THE DOUBLE-EDGED SWORD

Facing Our Plastic Crisis in a Changing Global Market

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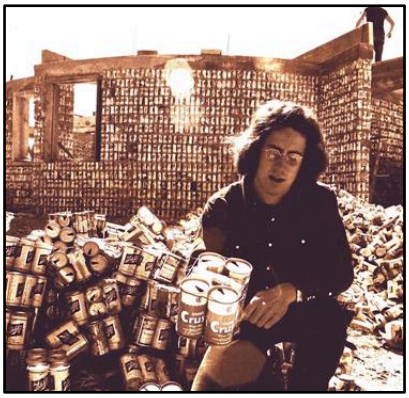
THANK YOU

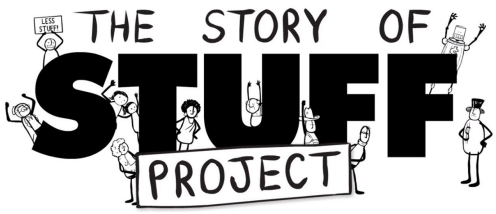
Marc Schlossberg, Bethany Steiner

PPPM Faculty, Staff, and Students

All the amazing waste management workers, educators, advocates, scientists, scholars and artists out there out there working to improve human and environmental well-being!

A few formative experiences and inspirations:



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ABSTRACT

In January 2018, China enacted a ban on shipments of recyclables coming from the United States. This major global market shift is known in China as the National Sword Policy. Domestically, it has mostly been referred to as "The Crisis."

In the wake of this major change, this research project seeks to understand how various governments in the Pacific Northwest Region have been strategizing plastic waste management at the city, county, and state level. The study examines opportunities and barriers for both short term and long-term strategies of materials management. Special attention is paid to the role of education, infrastructure, policy, and partnerships as well as the importance of waste reduction and sustainable consumption in these plans. Research methods include interviews with government officials, private waste haulers, and partnering non-profits; content analysis of website, planning documents, and public messaging; and participation in community events.

The major finding is that the National Sword is in fact a "double-edged sword" because although communities are scrambling to deal with the sudden change, it is forcing the communities to begin taking ownership over their own waste and developing more sustainable plans for the future of domestic materials management.

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"There's no magical land of recycling with rainbows and unicorns."

-Martin Bourque, Executive Director at the Ecology Center in Berkeley, CA

INTRODUCTION

In January 2018, China issued an immediate ban on imports of 24 different types of recyclables. This policy is known in China as the National Sword. In the US, the shock wave of this major market shift is commonly referred to as "The Crisis." This project was conceived to explore how local and regional governments in the Pacific Northwest are reacting to the ban, particularly in regard to plastic materials. In order to analyze the current state of affairs, it is important to understand the larger historical and ecological context of recycling and materials management.

HOW DID WE GET TO THIS POINT?

HISTORY OF SHIPPING RECYCLABLES TO CHINA

For the past several decades, much of the United States relied on China as it's recyclables collector. Essentially, China would ship consumer goods to the US, and rather than sending back empty shipping containers, a system was developed where the US could fill those containers with post-consumer materials that could be shipped back to China. This originally appeared to a be a mutually beneficial ordeal because it would allow the US to simply ship our waste away to a country that had plenty of cheap labor to sort the materials which were eagerly consumed by manufacturers in China that were hungry for cheap materials. For the US, this was a cheap and efficient system. Varying strategies for curbside recycling collection and local sorting sprang up, but once the scrap materials were baled up and loaded onto shipping containers, the US could wipe their hands of their waste.

NATIONAL SWORD POLICY

The Chinese government interrupted the system starting 2013 by reducing the amount of garbage in the materials being imported through its "Green Fence" policy. In 2017, China enacted "National Sword 2017," which imposed severe restrictions on the import of recyclable materials. In 2018, China took the National Sword even a step further and enacted a ban on post-consumer plastics and unsorted paper, as well as established a strict contamination standard of 0.5 percent. C*ontamination* refers to anything that disrupts the processing, whether is materials that are too dirty or materials that do not belong in the first place. Among China's reasons for the ban are poor state of the materials, harm to human and environmental health, and the need for China to develop its own domestic recovery system for recyclable materials. A wave of environmentalism in China has increased momentum in recent years. The 2016 Chinese documentary film *Plastic China* (Figure 1), depicting the lives of two families who make their living recycling plastic waste imported from developed countries, went viral and served to gather popular protest of the system. Politicians responded accordingly and set stringent new policies in place.

Figure 1: Poster for the film *Plastic China*
Source: https://www.plasticchina.org/

Why is it called "The Crisis"?

