegradable plastics from cassava roots.

Renewables may account for between 20 and 100 percent of plastic end products, depending on the item. The rest consist of fossil raw materials, or increasingly, of recycled ingredients. Currently, 0.02 percent of global agricultural areas are used to grow the plants that go into bioplastics. But this proportion is expected to grow rapidly.

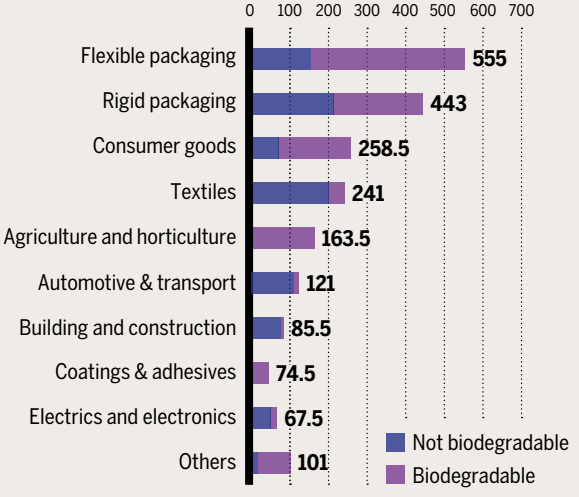
In 2019, bioplastics' production capacity was reported to be around 2.1 million tonnes, representing about one percent of total plastics output, with the industry forecast to reach 2.8 million tonnes in 2025.

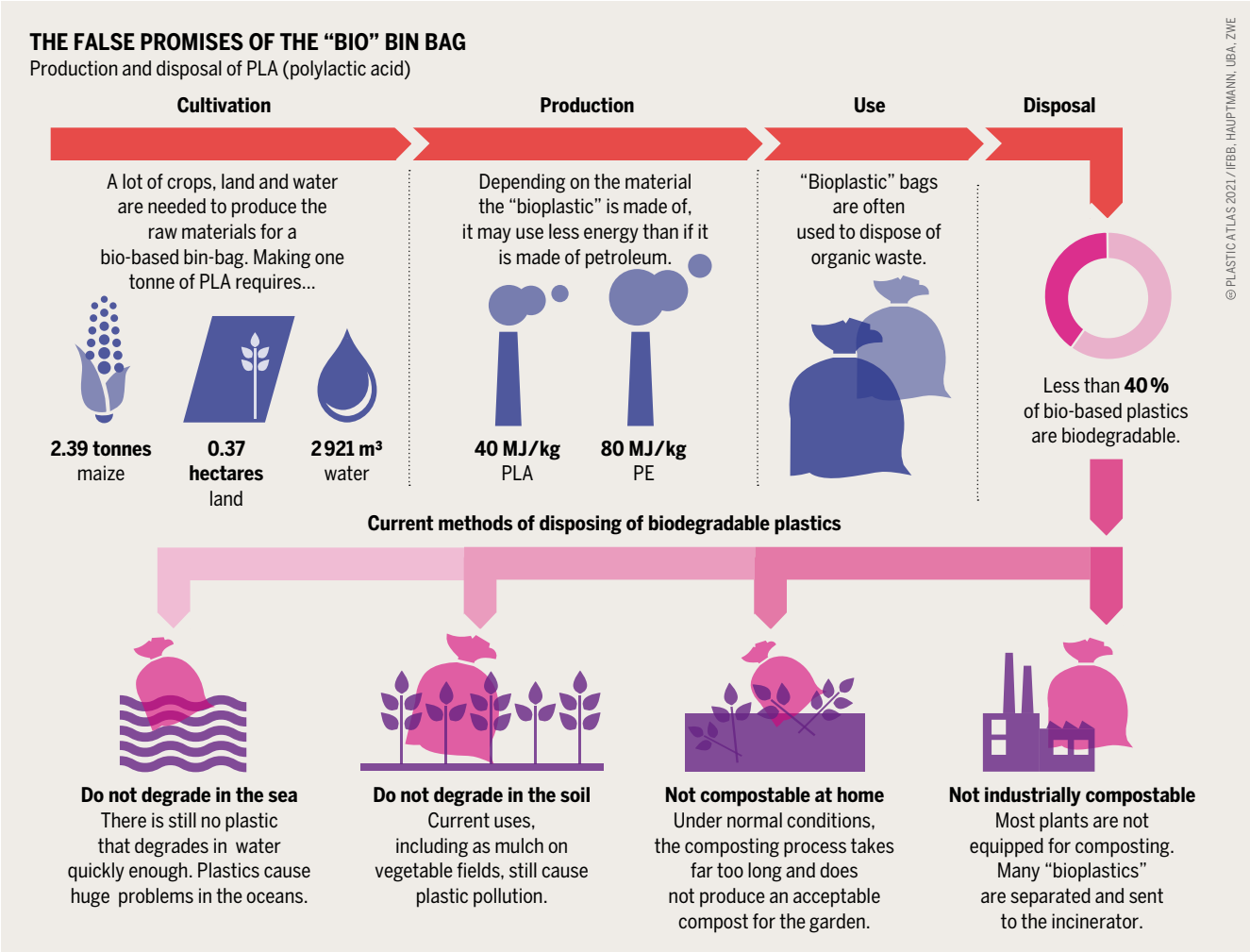
PRODUCTION AND USE OF "BIOPLASTICS"

Production capacity of bio-based plastic in percent, 2020
(total: 2.11 million tonnes)



Bio-based plastic by industry sector, thousand tonnes, 2020





A bin bag that is made out of renewable raw materials implies a sustainable cycle, but it creates significant environmental problems.

This is an indication that pressure on areas under cultivation is going to rise. In some parts of the world, the situation is already leading to water shortages, species extinction, desertification, and the loss of natural habitat. Thus, expanding the production of agricultural raw materials is not an option for producing environmentally friendly plastic.

The second category of bioplastics – biodegradable plastics – are designed to be degraded by microorganisms under specific conditions. Biodegradation can happen in both natural and industrial environments. It occurs more rapidly in aerobic conditions (for example, compost, soil, and some aquatic environments) and less quickly in anaerobic conditions (anaerobic digesters, landfills, and some aquatic environments). These plastics may be bio-based, but do not have to be.

Biodegradable plastics are used for many types of products, ranging from compostable bin liners and food packaging (for example, yoghurt containers) to takeaway coffee cups and fast-food trays. A specially designed international label is supposed to certify that the item can be composted. But the usual recycling process involved is not really composting but simply a form of waste disposal.

According to the test criteria for the label to be used, plastics have to be 90 percent degraded after 12 weeks at 60 degrees Celsius. But most composting plants allow waste to rot for just four weeks. Extending this period does not make economic sense. At the end of the process, only water, carbon dioxide, and mineral additives remain, but no materials that can form humus. Heat is also released that cannot be used further in the recycling process. To make the next bin liner or yoghurt pot, more energy must be generated.

Regardless, the majority of Asia's biodegradable plastics currently end up in incinerators or landfill. In addition, there are fake bio-based plastic bags. These are described as 100 percent biodegradable but are actually more damaging as they do not completely degrade. Instead, they fragment over time into smaller plastic and microplastic particles.

One argument often used to justify bio-based and biodegradable plastics is that, after taking their whole life cycle into account, they have less of an impact on the environment than comparable regular plastics. But even that claim is undermined by the overwhelming acidification and over-fertilisation of soils and water caused by the conventional cultivation of the crops used to make bio-based plastics.

Life-cycle assessments also fail to take into account direct and indirect changes in land use or the effects of using genetically modified crops. And the consequences for biodiversity in the areas that produce crops for "bioplastics" have not yet been adequately studied.

Thus, the attempt to simulate biological cycles will not be enough to stem the flow of plastic waste. Bioplastics only shift the problem and distract attention from the real solutions.

WE CANNOT RECYCLE OUR WAY OUT OF THE PLASTIC CRISIS

A feasible method to cope with the ever-increasing piles of plastic waste has yet to be found. Melting, burning, chemical engineering – all fall short as solutions to tackle plastic pollution.

No country is free from mountains of unrecyclable plastic waste, as there is no management solution to date, especially for low-grade, highly contaminated, often multi-layered plastic packaging waste. Indeed, only nine percent of all the plastics produced since the 1950s have been recycled.

In part, the low recyclability of plastics is due to the complexity and variety of products and packaging, along with the additives, colourants, and fillers used in plastic production, and contamination from consumer use.

The use of flexible and multi-layered packaging makes it harder to collect, separate, and recycle such waste. Inadequate waste collection systems and regulations also add to the challenges as many South and Southeast Asian countries lack formal waste separation and collection mechanisms.

Meanwhile, the relatively low price of oil and gas, compared to recycling, favours use of virgin materials over recycled plastic.

This means that even today only 14 to 18 percent of plastics are being recycled worldwide, while 24 percent are thermally treated. The rest ends up in dumps, landfills, and waterways.

In Asia, in addition to the growing amount of plastic waste generated by the increase in consumption, the region has been flooded with low-grade plastic waste and associated pollution shipped from the Global North for decades. However, data on the fate of this plastic waste is scarce and incomplete, as many Asian countries lack the institutional means to collect and analyse it, especially in rural areas.

General recycling rates for all waste streams vary greatly from eight to 61 percent depending on a country's economic level, readiness of infrastructure, and the role of waste pickers. Polymer types are another important factor in plastic recycling.

Even in high-income countries globally, the plastic recycling rate does not exceed 30 percent. For lower-income countries, the expectation is that rates will be low unless there is a robust and well-organised informal recycling sector.

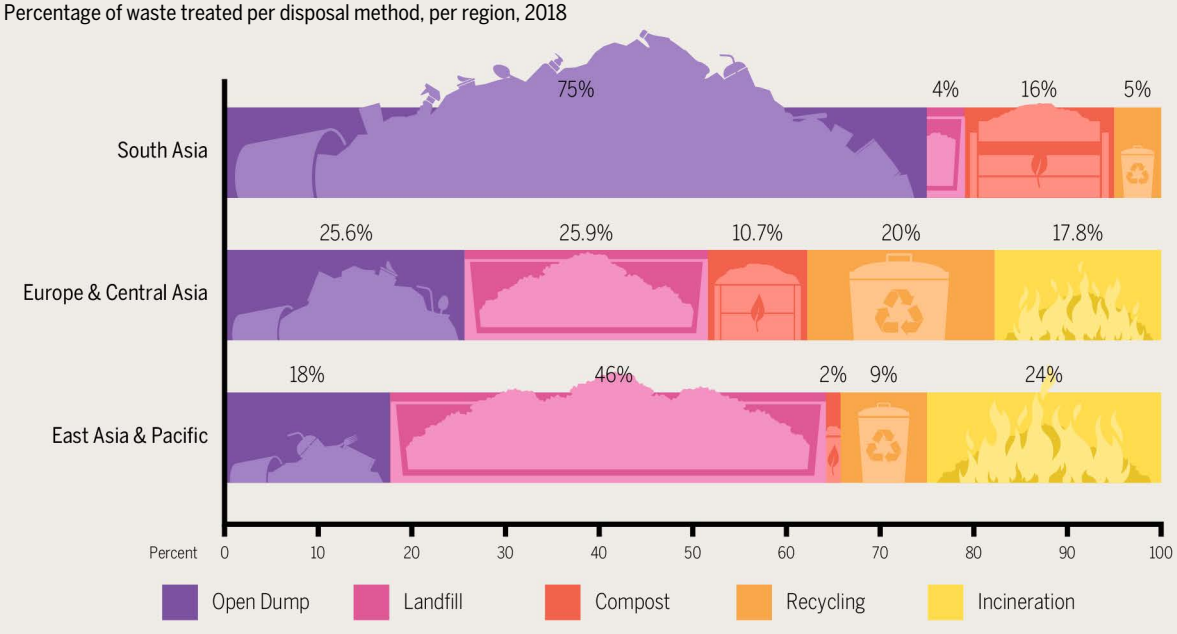
Burning is one of the major waste management options in Asia. This takes different forms but each produces their own set of problems.

