
Waste Management in Australia and its Effects on Indonesia's Environment

✉Sophie Dawson

Deakin University, Australia

ABSTRAK

This article explores the extent to which Australia's production of waste is impacting on environments overseas. In recent years global waste management has experienced a major shift, which has drastically effected the exports sector and as a result, the countries who are accepting the waste. This study was done to assess the levels of waste Australia is exporting to Indonesia and what particularly this contains. It is primarily made up of desk based research and quantitative analysis of data, however also involves a qualitative survey of local populations surrounding Melbourne to determine the public's perception of national waste management, and their knowledge of national exports. Furthermore, this article considers Australia's waste reduction initiatives and to what extent this has impacted on production of single-use items.

Kata kunci: Waste Management, Export, Waste Trade

INTRODUCTION

Since 2017 when China put strict restrictions on their previously major imports of waste from developed countries, the global plastic waste trade has gone through serious changes. This has had considerable impact on where countries are now exporting their waste, as well as increased imports from others. South East Asia is one of the greatest importers of waste, particularly Indonesia. This is causing a huge amount of additional pollution in the country, not only due to resource technology to deal with the recent influx of waste but also due to developed countries not effectively sorting waste, as well as the smuggling of plastics. Due to high amount of imports in Indonesia coming from developed countries, such as Australia, this report will contain a qualitative survey done on the population living in the Melbourne and Macedon Ranges area to assess their individual knowledge towards Australia's waste management system and plastics in the community. Following on from that, the national waste management system

will be discussed, with total annual exports and quantitative data from recent years, as well as from a local level with how waste is dealt with in individual households. Furthermore, national Government and local initiatives will be explored relating to what has been implemented to reduce people's consumption of waste and how that has affected plastic use in Australia. This report has been written to compare waste management systems in Australia and Indonesia and consider not only Australia's impact on pollution in the area of Gresik, but also what strategies could be put in place to reduce plastic pollution in the area.

The Brantas River is the second largest river on the island of Java and the largest urban river to supply raw water and drainage in East Java (Mariyanto et al. 2019). There is a dense population that lives along the riverside causing a threat of pollution due to anthropogenic pollutants (Mariyanto et al. 2019). Most of the river water quality problems in Indonesia have started from the upper part of the river and

✉ Corresponding author :
Address : Melbourne, Australia
Email : sophiedawson2000@gmail.com

are due to these anthropogenic activities as well as additionally, inappropriate land use management and poor wastewater infrastructure (Roosmini et al. 2018). Wastewater and solid waste both from domestic and industry has been known to cause much of the burden of river water quality, with some industries discharging wastewater that comes below the standards with a relatively high toxicity level (Roosmini et al. 2018). The poor quality of water in the Brantas river has been significantly impacted by pollution from waste management centres and the insufficient sorting of waste from exporting countries. Australia is a major contributor to this issue and further research will be done throughout this report to understand the scale to which Australia's waste exports are impacting on environmental pollution in Indonesia. Furthermore, future initiatives will be assessed to anticipate a rise or fall in levels of pollution and waste production, and therefore the need to export internationally.

METHODOLOGY

This report was conducted through desk-based research of peer reviewed sources, government documents and information from Australian waste management organisations. Multiple documents were compared as well as companies contacted, to ensure correct and current information is provided with the most relevant statistics. A qualitative survey was carried out and done so through online platforms and community forums. This garnered 170 respondents within the area of study. The survey was completely voluntary to participate in and all responses were confidential, to adhere to ethical standards. Names of participants are not shown in the research to maintain privacy measures. Additionally, local councils and waste management experts were contacted for further information through informal qualitative interviews. All information has been referenced from the correct source.

RESULTS AND DISCUSSION

Survey Results

A survey was conducted to assess the general population of Melbourne and the Macedon Ranges with what they thought about Australia's waste management system, if they knew about exports of waste, and their views on plastic reduction initiatives in their area. The results show varying levels of knowledge surrounding national waste management as well as how individual's health could personally be affected by plastic pollution in their environment. This provides a beneficial guide as to what areas Australian's need further information in relation to waste management systems, as well as risks plastics pose not only in the local environment but also how they affect countries internationally.