Much of the world relied on the convenience of the preexisting system. When the system came to a halt, there was little plan or structure to cope. There is a particular lack of processing infrastructure in the Pacific Northwest, with no significant facilities existing between California's Sacramento Valley and Portland, OR. There was never a need to invest in infrastructure, because as the region grew, it could continue to rely on China to accept its waste. Now the population in the region has nearly doubled and plastic consumption rates have increased dramatically since the inception of the waste export system, with little ability to handle the waste domestically. Even if Western states could ship their plastic recyclables to the East coast where there are more facilities, the cost in dollars and greenhouse gas emissions would be tremendous. Dramatic newspaper headlines have pointed to piles of waste mounting with a lack of options. Some cities have limited what they collect. Others have stopped recycling programs all together and landfill their waste. Citizens are upset they not able to recycle, processing facilities are overwhelmed with material, and governments are struggling for solutions to unprecedented problems. Dramatic headlines focus on the problematic repercussions (Figures 2 and 3).

Figure 2: Growing Stress Over the Ban

Source: https://www.nytimes.com/2018/01/11/world/china-recyclables-ban.html

Figure 3: Concerns About the Future of Recycling

Source: https://www.theatlantic.com/technology/archive/2019/03/china-has-stopped-accepting-our-trash/584131/

What about exporting to other countries?

There are other countries that have emerging import markets for plastic scrap, including Malaysia, Vietnam, Indonesia and Thailand. Southeast Asia has already witnessed a drastic increase of plastic scrap imports, with 62% growth in Vietnam, 117% in Thailand and 65% in Indonesia. But in these countries, there is already pressure on existing waste management systems, resulting in the leakage of plastic and other waste into the ocean. Scientists estimate that China, Indonesia, the Philippines, Thailand and Vietnam together currently contribute more than half of the eight million metric tons of plastic waste that enters the ocean annually from land. Thus, exporting our post-consumer plastics to these countries may improve our piles domestically, but would only serve to increase global problems as those countries do not have the infrastructure to recycle sufficiently. And some countries, such as Malaysia are starting to arrest illegal recyclers and requesting a halt of imports,[1] and even sending back loads of recycling claiming they will not be "bullied" into being the world's dumping ground.[2]

[1] Watson, I. et al.. (April 27, 2019). China's recycling ban has sent America's plastic to Malaysia. Now they don't want it. Retrieved May 27, 2019, from CNN website: https://www.cnn.com/2019/04/26/asia/malaysia-plastic-recycle-intl/index.html

[2] Tons of plastic waste are being sent back to Western countries. (May 28, 2019). Retrieved, from NBC News website: https://www.nbcnews.com/news/world/malaysia-send-back-plastic-waste-western-countries-n1010651

A Closer Look at Plastics

How Does the Plastic Recycling System Work?

Recycling is a multi-step process that involves multiple players. The first step is that consumers must *choose* to recycle. The exact process after that choice varies by locality and material, but generally involves:

Collection: Curbside; buy-back centers; drop-off centers

Sorting: Materials are separated by resin type, both by hand and machine. This can occur at various sorting stations, transfer stations and material recovery facilities (MRFs).

Preparation: Occurs at intermediate level MRFs that take the sorted plastic and use machines to process it into flakes or pellets, which are then cleaned to remove any potential contaminants.

End Markets: Companies purchase the pellets and flakes, known as "feedstock," which they can then melt and reform into new products for purchase.

In this system, there are multiple human players, including producers, retailers, consumers, waste haulers, processing plant workers, manufacturers, brokers, local and regional policy makers, non-profit organizers and educators.

Figure 4: The Many Steps and Players Involved in Plastics Recycling

Source: CNN. https://www.cnn.com/2019/04/26/asia/malaysia-plastic-recycle-intl/index.html

WHY ARE PLASTICS SO PROBLEMATIC?

Plastic is ubiquitous, and as much as it has helped progress and served vital functions, it has also caused severe harm. The plastics of concern in this paper are primarily single-use plastics, including eating and drinking utensils and packaging. These are the plastics which the day-to-day items that all consumers use and dispose of. These plastics have become increasingly inexpensive and accessible, without good systems for disposal. As such, these plastics end up as litter, clog rivers, and create floating garbage patches in the ocean that are larger than Texas. It would be easy to fill this entire report with facts about the many harms of plastics and those harms are certainly the impetus for conducting this research. Below are key points.