Open burning, a common practice in many countries in the region, emits toxic pollutants that threaten human health and the climate.

The most commonly used method of waste disposal in Asia is open dumping and landfills. This is followed by incineration, composting, and recycling.

WASTE DISPOSAL METHODS

Percentage of waste treated per disposal method, per region, 2018



Asian countries also tend to replicate practices of their high-income neighbours where waste management and the associated infrastructure are more firmly established, including incineration.

However, waste incineration simply takes the practice of open burning to an industrial scale, creating large-scale air pollution in the form of respiratory irritants, cancer-causing dioxins and furans, heavy metals including mercury, cadmium and lead, and major greenhouse gases.

Even sophisticated pollution control equipment cannot prevent all pollutants from waste incineration being released into the air while capturing pollutants concentrated in residue ash, which reach the soil and groundwater through landfills and other industrial paths.

Further drawbacks of this method include the massive investment and maintenance required; the current inefficiency of using waste as fuel; and the need for constant feedstock to keep an incinerator operational.

Geography, too, is a major reason there are few incinerators in Southeast Asia and South Asia, with such facilities being particularly inappropriate for areas with high organic moisture content in their waste, which would call for co-firing with coal or other conventional fuels.

Incineration is also cost-prohibitive, both because of the massive investment and maintenance requirements, and due to the low efficiency of waste as a fuel and a constant demand for feedstock to keep the system operational. Solid-waste combustion is the most environmentally damaging industry relative to the benefit it provides. Meanwhile it undermines recycling by consuming recoverable materials as feedstock and taking investments away from true renewable energy and zero-waste solutions.

Chemical recycling has also gained attention as a way to treat plastic waste that is hard to process through mechanical recycling. Despite the hype, chemical recycling's potential appears overestimated, being a repackaged version of thermal processes such as pyrolysis and gasification that have been around since the 1950s. There are also few signs of large-scale operational success in converting old plastic into new.

For many countries in Asia, these technologies are particularly unsuitable because the processes involved usually require specific types of plastic waste as well as heavy sorting and pre-treatment of feedstock, or technologies are adopted on a smaller scale without the wider systems needed for effective use. For example, some communities have adopted mobile waste gasifiers to convert waste into fuels, resulting in uncontrolled pollution.

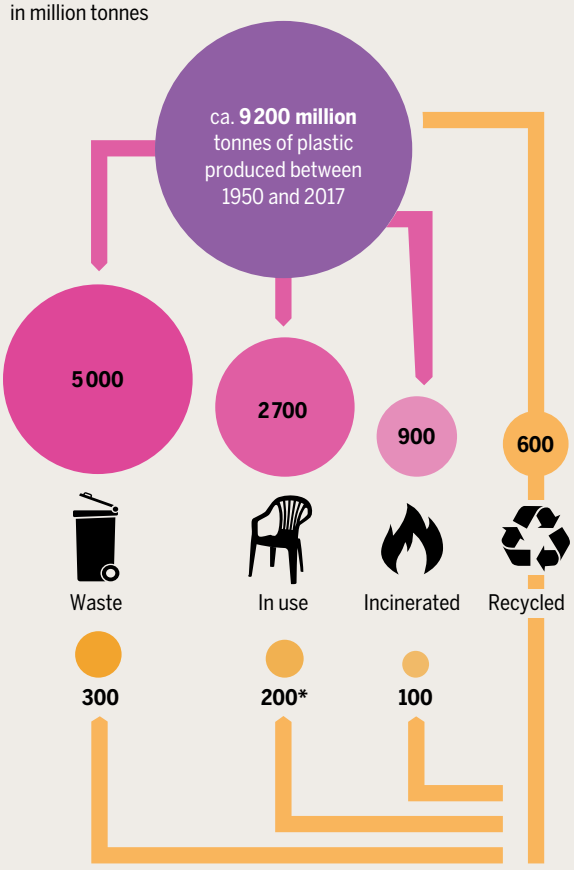
Given the huge volumes of plastic materials being discarded on a daily basis, it is becoming clear that no existing waste management methods can be a viable solution to the current plastic pollution crisis.

Caught between the limitations of plastic recycling and destructive consequences of burning or burying plastic waste, cities and communities are left with only one way to deal with the problem: to make zero waste and extended producer responsibility a reality through legislation and efficient waste collection systems that reduce plastic waste at source. China's recent efforts to curb plastic production through plastic bans and improved collection and separation of waste in 46 cities serves as one living example of the way forward.

Recycling saves a large majority of the energy contained in plastic waste. That is not the case with incineration, where most of the energy is lost.

THE CAUSES OF THE CRISIS

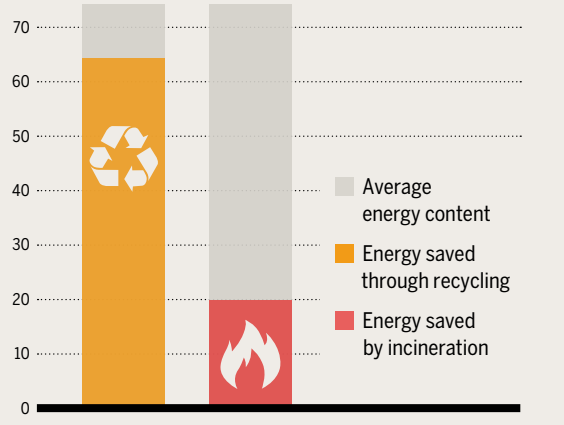
Global production, use and disposal of plastics, 1950 to 2017, in million tonnes



A glance at the flows of plastics made since the 1950s shows that recycling is part of the problem, not part of the solution.

WASTED ENERGY

Energy balance of incinerating waste, energy in megajoules/kg



THE RUBBISH DUMP IS CLOSED

The Chinese government's ban on plastic waste imports, effective from 2018, triggered a series of waste import bans in the region, with one message becoming clear: no country should serve as another's dumping ground.

Until recently, China was the world's most-frequented destination for low-grade plastic waste. In 2016, the country accepted more than half of the plastic waste traded by the entire planet, with shipments coming mostly from Europe, North America, and certain Asian countries in order to reduce refuse in their own backyards.

In the developed world, only high-value plastic materials such as polyethylene terephthalate (PET) and high-density polyethylene (HDPE) have been deemed suitable for domestic recycling. The remaining waste used to find its way to China and other countries with low environmental standards and cheap labour.

China's import ban on waste plastics and other materials, starting in early 2018, rapidly changed this. With most exporters responding to China's new regulation by stockpiling and exploring alternative markets, Southeast Asian countries became the destination, bringing a new threat of landfill saturation and environmental pollution to the region.

In 2018, Malaysia and Thailand were among the top plastic importers, showing huge increases compared with the previous year. Indonesia and Laos saw imported plastic waste more than double. Imports by China fell by more than 90 percent over the same period.

Lower-grade plastic waste largely went to less developed countries in the region while strong recycling demand for higher-quality clear PET bottles in South Korea saw waste imports there double.

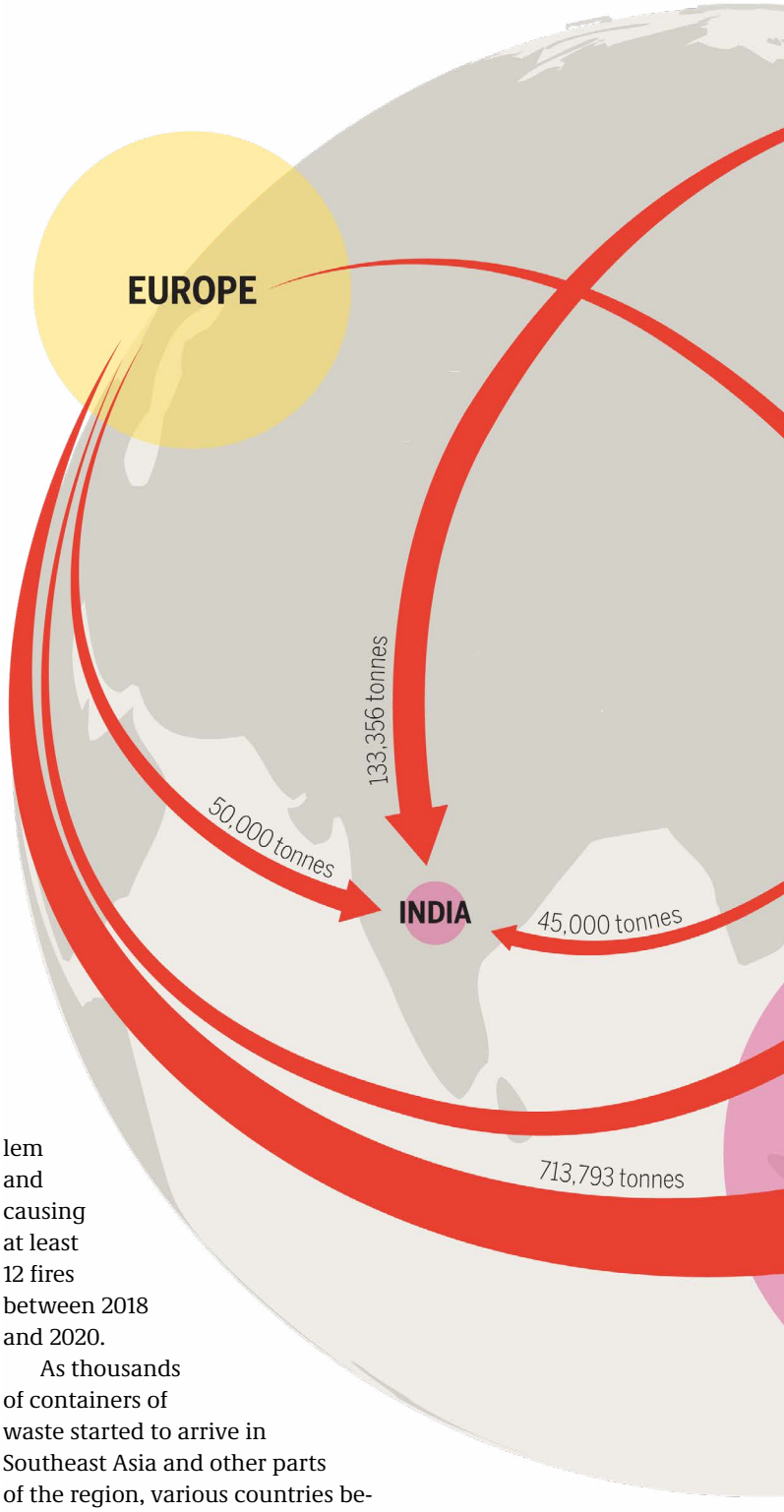
Hong Kong SAR was one of the largest importers in Asia as well as the biggest re-exporter in the region in 2019, with some importers re-routing waste bales to Southeast Asian countries through the city's port to skirt import limits and inspections.