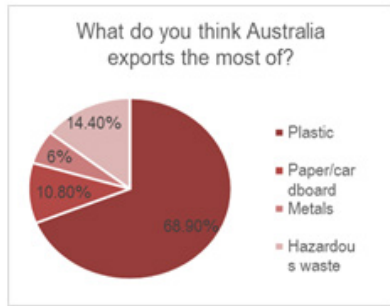
Source: Process Data

Figure 1
Survey Results. Were You Aware Australia Exports Its Waste Overseas?



Source: Process Data

Figure 2
Survey Results. Since China Put Strict Restrictions on Importing Waste, Where do You Think Our Waste is being Sent to?



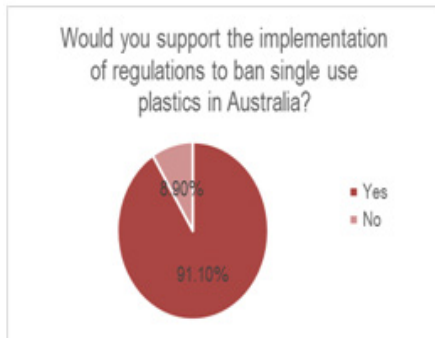
Source: Process Data

Figure 3
Survey Results. What do You Think Australia Exports the Most of?



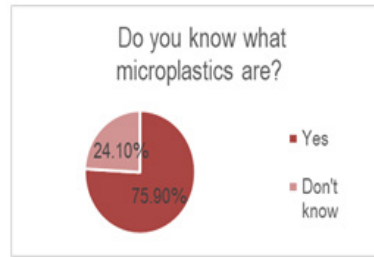
Source: Process Data

Figure 4
Survey Results. Do You Think it is Economically More Valuable to Export Our Waste Overseas or Manage it Nationally?



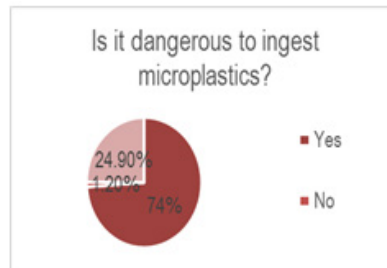
Source: Process Data

Figure 5
Survey Results. Would You Support the Implementation of Regulations to Ban Single Use Plastics in Australia?



Source: Process Data

Figure 6
Survey Results. Do You Know What Microplastics are?



Source: Process Data

Figure 7
Survey Results. Is it Dangerous to Ingest Microplastics?

From the survey results we can see that 21.3% of Australians were unaware that Australia’s waste was even exported overseas. Following on from that when participants were asked where they thought Australia’s waste was going since China imposed strict import measure the majority didn’t know, and an equal amount, 55 out of 170, thought Australia no longer exported waste and dealt with it all nationally, either ending up in landfill or waste pits. Others thought Australia exported to Indonesia, Asia, India, and more broadly developing countries in general, with a few believing Australia’s waste in being stores in boats out on the ocean until it can be successfully exported to an accepting county. Given all the responses on what percentage of waste people thought Australia exported, the average response was 46.8%. In terms of items being exported, the majority of

Australians (68.9%) think plastic is the most common exported item, followed by hazardous waste, paper and cardboard, and metals. 52.1% of Australians believe it is more economically beneficial to manage our waste nationally as opposed to the 19.5% who think it is more beneficial to send it overseas. 91.1% of Australians support the implementation of regulations to ban single use plastics in Australia. Furthermore, when asked about personal change's individuals have made to reduce their plastic use, only 15 out of the 170 people surveyed stated that they had taken no action. The majority of people mentioned they had stopped using plastic bags for grocery shopping and instead take their own cloth reusable bags, which for many people was incentivised by the government's fees put on plastic bags in retail. Other actions many people have taken include using a reusable water bottle, avoiding excessive extra plastic packaging when shopping, using a keep cup, switching personal care products to plastic free such a shampoo and conditioner bars and bamboo toothbrushes as well as buying products in bulk and from farmers markets as opposed to supermarkets. Only 75.9% of the population surveyed knew what microplastics were, and similarly only 74% knew they were dangerous to ingest.