- ***Harm to Wildlife:*** Studies show that certain plastic compounds that are commonly found in food packaging can affect both the development and reproduction in a large extent of wildlife species, including developmental disturbances and reduced hatching.[3]
- ***Harm to Human Health***: In addition to creating safety problems during production, many chemical additives that give plastic products desirable performance properties also have negative environmental and human health effects, including direct toxicity of some resins, carcinogens, and endocrine disruption which can lead to a variety of health problems.[4]
- ***Insurmountable Marine Plastic***: The amount of marine plastic debris entangling wildlife, causing aesthetic damage, commercial problems, and general environmental havoc is constantly growing and no amount on-site actions seem to be helping the situation. Addressing the problem at the source has become critical.[5]
- ***Staying Power***: There is much devastating irony in the ability of a plastic product being used once for a few moments, being discarded and then lasting in the environment for hundreds of years or more. Plastics may break down into smaller pieces, but micro-plastics continue to last and have harmful effects.[6]
- ***Embodied Energy***: What we throw in the bin—the final product—represents a mere 5 percent of the raw materials from the manufacturing, packaging, and transportation process. For every 150 kilograms of product we see, there's another 3,000 kilograms of waste that we don't see. [7]
- ***Contribution to Climate Change:*** There are huge (but largely hidden) contributions to global greenhouse gas emissions. A plastic product is not only the physical plastic in front of us, but it is also the embodiment of all the non-renewable resources used to produce and move it. There is a tremendous amount of greenhouse gas emissions of extraction and shipping of plastic materials.[8]

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[3] Oehlmann, J., Schulte-Oehlmann, U., Kloas, W., Jagnytsch, O., Lutz, I., Kusk, K. O., … Tyler, C. R. (2009). A critical analysis of the biological impacts of plasticizers on wildlife. *Philosophical Transactions of the Royal Society B: Biological Sciences*, *364*(1526), 2047–2062. https://doi.org/10.1098/rstb.2008.0242

[4] Centers for Disease Control and Prevention. Fourth Report on Human Exposure to Environmental Chemicals, 2009. Atlanta, GA: U.S. Department of Health and Human Services, Centers for Disease Control and Prevention. https://www.cdc.gov/exposurereport/

[5] Gregory, M. R. (2009). Environmental implications of plastic debris in marine settings—entanglement, ingestion, smothering, hangers-on, hitch-hiking and alien invasions. Philosophical Transactions of the Royal Society B: Biological Sciences, 364(1526), 2013–2025. https://doi.org/10.1098/rstb.2008.0265

[6] US Department of Commerce, N. O. A. A. (2018). What are Microplastics? https://oceanservice.noaa.gov/facts/microplastics.html

[7] Johnson, Alissa (2015) "Recycling Energy: An Exploration of Recycling and Embodied Energy," Penn Sustainability Review: Vol. 1 : Iss. 6, Article 5.

[8] Hamilton, L.. Feit, S. et al., Center for International Environmental Law (2019). Plastic & Climate: The Hidden Costs of a Plastic Plane. Retrieved from https://www.ciel.org/wp-content/uploads/2019/05/Plastic-and-Climate-FINAL-2019.pdf

WHY IS THIS **OUR** PROBLEM?

Plastics are everywhere, even in the deepest ocean trenches and outer-space. Everyone uses plastic, from the poorest and wealthiest, the rural and urban, the young and old. And everyone must dispose of plastic, whether by littering, trashing recycling, repurposing, and so forth. All humans make the choices about products, and all humans are also affected by the global consequences of those choices.

Recent UN Study shows the amount of species extinction in the coming years, and it is due to human impacts. Losing animal species is not only tragic for the earth, but it has serious healthy and economic impacts for humans.[9]

[9] Martin. (2019, May 6). UN Report: Nature's Dangerous Decline "Unprecedented"; Species Extinction Rates "Accelerating." Retrieved May 30, 2019, from United Nations Sustainable Development website: https://www.un.org/sustainabledevelopment/blog/2019/05/nature-decline-unprecedented-report

We Consume TOO MUCH

America is one of the most consumptive countries in the world. Overall world-wide plastic consumption has increased exponentially in the last 50 years, and Americans are some of the top users. Local waste reduction coordinators mention that even with increased education about reducing and reusing, consumption rates continue to climb.

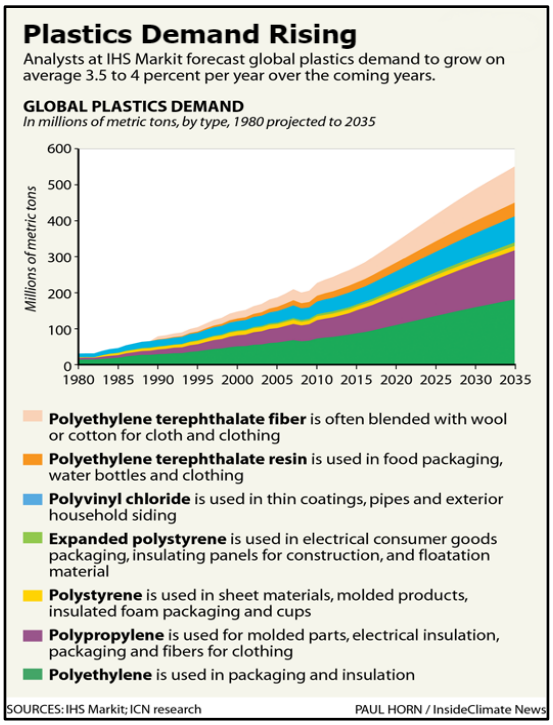

Figure 5: Consumption Continues to Increase.