In the same year, Japan, the largest exporter in Asia, shipped out close to 900,000 tonnes of plastic waste. Over 90 percent was transported to Asian countries and regions, including Malaysia, Vietnam, Thailand, South Korea, and Hong Kong SAR.

Overwhelming amounts of plastic waste led to a sudden rise in unauthorised recycling operations and illegal shipments. In Malaysia, nearly 40 unregulated recycling facilities sprang up in Jenjarom, a town southwest of the capital Kuala Lumpur, burning unrecyclable plastics and releasing toxic wastewater into waterways.

Although rigorous community action successfully called for an official investigation and shut down many of the illegal operations in Jenjarom, facilities spread to the western side of Malaysia, creating another pollution problem and causing at least 12 fires between 2018 and 2020.

PLASTIC WASTE EXPORTS ROUTES AFTER 2017
Exports of Plastic Waste into key Asian regions, 2018

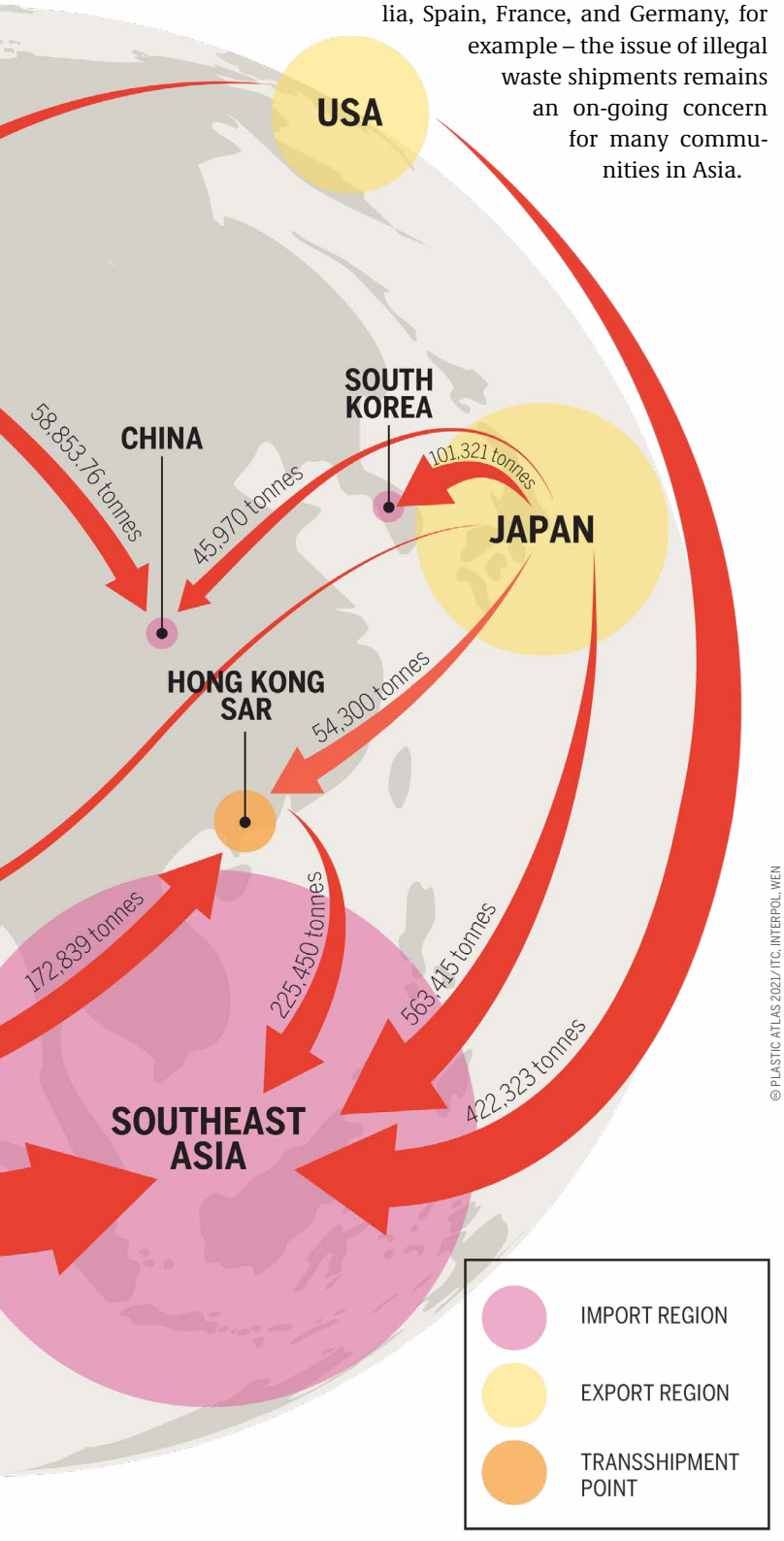


As thousands of containers of waste started to arrive in Southeast Asia and other parts of the region, various countries began to take regulatory action to restrict or ban imports of plastic waste.

The spike in Malaysia's plastic waste imports in 2018 led the country to tighten its requirements in the same year.

Thailand, India, and Vietnam have announced they will phase out plastic waste imports by 2021. Sri Lanka and the Maldives plan to ban the import of plastic products and packaging, as well as plastic waste, to protect wildlife.

The Philippines, Malaysia, Indonesia, Cambodia, and Sri Lanka have also been dealing with illegal plastic waste hidden in bales of recyclables. While some government agencies have sent back such waste to its origin – the USA, UK, Canada, South Korea, Hong Kong SAR, Australia, Spain, France, and Germany, for example – the issue of illegal waste shipments remains an on-going concern for many communities in Asia.



Asia is a major destination of plastic waste exports from Europe, USA and Japan.

While regulations help to protect affected communities, they fall short of addressing the deeper issue: why any country or region should serve as a dumping ground for others.

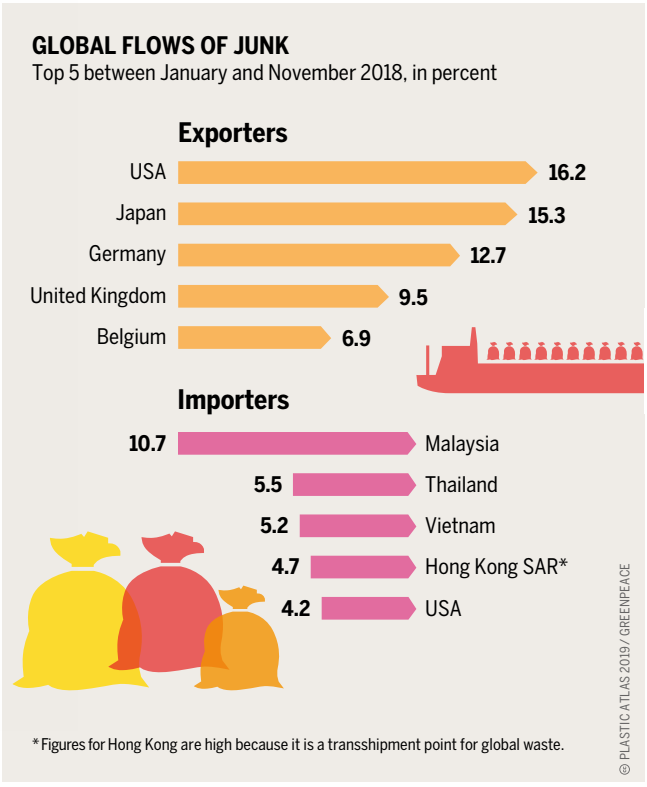
Waste collection and recycling systems in Asia are far more fragile than in the Global North; separation and collection systems are inadequate; and open dumping and burning are still prevalent in many rural areas in Southeast and South Asian countries.

The region is already facing health risks associated with treating low-grade plastic waste in precarious working environments. Proposed incinerators and the resulting ash threaten to further pollute land and water, and to poison residents with carbon monoxide, nitrous oxide, particulate matter, dioxins, and furans that are linked to cancer, respiratory illness, nervous disorders, and birth defects.

The global community must reform the international waste trade system and take robust policy measures to curb the flood of plastic waste. In April 2019, 187 countries agreed to amend the Basel Convention on the Control of Transboundary Movements of Hazardous Wastes and Their Disposal. This move will subject shipments of plastic waste to stringent controls and prior informed consent from importing countries. Effective from the start of 2021, the amendment will create more accountability around most categories of contaminated, mixed, and unrecyclable plastic waste shipments.

In addition, global environmental advocacy groups are continuing to push for holistic policy moves geared towards bans on plastics and support for reusable systems that can address this problem in an adequate and timely manner.

The industrial world is the source of most plastic waste exports. The biggest importers are in Asia. Most waste consists of containers, films and sheets.



UNDERPAID AND UNVALUED

Informal waste pickers play a crucial role in diverting plastic residuals from open dumps, incinerators, and the environment. Yet, across Asia, such workers are excluded from formal waste management and denied access to discarded materials.

In many poor countries, informal waste pickers take over the tasks of the municipal refuse truck and waste processing plants. They divert a significant amount of waste back into productive uses by sifting and selling items of value: glass, paper, cardboard, and metals, as well as plastic packaging, bottles, and bags.

Waste picking is intrinsically related to widening social and economic inequality. People who are excluded from society because of social prejudices, and those without access to education or formal labour, housing, health services, and even food, have no choice but to scrape a living by processing other people's rubbish.

Many waste-picker families – some of whom span three or more generations – live on dumps and next to open pits. Having fallen into a cycle of poverty, they face numerous health problems from handling contaminated materials and eating spoiled food. Moreover, dumps are physically dangerous and it is not uncommon for people to die trying to get at the best materials brought in by refuse trucks.