From these survey results it can be seen that the Australian population is not given enough information regarding national waste management systems or how Australia's waste production has the ability to effect other countries. This information is not readily available or easily digestible for the general public which makes it difficult for people to understand why changes in legislation need to be made or how it is having an impact on the Australian economy. Moreover, whilst many Australian's have stated making personal changes in becoming more aware of plastic production, and the amount they use in their daily lives, these are all still minor actions, where the general population is consuming high amount of

plastic and creating extreme waste. While Australia has quite an efficient waste collection and disposal system, this results in relatively low levels of pollution in the local community, giving the population the mentality that Australia both does not create a high amount of waste, and also disposes of it correctly. However, exporting our waste overseas just passes on this issue to another country to deal with and tackle the consequences.

Australia's Exports

Blue environment conducted their annual study on waste generation and found that from 2018-19 Australia generated 74.1 million tonnes of waste (Pickin et al. 2020). This has increased by millions of tonnes compared to previous years, with the 2016-17 period generating 69 million tonnes of waste. However, the recycling rate has also increased from 58% to 60% in the last 4 years. Over the last 13 years that Blue Environment has collected data, it has been noted that Australia's total waste generation has increased by 11.3 million tonnes, which is an 18% increase. However, again in the same time frame quantities of recycled materials have also increased (Pickin et al. 2020).

In the past 25 years, China had accepted nearly half of all the worlds nonindustrial plastic waste imports (Brooks et al. 2018). While this did prove economically beneficial it also seriously damaged China's environment with plastic pollution (Wang et al. 2020). The National Sword Policy in 2017, baning the import of nonindustrial plastic waste is incredibly beneficial for Chinas environment however has turned global plastic waste trade into disorder. Figure 9 shows the expected mass of global displaced plastic waste due to China's new import ban based on cumulative imports of plastics into China (Brooks et al. 2018). In 2016 Australia was the "8th biggest dumper of waste globally", exporting 56.6% of all total waste (McDonald 2020). However due to these new restrictions from the 2016-17 period to 2017-18, Australia's waste exports decreased by 41% and Australia

had to find new locations to export their waste to, which resulted in increasing exports to Indonesia, Vietnam, India and Malaysia (Pickin 2019).

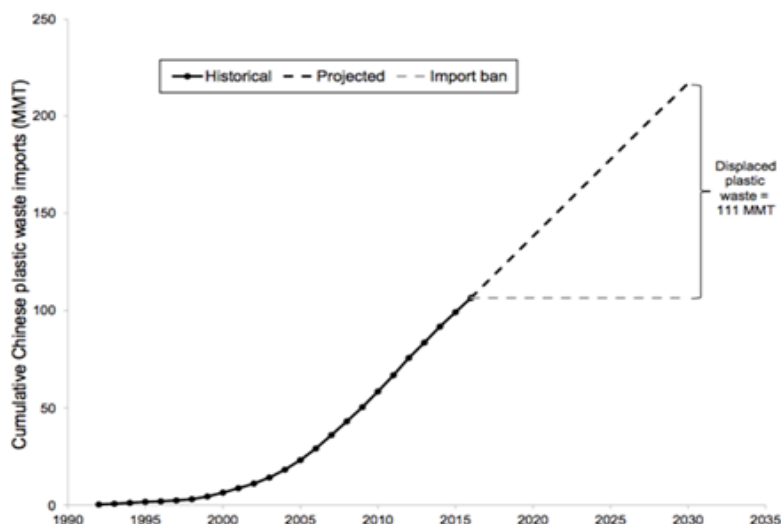
Headline numbers ¹			
Millions of tonnes	2016-17	2017-18	2018-19
Waste generated	69	73	74
Waste recycled	40	42	43
Waste to energy	2.1	2.2	2.1
Waste disposal	27	27	27
Resource recovery rate	61%	62%	63%
Recycling rate	58%	59%	60%

Source: Blue Environment, 2019

Figure 8
Australia's Annual Waste Recovery and Recycling Rates

The massive change in exports and imports, sparked by China's restrictions has meant that the total amount of waste exported has significantly decreased. In the 2017-2018 period Australia was exporting 12% of total recycling waste, which in the previous year has been 8 times higher (Pickin 2019). As can be seen from the Blue Environment data, plastics was the greatest material exported, with 72% of plastics being exported.