Source: https://insideclimatenews.org/news/06072019/plastic-waste-ocean-global-summit-industry-solutions-recycling-climate-change

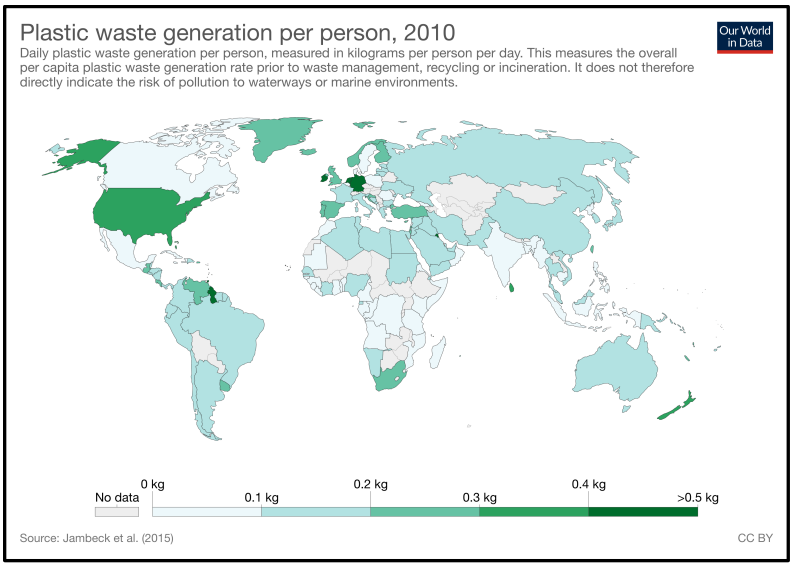

Figure 6: How the US Ranks in Plastic Consumption.

Source: https://ourworldindata.org/plastic-pollution#plastic-waste-generation-across-the-world

The Old System Enabled Blind Consumption

The system of sending our post-consumer materials to China made our lives seem easy. We could buy the products we want, feel good about disposing of them if we placed them in the correct bin, watch as they got hauled away, and never have to think about them again. It was as if we had actually done something good for the planet by recycling.

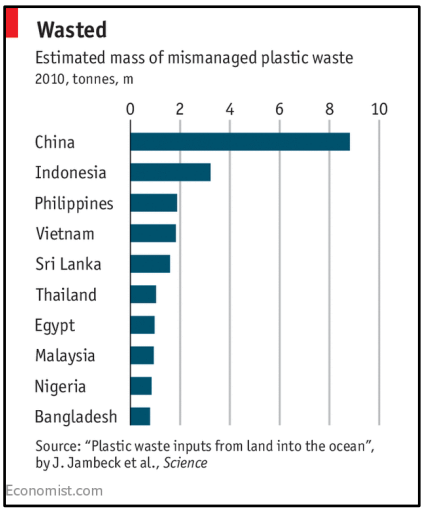

Figure 7: The US was a major contributor to the plastics that China mismanaged. Source: https://www.economist.com/graphic-detail/2018/03/06/only-9-of-the-worlds-plastic-is-recycled

It did not take much research to discover the reality behind this system. Furthermore, many waste management officials in the US were not even aware of all the dark details of the system. Many were on the same track as the average consumer, thinking that if we could efficiently and effectively collect recyclables stateside to be shipped off, we had done our part. Now everyone in the field is wide awake to the actual process of recycling and the realities of overseas processing.

The Good News: Plastics are in the Public Eye

People are talking about plastic. A lot. Each year, Collins Dictionary compiles a shortlist of new and notable words that reflect the last 12 months. They have named "single-use" as the word of 2018. This refers to products, often plastic, which are made to be used only once before they are thrown away. The word has seen a *four-fold* increase since 2013.[10] There is tremendous momentum not just in the field of waste management, but amongst the general public. Accounts of the global plastic crisis are in the news constantly and publications such as National Geographic have made big splashes with their coverage of the issue.

Figure 8: Popular Media Calls Attention to Plastic Problem Source: https://abcnews.go.com/US/national-geographic-launches-effort-reduce-plastic-waste/story?id=55237365

[10] "Single-use" has been named word of the year 2018 - CBBC Newsround. (November 2018). Retrieved from https://www.bbc.co.uk/newsround/46123738

How do we educate about recycling?

