Commitments Accelerator for Plastic Pollution

VOICES OF THE STUDENT GENERATION

ON PLASTIC WASTE IN EAST ASIA

August 2023

University and Graduate Student Teams throughout East Asia in the 2022 "Make the Case" student competition were asked the following question as part of their team entry:

AFTER READING "THE PLASTIC ATLAS ASIA EDITION" WHAT GRAPHICS (AND FACTS) SURPRISED YOUR TEAM THE MOST ABOUT THE PLASTICS SITUATION IN EAST ASIA AND WHY
(LIMIT 500 WORDS)

HERE ARE THEIR UNEDITED ANSWERS

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Ocean Recovery Alliance

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The views, information or opinions expressed during the Make the Case – East Asia Student Competition are solely those of the individual students involved and do not represent those of the co-organizing partners of the competition, nor our collaborating partner, the Hong Kong office of the Heinrich Boell Foundation HK, its Plastic Atlas Asia edition, or our sponsor, the Pictet Group Foundation.

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From Rob Steir, Co-Founder of the Commitment Accelerator for Plastic Pollution (CAPP.Global)

We asked each student team, worth 12.5% of their overall score to answer three questions about the Plastic Atlas Asia Edition report. The first question posed was, in 500 words or less, what graphic (and facts) surprised your team the most about the plastic situation and why?

When I read these answers from over 30 student teams from 22 universities in 10 countries who participated in our first East Asia "Make the Case" Competition, I had 3 simultaneous thoughts:

1) The student answers were well-written, well thought out, and had a ton of facts (many of which were from the Plastic Atlas Asia edition, of course).

2) Their answers were meaningful, and when read together, could have more impact than many of the world's lengthy, graphics-filled reports written about climate change, and the plastic pollution problems.

3) These answers should be shared…and read by government leaders in East Asia and the world.

I decided to highlight in bold certain sentences and paragraphs that show their "surprise" or "anger" and/or "dismay" about the plastic waste problems both in East Asia and the world.

Definitely worth reading to get a pulse of what the student generation in East Asia think. And here's food for thought –these are students who care enough about the problem to spend considerable time to enter our competition…what about all the other students. What do they really know? Do they care?

What can we do to broaden their education?

I have a strong feeling that the students in East Asia are just like students around the world, and that their answers are really the answers of students everywhere.

For our "Make the Case" competition, we asked these student teams to select an initiative they felt should be spotlighted for its effectiveness in reducing plastic waste where they operate, and why it should be scaled. Please take a look at the recorded presentations of the final 10 teams @ https://makethecase.capp.global/east-asia and see for yourself that there's hope for the world –here are some of the future leaders to reduce plastic waste!

Enjoy reading the insights of the next generation.

Best,

Rob Steir
Co-Founder of CAPP.Global

About the 2022 Plastic Atlas Asia Edition

https://hk.boell.org/en/2021/04/22/plastic-atlas-asia-edition

From their web site:

Plastic is ubiquitous: we use it for life-saving medical devices, clothing, toys and cosmetics; we use it in agriculture and industry. But we also know the growing risk of plastic waste in the environment, landfills and the oceans.

For example, the amount of plastic that some fulmars accumulate in their stomachs during their lives is equivalent to 31 grams in humans - that would be a full plate. But although awareness of the negative consequences of plastic is growing, we are experiencing an unbroken boom in plastic production. 99 percent of the plastic is produced from fossil fuels; the climate-damaging emissions involved are enormous. And only nine percent of all plastic thrown away since 1950 has been recycled; instead, huge amounts of our plastic waste end up in dumps in Asian countries every day.

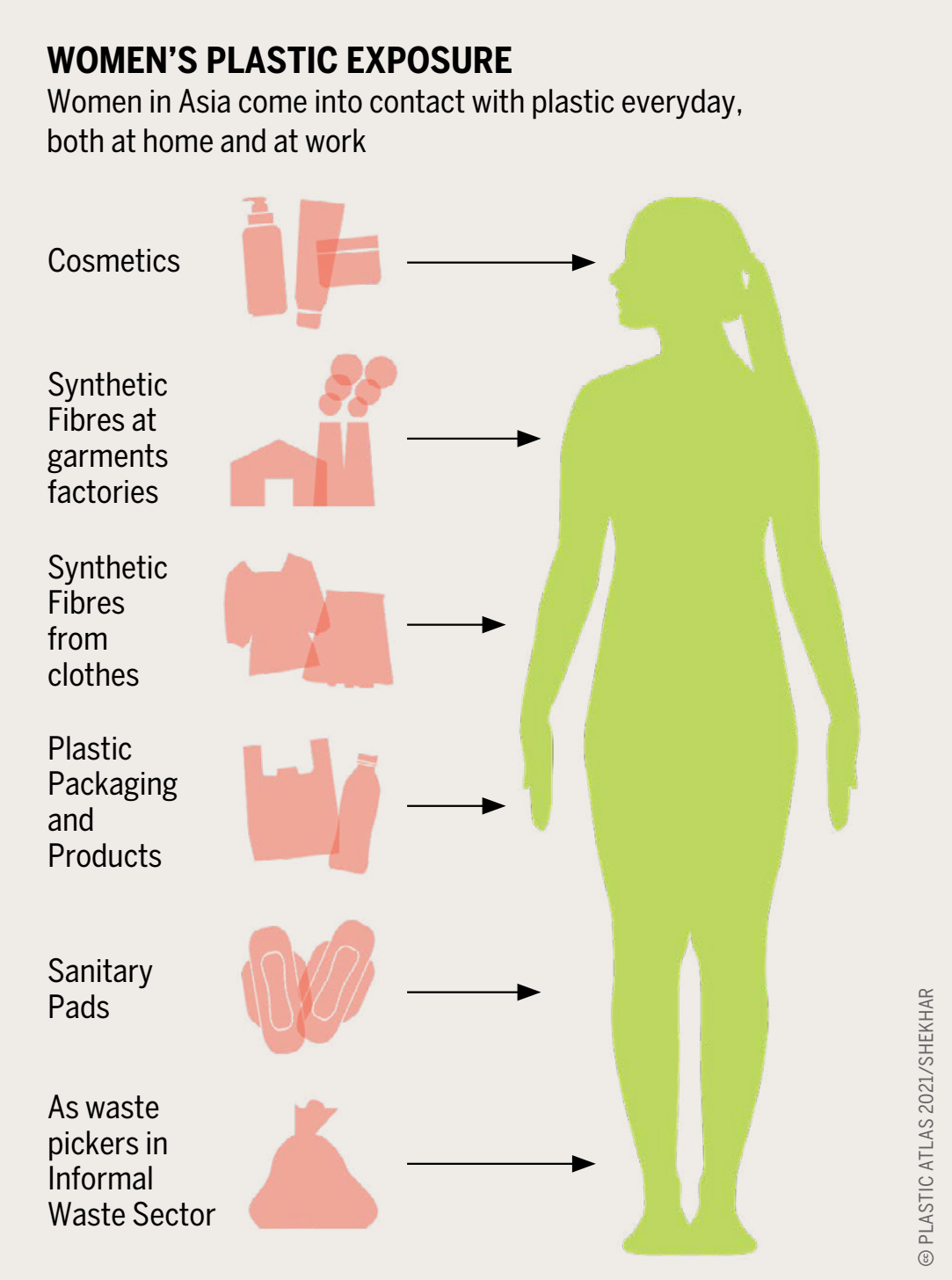
We have only just begun to understand the huge dimensions of this crisis. A change of course requires in-depth knowledge of the causes, interests, responsibilities and effects of the plastics crisis. The Plastics Atlas Asia Edition wants to offer exactly that in 20 chapters.

What graphic (and facts) surprised your team the most about the plastic situation and why?

FOR EACH GRAPHIC, WE COMBINED ANSWERS FROM THE TEAMS.

HERE'S WHAT THE STUDENT TEAMS SAID….

Women's Plastic Exposure



TEAM 1

What makes our team shocked is that women are more likely affected by the toxins in plastics. The higher body fat in women leads to a higher accumulation of plasticizers.

The effects are more significant in the less developed countries in Asia. The higher proportion of female employers in industries, especially garment factories, provide more exposure to toxic chemicals contained in plastics. The women waste pickers exposed them to dust and chemicals during the plastic recycling process. This enhances the chance of developing breast cancer and experiencing reproductive problems for females. Due to the lower education level of females, their awareness of toxic chemicals in plastics is lower. Therefore, gender differences exist in these impacts of toxins in plastics.

TEAM 2

One of the communities most negatively affected by plastic exposure are, interestingly, women. Although we do believe that women are more vulnerable to different societal issues because of their social roles, we did not expect that they are more affected by plastic than men.

This is exhibited through the graphic (Figure 4), showing the different plastic products women are exposed to throughout their lives. Women are target consumers for cosmetic and sanitary products, many of which can be costly, single-use items that are not properly disposed of. Due to having more fat biologically, women accumulate more phthalate plasticisers in their bodies, leading to reduced thyroid and reproductive hormone levels. Additionally, traditional female roles, such as housekeepers, waste pickers, and factory workers, expose them to toxins in plastic products. These include household items, dumpsite recyclables and synthetic fibers among others.

TEAM 3

The section on the unequal exposure of women to plastics is what surprised our team the most. Particularly, it was the different graphics showcasing how biologically, women are more likely to be adversely affected by the toxins in plastics, and how vulnerable women are to plastic-related health hazards due to their exposure to a whole range of plastic products everyday. The report even cited an extreme, where "they also become unwitting carriers and associated chemicals when these are transported through the placenta to fetuses."

These realities left quite an impression on us because when discussing plastic pollution, it is likely that one immediately thinks of its direct threats on our natural environment and the biodiversity

that depends on it. **However, the Plastic Atlas Asia findings made us realize that this situation is not just an environmental problem, but one that also has implications to different sectors and aspects of life. By bringing the focus on women and gender, the Plastic Atlas Asia report was able to identify and present specific issues that we would never have realized and reflected upon further.** These specific issues include the fact that women are major consumers of specific plastic products (e.g. essential feminine hygiene items) and that "the average woman will use more than 11,000 menstrual products of her lifetime, amounting to over 200,000 tonnes of waste ending up in the country's landfills and waterways every year." This is where we realized that women are key actors in the grand scheme of the plastic situation who's average plastic consumption as a woman accounts for a significant percentage in the overall plastic waste that ends up in the environment.

However, it seems unfair to pin the blame on women alone. The burden on this environmental footprint specific to the mass production of feminine care products should not fall on women since they need these products for their specific biological needs. Therefore, there really is a need for these industries to shift the way they create, market, sell, and dispose of their goods – to be more sustainable, environmentally-friendly, AND accessible to women from all walks of life, especially those in the fringes of society. These changes could include bridging the need for sustainable sanitary and cosmetic products (e.g. reusable menstrual pads) that may be used by all women and for all women.

In conclusion, we realized that it is imperative to look into the issue of plastic pollution through the lens of gender given the unequal exposure of women to plastic wastes and the harm these bring to their well-being. Not only is plastic pollution detrimental to our physical environment, but we also realize that it is a crisis of social, political, cultural, and economic inequality. As our chosen section illustrates, certain sectors of society are more vulnerable and exposed than others. Hence, effective action points to address plastic pollution must target these inequalities, and hopefully, bring equitable, inclusive, and comprehensive solutions to every community, especially to marginalized sectors such as women.

TEAM 4

In the Plastic Atlas Asia report, what our group was most surprised about was the article talking about the disproportionate impact of plastic pollution on women (pp. 18–19). While we'd already known beforehand that women generally have greater body fat percentages than men, we did not think about how this fact of life holds the key to explaining why there are so many more women with endocrine disorders than men as reported and documented in numerous epidemiological studies.

This article hits so close to home because two of our members have Polycystic Ovary Syndrome (PCOS), a hormonal disorder that has had a devastating impact on our physical, mental, and emotional health. **To think that we could have developed this condition as a result of our society's obsession with plastic bothers us immensely.** As biologically-female people, we know all too well just how much plastic women are exposed to on a daily basis. From the hygiene products that we need and the Tupperware containers stored inside our refrigerators and pantries to the pieces of fast fashion (usually made of synthetic fibers) hanging in our closets, there is no shortage of plastic in our homes.

Most of us are aware that plastic pollution has a deadly effect on wildlife. But what we fail to realize is that our overuse of plastic is killing us humans too. While no one is exempt from the health impacts

of plastic, women are much more vulnerable to plastic contamination than men. As mentioned previously, this is because of our biological makeup. The article helped us realize that plastic pollution is a women's health issue inasmuch as it is an environmental concern. **Reading about how women suffer more from the effects of plastic and are exposed to more of it on a regular basis renewed our commitment to try to solve the plastic crisis.** We believe that individual choices are simply not enough to stem the tide of plastic pollution and mitigate its effects on human health, more specifically women's health. Merely deciding to make the switch to reusable and eco-friendly products will not be enough to overcome the plastic pandemic. For there to be real, long-lasting change, we must address the systemic inequalities and injustices that heighten women's exposure to plastic.

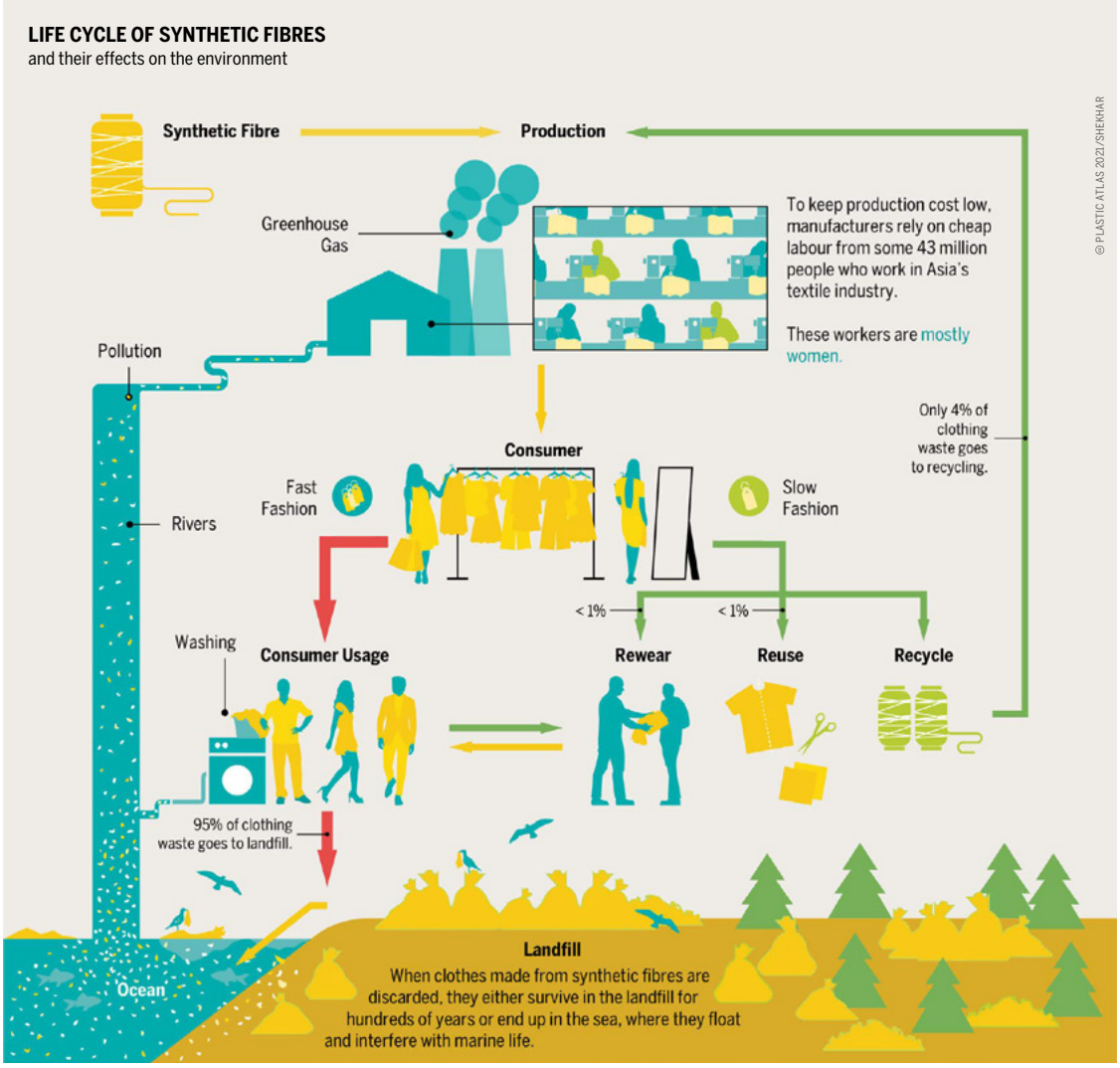
The facts that surprised our team most are the gender-differentiated exposure to plastic products and a more serious adverse effect on women's health from the graphics of Gender Unequal Exposure (Section 18), which we were poorly informed about.