Some waste pickers are homeless or live far from the wealthier residential or commercial areas that generate refuse. They use handcarts or carry sacks to such areas to collect rubbish from bins and roadsides, then haul them home to sort and sell recyclable items.

Through their aggregating and sorting different types of rubbish, waste pickers are well equipped to assess waste streams, and know from first-hand experience how problematic plastics are to collect and resell because of their design and due to market conditions.

Prices paid for plastics are low compared to paper, cardboard, and metals, and demand is typically seasonal, making it difficult to earn a reliable income. Sorting plastics also takes a lot of time, with non-recyclable plastics – often a significant portion – unable to be sold.

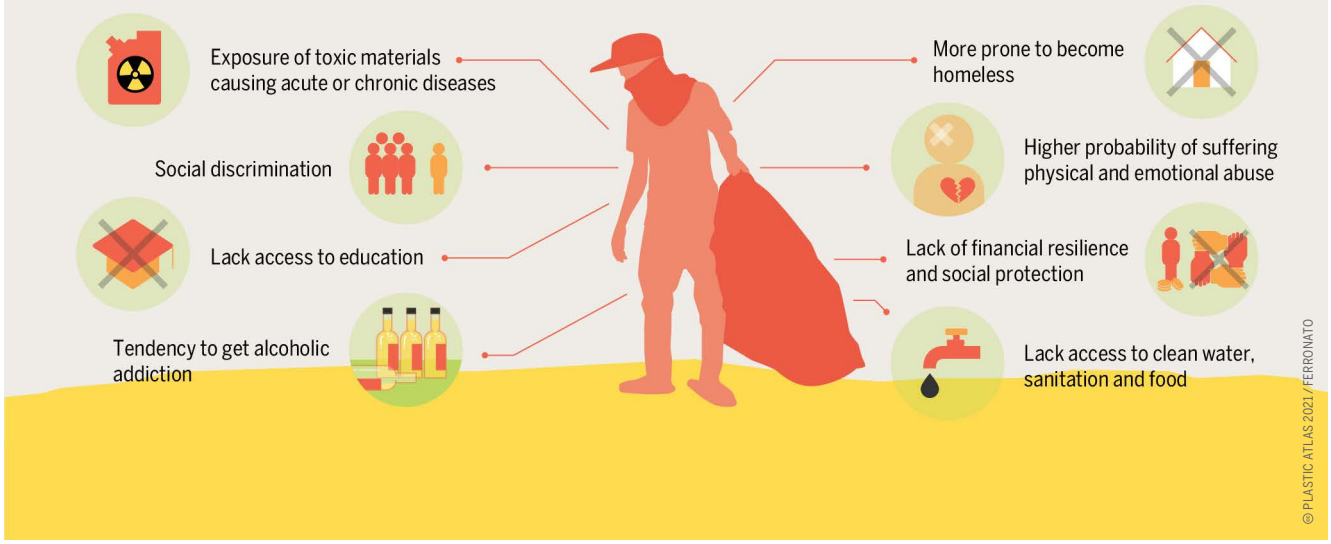
Waste pickers perform an important role in diverting recyclables from the waste stream. Recycling rates achieved by the informal sector in China, Pakistan, India, and the Philippines range from 20 to 50 percent. In Pune, India, the SWaCH waste pickers cooperative recovers 89 percent of materials, diverts 52 percent of plastic wastes from landfills, and saves the Pune municipal government more than US$12.5 million in solid waste management costs annually. Their door-to-door collection and materials processing service also has a greenhouse gas emission impact equivalent to removing annual emissions from 39,195 passenger vehicles.

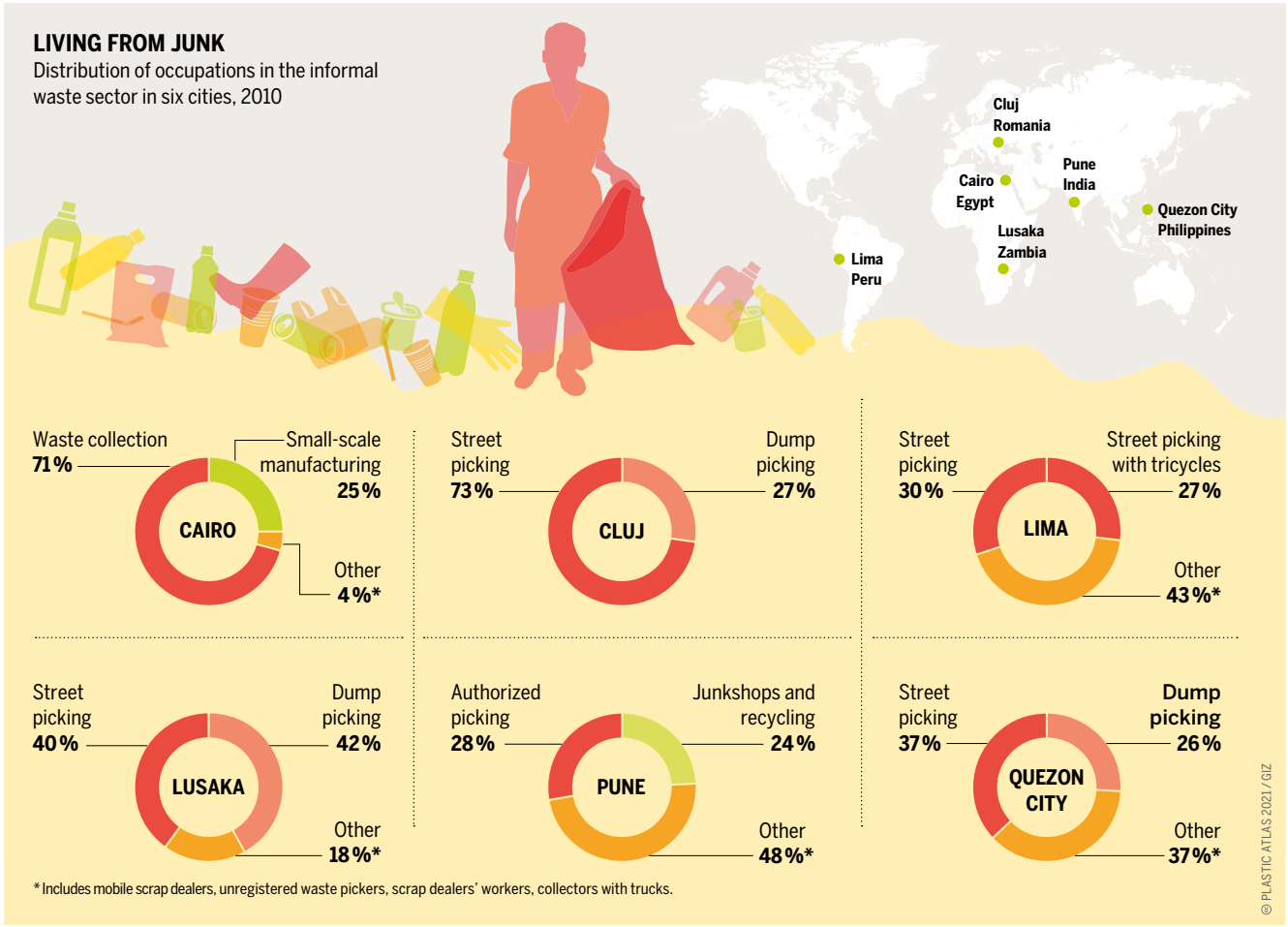
Despite waste pickers' role in creating a closed loop economy for rubbish, these workers receive little compensation, face great risks of injury, and are exposed to health hazards from activities such as burning or melting plastic. Across Asia, they and their contribution are overlooked by

Every day, waste pickers are exposed to a wide range of health and environmental hazards, leading to different levels of damage. In addition, a mix of social conditions including the poor work conditions, social discrimination and marginalisation, low education, physical and emotional abuse result in a negative impact on their wellbeing.

SOCIAL AND HEALTH ISSUES

Waste pickers are more vulnerable to a range of health hazards and social issues





There is a division of labour among different roles of the informal waste sector around the world, ranging from street picking, dumpsite picking, to junk shops and recycling and even small-scale manufacturing. These generate their basic income and make significant contributions to plastic waste recycling.

governments, often facing discrimination by public authorities and being left without a proper livelihood, social security, and healthcare.

Another problem for waste pickers is their reliance on unimpeded access to solid waste of monetary value. However, for many cities in Asia, materials discarded in public spaces are legally regarded as public property, and waste pickers need authorisation to sort and collect refuse, exposing them to harassment from the authorities.

In some cases, waste picking is even seen as counterproductive to effective urban waste collection and recycling. Waste pickers are excluded from the formal labour market by many municipal governments in India. In Indonesia, they are considered dirty and prohibited from certain places. In Phnom Penh in Cambodia, waste pickers are not allowed into certain modernised urban areas.

Where public waste management services do exist, waste pickers are sometimes eased out by waste management contractors. Some new entities, such as producer responsibility organisations and technology-oriented start-ups, hitchhike on the rising criticism of plastic pollution by leveraging waste pickers' knowledge of post-consumer plastic products and packaging to work with plastic producers to adapt their products.

Harassment and the lack of means to transport bulky or heavy recyclables mean it is more practical for waste pickers to sort through contaminated waste in municipal waste dumps than to collect them directly from households or from the streets. This forces them to sell to nearby small aggregators at extremely low prices. While the value of collected materials increases downstream, this value is not passed upstream to frontline aggregators.

Some waste pickers have started to organise and advocate for better working conditions and access to recyclable materials that have greater market value, including certain plastics. In many countries, waste pickers collect and separate materials in categories required by the recycling industry, and conduct information campaigns to teach people to separate recyclables properly so that these can be sold.

With concepts of a circular economy evolving, systems for resource recovery are also developing. Some countries legally mandate recycling through clear policy objectives and performance targets, financial and behavioural incentives, as well as funding through public budgets and extended producer responsibility schemes. However, few producers try to incorporate such objectives and undertakings into their existing processes, while others continue to outsource the responsibility to the informal waste sector.

In the transition towards a plastic pollution-free future, producers should be held liable for the pollution caused by their products. Waste pickers must also be protected and properly compensated as entrepreneurs who perform a vital service.

A FRAGMENTED RESPONSE

There is no lack of policies and initiatives to manage the plastic crisis in Asia, but most only deal with waste disposal rather than waste reduction at source. Policies are not coordinated, and often absolve manufacturers of responsibility while implementation remains a common issue.

In Asia, consumption and disposal are on the rise. The problem of plastic pollution has accompanied them.

A lack of binding regional mechanisms has meant collective responses to the plastic crisis – such as efforts to address marine pollution – remain uncommon, with policy responses largely at the country level and as diverse as the region itself.

Overall, none stray outside "the usual", a focus on the downstream stages of the plastic life cycle. While more countries in Asia have adopted, or are preparing to adopt Extended Producer Responsibility – a principle centred on upstream plastic production rather than downstream plastic litter – greater attention is still being given to collection and recycling.