A central question when we think about revamping our recycling system is *how do we best educate constituents?* Much research has explored the different factors that affect how people dispose of their products. The importance of developing individual and community efficacy within a recycling system and maintaining a high level of satisfaction with that system is necessary for creating buy-in.[11] Creating tailored environmental education programs for homes, workplaces, schools, and recreation sites all aid in improving community value for those places.

When looking at the disparity of recycling rates in various neighborhoods, certain causal patterns emerge. A New York study showed four variables are found to be strongly correlated with low diversion rates: percentage of persons below poverty level; percentage of households headed by a single female with children; percentage of adults without a high school diploma; and percentage of minority population. Rapid program changes and substandard residential recycling environments also have a negative impact on recycling rates.[12] In the months after the National Sword, there was much discouragement regarding recycling due to rapid changes and inconsistency. Lower-income, multi-family units often have lacking infrastructure for recycling, making it difficult even if people have the time or knowledge to do so.

As communities move forward with new recycling and waste prevention plans, embedding evaluation systems into the plans will prove very helpful down the line. Evaluation of education programs is important to determine their effectiveness, whether improvements are needed and if funds are being allocated appropriately. Evaluation is much easier and cheaper if it is planned for and embedded into the program's initial plan.[13]

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[11] Tabernero, C., Hernández, B., Cuadrado, E., Luque, B., & Pereira, C. R. (2015). A multilevel perspective to explain recycling behaviour in communities. *Journal of Environmental Management*, *159*(C), 192–201. https://doi.org/10.1016/j.jenvman.2015.05.024

[12] Clarke, M. J., & Maantay, J. A. (2006). Optimizing recycling in all of New York City's neighborhoods: Using GIS to develop the REAP index for improved recycling education, awareness, and participation. *Resources, Conservation and Recycling*, *46*(2), 128–148. https://doi.org/10.1016/j.resconrec.2005.06.008

[13] *Skumatz, L. A., & Green, J. (2002). Evaluating the Impact of Recycling Education. Resource Recycling, 20(8), 31–32,34,36-37.*

What About Alternatives to Plastics?

Life Cycle Analysis

Stepping back to look at the larger global picture, the purpose of responsible materials management is sustainability. The UN Sustainable Development goals define that as Human Wellbeing, Ecological Stewardship, and Economic Equity. There are multiple frameworks to use when thinking about sustainability, including Lean Thinking, Pollution Prevention, Zero Waste, Circular Economies, and Sustainable Materials Management. Oregon's Department of Environmental Quality is pioneering the use of Life Cycle Analysis (LCA) to inform decisions about Sustainable Materials Management (SMM). LCA is a technique to assess environmental impacts associated with *all* the stages of a product's life, including raw material extraction, materials processing, manufacture, distribution, use, repair and maintenance, and disposal or recycling (Figure 9). SMM aims to use life cycle thinking to prioritize materials for their highest and best options. When using the LCA lens, it is clear how little a piece of the pie the impacts of disposal and recycling are (Figure 10). As many officials noted, by the time a product makes it to a bin, whether recycling or garbage, most of its impact has already happened. In recent years, and with the advent of "Zero-Waste" ideals, people are so focused on diverting materials from the landfill that they can often disregard the significance of the upstream impacts.

The core principles of Sustainable Materials Management are:

1. Preserve natural capital
2. Design and manage materials, products, and processes using LCA perspective
3. Use the full diversity of policy instruments to stimulate and reinforce sustainable economic, environmental, and social outcomes
4. Engage all parts of society to take active, ethically-based responsibility for achieving sustainable outcomes

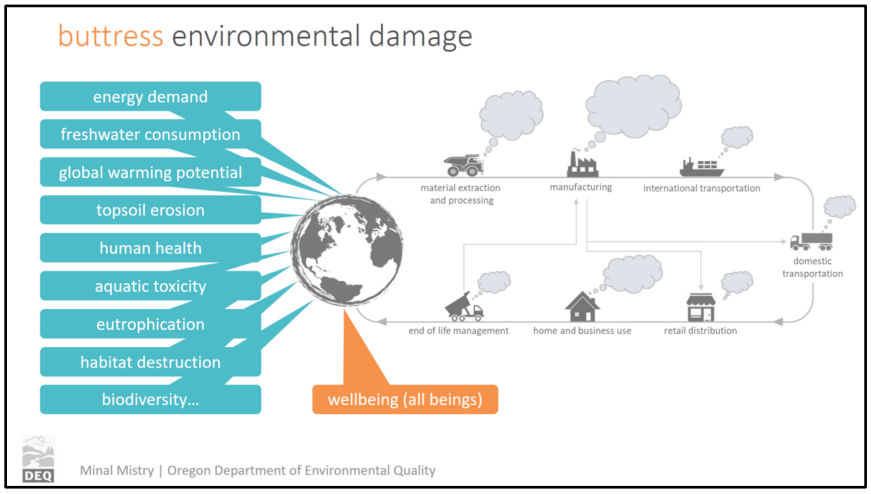

Figure 9: Collective Harms Caused by Plastics Lifecycle
Source: Minal Mistry, Department Of Environmental Quality