In reality, plastic pollution hasn't caught so much attention in China, both in the academic area and in daily life. In the China National Knowledge Infrastructure (CNKI), plastic pollution-related academic papers are of a small number, with less than 30 annually before 2016, so is related news, with no more than 6 annually in all 153 central level and 441 provincial-level newspapers, which causes an information shortage for college students like us.

Following the given mechanisms in the report, we find that gender-differentiated effects of plastic pollution do exist in China, where physiological differences and social roles make women more likely to be victims of plastic pollution. In the Chinese Family Panel Survey (CFPS) in the 2020 wave, for cohorts aged>50 years old, males have a mean BMI of 23.44 (Standard Deviation 3.29), while females have a higher BMI of mean 23.55 (Standard Deviation 3.60). As evidence has shown, toxins like phthalates and other oil-soluble chemicals can be accumulated in fat, and it is likely to result in a higher accumulation in women's bodies in their middle ages and above in China. Apart from that, in CFPS 2020, 70.20% of the female population in China is in employment, significantly lower than 86.00% of the male group, combined with the different statutory retirement ages for men and women (5 – 10 years younger for women), the gender-differentiated roles in the family will be even more pronounced, which will exacerbate women's exposure to plastic pollution out of domestic homework. Besides, women working in the waste sector are more likely to get exposed to dust and chemicals through inhalation and contact with skin. In CFPS dataset, 0.3% of working females worked in waste sectors, and nearly 2% of them worked in the textile industry, representing a relatively large female population in China are suffering plastic toxins from working sites, where they are exposed to dust and fumes, and are more likely to develop breast cancer and experience reproductive problems.

Such a problem would be even worse for women because of the lower education expenditure they can receive in a family compared with men. In 2018, 72% of respondents in CFPS showed a son preference for their next generations, which results in a significantly lower education level driven by lower education expenditure for women. In 2018, 32.72% of the sampled female population in CFPS are illiterate/semi-literate, which means never finished primary school, compared with only 18.44% of males, together with only 4.57% of women who have a bachelor's degree or above, compared with 5.03% in men. Those gender- differentiated education levels out of conventional ideology will keep exacerbating gender education inequality and the harm of plastic pollution to Chinese females.

Life Cycle of Synthetic Fibers



TEAM 1

The graphic "Life cycle of synthetic fibers and their effects on the environment" and its related facts surprised us the most. The following facts deeply impressed us:

1. The reuse rate and rewear rate are both less than 1%.

Although we knew fast fashion is prevalent, we were surprised by the low rates of reuse and rewear. "Throwaway culture" reminds us and we start to rethink our lifestyle. Most of our team regularly buy cheap clothes online, and it's common for us to throw away clothes that we don't like but can still wear. When we saw the graphic, we found that our behavior was a way of fast fashion. After we realized the seriousness of the fast fashion, we urgently wanted to know how to solve it and we conducted relevant search. During the search, we have found a few fashion brands have taken action. For example, H&M has already promoted a plan---people who bring discarded clothes to H&M will get an account coupon. But if we think it from a different perspective, H&M seems to support us buying their products, which means that we've always been trapping in fast fashion. This deserves our deep consideration.

2. The clothes which made by synthetic fibers need to be decomposed for long-term in landfill.

When talking about plastic waste in landfill, the first thing that comes to our mind is plastic bottles or bags, but we wouldn't count the clothing as one of them. However, the figures regard "... 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 fibers produced" make us know the severity of the problem. Our subsequent investigation made us more aware of our lack of knowledge in this field. One data from China National Textile and Apparel Council predicted that if all of our waste textiles are recycled, the annual supply of chemical and natural fibers is equivalent to saving 24 million tons of crude oil, reducing 80 million tons of carbon dioxide emissions.

3. There are large number of cheap labors in garment factories and most of them are women.

43million, the amount of labors is far away beyond our impression. "Exploitation in sweatshops across Asia is the human cost of the fast fashion frenzy" emphasizes the economic benefits they produce and the harm they suffer. China has a large number of garment factories, and one team member's relative used to be a garment factory worker in Guangdong Province. She told us that she inhaled a quantity of dust since she worked with overlock sewing machine. After a period of work, she got rhinitis. We suppose most workers are in similar situation and suffering more than we could imagine. The public need to pay more attention to the mental and physical health of this group.

More facts we learn, more guilt and shock we feel. For our young generation, changing our consumption behavior are necessary and urgent at present.

TEAM 2

The prevalent harm of the synthetic fibres in our clothing stood out for us. Who knew that something generally accepted as a necessity can be so harmful to the environment? Peering into our wardrobe reveals just how many pairs of clothes we own - many of which are made from synthetic fibre. Now multiply that by all the people on Earth and we have a problem.

For the longest time, the harms of the garment industry were invisible to our eyes.

We now know for a fact that textiles make up 15% of the world's annual output of plastics. Synthetic fibre has replaced cotton and other natural fibres in manufacturing. Its lower price, softness, versatility, and stain resistant properties have rendered it the preferred material, accounting for 60% of clothing and 70% of household textiles. To make things worse, clothes are often sold in single-use clear plastic bags. Oftentimes, manufacturers try to sell the idea of recyclable plastic bags. This cannot be further from the truth.

Hence to our contention, the harms of the textile industry are twofold: usage of synthetic fibre and individual plastic packaging. Turning first to synthetic fibre, the nature of the material results in it releasing millions of **microplastics** when washed. In fact, the International Union for Conservation of Nature estimates that 35% of the microplastics in the world's ocean stems from washing clothes made from synthetic fibre.

Secondly, further research reveals that the textile industry extends its tentacles by encouraging the use of single-use plastics for individually packaging clothes. Almost every new garment comes in a plastic packaging, oftentimes single use in nature. Upon reviewing the graphic, the following thoughts come to mind.

The reception by the public is mind-blowing.

First, the clothing brands that use synthetic fabrics are the very same brands that advocate for environment preservation – by setting up collections of old clothes in stores and cross-selling metal straws. The lack of research and awareness amongst consumers is appalling, as they are the ones who pride themselves as eco-warriors.

Second, clothing brands current initiatives in driving sustainable fashion or closed loop economy is symbolic at most, since they continue pushing out clothes made of synthetic fibre - albeit apprised of its harms. These synthetic fibres have devastating impacts on marine life, whilst staying around for decades.

Finally, the boom of fast fashion – churning out new designs within days – further drives the need to lower production cost, resulting in synthetic fibre as the natural choice. Moreover, major players continue relying on cheap labor from Asia to keep the price tag low. The explosion of choice due to e-commerce and subsequent door-to-door delivery, particularly allowing return for change of mind, underpins the need for variety to entice consumers.

The insidious danger of synthetic fibres in clothes have stayed hidden for too long. The time to act is now.

Plastic is a wonder substance that people use for almost everything, but it unfortunately pollutes the environment. Indeed, improper plastic disposal can have negative effects. The current solutions to the growing plastic waste problem, nevertheless, are insufficient to deal with the problem's worldwide scale.

Even the non-Asian nations cannot meet the standards set by open dumping, landfills, composting, incineration, and even recycling. It is difficult to determine if people are simply overly optimistic about recycling plastic, giving the impression that the world has been preserved to a degree of 60 to 70 percent, or whether people have grown more avaricious as a result of consuming plastics endlessly

for their comfort. Furthermore, as stated in the article, it is quite concerning that only 9% of the plastic produced since the 1950s has been recycled. On the other hand, more than 50% of plastic waste generated worldwide ends up in landfills, dumping grounds, and waterways. While Asian nations attempt to mimic or adopt some of the activities of their wealthy neighbors, the majority of these techniques are not practical and beneficial for their circumstances, mostly due to inapplicable elements such as the particular sorts of plastic wastes and similar issues. Thus, it is imperative that the highly worrisome numbers and the information offered in the article be shared widely for the governments, organizations, and specific social media groups to cooperate to raise public awareness and develop severe measures to help taper off the expanding plastic pollution.

To conclude, our team's level of concern was prompted by the stated facts mentioned in the article. The idea of a world without plastics or synthetic organic materials seems too hard nowadays because of the comfort it gives to consumers, but this needs a leap to make it possible for a plastic-free life. There is a study published in the Journal Science Advances that says only about 9% was recycled since 1950, and it was also proven that only 12% of the waste was burned. Consequently, 79% are in the natural environment or in landfills which are the root of peoples' concerns that would give rise to ecological movements. It also projected that eight million metric tons of plastic reached the ocean in 2010, and they are already calling for a more serious analysis of its use and significance at the end of its useful life (Geyer et al., 2017). This must come to an end. We agree that marine debris pollution is a transboundary issue that requires regional collaboration as well as regular monitoring of the success of such activities by civil society, which would only be done by having the information offered in the article. Undoubtedly, students were astonished and were able to broaden their grasp of various environmental concerns as well as possibilities for sustainability.

TEAM 4

The changes in our environment are becoming more apparent as time passes. Human activities that leave carbon footprints have expedited the change in our environment so much so that temperatures worldwide rise and large amounts of glaciers continue to melt away in the Antarctic seas. With the growing threat of irreparably damaging our planet, more people and companies showed interest and determination to become greener and environmentally friendly by spreading awareness and practicing the three Rs (Reduce, Reuse, and Recycle).

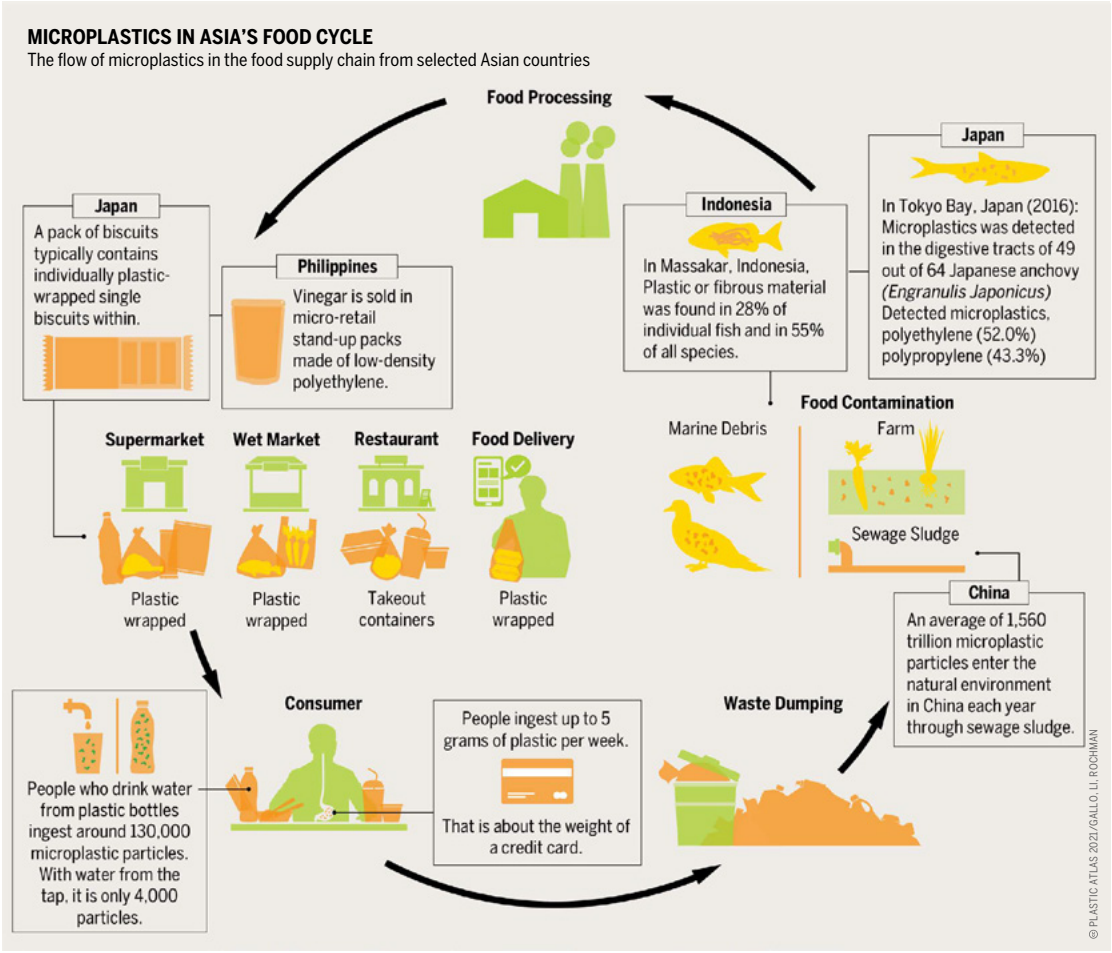
Practicing the three Rs and spreading awareness is great. However, people could do more for the environment and the planet that we live on as our actions do not stop on only affecting the environment. According to the graphic that we chose, which shows the life cycle of plastic products and the flow of toxins, the process of manufacturing products can also produce by- products that, when released, can be harmful to the animals, the environment, and the people, especially the workers that make the products. **When viewed through an anthropocentric lens, every harm done to the environment eventually finds its way back to us three-fold as the animals we rely on for meat and the air we breathe can become contaminated by our waste.**

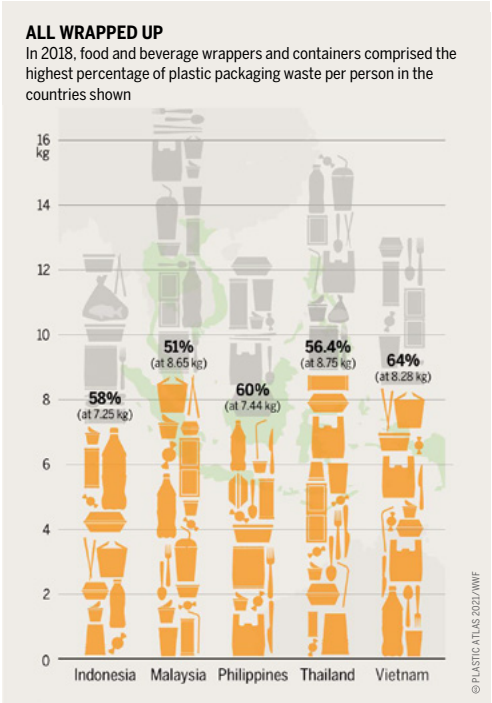
This, coupled with the pollution around us, can negatively impact our health and affect us with a slew of illnesses. All these combined are very concerning as not all people, countries, and companies properly dispose of waste products. This is the case in our home country, the Philippines, just south of east Asia. According to the World Wildlife Fund's report in 2018, almost 74% of collected plastic waste

ends up in the ocean. We can assume that most of these plastic wastes end up in the Pacific Garbage Patch.