Thus, efforts seem closer to shifting the "burden of disposal" from municipalities to producers, rather than the more fundamental task of moving from a linear to a circular system of production, or shifting from plastics to more ecological materials.

The most common plastic-related regulations in the region, to date, relate to end products, mainly plastic bags, straws, and dining utensils. Although these regulations are important, they represent a relatively easy and piecemeal approach.

In some cases, their scope is further narrowed to certain types of plastic bags, or the introduction of taxes or fees on stores (large retailers) in place of a complete ban. Some exemptions or alternatives do not help the situation either, such as exemptions on clear plastic bags, or the use of "eco-bags" and flimsy non-woven reusable bags.

Most national policies do not cover sachets, while local ordinances tackling this type of packaging remain rare. As such, the burden is on the consumer. Producers and retailers need not act.

In addition, implementation is a challenge in Asia. Japan took the regional lead on Extended Producer Responsibility when it adopted the concept in 1997 through a law that shifted responsibility for recycling on to container and packaging producers. South Korea also became one of the region's early adopters in 2003.

Unfortunately, the regulations introduced by South Korea failed to set a useful example for other countries in Asia. While the range of products gradually expanded from PET bottles to other types of plastics used for packaging, recycling targets depended on the previous year's self-reported achievements. Reliance on incineration and refuse-derived fuels concealed actual material recycling rates. Moreover, such regulations suggested to outside observers that governance of plastic waste management tended to be weak, and that both the government and community were reluctant to fully commit to abide by such legislation.

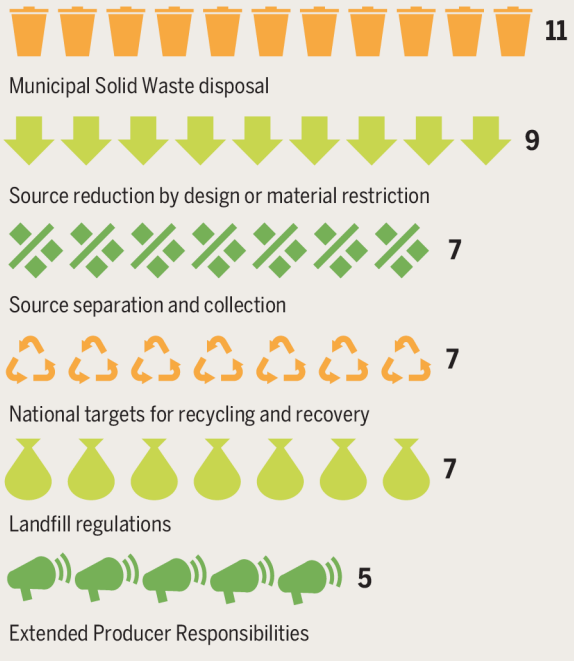
Another barrier for the region is the basic level of general waste management within some countries. Many are only starting to introduce national policies, systems, and infrastructure on sustainable waste management. In such cases, the priority is on increasing waste collection coverage and preventing illegal or improper disposal. While these are undeniably significant, it means few countries have, as yet, set ambitious targets or introduced comprehensive plans specific to plastics that could become strong drivers for change.

However, progress is being made, albeit slowly. In 2018 alone, Thailand, Malaysia, and South Korea announced or began implementing comprehensive roadmaps for the management of plastic waste.

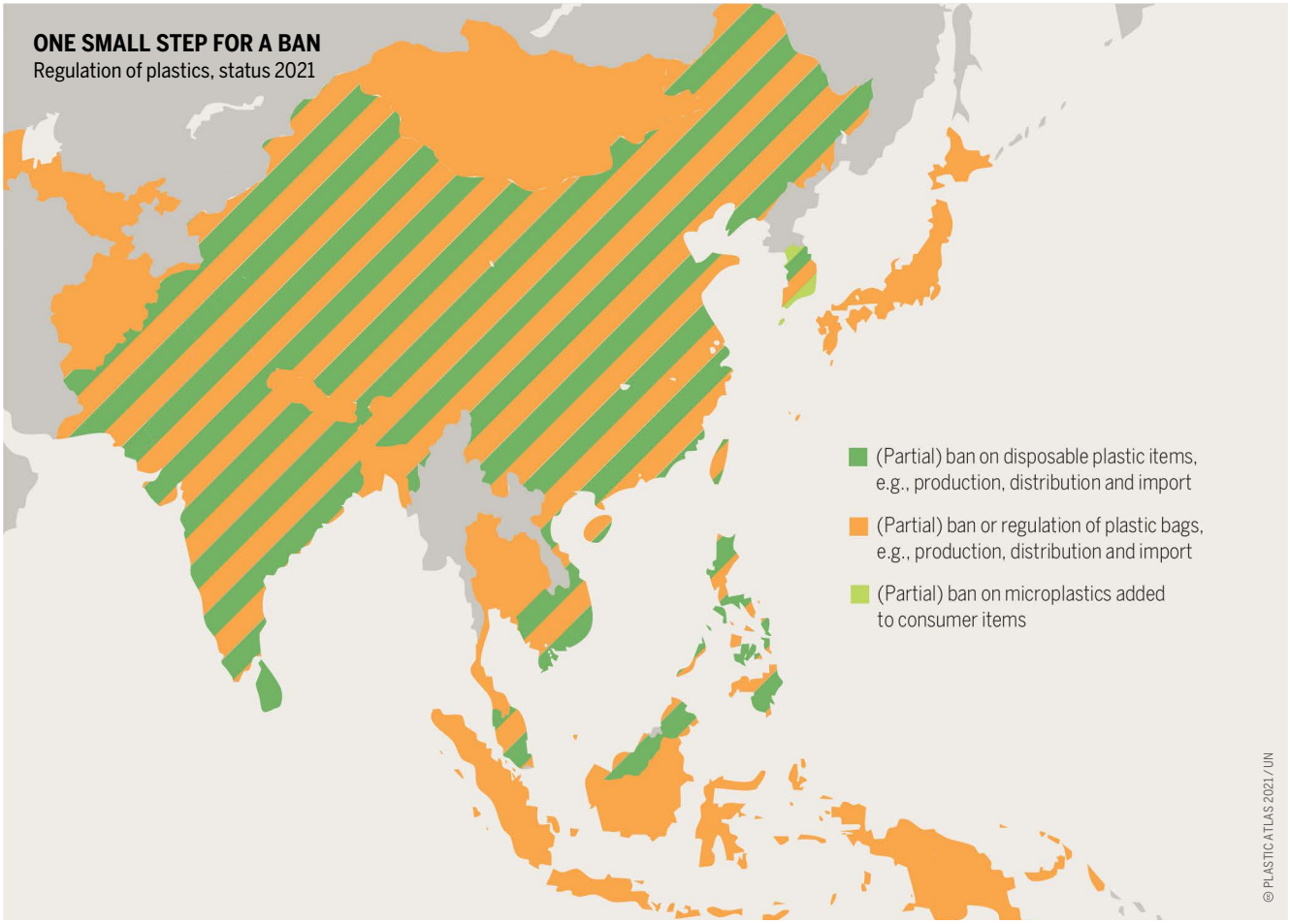
In the case of South Korea, the move was a direct response to the ban on waste imports by China, one of the

HOW MANY COUNTRIES HAVE ENDORSED REGULATIONS AND LEGISLATION?

A comparison of waste-related legislations in all 10 ASEAN countries and Japan.



In Asia, most of the waste regulations focus on disposal, followed by reduction, segregation, recycling and landfill. Less than half of these countries have regulations on extended producer responsibilities.



Some Asian governments have banned or have started banning plastic bags, while others promise a roadmap or a timeline towards the elimination of single-use plastic.

largest former importers of plastic waste. With China's implementation of its import ban in 2018, a crisis-level panic arose in South Korea, as the latter's collectors of recyclables refused to pick up vinyl waste (for example, plastic bags and packages). The result was the setting of a goal in South Korea to halve plastic waste generation by 2030, increase the recycling rate to 70 percent, and reduce waste by 20 percent at the manufacturing stage.

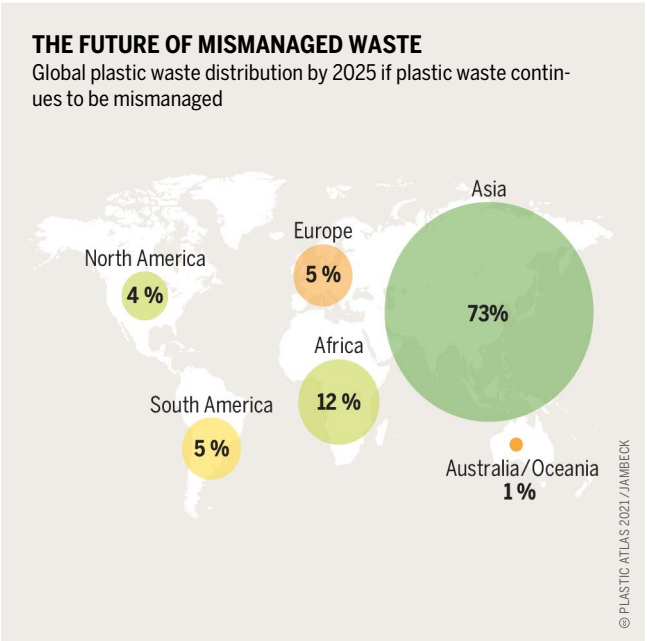
Like China, other Asian countries are now sending signals that they will no longer serve as the world's waste bin by introducing a ban or levy on waste imports; and, as shown by China's ban and its effect on South Korea, such regulations do have the potential to shape national initiatives and impacts.

Regionally and internationally, there are joint country initiatives as well as action plans among Association of Southeast Asian Nations members and the G20. Yet none are binding on signatory member states.

At the same time, use and disposal of plastics continue to increase at a greater rate each year. Plastics remain ubiquitous and convenient. Alternatives are too costly to become the market mainstream, and regulations still tend to address the more visible aspects of the negative consequences of the plastic product cycle.

More than 70 percent of the world's plastic waste will come from Asia if the region does not regulate and fails to enact regulations on plastic waste.

Meanwhile, the greater challenge of tackling plastics at the manufacturing and design stages remains largely untouched.



TAKING UP THE BATTLE FOR A PLASTIC-FREE ASIA

The global Break Free From Plastic civil society movement is unmasking the real culprits behind the plastic problem. In Asia, independent groups and start-ups are stepping in where industry and governments are failing to act.

For decades, plastic pollution has been framed as a problem of litter and waste management. While irresponsible consumption and the lack of proper waste management at the national and local levels have contributed to the growing problem of plastic pollution, focusing solely on blaming consumers has allowed corporations to continue to produce throwaway plastic products and packaging.