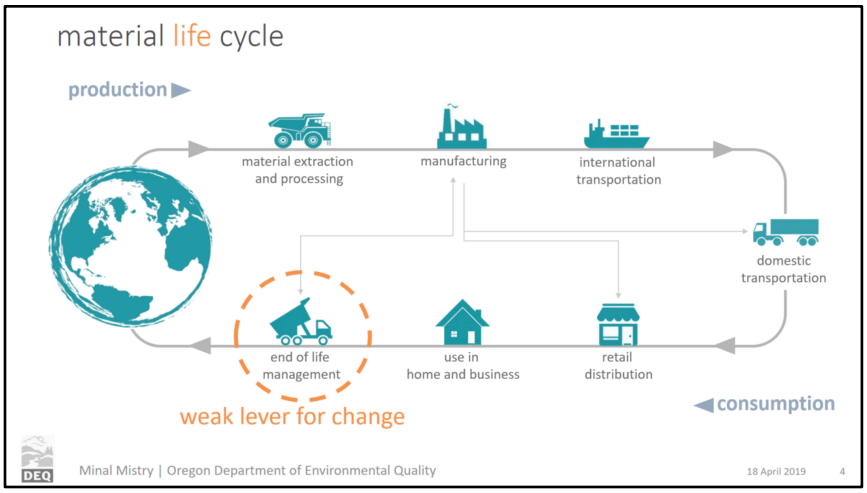

Figure 10: At The Time Of Disposal, Most Of The Impact Has Occurred.
Source: Minal Mistry, Department Of Environmental Quality

The DEQ recently sponsored critical research that is already starting to make an impact in the region. In order to achieve this framework vision, Oregon's organizing approach is to improve foundational knowledge through research, educate (including unlearning unhelpful habits), collaborating, and using science and increased collective energy to push towards lasting policy change.

The Myth of the 4 Attributes

When people make the effort to make environmentally responsible purchases, they often rely on four common material attributes that are generally assumed to be effective. Those attributes describe the origin of the material (whether it is bio-based or made of recycled content) and how one can dispose of the material (whether it's recyclable or compostable). This report shows that these assumptions leave out a large portion of the impacts a material makes in its life-span which can lead to "unintended and regrettable outcomes."[14] For example, many food retailers and institutions have come to rely on "compostable" utensils instead of single-use plastics as a way of alleviating environmental burden. At our own University of Oregon, the ubiquity of the bright green forks we see all over campus are undeniable. However, this research shows that compostable items are not environmentally preferable due to the intensive environmental burdens of production and the difficulty and unlikelihood of the actual "composting." This thorough research comes as a major to blow to producers and consumers who have believed they were doing a good thing for the planet by choosing compostable, or one of the other attributes. A holistic evaluation of a material's entire life cycle is needed to inform good choices. However, the simple choice is *always* reusable instead of disposable.

[14] Vendries, J., Hawkins, T. R., Hottle, T., Allaway, D., Canepa, P., Rivin, J., & Mistry, M. (2018). *The Significance of Environmental Attributes as Indicators of the Life Cycle Environmental Impacts of Packaging and Food Service Ware*. 106.

Whether producers of such materials intend to or not, products labeled with these four attributes are typically a form of "green washing," a market friendly spin that promotes the perception that products, aims or policies are environmentally friendly, when in reality, they are not. It can be extremely difficult for the average consumer to analyze green washing and so it may be the burden of governments and institutions to set policies that stop green washing before it starts.

WHAT ABOUT EXTENDED PRODUCER RESPONSIBILITY?

Extended Producer Responsibility (EPR) is a legislative strategy used to put more of the onus of material management on the producers of materials. In a best-case scenario, that mean producers use materials that have low environmental impact during each stage in its lifecycle, is durable, and is able to be recycled through some sort of circular economy. At the weaker end of the spectrum, it simply means that producers are responsible for the disposal of their products, whether environmentally sound or not. Presently, most US law allow producers to endlessly flood our markets with products and materials that do not have simple, if any, means of proper recyclability. IF there is legislative burden on the producers, they would be required to come up with the solutions to the problems of their own making.

in 2011 Oregon passed the nation's first extended producer responsibility law with full support from the paint industry in the form of PaintCare. Since then, eight states and the District of Columbia have passed legislation modeled after the Oregon law. There are also product stewardship laws such as the Bottle Bill and Electronic Recycling Law. In the 2019 legislative session, there are more opportunities to properly manage prescription medications, recycle mattresses, and receive funding for statewide hazardous household waste disposal.