As can be seen from Figure 11, as of May 2020 Indonesia 3rd highest importer of waste from Australia, following Vietnam and Bangladesh. This has decreased from previous years, importing 25,000 tonnes less than the previous year's monthly average. It can also be seen that the value



Source: Science Advances, 2018

Figure 9
Estimated Global Displaced Plastic Waste, 1990-2035

Waste material type	Quantity recycled in 2016-17 ¹	Quantity exported in 2017-18		Quantity exported to China ² in 2017-18	
	(thousands of tonnes)	(thousands of tonnes & percent of 2016-17 recycling)	(thousands of tonnes & percent of all exports)	(thousands of tonnes & percent of all exports)	(thousands of tonnes & percent of all exports)
Metals	4,982	2,446 49%		156 6%	
Paper & cardboard	3,361	1,317 39%		559 42%	
Plastics	306	219 72%		27 12%	
Other, incl. hazardous	28,381	440 2%		4 1%	
All wastes	37,030	4,422 12%		746 17%	

Source: Blue Environment, 2019

Figure 10
Australia's Exports and Overall Recycling Rates

of waste has decreased significantly from an average of \$23.7 million per month in the 2018-19 period, to \$9.3 million in 2020. This value however is country dependent with different prices put on each country of export.

Of all the waste Australia generates, still there is up to 40% that doesn't get recycled or exported and ends up in one of the hundreds of landfill sites around the country (McCabe & Clarke 2017). Government data suggests there are approximately 600 officially registered landfill sites in Australia, however there is potentially 2,000 smaller unregulated ones. Despite these numbers, around 75% of landfilled waste in Australia goes to only 38 sites (McCabe & Clarke 2017). The Woodlawn landfill gets the highest amount of waste than any other in Australia and is located 240km southwest of Sydney.

While plastic smuggling in imported recycling has been noted as a major issue in Indonesia, it is not something that is commonly shown in Australian media. Most likely for Australian media outlets to show Australia in a positive light rather than exposing their unlawful actions. However, there have been a few instances where newspaper companies have shown what is taking place. In 2019 The Sydney

Morning Herald published an article titled "Visy Recycling behind 'toxic' plastic waste container in Indonesia" in which Visy, one of the world's biggest recycling companies, was found to have shipped a 13.7 tonne container of mixed plastic scraps regarded as toxic to Indonesia (Massola et al. 2019). Whilst this is not an isolated issue it seems to be the most common instance spoken about and revealed to the public, with many other sources staying quiet. ECOTON's advocacy, however, has been recognised by the Australia media with the ABC showing a report on Australia's plastic smuggling and how it is affecting the Brantas River (Walden & Renaldi 2019). This shows that with environmental organisations reaching out and refusing to accept the unlawful actions of developed countries waste imports, it will be noticed by the public and expose companies for their illegal smuggling of plastic waste.

Melbourne's River Pollution

Melbourne's Yarra River has its own issues with water conditions, with pollution, litter and invasive species being the leading threats to the river's environmental health (Water Source 2019). In a report done by the State of the Yarra and its Parklands (2018) 36 indicators

Export destination (ranked by tonnes since July 2018)	QUANTITY					VALUE			
	May-20 Tonnes	% of total	Apr-20 Tonnes	% change	2018-19 monthly avg	May-20 \$ mil	Apr-20 \$ mil	% change	2018-19 monthly avg
1 Indonesia	35,000	11%	42,000	-15%	60,000	\$9.3	\$11.3	-18%	\$23.7
2 India	27,000	9%	33,000	-17%	49,000	\$11.4	\$15.1	-25%	\$33.5
3 Vietnam	53,000	17%	41,000	28%	61,000	\$19.7	\$17.0	16%	\$29.8
4 China	18,000	6%	18,000	-1%	54,000	\$25.5	\$27.4	-7%	\$41.6
5 Bangladesh	53,000	17%	96,000	-45%	25,000	\$19.5	\$39.6	-51%	\$11.2
6 Malaysia	16,000	5%	29,000	-43%	27,000	\$9.8	\$9.6	2%	\$10.4
7 Thailand	19,000	6%	27,000	-28%	20,000	\$6.7	\$9.5	-29%	\$7.9
8 Korea, Republic of	10,000	3%	10,000	-3%	15,000	\$15.6	\$50.5	-69%	\$32.6
9 Taiwan	25,000	8%	16,000	56%	13,000	\$13.4	\$8.9	51%	\$8.3
10 Pakistan	10,000	3%	15,000	-33%	4,600	\$4.4	\$6.7	-35%	\$3.3
Top 10 total	266,000	85%	326,000	-18%	329,000	\$135.2	\$195.6	-31%	\$202.1
Monthly total	312,000	-	400,000	-22%	369,000	\$198.5	\$249.8	-21%	\$258.8