It is why it is difficult nowadays to make any purchase, big or small, without coming home with plastic packaging that is almost immediately put in the bin; and why countries in the Global South, especially in Asia, are often hauled up for their poor waste management and infrastructure.

Local governments across Asia have struggled to handle the plastic deluge, brought mainly through waste imports from outside the region and by companies that continue to produce throwaway plastic products. Beset by different interests and demands, including increasing waste management spending and seeking foreign aid to build incinerators, many have resorted to stop-gap measures, endless clean-ups, and awareness programmes for citizens to put waste in the "correct" bins.

Where industry and governments have failed, civil society movements and grassroots organisations across Asia have stepped in to fill the gap. These groups focus on diverse aspects of the problem, including maintaining and supporting Zero Waste efforts in the Philippines (Mother Earth Foundation), addressing the prevalence of disposable feminine hygiene products in India (Sustainable Menstruation Kerala Collective), supporting waste pickers in India (SWaCH Cooperative [KKPKP] and Chintan Environmental Research and Action Group), or reducing waste and keeping the focus on producer responsibility (volunteer-based Trash Heroes that operates locally and globally).

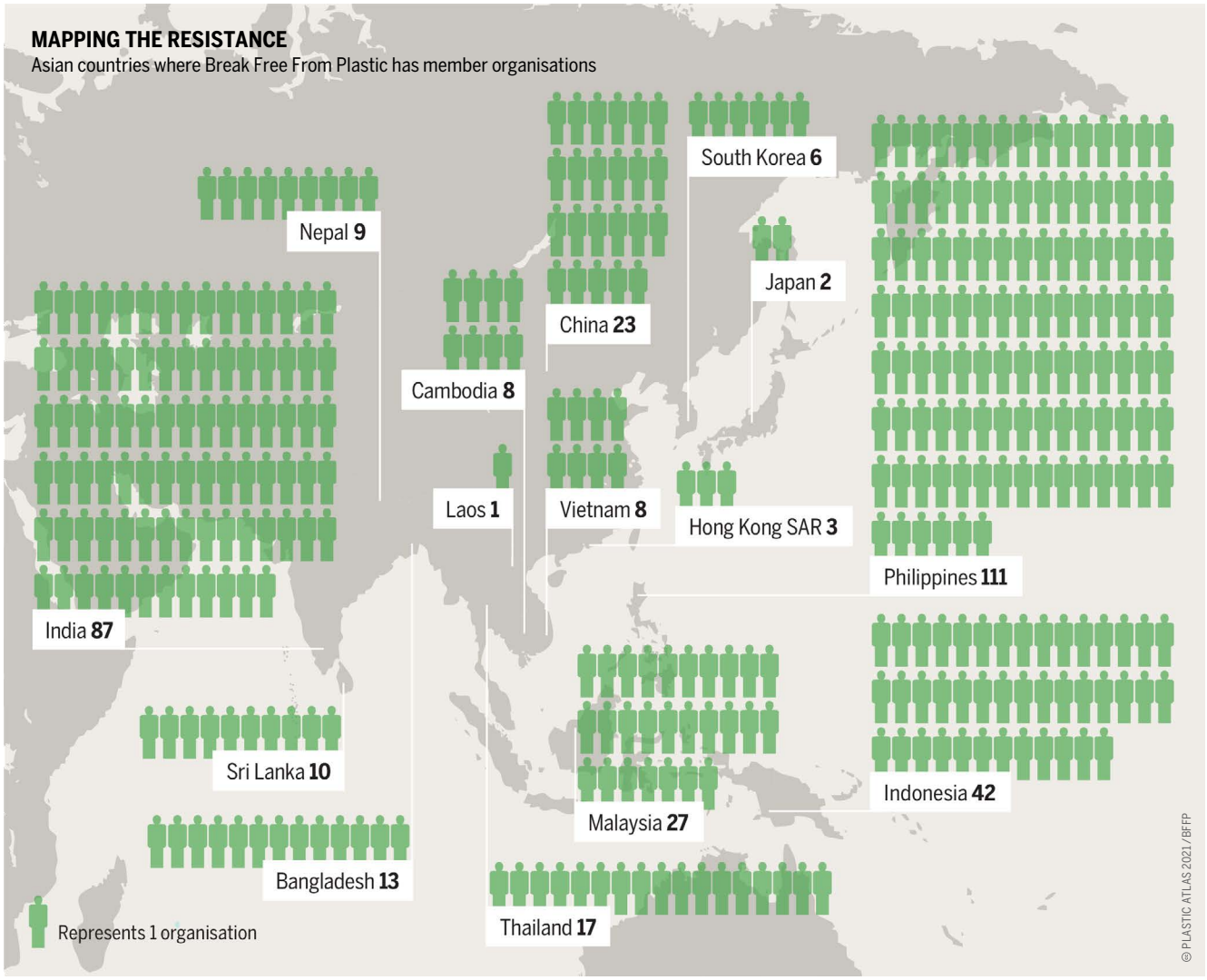
Although young, country-level Zero Waste alliances in Indonesia and Vietnam provide communities with simple yet effective models and programmes, groups such as EARTH Thailand and the Consumers' Association of Penang in Malaysia have demanded their national governments create a regulatory framework for Extended Producer Responsibility schemes.

In addition, at a global level, Break Free From Plastic (BFFP) unites more than 1,900 organisations and thousands of supporters across six continents. BFFP is the first movement in which groups from all over the world, targeting different stages of the plastics lifecycle, have come together to work towards a shared vision. The goal is to achieve fundamental change by tackling pollution along the whole plastics value chain, focusing on prevention rather than cure, and advancing lasting solutions.

The challenge is enormous. The production, distribution, and disposal of plastics involve a long list of the world's biggest companies, including oil majors ExxonMobil, Chevron, Shell, and Total, chemical firms DowDuPont, BASF, SABIC, and Formosa Plastics, consumer goods giants Procter & Gamble, Unilever, Nestlé, Coca-Cola, and PepsiCo, and waste management firms SUEZ and Veolia, among others.

Most of these companies resist the call to reduce plastics production as it would force them to abandon their optimistic growth projections, upend ingrained business practices that depend on single-use plastics, and accept lower profits.

Civil society and grassroots organisations in Asia are at the forefront of filling the gaps where governments and businesses have failed in waste management.



Members of Break Free From Plastic in Asia help transform communities to become zero waste, organize brand audits, and conduct awareness campaigns on how to be plastic-free.

Instead, these enterprises strive to keep throwaway plastics as part of people's daily lives.

BFFP challenges industry on four fronts. First, it puts pressure on corporations to massively reduce production and use of single-use plastics. Second, it unmasks the industry narrative around plastics and reveals the truth. Third, it promotes Zero Waste cities, especially in Asia. Fourth, it continues to build and strengthen the plastic-free movement through national alliances, in particular in key Asian countries.

BFFP also campaigns to get manufacturers that have "outsourced" their pollution to consumers to change their practices. Since 2017, the movement has conducted numerous "brand audits" around the world, popularising the term "branded trash" and putting consumer goods companies on the defensive.

Brand audits, formally known as Waste Assessment and Brand Audits, involve waste being collected and classified according to the company brand from which it originates. By putting a spotlight on problematic and unnecessary plastics being churned out by companies, brand audits expose the real actors behind the pollution, helping to debunk the industry myth that consumers and waste management systems – particularly in poor Asian countries – are the problem.

Such audits do not simply criticise. They also help to advance solutions. In Asia, several BFFP member organisations are working with cities to establish environment and community-friendly waste management systems using audit data. Under the BFFP banner, at least 50 local governments in the region are working towards becoming Zero Waste cities and communities.

With social pressure growing, in January 2019, the plastics industry formed the Alliance to End Plastic Waste. An initial 30 of these global companies, which make, sell, use, or process plastics, pledged US$1.5 billion for waste management and disposal infrastructure, particularly in Asia. Yet the same companies will invest over US$89.3 billion on plastic expansion projects by 2030, entrenching the production of fossil-fuel-based plastics.

The Alliance thus appears set to join other ventures that have fallen short of their goals of eliminating or reducing plastic waste, such as the New Plastics Economy Global Commitment and numerous trade group and independent company initiatives.

The BFFP and civil society movements dedicated to tackling the plastic pollution crisis are relatively new. However, their numbers and reach are growing organically, seeding a network of resistance to the plastic industry's ambitions, and helping to usher in a world free of plastic pollution.

CLOSING THE LOOP

The complexity of the plastics problem makes local responses a challenge. However, progressive communities around Asia have shown that by using the Zero Waste approach, they can help to keep plastics from ending up in the environment.

Zero Waste as an organised, worldwide movement can be traced to the early 2000s, when it gained momentum following years of individual efforts to refuse, reuse, reduce, and recycle. Today, Zero Waste has evolved further into an approach that addresses the problem of waste by encouraging products, packaging, and materials to be consumed and recycled in a responsible manner at the community level.

Through Zero Waste initiatives, towns and smaller cities across Asia, visionary policymakers, and innovative entrepreneurs are showing it is possible to use resources efficiently, maintain a healthy environment, consume in a sustainable way, and at the same time boost local economies and jobs.

WHAT IS ZERO WASTE

The Zero Waste hierarchy has seven levels: two levels concern products, and five are related to waste.

The numbers related to such programmes are often inspiring. Waste reduction rates as high as 85 percent, cost savings for local government ranging from tens of thousands to millions of dollars, revenues from sales of recycled materials and organic fertilisers up to thousands of dollars, and a significant reduction of greenhouse gases within a short period.

There is no one-size-fits-all solution, as has become clear from the diverse experiences of Zero Waste communities. However, these initiatives do encompass a common vision focused on moving from a linear to a circular model, where waste is managed as a resource, preventing plastics from ending up in waterways, open dumps, landfills, and incinerators.