The US has yet to legislate any EPR laws nationally, unlike Canada and members of the EU. The Canada-Wide Action Plan for Extended Producer Responsibility (CAP-EPR)[15] was adopted in Canada in 2009 under the guidance of the Canadian Council of Ministers of the Environment. The CAP-EPR sprang from admission that 30 years' worth of recycling efforts had done little to divert material from the landfill. Since the CAP-EPR's 2009 inception, nine of the ten provinces have enforced legislation or restrictions on a wider range of products and materials under EPR programs, and the producers are now responsible for recycling collection.

Opinions differ about the feasibility of plastics EPR in the US, but there are models that prove success is possible. For example, in the 1990's, Germany was able to reduce its per capita packaging consumption by 13.4%[16] A 1999 study examined the possibility of moving towards zero waste in Oregon and the Northwest through an interconnected three-part strategy of EPR, improved waste management infrastructure, and fostering waste-based businesses. That study proposed that if the strategy was followed, by 2025 state and local policies and programs would require, foster and support the manufacturing of products that are designed to never become waste.[17]

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[15] Canadian Council Of Ministers Of The Environment (2009): *Canada-Wide Action Plan for Extended Producer Responsibility*

[16] Hanisch, Carola. "Is Extended Producer Responsibility Effective?" *Environmental Science & Technology* 34.7 (2000): 170A-75A.

[17] Self-Reliance, I. (1998). *Creating closed-loop economies through reuse, recycling and bioproduct-based economic development: site assessment for Southern Willamette River Valley*. Retrieved from https://scholarsbank.uoregon.edu/xmlui/handle/1794/2393

The Importance Of This Study

There is an urgency to this project. Each day that plastics are irresponsibly disposed of means potentially thousands of years that that material exists in our environment. Each day that we continue generating this much waste at a rate never before seen in history, there are untold consequences. Collaboration, knowledge-sharing and the creation of solutions is needed now more than ever.

RESEARCH QUESTIONS

After first trying to gather information about the complex system of recycling and the multiple players involved, the research narrowed to these central questions:

- What are some local and regional governments in the Pacific Northwest doing in the face of this abrupt change?
- What are short-term and long-term solutions?
- What role does waste prevention and sustainable consumption have in waste management planning?
- How do education, infrastructure, policy, and partnerships compare as effective avenues for success?

METHODOLOGY

The research for this project was qualitative in nature. Rather than examining measurable characteristics, the research sought to comprehend the totality of the situation, from multiple perspectives and geographies. In order to best understand the real-time, on-the-ground effects of and reactions to the National Sword, interviews were the primary method of research. As so many different stakeholders are involved, interviewees were selected from a wide variety of places and job responsibilities.

INTERVIEWS

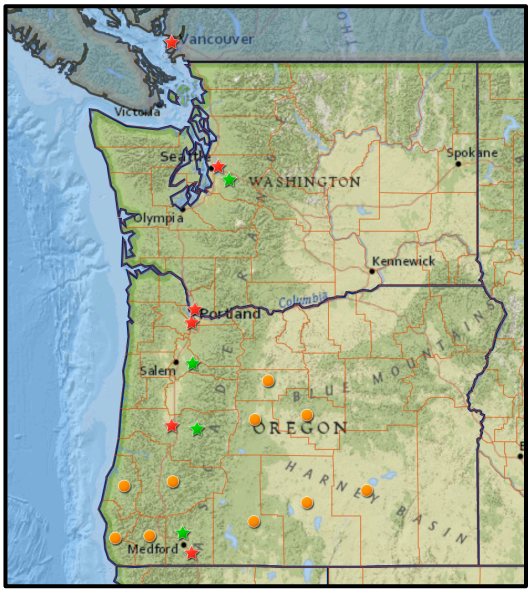
Twenty-two interviews were conducted with government officials, private waste haulers, and partnering non-profits. Sixteen interviewees work in Oregon, three in Washington, two in British Columbia, and one in Connecticut. The interview in Connecticut was to enable comparison between the Pacific Northwest and a small, industrialized Eastern state. A few of the first interviews included more general information gathering to understand the current events and how the recycling system works. The majority of the interviews followed a scripted interview guide[18], although depending on the person's job or region, the interviews took special focus on certain issues. Ten of the interviews took place in person, including site visits in Lane County, Ashland, and Medford. The other twelve interviews took place via phone.