The graphics were undoubtedly an eye-opener as it visually explains how important protecting the environment is as it affects our planet and ourselves. Individually practicing environmentally friendly practices does help a lot. However, since this is a large global issue that should attract the attention of all, countries and companies should do their part as well. Countries should impose strong laws that make people and companies manage their waste well. On the other hand, companies should look into effective ways to manage their waste so that environmental damage can be minimized. The negative impacts that are caused by harming the environment might not be felt as much today by those who are in power as they are indirectly protected by those who are lower than them in a figurative pyramid. However, there will come a time when all of us will experience all the negative impacts of harming the environment. When that time comes, it might be too late for us to try and reverse all that we have done.

Microplastics in Asia's Food Cycle





TEAM 1

For this question, our team chose this graphic. This graphic describes a cycle of micro plastic over human life and ecosystem. The most surprising thing was the fact that we eat 5 grams of plastics per week, equal to one credit card.

This is because we did not expect we take such amount of microplastics in our daily life. We have heard that there are many microplastics in the ocean and we take in them indirectly through fish, **but we did not expect water bottles and other plastic packages are the sources of microplastics as well.** Additionally, it was beyond our expectation that microplastics have got our body through various ways. In farmlands, due to micro plastic on the land then flowing to soil, vegetables and fruits ingest microplastics. Also, this graph is showing that package used in restaurant, wet market, and food delivery is carrying microplastic to our mouth. As well as packaging, through plastic bottles we take micro plastics. For health concerns, in almost all countries, bottled water is preferred but there is a hidden risk of taking way more micro plastic which is still unsure about health effects than tap water. These parts in graphic reminds us of that we are exposed to the danger of microplastics unless we stop using plastics completely or make all the plastic degradable.

As a biggest reason why, it is hard for us to get understandings of microplastic, a complicated and unseen process would be raised. **This graphic helps us to understand how we get micro plastic by visualizing how much weekly we get and the cycle which micro plastic goes through.** Plastics are long lasting, durable, and not biodegradable. These features have shaped our image of plastic, "Plastic is convenient, everywhere, never goes bad", and the public usually do not see the damaged and littered plastics due to countless use of single use plastic, which always looks good. That makes the public get the whole picture of this issue, where plastic goes, how they get to our body.

Also, this graphic would raise public awareness of plastic use. In this cycle, the fact of overpackaging in Japan is mentioned. These products are typical in Japan, and most of products are sold this style. Our team think that this graphic would raise public awareness from health perspective. **If people are never aware of the danger of micro plastic intake, companies keep selling their own products with overpackaging.** The health risks of micro plastics remains unrevealed hence we could not give additional health concerns to the public, but this fact would make people realize the fact itself and rethink their behavior with a bit health concerns.

TEAM 2

In the picture on page 21, we learned about the microplastics in Asia's food cycle. Over-packaged and poorly packaged products come out of food processing plants and our lives.

Human use and consumption of these products are likely to increase significantly the number of microplastics ingested by the body. With the resulting plastic waste wanton discharge, microplastics into nature, water, and land resources. According to research, microplastics are found in seafood worldwide, especially in East Asia. When humans eat seafood, they are also bringing microplastics into their bodies. Ingestion of plastics is likely to cause damage to the digestive tract of marine organisms, but the full impact on human health remains uncertain. **Microplastics travel through the human digestive tract and into human organs, carrying toxic contaminants from the plastic itself or absorbed from the environment. This undoubtedly poses a significant threat to human health.**

With the development of industry, more and more plastic packaging. Plastic is mostly disposable,

and cannot be reused many times, but the use of plastic packaging is undoubtedly the most mature technology and the lowest cost. However, manufacturers enjoy the low cost of plastic packaging at the same time, whether they consider the high price of throwaway culture. When plastics are synthesized from factories and put on the market, there are two superpositions, the superposition of the natural environment and the superposition of humans.

On the one hand, the accumulation of microplastics in the environment will continue with plastic products, which nature's self- regulation cannot digest, and microplastics can enter poplars through sewage and can flow anywhere in the world, affecting the world's ecosystems. On the other hand, some products with plastic packaging can quickly enter the human body after humans use them. **Biologically, women are more likely to be adversely affected by the toxins in plastics.** A new study has revealed that microplastic fragments have also been detected in placental samples of ordinary physiological pregnant women. Most of the plastic pieces were made from polyethylene and polypropylene, which may have come from food packaging or washing clothes made of synthetic fibers. Some particles were similar to microbeads often found in facial wash, toothpaste, and other personal care products. This means that the harm of microplastics from various sources has gone from affecting our generation to affecting our offspring.

Scientists have determined that microplastics are more dangerous to human health than previously understood. For example, inhaling plastic fibers appears to cause mild inflammation of the respiratory tract after exposure to them exceeds a certain level. At the same time, certain types of plastics contain chemicals and additives, some of which have been shown to affect human fertility, cancer rates, etc. Microplastics in the air can also carry pollutants from the surrounding environment. In conclusion, the overuse of plastics affects the environment in which the next generation lives and affects their physical health.

TEAM 3

The flow of microplastics in the food supply chain from selected Asian countries"

Perhaps the most compelling information from the report was the entrance of microplastics in the food supply chains. Staple seafoods in Asia are found to contain microplastics within their digestive tracts, which means that they have infiltrated the natural feeding ecology of marine organisms and other organisms it interacts with. Humans are one of them, so it is not surprising that they are consuming microplastics already, not to mention that Asian populations are the major consumers of seafood in the world.

So far, no human has been reported yet from dying of microplastic ingestion and inhalation. Unlike smaller marine organisms, it would take higher amounts of microplastic in order to cause threatening damages to the human body. Despite this, isn't it concerning enough that something inedible and invisible just enters the body, undetected and without symptoms? Also, it does not clear the fact that the unwanted particles can lead to pulmonary distress, cytotoxic and autoimmune effects in humans over time (Campanale et al. 2020). Moreover, the presence of microplastics (PET, polystyrene, polyethylene) has already been investigated wherein it was found in human blood samples (Carrington 2022). **If one would think about it, it is ironic how humans get to throw away plastic waste but at the end of the day, it still goes straight inside our own bodies.**

TEAM 4

The most surprising fact for our team is "TASTY PLASTIC MORSELS." We eat 5 grams of plastics which is as same as credit cards weight (p.20).

Have you ever aware that our irreplaceable plastic boxes and bottles invades zone of our life while we are enjoying our bright days? Definitely we haven't. The main reason is that we have never thought the notion ever. Especially in Japan, more than half of people don't have passion about the fact much plastic waste is in the sea. Moreover, we Japanese don't try to get information about other Asian countries are in serious problem about sea pollution. In our busy life, it is inevitable that we don't take advantage of the use of plastics in perspective of convenience and cleanness. It not only eases the citizens life but also retailer's work. If retailers don't have ways to use plastics, their assignments skyscrapers and a lot of customers become to complain about the state of food and the absence of food that is seasonal. We need to accept the thought that the largest amount of plastic waste is food packages. In this point, more or less we should take a look at what happen in the world concerning the grocery packaging.

Since the COVID-19 has influenced, the demand of online food delivery industry has grown and because of it, the amount of plastic the industry requires has be in proportion to it. The industry demand plastic food containers. The problem of it is that plastics used for food go into food and we people ingest them unconsciously, and finally it causes us hormone disorders. In general, plastics travel upwards through the food chain.

Eventually, we could learn the fact that we people ourselves contaminate oceans and soil and finally the dirt come back to our body. As a one of Asian, we decided that we try to feel plastics are in our body and enlighten our friends and family as

The graphics that struck the team the most are the "All Wrapped Up" and "Microplastics in Asia's Food Cycle" under Tasty Plastic Morsels Article (Plastic Atlas 2021).

The information enclosed in the graphics infer that the use of plastic in East Asian industries has already been running for a long time. Due to its promising physical properties, cost efficiency, and convenience, the subscription towards plastic is the primary option to provide food and services for people. There are already existing implications which are directly attributed to plastics waste like clogged drains and plastic-dominated shores. On the other hand, the awareness regarding the implications brought about by the abundance of microplastics in soils and waters still hasn't been brought to light, despite its existing and potential effects.

"Nearly 1.9 million tonnes of plastics in total were used to package food and drinks in these five Southeast Asian countries in 2018."

The large production of single-use plastics is evident amid the COVID-19 pandemic. In the Philippines, the demand for courier services during the pandemic has significantly increased due to the travel limitations set on the country (Dones & Young. 2020). These services are mainly food and parcel deliveries which are commonly wrapped in plastics. On another note, microplastics take years to form as it requires time for a single piece of plastic to break down. **Thus, with the continuous rise in the use of plastic as food packaging, which is extremely rampant in East Asia, it can be predicted that the microplastic situation in the region for the following years to come would be even more severe, evident, and uncontrollable.**

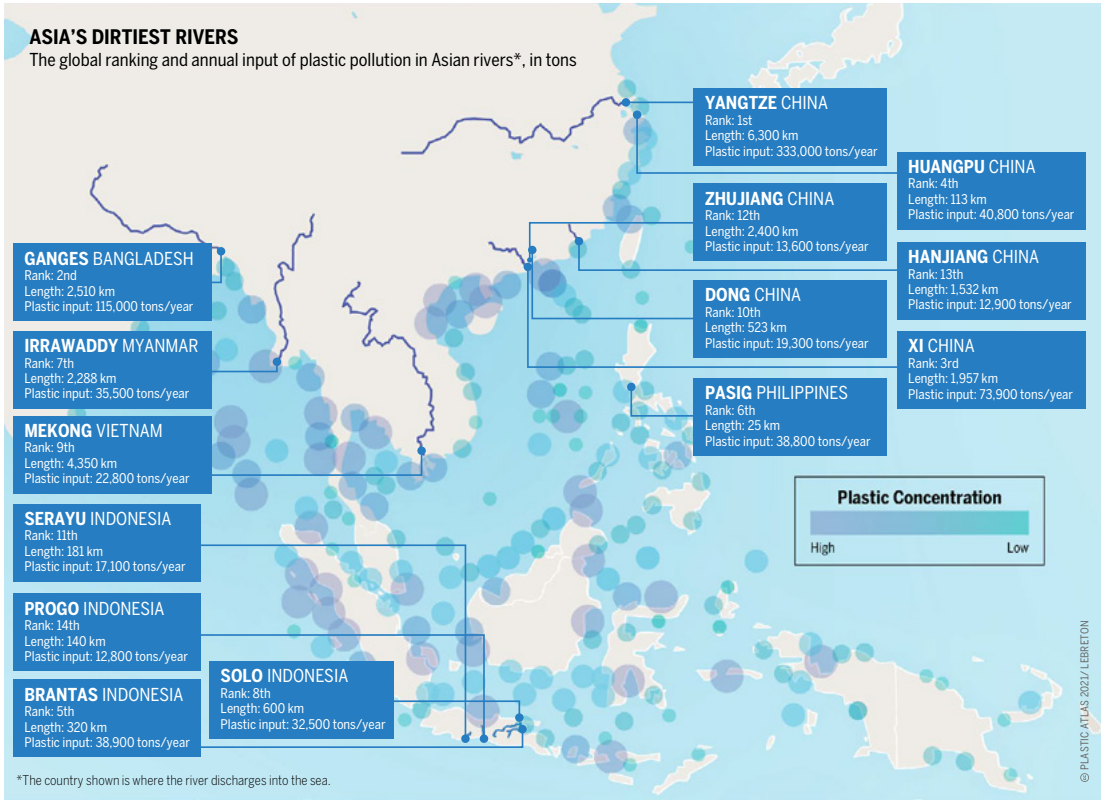
TEAM 6

One fact that surprised my team the most is that "oceans absorb a quarter of anthropogenic greenhouse emissions. Pollution by microplastics may put biological carbon pumps at risk."

The ocean acts as a medium to uptake and stores carbon dioxide. According to the article, growing levels of microplastic debris in the oceans may interfere with biological processes through which plankton capture carbon dioxide at the sea surface and sequester carbon in the deep oceans. On one hand, the macroclimate will be disturbed and impose a threat to global warming. On the other hand, evidence pointed out that "plastic pollution of the soil can be between 4 to 23 times higher than in the seas." In view of this, plastic pollution is a worrying issue that imposed a threat on both the ocean and land. Health issues like cancer may be raised. researchers claim that plastic can causes poisoning among residents with carbon monoxide, nitrous oxide, particulate matter, dioxins, and furans linked to cancer, respiratory illness, nervous disorders, and birth defects.

Another fact that surprises our team is that the article pointed out that the plastic pollution problem in Asia is far more serious than that of the Eurasia countries. "Annual global plastic production has reached nearly 370 MILLION TONNES, with Asia now accounting for 51 percent." "The salts used in products from Asia have contained more microplastics than those from Europe". We can no longer afford to sit tight and turn a blind eye to the impact of plastic pollution in Asia. "HONG KONG SAR AND SOUTH KOREA are among the world's highest plastic waste producers per capita in 2018". We believe that the Hong Kong government can play a more important role in tackling the plastic contamination in Hong Kong since there is a sufficient fiscal budget and capital. There are several NGOs that fight on this issue and our team believed that education is one of the ways to relieve the problem in the long term. Big businesses and companies like Sino group and Nanfung Group are proposing sustainable city plans and if we can bring our proposal into action, together with these big companies, it is no doubt it can be a successful plan and a good reference for other regions around the world.

Asia's Dirtiest Rivers



TEAM 1

On the 29th page of the Plastic Atlas Asia report, there is a graph of Asia's dirties rivers which point out 14 river basins that are most polluted by plastic, located separately in China, Philippines, Bangladesh, Myanmar, Vietnam, and Indonesia.

The first surprising observation to us is that Indonesia and Philippine appear on this list, because in our inherent impression, both countries are known for their developed tourism industries. A lot of people would spend their holidays by the sea in Bali or Boracay, scuba diving with fish and sea turtles. However, it appears that this is a huge stereotype of water quality. The graph shows that four rivers in Indonesia are being polluted by plastic for more than 101,300 tons/year in together. From the research, we discover that Indonesia is the second-largest source of plastic pollution after China, and the underlying causes are largely due to excessive consumption of single-use plastics and poor waste management. When we look at the picture of Brantas river, we find it horribly dirty where the color of water is brown and a lot of garbage is floating, but the poor who live in slums still drink from the river which certainly causes health problems such as hormonal changes, developmental disorders, reproductive abnormalities, and cancer. Plastics are ingested by people

through seafood, beverages, and even table salt; when plastics are suspended in the air, they are inhaled and penetrate the skin.

The second surprise to us is that China has six rivers listed. Even though a slogan of "lucid waters and lush mountains are invaluable assets" has been prevalent in China, people seemly are still not aware of the importance of water cleanness. We also find the relationship between plastic pollution in rivers and underground water. According to the data cited in the "Groundwater Dynamics Monthly Report" recently released by the Ministry of Water Resources of China, more than 80% of the groundwater in the 2,103 wells has been seriously polluted by surface water discharged from industry and agriculture, making these wells unfit for drinking. Nearly 25% of the groundwater in the plain area of the country is polluted to varying degrees. In watersheds with dense population and socio-economic activities, groundwater pollution has shown a trend of widespread diffusion. We have to recognize the difference between the congenital factors of groundwater quality and human pollution.

Some other observation that is surprising to us is that 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. The size of the Great Pacific Garbage Patch is equal to 4.2 times size of Japan and the current in the river could bring plastic trash together, spread them to other parts of the world, and in the end form garbage island. **We were assuming that plastic would only remain in a particular area like a river and stay there for a long time. This possible negative consequence is far beyond our expectations.**

TEAM 2

Based on the graphic, we were surprised that East Asia is known for the world's largest number of rivers experiencing plastic pollution, alongside its average severity.

Indeed, most East Asians have adopted long-standing East Asian cultures and traditions for centuries. Whilst some of these cultures adopt the habit of disposing of items, including plastics, on land or water bodies, others do not care about the use of plastics. These reveal a lack of emphasis amongst East Asians on the proper disposal of plastics. This situation is further exacerbated by the continual increase in the pace of life in most East Asian countries and is particularly hard-hitting in densely populated cities, such as Shanghai and Guangzhou in China. Specifically, China places its top priority on ensuring strong economic growth ahead of environmental conservation. Nonetheless, it is significant for China to conserve the environment due to its high sensitivity to climate change and gigantic global interconnectedness of its water sources.