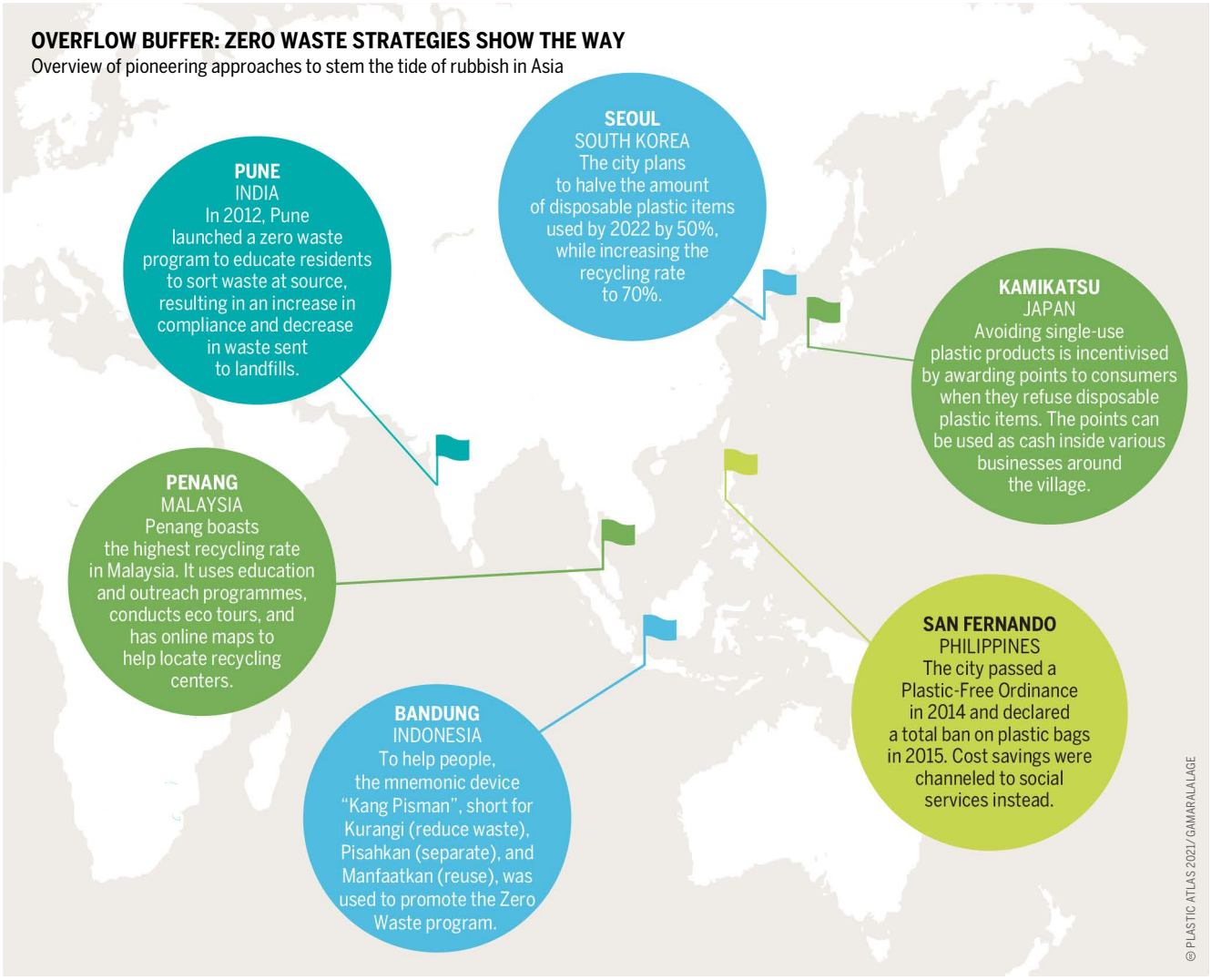
Most of these communities started with a problem they needed to solve, with the story of Kamikatsu, a town in Japan, among the most famous. Kamikatsu's Zero Waste journey began in 2001 when the town did not have the money or resources to renovate their dioxin-emitting incinerators and make the equipment compliant with a new national regulation. Instead, the town used the crisis to organise a waste reduction programme that would free it from dependence on incinerators and landfills.

Successful Zero Waste communities recognise that information and communication are of key importance. Kamikatsu's town office, which implemented the Zero Waste system and now runs the waste segregation centre, used booklets and visual signs at its waste collection centre to provide clarity to residents on why waste segregation was necessary. In Osaki, known as the town with the highest recycling rate in Japan, it took more than 450 sessions with the 150 self-governing associations comprising its residents to ensure that the purpose of waste segregation and methods involved was understood.

Ploughing benefits from Zero Waste schemes back into the community can strengthen commitment further. Japan's port town of Minami-Sanriku has awarded "appreciation points" to residents every time they visit and contribute to the town's waste collection centre. The City of San Fernando in the Philippines has used its 88 percent cost savings from waste disposal to hire more waste workers and upgrade local waste-management facilities.

Zero Waste communities debunk the myth that efficient waste management needs highly centralised administrative systems and modern infrastructure. Cities in different regions of the Philippines, for example, Alaminos, Tacloban, and the City of San Fernando, have all successfully carried out policies integrating local Zero Waste plans, including mandating waste segregation, banning single-use plastics, increasing material recovery, and converting organic waste into compost.

Keeping waste from being produced needs to be the priority, by influencing consumption habits, and rethinking business models to make them waste-free by design.



Zero Waste concepts are spreading across Asia, where some local communities and authorities have been fighting the plastic crisis since the start of the millennium.

The enactment of local laws and working with civil society organisations can make a major difference. In 2010, the local government in Penang started requiring customers to pay for plastic bags at various stores. In 2014, polystyrene was banned as a food container, and from 2016 waste segregation, which was already being promoted by civil society groups, was enforced.

Engaging business has proved effective. Kamikatsu's Zero Waste Academy shared the halo effect of its success by developing a Zero Waste accreditation scheme for small businesses to gain certificates indicating their waste reduction efforts and use of eco-friendly materials and methods.

Integrating the informal sector and working with social enterprises can also help. As well as introducing regulations to support the creation of Zero Waste communities through a plastic bag reduction campaign, Indonesia's Bandung City has set up neighbourhood "waste banks", known as the Bank Sampah initiative, where people are taught how to reduce their household waste and save through recycling.

Similarly, Pune City in India transformed its municipal waste management system by engaging an untapped resource, namely waste pickers. Waste pickers union SWaCH has promoted Zero Waste through door-to-door collection and waste segregation. This has increased waste pickers' incomes from a maximum of US$2.80 per day in 2012 to as much as US$6.20 per day in 2019. It also helped them achieve social integration into the community. Meanwhile, residents have benefitted from improved waste management services at lower cost, with the programme leading to estimated annual savings of US$12.5 million in labour, transportation, and processing costs for Pune's solid waste management system budget overall.

Despite the success of community efforts in managing waste at the local level, plastic waste remains a challenge in the Asian region.

The Zero Waste communities show consumers can and are willing to make purchase and individual lifestyle decisions that reduce consumption of single-use plastics; and that reconfiguring waste management systems can divert plastic waste from disposal to recycling.

However, zero plastic pollution still requires plastic producers to apply zero waste norms in their own production processes. They can, for example, promote more sustainable and cleaner designs, aim for product durability, embrace Extended Producer Responsibility, and establish take-back systems. In this regard, the onus is on global decision-makers and national authorities to push such initiatives forward.

THE DETRITUS OF A PANDEMIC

The global health emergency appears to have diminished gains in stemming plastic pollution. What actions can we take to tackle the deepening pandemic-related plastic waste crisis?

Along with devastated economies and physically distanced lives, a year into the COVID-19 crisis, the world is also dealing with the detritus of the pandemic: single-use plastics including personal protection equipment (PPE), other medical waste, and growing piles of takeaway food and drink containers.

Monitoring of debris from March to April 2020 at the outlets of the Cilincing and Marunda Rivers in Indonesia revealed plastics not only constituted 57 percent of the debris by weight, but that PPE (medical masks, gloves, hazard suits, face shields, and waterproof coveralls) accounted for 15 to 16 percent of the daily river debris collected. In Bangladesh, a study by the Environment and Social Development Organization (ESDO) found 14,165 tonnes of plastic waste generated in the country within the same period, consisting mostly of gloves and face masks.

But the problem is not confined to medical waste. Government-enforced lockdowns have confined people to their homes and forced them to rely on delivery services. Hygiene precautions have further boosted the sale of single-use items.

Some 80 percent of reported plastic waste in Thailand in the months following the outbreak consisted of plastic bags, and takeaway food and drink containers. Studies monitoring plastic waste in Singapore and Hong Kong SAR recorded similar findings. In the ESDO study in Bangladesh, 41 percent of the plastic waste generated during lockdowns comprised polythene bags, used mostly for takeaway food or for distribution of relief goods. Even worse, in the country's capital, Dhaka, around 1,500 of 6,000 informal waste collectors have been unable to work as they have fallen ill.

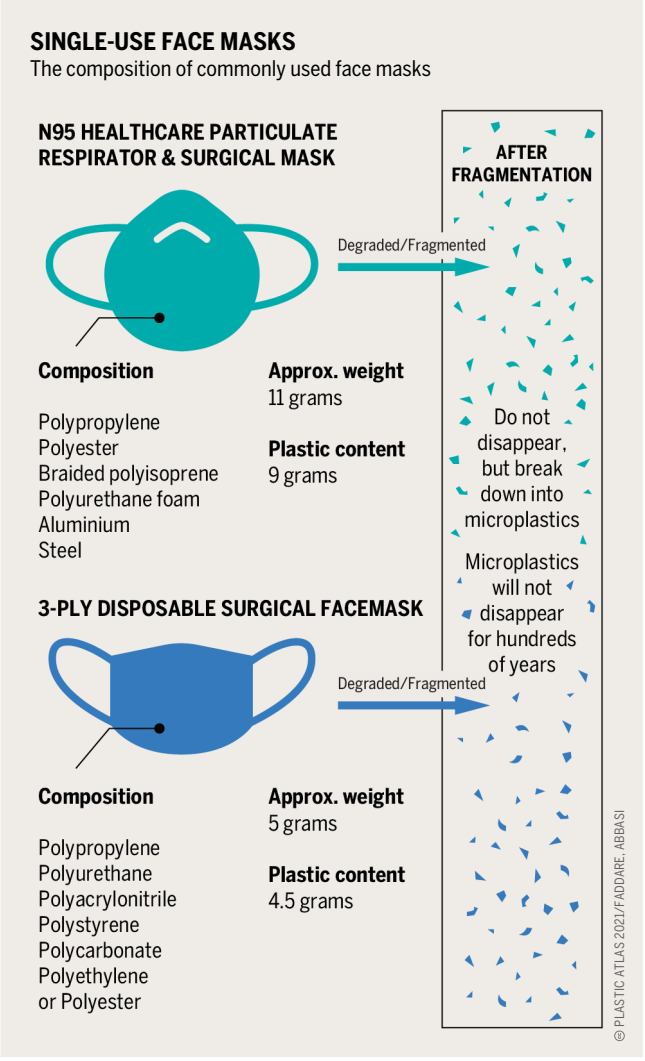
In South Korea, the Ministry of Environment reported 15.6 percent more plastic waste in the first half of 2020 than the same period in 2019, reflecting an increase of 25 percent year-on-year by June 2020. Meanwhile, data from Malaysia's Environment and Water Ministry showed that medical waste, including PPE, gloves, and swab test tools, rose 27 percent in March 2020 from the previous month. This was followed by 31.5 percent and 24.6 percent increases in April and May 2020, respectively.