Source: Blue Environment, 2019

Figure 11
Month-to-Month Exports of Waste Derived Products by Destination

were measured to assess pollution and sewerage, streamflow, climate change, and more. Overall the results from this report deemed the Yarra River to be in a “poor but stable” condition which is mainly due to factors such as Melbourne population growth, stormwater, sewerage and decreased rainfall due to climate change. Yarra Riverkeeper conducted a study to find the most prevalent items of rubbish in the Yarra River with results showing that 50% of non-organic litter in the river is polystyrene and 30% is drink bottles (Topsfield 2020). This causes major concerns as polystyrene is shown to be more harmful than other forms of plastic as it is made from relatively hazardous chemicals. Furthermore, as polystyrene breaks down, known as styrofoam, it is extremely lightweight and brittle meaning it can easily be blown into gutters and stormwater drains, causing challenges in removing it from the environment (Topsfield 2020). The most common forms of polystyrene found were protective packaging for white goods and electronics, polystyrene balls, and food and drink packaging. The Yarra Riverkeeper Association states that this study shows that polystyrene leakage is a widespread issue in the Melbourne area and is often from retail outlets as well as recycling and waste transfer centres (Topsfield 2020). Indigenous environmental management is also being recognised as imperative to improve land use and prevent further environmental degradation. The Victorian Government has been recommended to enhance the role of traditional owners in cultural landscape health and management as it is a fundamental aspect of Aboriginal community life and cultural identity (Water Source 2019).

There have been multiple initiatives to improve waste management and pollution surrounding Melbourne. Clean Up Australia Day is the largest community-based environmental event. This organisation was established 30 years ago and works with the community, governments and businesses to provide

practical solutions to their waste issues and helps everyone to live more sustainably every day. In this time 18.3 million Australians have been involved in clean-up activities. People can register as part of a work group, school group or join community clean ups as well as raising money for the organisation (Clean Up n.d.). ‘Take 3 For The Sea’ is another movement making use of social medias growing use, encouraging everyone to take 3 pieces of rubbish with them whenever they leave a beach, waterway or any environment where they have made a difference. People are then encouraged to share their actions which with social media is a quick tool to spread information and grow a movement, especially with the involvement of youth (Take 3 n.d.).

Local Waste Management System - Macedon Ranges

In the Macedon Ranges, an hour north west of Melbourne, a relatively new waste management system has been implemented. As of the 3rd of February 2020, each household has four separate bins to segregate their waste in a plan to “transition towards a more sustainable and responsible collection service” (Macedon Ranges Shire Council n.d.). These four kerbside bins are differentiated by colour as well as images to show what can and cannot be put in the bins. Yellow represents recycling, purple for glass, red for general waste and green for food and garden organics. Smaller size FOGO (Food Organics Garden Organics) bins were also distributed to each household so they can easily compost and segregate their waste inside before taking it to kerbside bins. The local council has made this initiative without an opt-out option, stating that this system of waste management is a long-term priority to reduce the amount of waste sent to landfill and reduce Australia’s overall greenhouse gas emissions (Macedon Range Shire Council n.d.). A timetable is distributed at the beginning of each year to easily show which bins will be collected and when. Food and garden organics

are collected weekly as that bin is where most household waste can be disposed of, and others are done either fortnightly or monthly. This system costs \$449 AUD annually per household which equates to roughly \$37 per month. In order to encourage the community to follow proper segregation methods, stickers are left on bins if they are contaminated with other waste and won't be collected until this problem is resolved.

This system has had high success so far, from February to December 2020, 7,868 tonnes of organic waste was diverted from landfill and turned into compost to be used on farms, parks and gardens across the state of Victoria. Additionally, 1,776 tonnes of glass were also saved from landfill which was recycled and used in Victorian roads and construction (Macedon Ranges Shire Council n.d.). Each segregated bin goes to different locations for proper disposal and recycling. Both general waste and recycling go to their particular waste stations which are located roughly 40-50km from the pick-up area. While organics and glass are taken to their own recycling points 100-150km from the initial pick-up location.