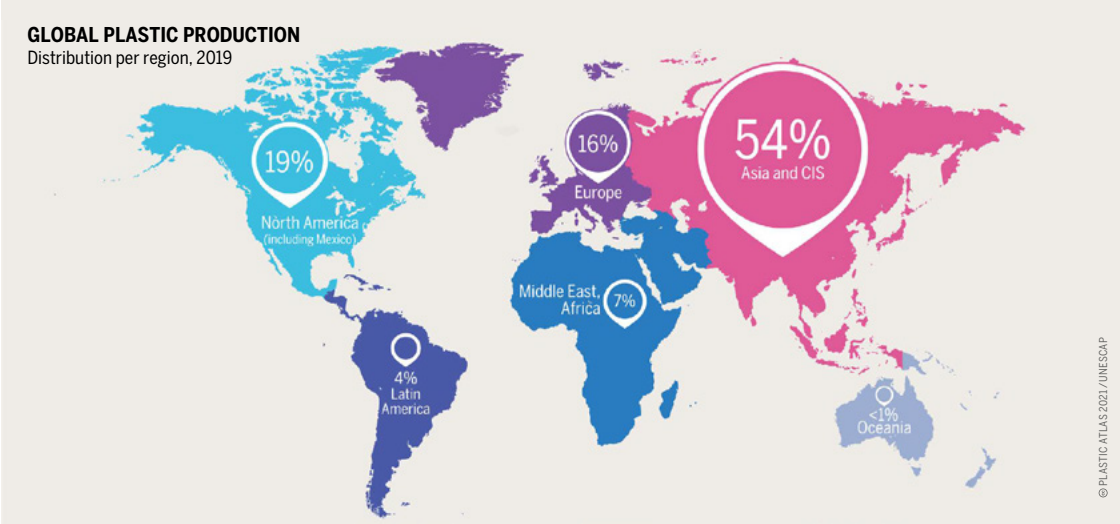
TEAM 3

From this graph, the fact that is quite surprising is that China as one of the developed countries is included in one of the places that became the world's first annual input of plastic pollution in Asian rivers. China is one of the countries with the largest area and the largest population in the world. And with the largest population in the world, it will certainly increase the use of plastic. However, economically China is the second largest economy in the world which accounts for 16.9

% of the world economy. In addition, this country is quite advanced in technology development as can be seen in several large companies engaged in a technology such as Xiao, Alibaba, Baidu, etc. Plastic waste management should not be a big problem for country with a very good economy and technological development.

Our group thinks that the first rank is one of the countries from southeast asia where many countries have the status of developing countries because these countries are still lacking in technology. However, it turns out that China as a developed country is still having problems managing plastic waste, which results in many rivers being polluted by plastic waste. As a developed country this fact is one thing that is very unfortunate. China dumped 200.7 million cubic meters of trash into the sea in 2018, up 27 percent from the figure recorded the previous year. China's Ministry of Environment and Ecology said the number was also the highest on record in at least the last 10 years. The decomposition of plastic waste will not occur in a short time. So, not only companies that produce plastic, but the public are also encouraged to participate in reducing the use of plastic waste which has become a global problem

Global Plastic Production



TEAM 1

The Graphic of "Global Plastic Production" about the distribution in 2019 and the fact that "Asia is the region with the biggest plastic production in the world, where both China and Japan are the major players" surprised our team the most.

Before reading this edition, we haven't realized that we are living in the region with the largest production of plastics, and when going through history, we were shocked by the longstanding industry chain of plastic production and export in East Asia. As a custom for a person is hard to change, a huge and persistent system in East Asia is also difficult to transform. But today, we are suffering from plastic problems of increasingly severe degree, so the urgent situation requires immediate and effective solutions, and being the residents of East Asia, it's our responsibility to research the roots of problems and come up with good measures to change the situation. Therefore, being so close to the worldwide problem is why we are surprised.

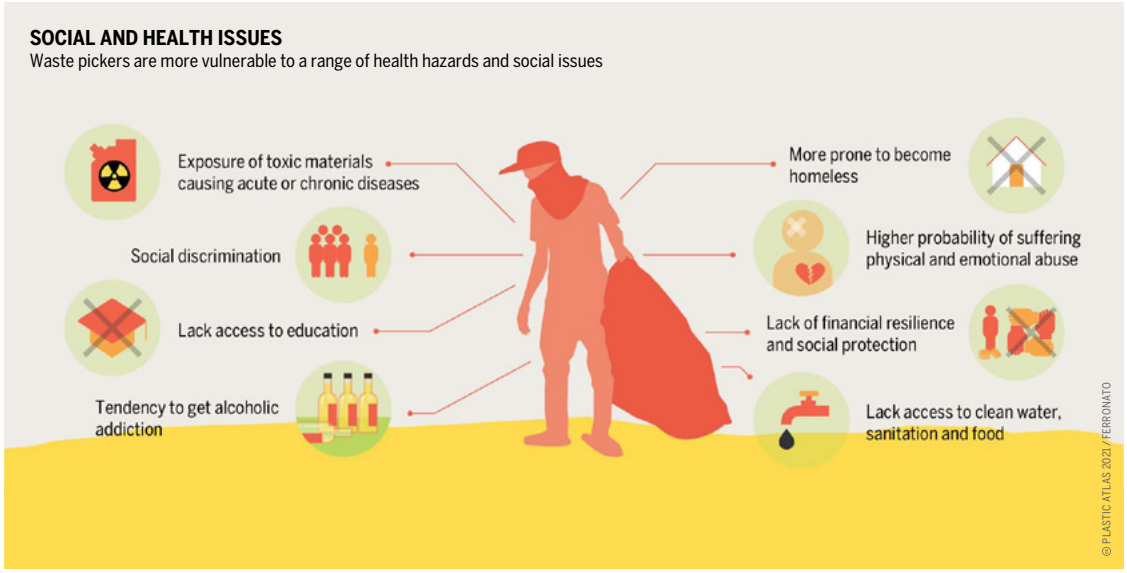
TEAM 2

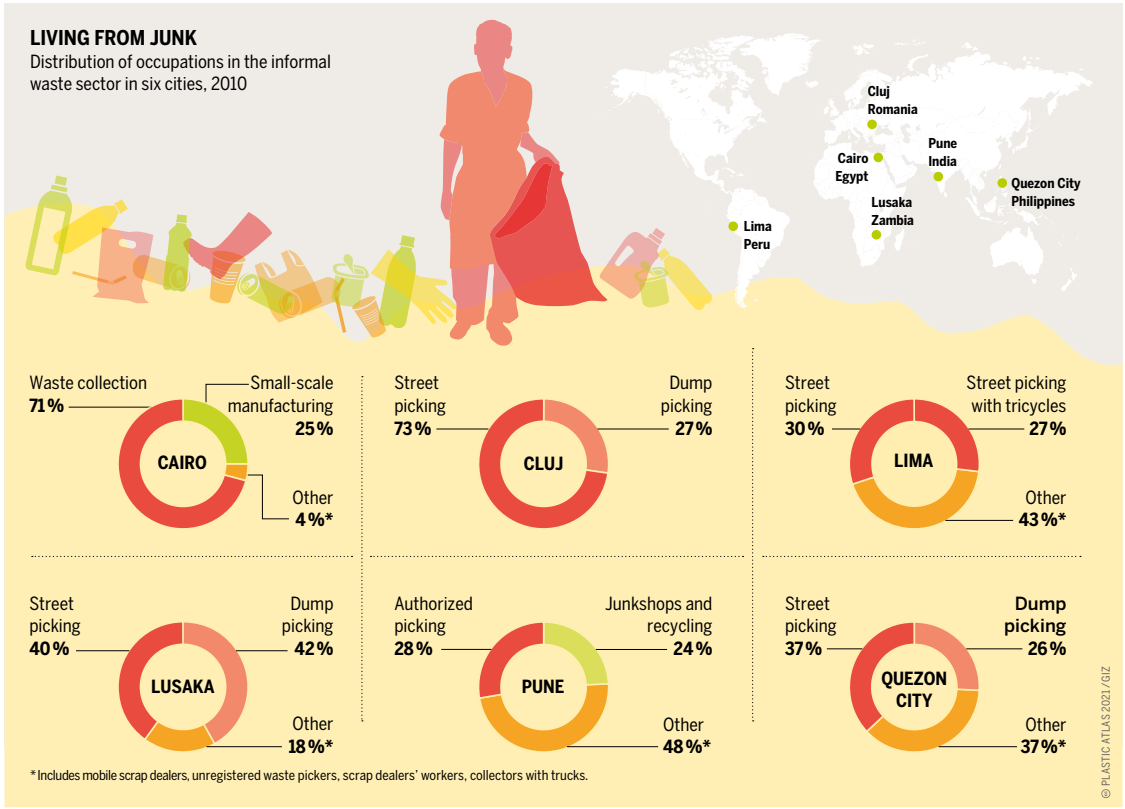
Imagine a world without plastic. Perhaps most of us would think of the inconvenience that follows and the delicious boba tea we will never get to enjoy comfortably. However, in a world entwined with plastic, many are unaware that they are the cause of their invisible health consequences.

When addressing plastic waste, we are quick to shift responsibilities without taking proper ownership of our actions. The significant amount of plastic waste in East Asia has contributed to satisfying our lifestyle. East-Asians in today's world reflect strongly on the social habit of meal takeaways, which was further set in stone by the lockdown restrictions of the Covid-19 pandemic. The convenience of digitalisation further encouraged consumers to order food and necessities with just a few mobile phone taps (Alegado, 2021).

Food and retail industries continually promote convenience through single-use plastic, which further downplays the severity of the pollution (Forbes, 2021). Our complacency led us to concede convenience to our lifestyle without acknowledging the cost of our actions. Coupled with our hectic way of living, this increased our plastic usage, with Asia contributing 54% of global plastic waste. **Unbeknown to our high consumption, plastic has become an inseparable entity in our lifestyle. These data highlighted our ignorance as culprits behind the major plastic pollution issue and made us realise that we unconsciously drive the demand for plastic.**

Underpaid & Undervalued Section: Waste Pickers





TEAM 1

Plastic is a problem that continues to surround us, from mountains to lowlands, from land to oceans, where plastic not only harms the environment but also continues to change our lives. The main problem with plastic is its ability to be strong and durable even when it is out of use, supported by the influence of globalization, which makes people happy to use disposable items, making plastic a big problem for the world today.

From some of the graphs provided by the Plastic Atlas Asia edition, our team was stunned by the fact that the Trash picker, as one of the critical roles in the diversion of plastic residues, is considered a low-value and unvalued job. Being a trash picker is a job that has significant risks but gets little compensation. Where many trash picker families do not have proper houses but live side by side with plastic waste, surrounded by social prejudice where work as trash pickers is considered a counterproductive job. They are considered dirty, have a low economic level, have no access to education, and have no other choice in earning a living other than sorting and processing other people's waste.

Another surprising fact about a trash pickers is that trash pickers play an important role in diverting recycling from the waste stream. The recycling rate achieved by the informal sector such as in China, Pakistan, India, and even the Philippines ranges from 20 to 50 per cent. In Pune, India, the trash picker cooperative SWaCH recovered 89 per cent of materials, diverted 52 per cent of plastic waste from landfills, and saved more than US$12.5 million in solid waste management costs annually to the Pune city government. Door-to-door material collection and processing services also have a greenhouse gas emission impact equivalent to eliminating the annual emissions of 39,195 passenger vehicles.

Some trash pickers have started to organize and continue to exploit this work to be better and provide access to recycled materials with a more fantastic market value opportunity. In many countries, trash pickers collect and separate materials into categories the recycling industry needs and do information campaigns to teach people to properly separate recycling so that people can turn garbage into money. In addition, the resource recovery system continues to develop, and some countries have a clear policy in the waste responsibility scheme of a producer. However, few producers focus on this and still shift responsibility to the informal waste sector.

Apart from the role of trash pickers and the risks they face, producers should be responsible for the waste and waste produced by their products. Trash pickers must also be protected and compensated adequately by entrepreneurs who work with a significant impact so that resources can continue to be sustainable. To create the sustainability of resources and eliminate the bad stigma of society about trash pickers.

TEAM 2

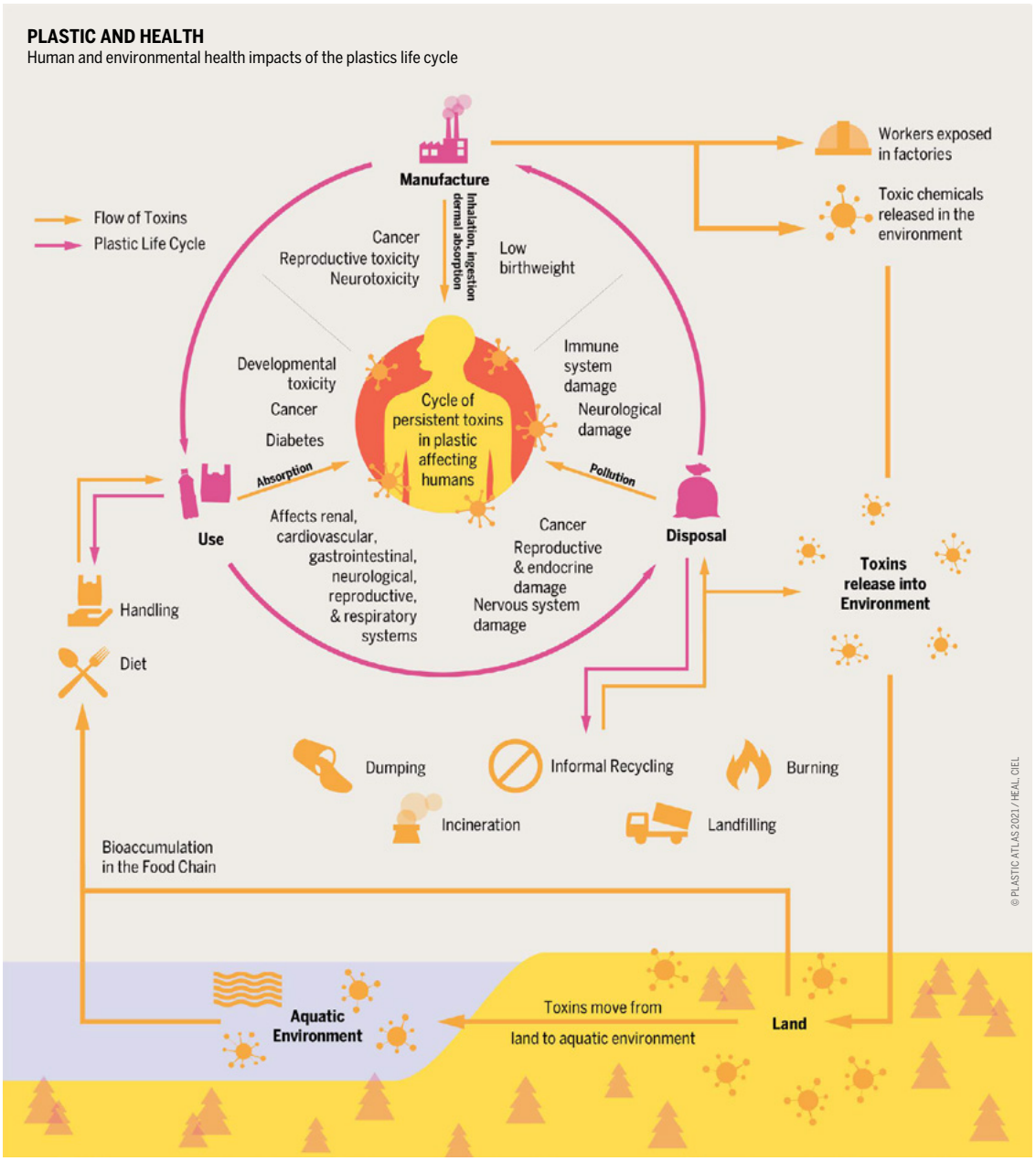
The Plastic Atlas Asia report presented relevant environmental information in which the world is currently experiencing. The multitude of plastics and other forms of rubbish being openly thrown out at bodies of water and how there are certain deficiencies in the policies of most Asian countries in its efforts to reduce improper

wastages. However, beyond the plastic wastage, the report perfectly highlighted one of the sectors that are deeply affected by the aforementioned problem, the waste-picking sector.