Another indication of the rise in single-use plastic items – whether PPE, packaging, or disposable cutlery – was the more than 10 percentage increase in sales at the food packaging and healthcare divisions of Germany's INEOS Styrolution Group GmbH and US-based Trinseo SA, two of the world's biggest plastic manufacturers, during the early months of the pandemic. Even worse, during the COVID-19 pandemic, oil industry plans to spend around $400 billion over the next five years on plants to make raw materials for virgin plastic. However, their pledges in plastic reduction only cost 0.5% of their total cost of new plastic production.

The pandemic has also made the recycling activities stalled or slow down in many countries. Together with the weak oil price, sales of recycled plastic have become harder with the lower price of new plastic, which can be half the price of the most common recycled plastic.

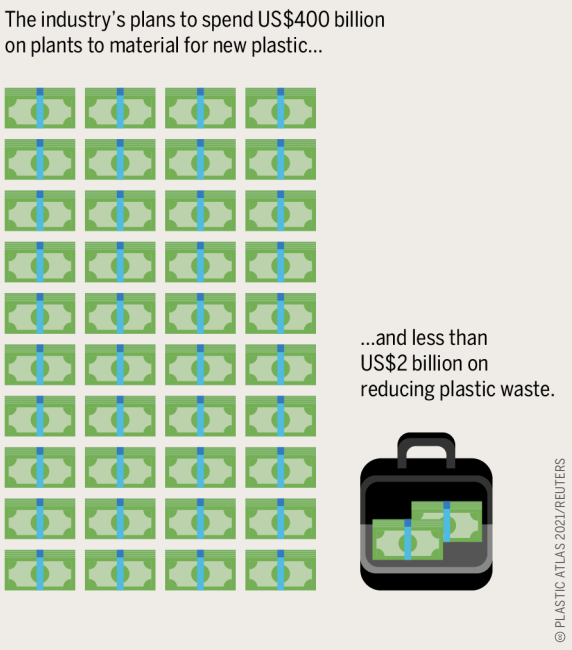
In some countries in Asia, environmental groups allied with the Break Free From Plastic movement have reported that the plastic industry has used the pandemic to push back on hard-won plastic bans and regulations. In certain cases, hygiene concerns have led to the suspension of community plastic recycling initiatives while discarded face masks have joined plastic bottles and bags as litter on beaches, farmlands, and streets.

As a safety precaution against the coronavirus, it is prescribed wearing face masks especially when going outside.



PLASTIC REDUCTION MYTH

Oil industry's investments in new plastics and plastic reduction during the COVID-19 pandemic (2020)



The oil industry plans to spend around US$400 billion over the next five years on plants to make raw materials for virgin plastic. However, their pledges in plastic reduction only cost 0.5 percent of their total spend on new plastic production.

The COVID-19 pandemic across countries in Asia has thus shown the weakness in their waste management. It has shown that at-source segregation of medical waste becomes difficult when both volume and frequency increase at the same time, as is the case during pandemics; informal waste pickers become even more vulnerable as they have no access to protective gear; and failure by governments to treat waste management as an urgent and essential service can have disastrous impacts on public health and the environment, as seen in the increase of mismanaged plastic waste.

However, we still have ways to address the plastic pollution crisis. For example, the authorities responsible for waste collection and treatment need to create guidelines and procedures before, during, and after the pandemic to ensure safe recycling and reduction. Certain disinfection technologies can be deployed for single-use plastics, including medical waste and face masks. WHO has proposed rational use of personal protective equipment, which could lead to a reduction in medical waste. While the COVID-19 pandemic seems to have led to a "new normal" with regard to increased use of single-use plastics, we need to critically question this prevailing mindset. Taking concrete action, such as choosing to reuse whenever possible, is a step in the right direction.

In the Philippines, Vietnam and India, as much as 80 percent of the recycling industry was not operating during the height of the pandemic. And there was a 50 percent drop in demand for recycled plastic on average across South and Southeast Asia

In Quezon City, the Philippines' most populous highly urbanised area, a single-use plastics ban ordinance set to be implemented in July 2020 was suspended until March 2021. In Thailand, the gains from the government's ban on plastic bags was negated by the deluge of plastics brought about by lockdowns.

While it may seem that the plastic pollution crisis is being overlooked in the battle against the pandemic, it does not have to be a choice between health and ecology.

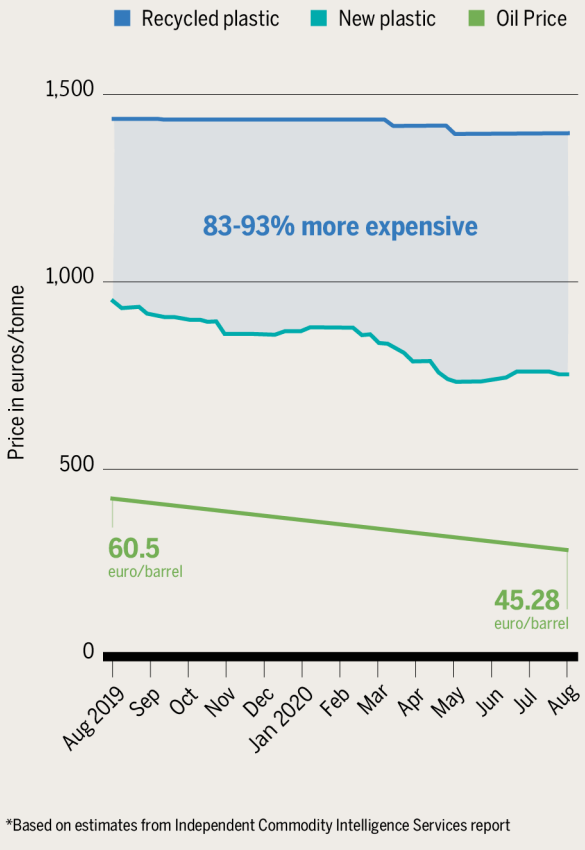
To allay fears about transmission via surfaces, around 120 international scientists, academics, and doctors issued a statement in mid-2020 assuring the public that cups and containers could be reused safely by applying basic hygiene and disinfection practices.

The World Health Organization has advised switching to reusable face masks whenever possible in order to allocate single-use protective masks to medical professionals.

Regarding medical waste, Healthcare Without Harm Asia and its allied members in the Global Green Hospitals Network have emphasised the need to segregate such waste at source and that COVID-19 waste materials do not need to be burned or incinerated.

WHERE OLD COSTS MORE THAN NEW

Falling oil prices make new plastic cheaper than recycled plastic



Recycling activities slowdown during COVID-19 pandemic and weak oil price widen the price gap between the recycled and new products. The new plastic can be half the price of the most common recycled plastic.

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The Heinrich-Böll-Stiftung (hbs) is a non-profit organisation that is part of the global Green movement. Based in Berlin, Germany, hbs has a network of over 30 offices around the world.

In 2020, hbs opened Heinrich-Boell-Stiftung Asia Limited, a new regional office in Hong Kong. The importance of Asia in advancing global progress cannot be overemphasised. Asia is home to highly dynamic nations and societies that are increasingly shaping technological innovation, impacting global economic and environmental developments, and raising issues of governance.
Our Hong Kong office hosts the Asia Global Dialogue programme, which seeks to promote engagement between Europe and Asia on developing and transformative trends in Asia. We aim to bring together stakeholders, experts and academics from various disciplines with common points of interest. In order to facilitate fact-based exchanges and networking, we support research, analysis, and publications.

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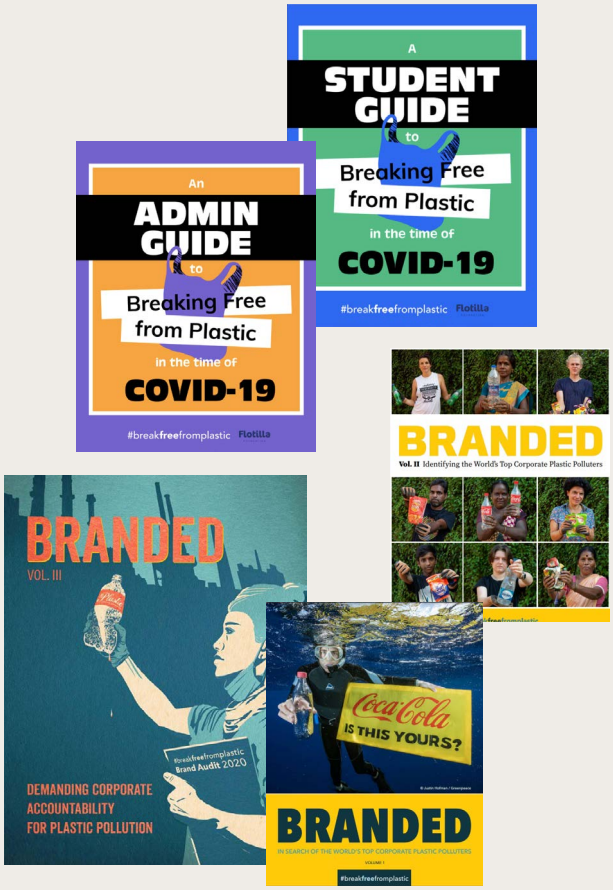
BREAK FREE FROM PLASTIC

#breakfreefromplastic is a global movement envisioning a future free from plastic pollution. Since its launch in September 2016, over 1,900 non-governmental organizations and individuals from across the world have joined the movement to demand massive reductions in single-use plastics and to push for lasting solutions to the plastic pollution crisis.

These organizations share the common values of environmental protection and social justice, which guide their work at the community level and represent a global, unified vision.

Break Free From Plastic
www.breakfreefromplastic.org



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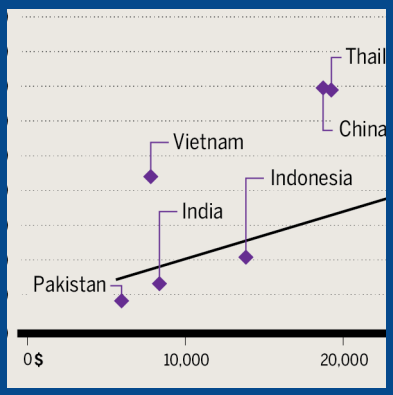

In 2019, half of the global plastics production of 368 million tonnes took place in Asia.

FROM A BLESSING TO A CURSE, PAGE 14

Multinationals and local companies in Asia continue to sell essential food and hygiene products in single-use, unrecyclable plastic.

SHIFTING THE BLAME, PAGE 30

Plastics could consume between 10 and 13 percent of the earth's remaining carbon budget for staying below a global temperature rise of 1.5 degrees.

A PROBLEM FROM BEGINNING TO END, PAGE 26

Most humans today ingest, breathe, and come into skin contact with harmful chemicals from plastics. Absorption of plastics and their additives has been linked to cancer and hormone disorders.

HARMFUL AND PERSISTENT, PAGE 16

The global health emergency appears to have diminished gains in stemming the tide of plastic pollution, but what actions can we take to tackle and avert the deepening plastic pollution crisis during and after the pandemic?

THE DETRITUS OF A PANDEMIC, PAGE 48