Government Plastic Reduction Initiatives

The Victoria Government has implemented multiple initiatives to reduce the populations consumption of single use plastic items, such as plastic bags, straws and food containers. From the 1st of November 2019 a ban was put in place for lightweight shopping bags in all retailers such as; supermarkets, bakeries, pharmacies, clothing stores, cafes and markets. Businesses that do not comply with the ban face up to \$50,000 fines (Victoria State Government 2019). But this new legislation does not mean an end to plastic bags in all retailers with the majority of major supermarkets selling heavier-duty plastic reusable bags for a small price of 10-15c each. However, not everyone was satisfied with this new legislation as many other variations of plastic bags were not included under the ban, for example garbage bags, fruit bags, medical waste

bags and more (Costa, 2019). Furthermore, the heavier-duty plastic reusable bags that are being sold will in future cause a larger threat to the environment as they will take longer to break down. While many Australian's have been incentivised to bring their own fabric reusable bags to the supermarket or other retail stores, others feel that the small fee is pointless as they are not bothered with paying a few extra cents for their bags therefore are making no difference to the environment. Another initiative came about through the Responsible Cafes Movement in 2013, where cafes and hospitality venues give their customers discounts for bringing their own takeaway coffee cups. Stereotypically across Australia customers receive 50c off their coffees for using a keep cup, which has saved hundreds of millions of single use cups from landfill (Responsible Cafes 2013). Other states in Australia also have initiatives to reduce litter which are yet to be implemented in Victoria. New South Wales and South Australia have both recognised a large percentage of the litter in the environment consists of bottles, cans and cartons. Therefore, in order to resolve this issue, collection points have been set up around the states where people can collect their bottles and cans for recycling and receive 10 cents per item. This incentivises the community to pick up litter in order to receive money, and also resolves the issue for councils to be responsible for cleaning up litter (NSW Government n.d.). REDcycle is another waste management system which was established in Melbourne as a way for people to recycle their soft plastics. These include all items such as bread bags, pasta and rice bags, plastic bags, etc. REDcycle is an initiative that has partnered with major Australian supermarket such as Coles and Woolworths, so individuals can drop off their soft plastics recycling as their going to the supermarket to do their grocery shopping (REDcycle n.d.). From the collection point, it is picked up and delivered to Victorian manufacturer Replas where these products are then used

to produce a wide variety of recycled-plastic products (REDcycle n.d.).

Legislative Action

Along with these initiatives to reduce the populations plastic usage, there may be action legislative change to Australia's waste export industry. In December 2020 Susan Ley introduced the Recycling and Waste Reduction Bill with the aim of phasing out the exports of plastic, paper, glass and tyres (McDonald 2020). It was stated that much of the reason behind Australia's high level of exports was due to policies favouring economic benefit rather than human health. The sorting and recycling of waste in South East Asia are much cheaper in comparison to Australia due to low wages, poor work conditions and little to no regulations. Additionally, for Australian businesses, the production of new plastic and new glass items are much cheaper than recycling good, therefore manufacturers have little incentive to use recycled materials (McDonald 2020). However, with this new bill, the federal government plans to spend \$190 million on a new recycling and waste reduction plan and expects to create 10,000 new jobs in the process. Their objectives will be achieved by regulation the reuse, remanufacture, recycling and recovery of products in an environmentally sound way; regulating manufacturers, importers, distributor, designers and others to take responsibility for products; avoiding generating waste through improvements in product design; improving the durability, reparability and reusability of products, and managing products throughout their life cycle.

CONCLUSION

Australia has a long way to go from being named one of the largest dumpers of waste in the world. The current waste management systems in place are damaging not only the local environment but more so internationally to our exporting countries. While the federal and local governments across Australia have implemented varying incentives to reduce the populations plastic use, from the

survey it can be seen that people are still unaware of Australia's waste issues. Not only in terms of exports but also knowing about health and environmental risks such as microplastics that could be harmful to their own individual health. The recently introduced Recycling and Waste Reduction Bill is however a step in the right direction to reduce our exports overseas as well as promote economic prosperity in the waste sector within Australia. It is hoped that this Bill will halt the amount of waste being sent to Indonesia and also reduce the production of single use plastics in Australia.

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