As explained in the graphic and in the report, most individuals who belong to the sector are living under the poverty line because this occupation is seen as "degrading" and away from the norms of society (pg. 40). **The group was truly shocked when the team read through the report and saw the graphic presented above fro the underpaid and undervalued section. The group deeply empathized with the facts and information presented in the section because of how rampant waste-pickers are and often discarded by society, especially in the team's home country, the Philippines.** There is a statistic from the graphic above that included a city in the Philippines (Quezon city) wherein it divided the occupations in the informal sector of the city and it can be seen that the two dominating occupations are always picking up rubbish. This goes to show how people who make their living out of picking up wastages play an important role in the recycling industry and in the environment as a whole because they not only clean off rubbish along the streets but also deliver (sell) to recycling stalls where rubbish are turned into something useful. However, not all rubbish can be recycled as most plastic materials cannot be sold off such companies and returned as a rubbish that continues to harm the environment and makes it harder for these pickers to have a stable source of income (pg. 40).

The team was also surprised by how the waste-pickers risk their health and ultimately, their lives just to earn one meal from a whole day of work (pg. 41). The urgency of the situation of waste-pickers and various health hazards that come with it are further exacerbated through the surge of the COVID-19 pandemic. The team noticed that there are a lot of mismanaged medical wastages like used face mask, syringes, among others that are just thrown away on the streets. Because of the lack of proper safety and medical equipment of the waste-pickers, they are exposed to the threat of contracting the virus firsthand.

Plastic And Health



TEAM 1

Our team found the graphic on the plastic life cycle and the path of plastic toxins the most surprising. At one glance of the graphic alone, the orange lines appear to dominate the pink ones, representing how microplastics and their toxins travel much farther than the actual use of plastic. It is easy to claim that plastics are detrimental to oceans because it harms marine life, but this graphic expounded on a wider scale how plastic chemicals reach various habitats and affect a much larger population.

Plastics are manufactured in factories that involve various chemicals in the production process which contribute to both environmental degradation and health issues. After production, plastics are used by the public. Through exposure and absorption of plastic substances, various risks to health are imposed. The same goes for disposal, wherein harmful waste from plastic pollution enter the body and through various disposal methods, are released into the environment leading to further exposure. Little did we know that as these toxins are released, they reach the land, atmosphere, and water. Through land, toxins make their way into or are brought into aquatic environments, which may justify the reason why many shift their focus to water pollution caused by plastics rather than acknowledging their existence in other spaces. Whether on land or in water, plastic waste gets accumulated in living organisms and reaches other levels of the food chain. This means we, humans, are still very much affected by the plastic pollution problem.

In the context of East Asia, many countries still remain reliant on plastic as a source of packaging and construction material. This may be because of its affordability and convenience brought into the lives of residents and manufacturers. However, it is worth contemplating that the plastic pollution problem will greatly affect the locals, biodiversity, and the environment that East Asian countries hold. For instance, in our country, the Philippines, the archipelagic country is well-known for its large biodiversity and fishery as its primary source of livelihood. With the circulating plastic pollution, we are at risk of losing flora and fauna because toxins affect different species as well, and the harmful microplastic substances may be infused in the seafood that we Filipinos intake.

This graphic serves as an eye-opener to the global reality that although plastic has become one of the centers of the economy and a benefit for the general public, it brings consequences that affect the biosphere. If no action is taken to lessen the production, consumption, and escalation of plastic, our reliance on plastic materials will cause a high increase in environmental degradation and health complications, and a decrease in biodiversity and responsible consumerism.

TEAM 2

The high plastic consumption in Asia also led to significant issues in our ecosystem. The air we breathe, the water we drink, and the food we consume potentially contain harmful chemicals from plastic.

Salt, commonly used in many dishes, is reported to have more microplastic in Asia than those in Europe, North and South America, and Africa. These microplastics seep into our rivers and ponds and disrupt the healthy ecosystem. On an average weekly, an individual ingests a credit card equivalent

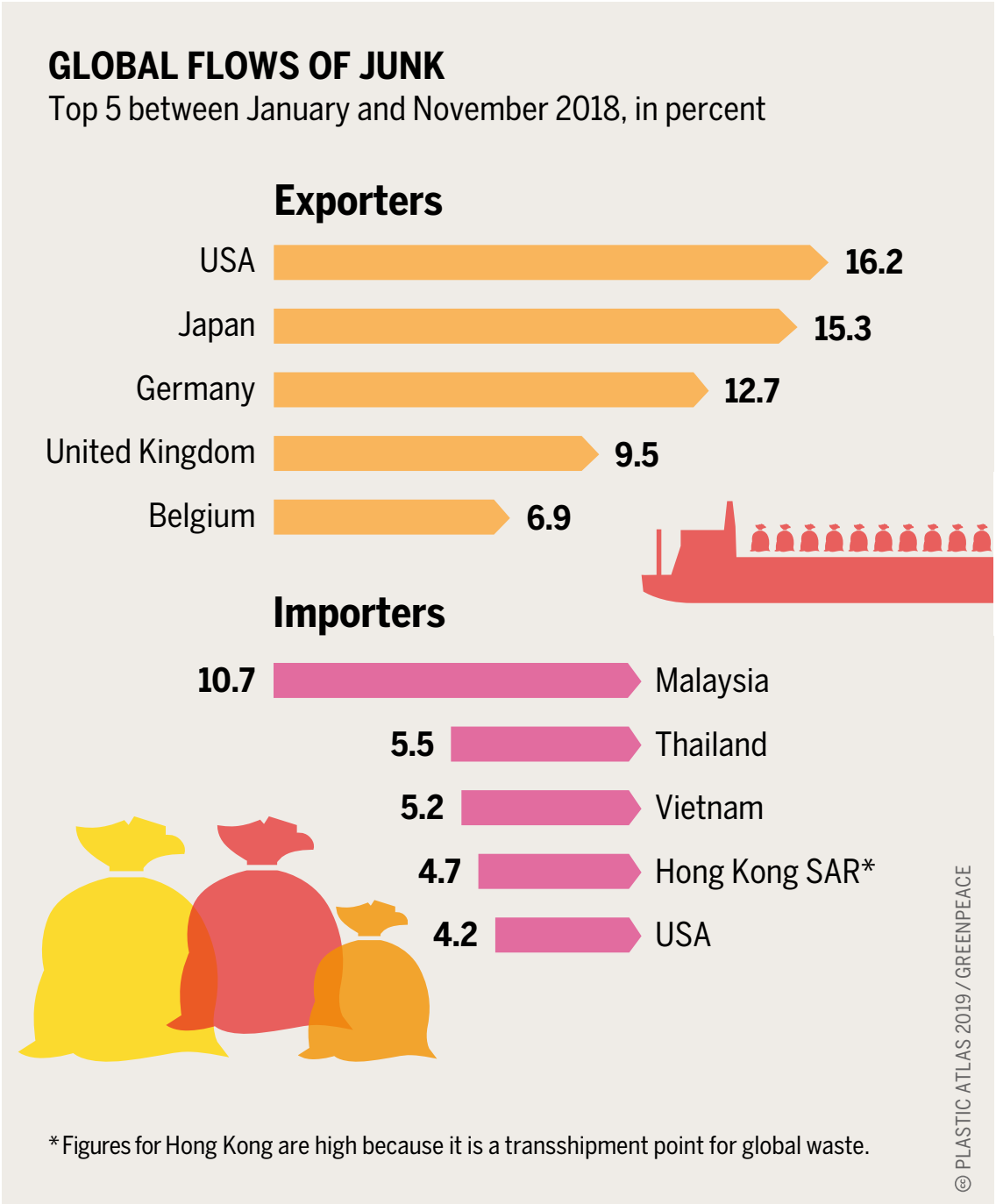
to 5 grams of plastic - bon appétit (Reuters Graphic, 2019). It is now a complete cycle of what we irresponsibly used, returning and affecting us.

The rise of the pandemic could be argued to be an act of God, but the mismanagement of plastic is not debatable. To be aware that the poor production and disposal of plastic causes suffering to the surroundings is frustrating yet helpless. **By understanding the root cause of the plastic pollution issue and a better comprehension of the full cycle of plastic, it is time to reorient our priorities and make a conscious promise to spread awareness about the usage of plastic and its consequences and be an advocate for others to follow.**

One of the graphics that our team found surprising is found in p. 17 under the section "HARMFUL AND PERSISTENT" which summarizes via a chart the human and environmental impacts of the plastics life cycle whose emissions and pollution are inescapable. Thus, it becomes more inescapable as we become enslaved with its surface level convenience and cheapness.

This creeps into our overall habits as a human species as somebody who becomes apathetic. This is because we will most likely tell ourselves that we do not really feel affected by it until nowadays, when its adverse effects are not only stronger than ever, but are even harder to recuperate than ever. (16-17)

Global Plastic Trade



TEAM 1

We were surprised by the issue of the global plastic trade mentioned on pages 38-39.

A graph about "plastic waste exports routes after 2007" was shown and displayed that the East Asia countries are receiving plastic waste from all over the world. We all understand that the treatment of plastic waste is a global issue. **The plastic waste trade will undoubtedly exacerbate the burden of plastic waste on the environment of East Asia countries.** While more developed countries (mainly Westerns) equipped with techniques on plastic waste recycling, those least developed countries ran out of ideas on plastic waste treatments and the only solution to imported plastic waste is dumping them into landfills and rivers. As we all know that plastic pollution impacts greatly on health such as water safety and hygiene, it is believed that the global plastic waste trade may pose a threat to the livelihood of people in East Asia.

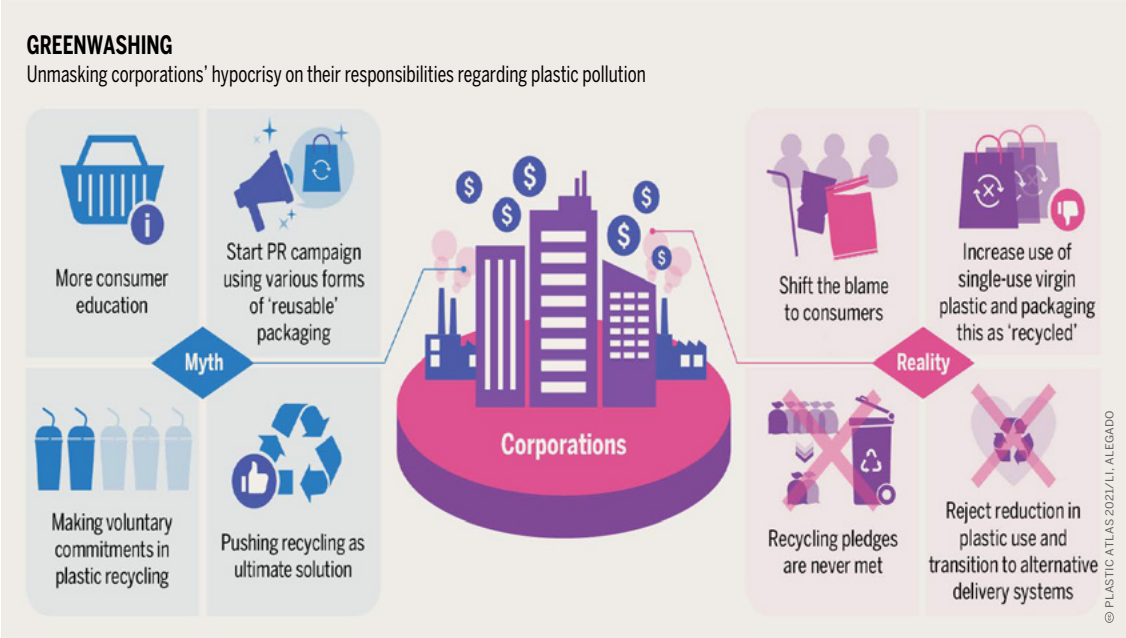
In the Atlas, we also discovered that there are two categories of plastic waste as mentioned: the high-valued and the lower-graded. The high-valued are considered as possible for domestic recycling while the lower-graded are considered as unusable and waste. It is believed that there should be more promotion of the use of high-value plastic materials and facilitate domestic recycling policies around the world. Recycling should be the best way to reduce the disposal of plastic and sooth the impact of plastic pollution on the environment and the livelihood of humans.

The Plastic Atlas Asia edition mentioned that treatments on lower-grade plastic waste is a thorny issue. The global flows of junk may reveal that some countries fail to properly deal with those lower-grade plastic wastes and they export them through illegal shipments. Such a phenomenon shows that some countries are irresponsible in tackling this global issue. It is believed that every country should bear the responsibility for the plastic waste problem. Although there are more and more countries announcing the policies on phasing out plastic waste imports, it is also important for every country to develop recycling policies in order to reduce plastic waste at its source. Those plastic waste export regions should develop their own strategies on plastic waste issues. **No country should serve as another's dumping ground. Every country should remain self-disciplined on the treatment of plastic waste and take responsibility on the issue of plastic pollution.**

TEAM 2

The import-export of plastic waste is disheartening. This is an indication of how a more well-off country tends to show disdain and disparity against developing countries. This can be seen with the fact that the four biggest exporters are the USA, Japan, Germany, and the UK.

Greenwashing



TEAM 1

In recent years, there has been an increasing trend in sustainable living and eco-friendly substitutes for single-use plastic products.

Consequently, the narrative being pushed is that people need to be more cautious and aware of their consumption for they contribute to the ever-growing problem of plastic pollution. For instance, there was a recent trend where consumers were exhausting all the means possible just to avoid using plastic straws to "save the turtles." **This is what made the graphic so eye-catching. Are individuals solely to blame for the problem or do these corporations contribute to it too? As Legal Management (Business) students, the members of the group are well-versed in the idea of capitalizing on trends to attract customers as a marketing scheme. However, despite already knowing this, it is extremely difficult to avoid being drawn in by the gimmick.** So many corporations have jumped on the bandwagon of promoting sustainable and plastic-free lifestyles. **Oftentimes, these are surface-level public relations tactics with a sole focus on increasing product engagement and consumer awareness.** The idea of reducing plastic waste is put on the back-burner, and becomes more of an afterthought. This is greatly depicted in the Plastic Atlas Asia graphic. Each panel on the "Myth" side of the infographic has a corresponding panel on the "Reality" side. This layout allows the viewer to compare and contrast what is being pushed by corporations and what the hidden reality truly is.

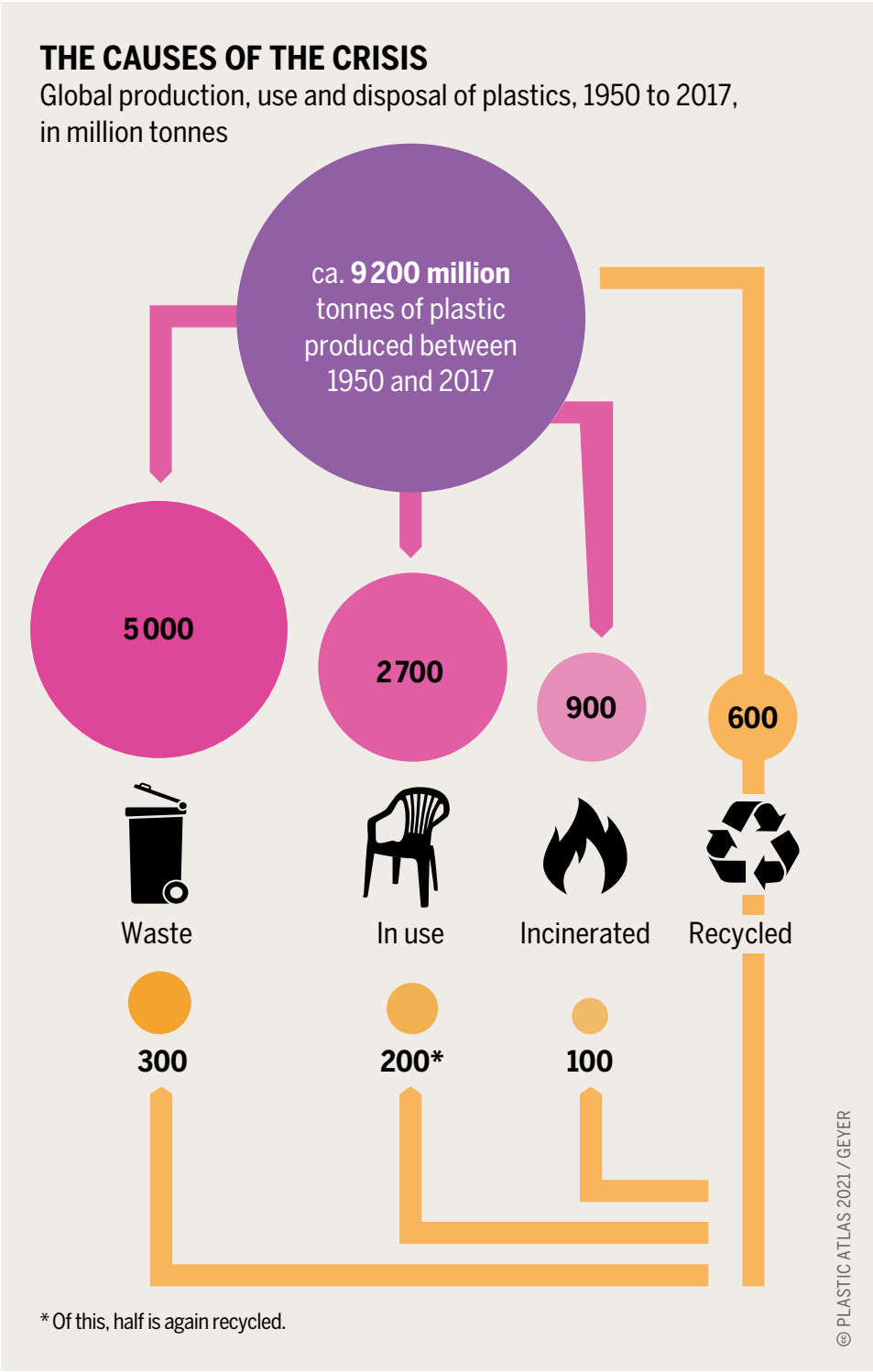
Moreover, the subtle addition of the dollar signs surrounding the corporations provides a more prominent message—this facade is profitable. False promises and flashy "green" advertisements successfully attract customers looking for ways to reduce their carbon footprint. **Genuinely making changes to their products and operations in order to reduce their plastic use does not appeal to these corporations for this translates to incurred costs.** At present, plastic is much cheaper and more accessible than its eco-friendly counterparts. Plastic being a cheap option is beneficial for the company as it allows for lower costs and can maximize profit. Additionally, changing how they make their products or how they provide their services can result in additional and considerable costs to the company. Thus, there is very little incentive for green improvements to be made. It is so easy for these brands to simply stamp on "recyclable" symbols, use kraft paper packaging, and print eye-catching "green" slogans onto their products. Why actually commit to the cause and incur the costs when they can merely make themselves look eco-friendly and reap the benefits through their brand reputation?

The graphic can serve as an eye-opener for the people brought in by this narrative who are blaming themselves for not doing better and being stricter with themselves. Individual effort is indeed important; however, there is not much improvement to be made when gigantic and major corporations offset these good intentions by exacerbating the problem through both multifarious and drastic ways.

Lastly, it was satisfying and courageous that Plastic Atlas Asia had the authentic audacity to call out the biggest corporations in the world with their hypocrisy.

As seen in the graphic in p. 30, it was eye-opening on how these corporations have been twisting it for us all their surface-level goodwill but in reality are shifting the blame to consumers, increasing the use of single-use plastic & just packaging it as recycled, not being able to meet the recycling pledges, and actually just not reducing plastic use and/or transitioning to alternative delivery systems.

The Causes of the Crisis



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

TEAM 1

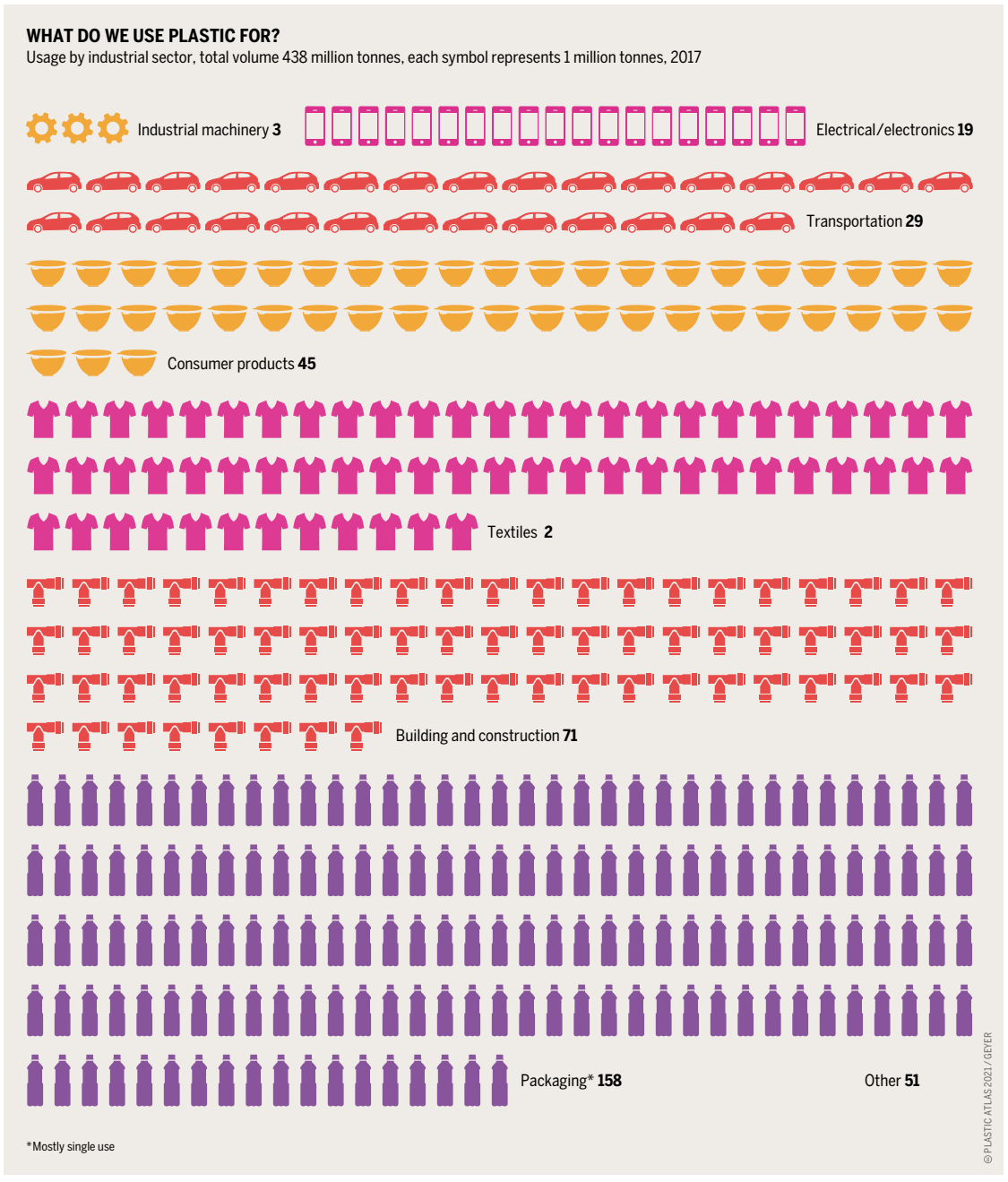
What surprises us most about the state of plastic in East Asia is the fact that we cannot recycle our way out of the plastic crisis.

Plastic recycling has long been regarded as an important solution to the plastic crisis. **Much to our surprise, on seeing the flows of plastics manufactured since the 1950s, we found that recycling is part of the problem itself, not part of the solution.** First of all, in terms of the characteristic of plastic waste, plastics in East Asia generally have high water content, which brings a huge burden to waste sorting and incineration. Secondly, plastic waste contains various additives, colorants, and other complex components, which further reduces the recyclability of plastics. We believe this is also the main reason why only 9% of plastic waste has been recycled since 1950. Additionally, in terms of cost, it is a saving of time and labor to produce new plastics with oil and natural gas than recycling plastics. Furthermore, in terms of environmental benefits, although a series of methods such as chemical recycling have been widely publicized, there is still no sign of successful large-scale operation, and the resulting secondary environmental pollution is still uncontrollable.

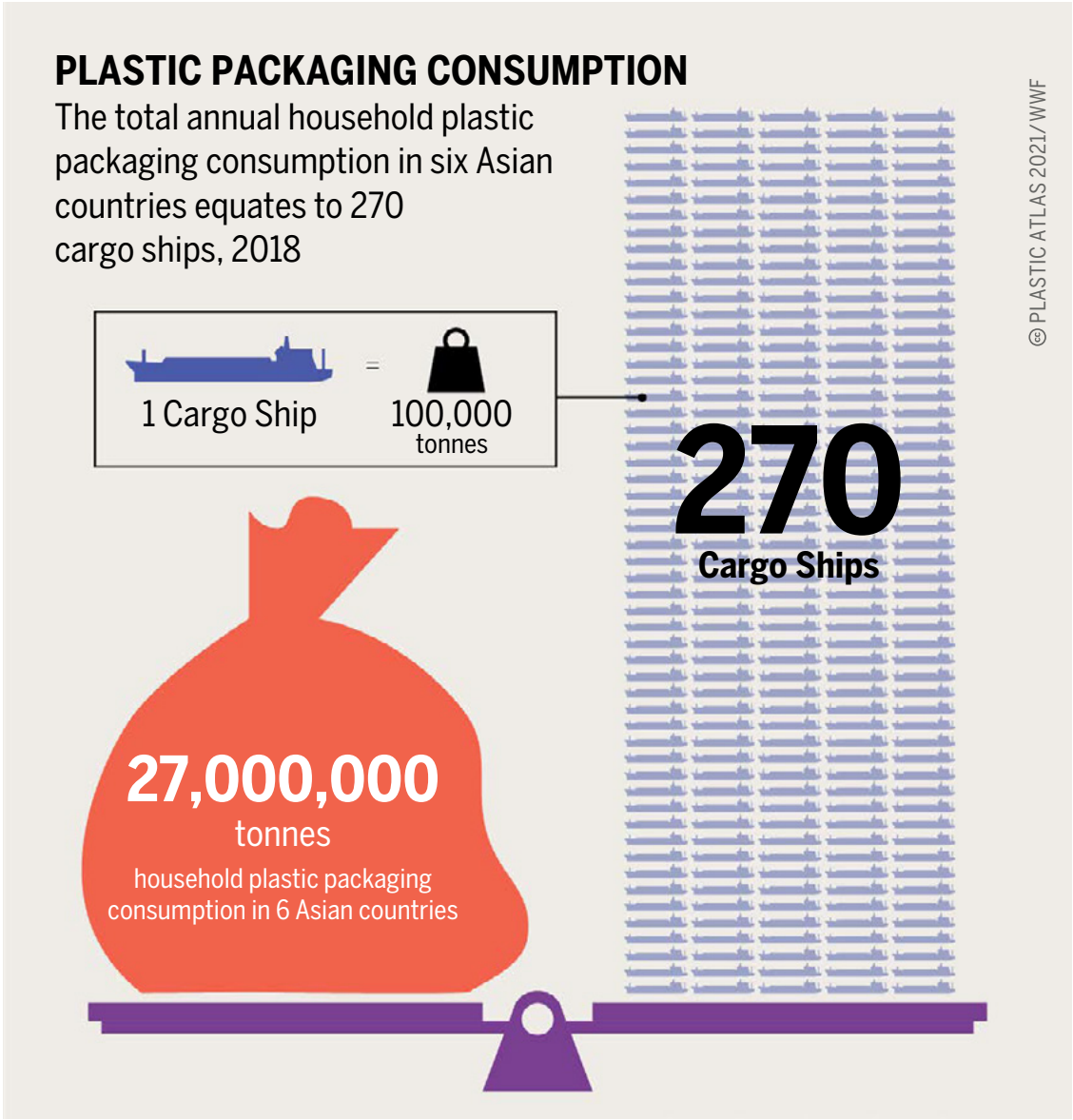
It was not until we learned about The Plastic Atlas Asia Edition that we realized that getting rid of the plastic crisis is a challenging and meaningful career. For one thing, it may not entirely solve the problem simply by plastic recycling, and a feasible mode still needs to be developed. For example, a reasonable collection mode can be used to mobilize the enthusiasm and full participation of the whole people. By using an intelligent plastic sorting mode, we are able to distinguish high quality plastics from inferior plastics. An environmentally friendly cleaning mode allows us to remove the dirt of the plastic itself while reasonably treating the sewage, thereby avoiding secondary pollution. By promoting a value recovery mode, we can convert cheap plastics into high-value-added products with the help of cutting-edge technology. For another, to develop a sustainable governance mode and win a future with zero plastic waste, we are in urgent need to make plastic recycling go beyond pollution control itself. By protecting the environment, driving employment, and forming an economic industrial chain, we can further demonstrate the social value of plastic recycling, and ultimately make it a way of life and a fashion trend.

Given the huge volumes of plastic materials being discarded daily, it is becoming clear that no existing waste management methods can be a viable solution to the current plastic pollution crisis. Many of our existing measures, such as garbage recycling, the development of degradable plastics, and chemical recycling, have been gradually proved impossible to implement on a large scale in practice. But thankfully we have accumulated a wealth of experience from it, and have been striving to prevent treatment technology from being a pollution problem itself. We have reason to believe that mankind's vision of controlling "white pollution" will be realized one day.

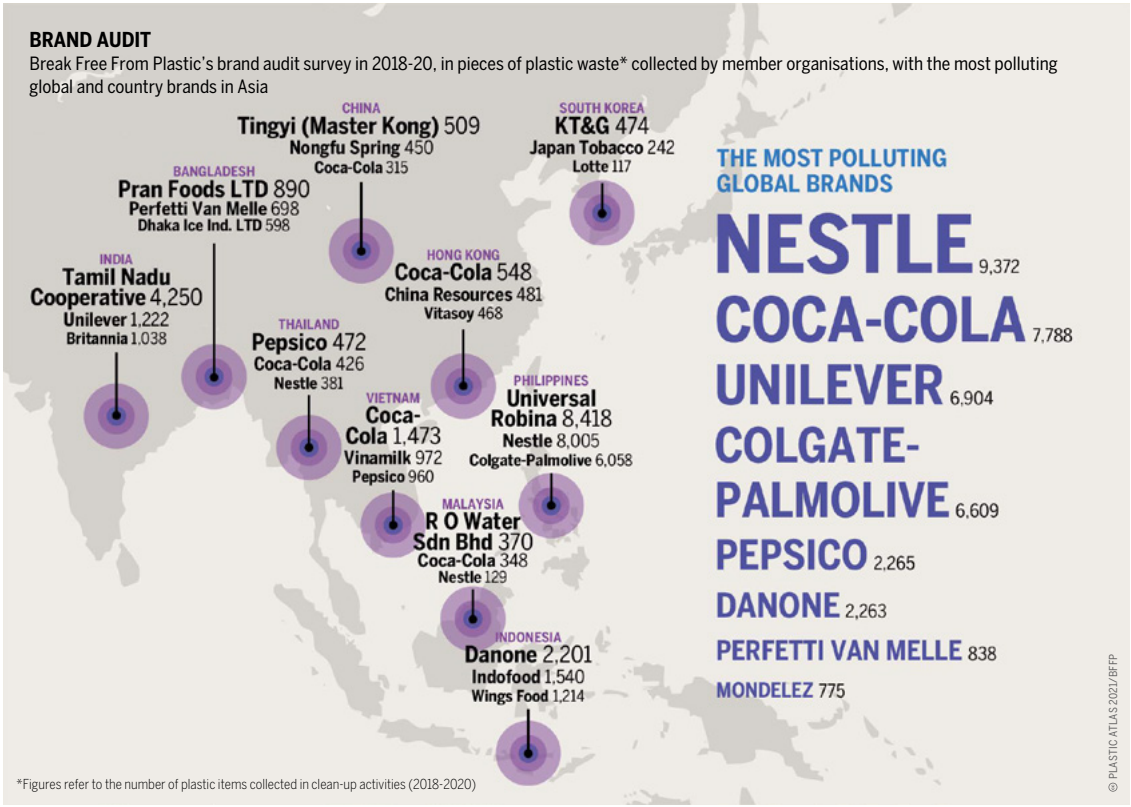
Plastic Packaging



Plastic Packaging



Plastic Packaging



TEAM 1

When we saw the map of Asia's most polluting global and country-brand plastics in this graphic, we realized that the petrochemical and plastics industries, as well as multinational corporations, are promoting recycling and consumer education, trying to make consumers scapegoats for Asia's plastic waste problem.

When the producers themselves do not use recycled materials, post- consumer plastics have little value.

TEAM 2

We are shocked that Asia produces more than half of the global plastic production. Regionally, more than half of plastic use occurs in Asia, with China accounting for 31%.

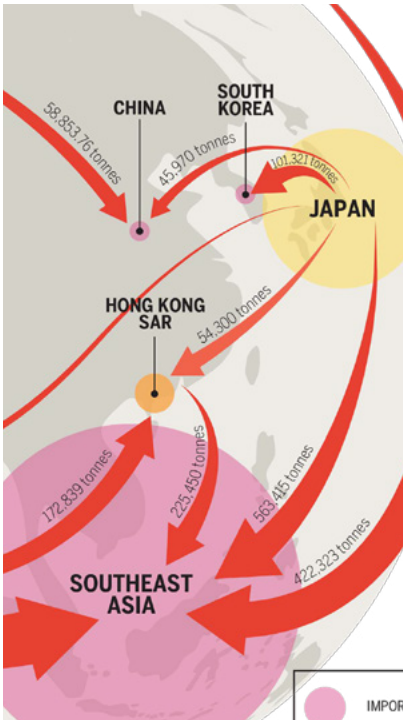
From the perspective of usage, this graphic shows that packaging accounts for nearly one-third of global plastic production, and Asia has added as many as 800 million online food delivery customers, with an average of about 2.8 single-use plastic products per meal delivery, equivalent to about 54 grams of plastic. Food delivery industry is quickly developed in China. In our daily life, **we think that food delivery has brought us great convenience, but we did not expect it to cause so many hidden dangers.** The whole process of plastics from production to use, and finally to disposal will pose a huge threat to human health and environmental safety. In addition to the immediate effects, when microplastics enter the food chain, after being eaten by humans and even detected in the human placenta, the substances they carry may have long-term effects on the fetus.

TEAM 3

From our observations in restaurants and homes we can imagine this graphic, consumers love the convenience of disposable packaging.

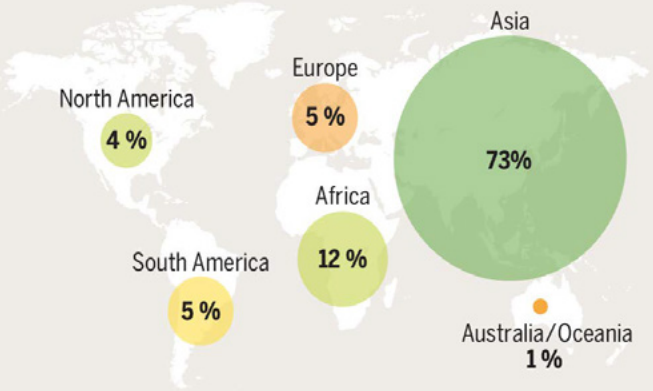
And do not think of where it goes, in reality it just accumulates and may literally be in volumes as much as the graphic presents. **We think that there is an urgent need to study plastic circularity because plastic manufacturers will not stop producing as long as it makes money.** Therefore a recycling industry needs to out match the present practices, and policies should favor this method in order for a lawful circular economic system to take place.

The Future of Mismanaged Waste



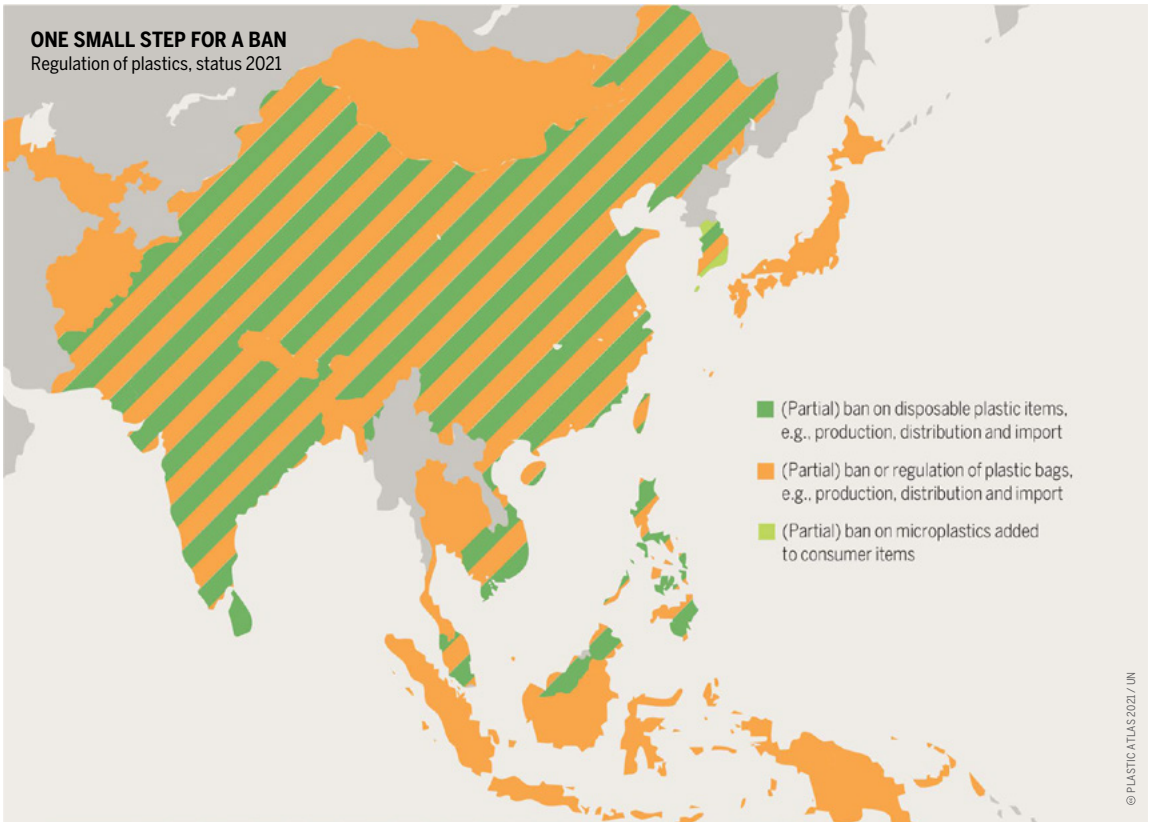
THE FUTURE OF MISMANAGED WASTE

Global plastic waste distribution by 2025 if plastic waste continues to be mismanaged



ONE SMALL STEP FOR A BAN

Regulation of plastics, status 2021



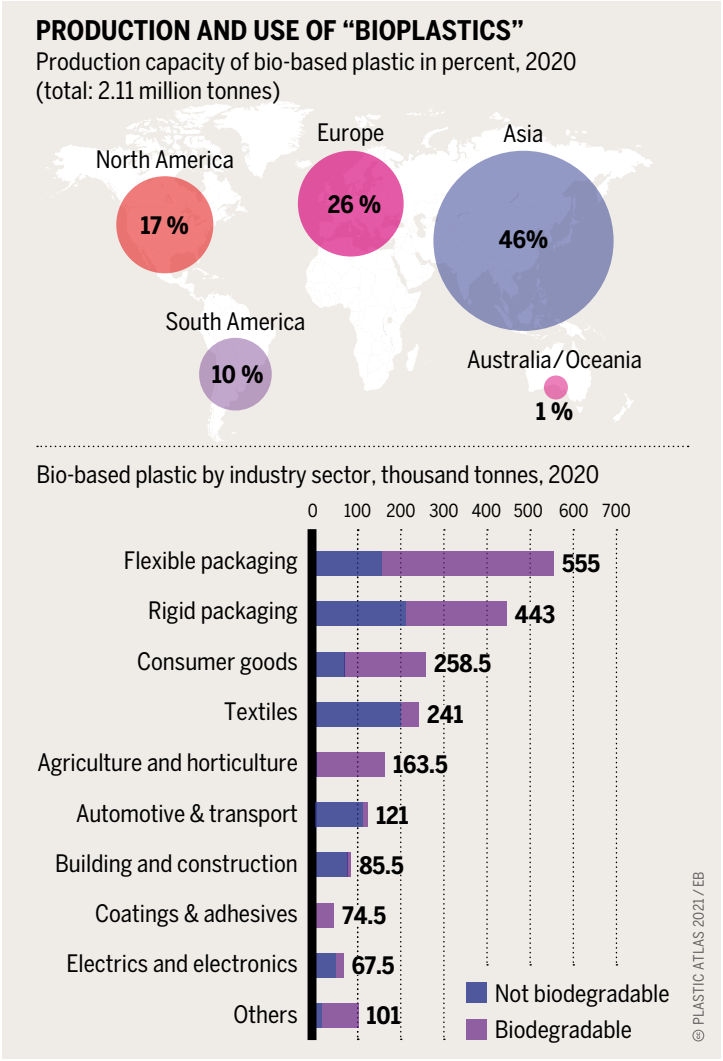
TEAM 1

The first graphic (Figure 1) that surprised the team the most is the expected global plastic waste distribution by 2025. The graphic explains that if Asian countries continue to take small steps in implementing plastic-ban regulations, more than 70% of the world's plastic waste will come from Asia.

Altogether, the waste of the other six continents has a significantly lower percentage than what Asia may contribute. It is also important to remember that this **doesn't reflect the possible microplastics humans may have ingested.** Salts used in Asian countries have more microplastics than in other countries according to the report

Even if this were already the case, only a few regions in Japan have acted upon the situation by partially banning microplastics (Figure 2). **Aside from the small-scale plastic banning in Asia, the team was also dismayed to know about the improper waste disposal methods currently used in Asia.** The current methods are not eco-friendly so the prediction that the majority of the plastic waste would come from the continent is most likely to occur. **In fact, 91% of the waste disposal methods aggravate the waste crisis in East Asia, while only 9% involve recycling.** In addition, **the team was also taken aback when the document brought the news that we cannot recycle our way out of the rampant plastic crisis.**

Production and Use of "Bioplastics"



TEAM 1

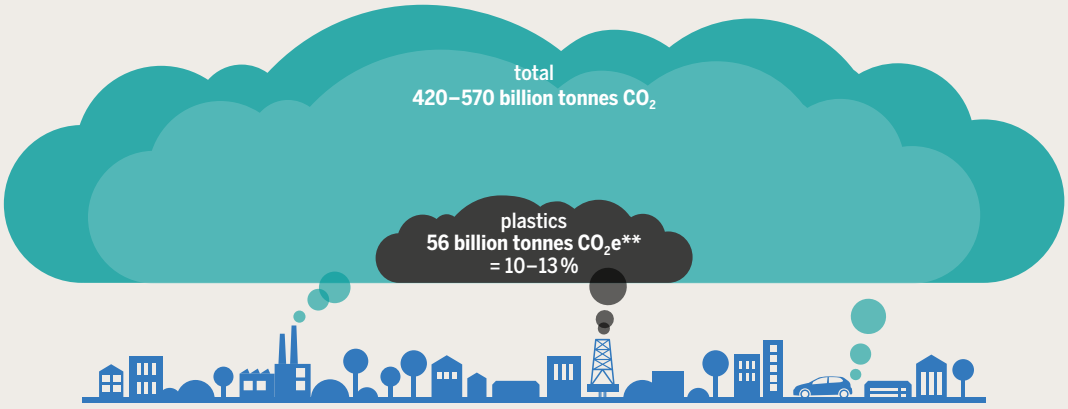
The solution that the team initially thought was hopeful was bioplastic (page 34)but we learned that these are not entirely environment-friendly.

Bioplastics are made with renewable materials but pose detrimental effects on nature and people through the use of pesticides for biological raw materials. Also, biodegradable plastics are supposedly composted but instead follow the usual procedure of waste disposal, which results in no composting materials and requires more energy for production. According to the graphic (Figure 3), Bioplastics comprise only 1% of the world's total plastic output, with Asia leading in their use and accounting for 46% of bioplastic production. It is shocking that even with their supposed purpose, bioplastics still end up in incinerators or landfills, and some even become harmful microplastic particles over time.

Threat to the World's Climate

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

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.

TEAM 1

The graphic showing threat to the world's climate posed by plastic. Although the three main factors of climate change are transport, energy, and farming; we should not neglect the fact that plastic pollution also contributes the climate change.

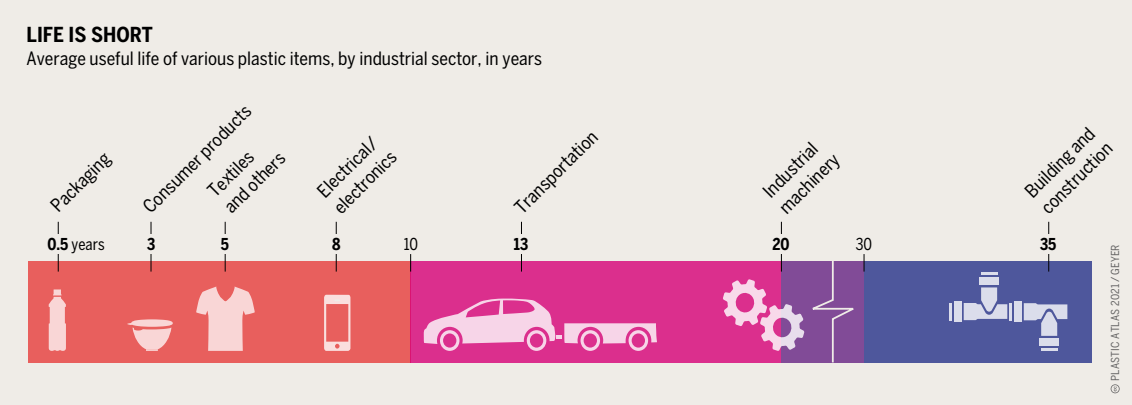
Plastic pollution tends to pass as we focus on its effects from a biological aspect such as affecting wildlife. For example, fishes can ingest plastic and the plastic will be accumulated in its gut, causing intestinal injury or even death. The plastic can also affect other trophic levels including marine mammals and humans when they consume the fishes. Another well-known effect of plastic is tangling or choking marine animals such as turtles, seabirds, and marine mammals.

The process of manufacturing plastic tends to be overlooked. Examples of starting material for plastic is crude oil, natural gases and coal. Crude oil, natural gas and coal needs to be extracted before entering refining process. In the refining process, the raw materials would be heated and sent to a distillation unit. As a result, the raw materials would be separated into lighter components known as fractions. The next step would be polymerization where the monomers are converted into polymers. All these processes releases greenhouse gases which contributes to climate change. As the demand

for plastic increases, greenhouse gases increase due to increase in plastic production.

When the plastics are not properly disposed or recycled, it can end up in different location. An example of the location is the ocean. The plastics will flow from rivers into the sea, forming garbage patches on the way. As the plastic breaks down with exposure to sunlight and wind, greenhouse gases such as methane and ethylene are released. Another byproduct, microplastics are formed. Microplastic can affect the plankton's ability to sequester carbon into the sea in different ways. The first way is by reducing the phytoplankton's ability to photosynthesize; and the second way is by reducing the phytoplankton's feeding, survival and reproductive ability. The ocean acts as a carbon sink by absorbing greenhouse emissions. Hence, it can be concluded that plastics does contribute to climate change. Even if the plastic doesn't end up in the ocean, it can end up in landfills and incineration. Burning of plastic releases greenhouse gases and other toxic gas that can contribute to climate change. Recycling poses as another problem as not all plastic are recycled, and the plastic will end up in landfills as well.

Life is Short



TEAM 1

The team appreciated the origins of our throwaway culture (on how that came to be) especially in an Asian context. Since global economies started to be driven by the need to consume ever-increasing quantities of resources, it explains how we as a society want everything instantly which prompts us to throw/dispose of everything instantly. This explains the tingi system in the Philippines where it centers on the sale of small quantities of a product to make items affordable to minimum wage earners.

These sachets that are made from plastic have become a staple marketing strategy for selling to consumers who could not afford to buy in bulk. All of which is brought about by rapid globalization, urbanization, having to adapt to the uncontrollable economic growth of developing countries, lack of law enforcement, and collusion of political and business interests. (12-13)

Plastic Waste and Soil

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.

TEAM 1

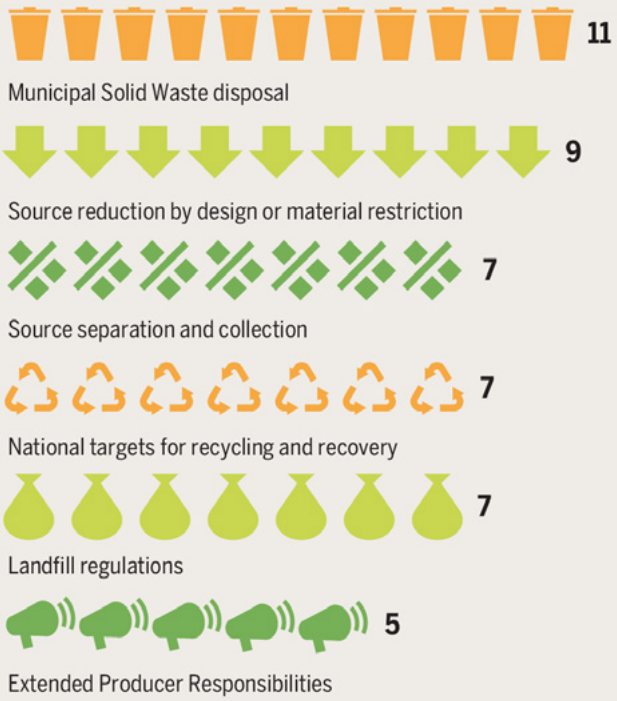
The team was surprised that plastic pollution of the soil can actually be four to 23 times higher than marine plastic pollution.

This made us reflect that without solving what is happening out here on land and we would just solely focus on marine plastic pollution, then whatever efforts being done to conserve marine life will be heavily outweighed by the nonchalant efforts being done to lessen land plastic pollution since plastic pollution that is thrown in the sea most likely comes from land.

Regulations and Legislation

HOW MANY COUNTRIES HAVE ENDORSED REGULATIONS AND LEGISLATION?

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



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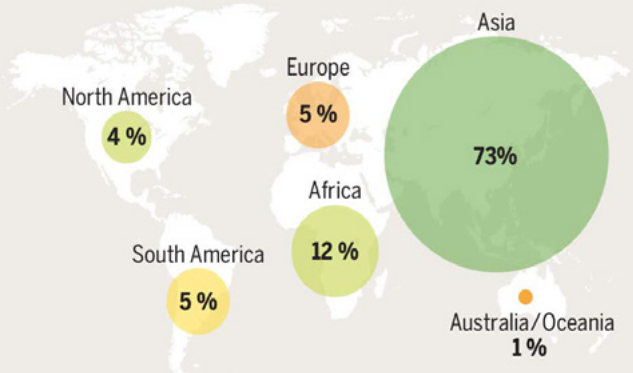
THE FUTURE OF MISMANAGED WASTE

Global plastic waste distribution by 2025 if plastic waste continues to be mismanaged



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TEAM 1

Growing up, our team encountered various practices to reduce our individual waste (e.g. "reduce, reuse, recycle", "clean as you go") and found ourselves accustomed to thinking it was our responsibility to do our best to reduce waste through mindful practices such as composting, bringing your own grocery bag, and avoiding single-used plastics.

So it came as a surprise for our group to learn from the graphic (Figure 1) that the status quo we have grown accustomed to — which heavily focused on the individual's responsibility to managing their own waste — is not just a cultural bias but is also a bias is reinforced by multiple ASEAN countries and Japan while ignoring the culprit who is also responsible for introducing wastes in our economy — the big plastic producers.

Holding plastic producers responsible for their role in plastic pollution is one of the main tenets of Extended Producer Responsibility (EPR), a policy approach important to achieving the highly desired circular economy — defined by the core ideas of eliminating waste in product processing, and adopting resource-conscious conduct in businesses **(Sariatli 2017)** — due to its extension of the producer's responsibility up to the product's post-consumer stage. The **OECD** characterizes an EPR policy as 1) being able to shift the responsibility upstream towards the producer and away from municipalities, and 2) being able to provide incentives to producers to consider environmental considerations when designing their products. Hence, what the graphic implies in the article "Regulation: A Fragmented Response" is that zero waste efforts are primarily the responsibility of the individual and their municipalities rather than the producers.

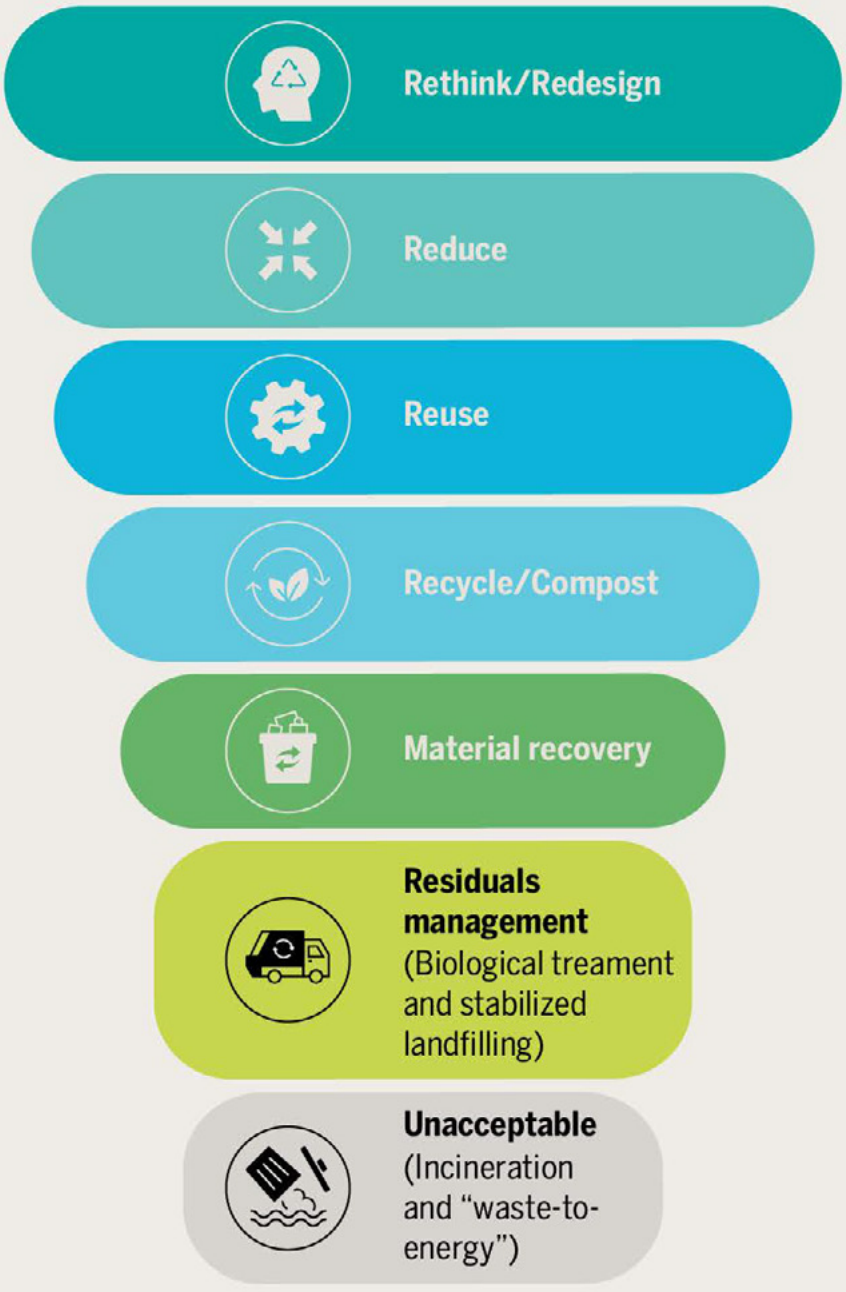
Unfortunately, based on the **Circularity Gap Report (2021)**, circular waste-free economies only make up 8.6% of waste stream designs on a global scale and, hence wasting 91.4% of the resources vulnerable to waste generation and accumulation. The graphic reflects this finding by highlighting the disappointingly low number of countries (5 out of 11) in the ASEAN + Japan region with EPR regulation and legislation. EPR is an important policy for ASEAN countries to implement considering the potential of waste mismanagement in the future, with 73% of global plastic waste coming from Asia as shown in another graphic within the same article (Figure 2).

However, considering the varied response of multiple ASEAN members in regards to different plastic items, a push for uniform response to tackling plastic bans should be promoted. Just recently, ASEAN countries launched a five year plan named the **ASEAN Regional Action Plan (2021-2025)** to acknowledge the need for policies and practices to be implemented at the national level while enhancing collaboration at the international level. **ASEAN (2021)** points out that the private sector (through EPR and innovation) is crucial in reducing waste on the sea by preventing waste at the source. However, the level of EPR implementation across the countries varied due to their different contexts such as amount of plastic waste and advancement (or lack) of infrastructure. Regardless, EPR policies are still considered fruitful by ASEAN and it is hoped that best practices are shared across countries to aid in the widespread development of EPR schemes

The Relevance of the 3 R'S (Reduce, Reuse, Recycle)

WHAT IS ZERO WASTE

In the International Zero Waste Hierarchy, seven levels of strategies are listed, from best to worse uses of materials



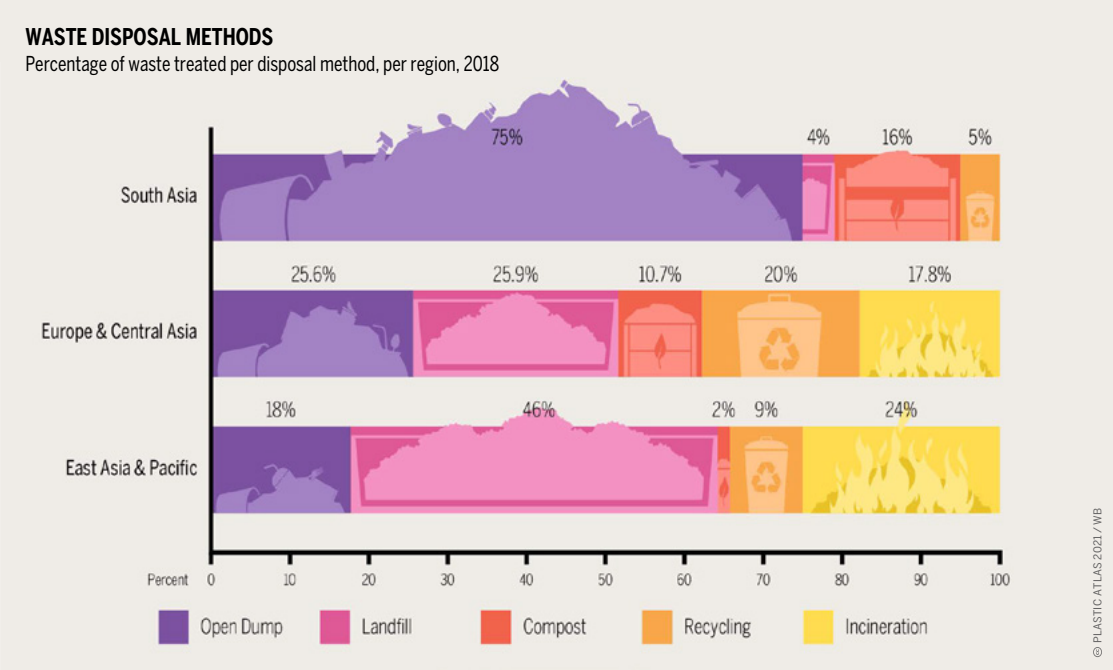
TEAM 1

In general, there is one common misconception about the usage of plastics – plastics are harmless.

As the refinement process has been improved, plastics are perceived as body-friendly materials. Unlike this, **we were surprised that day-to-day contact with plastics may result in serious health consequences especially related to hormones in different age groups. Specifically, plastics can cause profoundly serious incurable illnesses to pregnant women such as infertility and disorders in the embryo, which results in congenital defects to the newborn. In other words, plastics can permanently provoke irregularities in the hormone system to be handed across generations.** This is a profoundly serious safety frigidity as such side effects are rarely known to the public and give rise to lower birth rates or more newborns experiencing congenital defects. These add burden to affected families. In this sense, it is imperative to conduct campaigns to arouse people's attention to the plastics' harmfulness.

From the greatest and best to the lowest usage of materials, the Zero Waste Hierarchy illustrates a sequence of policies and initiatives to support the zero-waste system. Its goal is to provide the internationally known 3Rs - Reduce, Reuse, Recycle - with additional depth; to inspire policy, action, and investment at the top of the hierarchy; and to provide guidance for those who want to build systems or products that bring us closer to zero-waste lifestyles. It adds to the zero-waste concept by giving planning assistance and a method for evaluating suggested solutions. These include recycling rules, solid waste management plans, and resource conservation programs that involve recovery prior to disposal. While there is every likelihood that plastics are regarded as something expendable with no alternative usages, the highest level emphasizes how we can convert the 'trash' into items of greater value. With this hierarchy ending the report, after a variety of horrifying statistics, the report may convey a positive and hopeful message itself: no matter how complicated the plastic problem is, if every single one of us takes a simple initiative, it could be alleviated.

Waste Disposal Methods



TEAM 1

Reduce, Reuse, and Recycle, have always been the fundamentals of tackling the plastic issue. However, according to recent research by the Plastic Atlas, recycling might not be the perfect solution.

Recycling is not as simple as it sounds. As more and more packaging becomes multilayered and sophisticated, it makes it harder to separate these materials. **Shockingly, only 14-18% of plastics are actually recycled,** 24% are thermally heated, and the rest just sits in landfills and even made their way to the ocean garbage patch. **We originally thought recycling was the key to intercepting and diminishing this issue.** Turns out, as stated by Plastic Atlas, Recycling is part of the problem, not part of the solution. However, recycling is not just a wasted effort. Most of the energy contained in plastic wastes can be saved through recycling. Incineration, on the other hand, loses most of its energy. This graphic also let's us know that it is done in a lot of Asian countries which creates a lot of toxic pollution and also influence the climate change.

We would like to thank our collaborating partner, Heinrich Boell Foundation HK, and our supporting sponsor, the Pictet Group Foundation for their generous financial support of the 2022 "Make the Case – East Asia" student competition.

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