INTERVIEWEE BY JOB TYPE:

- Department of Environmental Quality (DEQ) Program Managers for Crook, Jefferson, Deschutes, Klamath, Lake, Harney counties, Coos, Curry, Douglas, Jackson, Josephine, and Lane counties
- DEQ Materials Management Senior Analyst and DEQ Material Recovery Coordinator
- Municipal Waste Prevention Coordinators, Project Managers, and Educators
- County Waste Reduction Coordinators and Educators
- Private Waste Disposal Education Coordinators
- Non-Profit Waste Reduction Director and Educator
- Waste Prevention/Sustainability Consultant
- Connecticut State Level Environmental Analyst

INTERVIEWEE LOCATIONS:

Oregon County Level: Lane, Marion, Jackson
Oregon City Level: Eugene, Ashland, Portland Metro
Washington County Level: King
Washington City Level: Bellevue, Vancouver, Seattle
Canada: City of Vancouver, British Columbia
Connecticut: State Level



[18] See appendix for interview guide.

Content Analysis

Study and comparison was conducted on websites, planning documents, and public messaging from these various communities. This information is complementary to the interviews and was not performed with strict metrics. It was rather to look for study the similarities and differences of various publicly available documents so as to understand common trends, arears of content deficit vs abundance, and unique strategies.

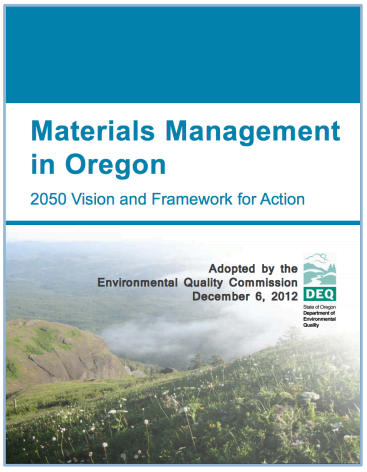
Websites

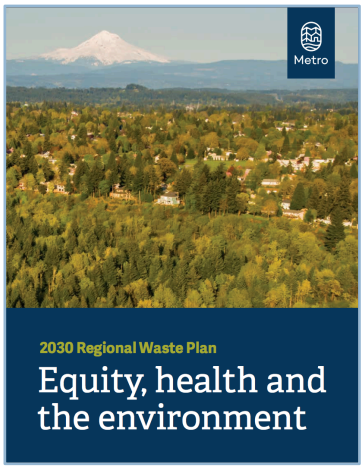
Various City, County, and State websites were studied to see what tools and resources are easily available to the public. Attention was also given to user experience and accessibility of the websites themselves.

Planning Documents

Several planning documents were studied to understand goals, actions, and implementation for various plans to recycle efficiently, reduce waste, educate, and research.

- *Materials Management in Oregon: 2050 Vision and Framework for Action*, Oregon Department of Environmental Quality
- *Washington's New Solid Waste Metrics*, Department of Ecology
- *Seattle Climate Action Plan*, City of Seattle
- *Regional Solid Waste Management Plan*, Oregon METRO
- *Zero Waste 2040*, City of Vancouver Canada
- *Sustainable Consumption Toolkit,* Urban Sustainability Directors Network (USDN)





COMMUNITY PARTICIPATION

I also decided to get directly involved in waste issues as part of this research project. Participation in various local and online communities provided invaluable information about the current state of recycling and waste prevention. Active involvement and observation led to greater insights on how this the recent changes are affecting communities, what the knowledge gaps are, and what methods are working well to convey information and create positive outcomes. Participation included:

- Attending the Extended Producer Responsibility forum in Salem entitled "The Past, Present, and FUTURE of Product Stewardship in Oregon."
- Volunteering as a "community collector" for Lane County Plastics Round-Up
- Obtaining membership to the Association of Oregon Recyclers (AOR), a network where recyclers can share knowledge and expertise.
- Participation in webinar: "A Review of Sustainability Frameworks – Expanding Material Stewardship Potential" presented by the West Coast Climate and Materials Management Forum
- Subscription to various waste and sustainability newsletters such as WasteDive.com, which send up-to-date digests analyzing happenings in the waste industry.
- Attending city council meetings regarding single-use plastic bans.
- Volunteering with UO Zero Waste Program.
- Engaging UO Zero Waste Program, Student Sustainability Center, and UO Housing in discussion on single-use dining products.

FINDINGS

MAJOR FINDING: A DOUBLE-EDGED SWORD

The first and most important finding is that although it is creating short-term havoc, the National Sword is actually a *good* thing. This project commenced over concern for the plastics piling up in our homes and cities. But it did not take long to understand that the National Sword is actually a much needed, albeit abrupt, change to clean up a dirty system abroad and reinvent our system domestically. High level players are developing long-term strategies and envisioning frameworks that steer away from recycling business as usual. Local governments and their partners are working on short-term strategies to communicate with their constituents and ease the immediate problems at hand. In general, all key players agree that a sustainable future for materials management must include an emphasis on reduction, greater understanding of material impacts throughout their lifecycles, and high-level policies to ensure more producer responsibility. Although these endeavors will create a more sustainable and equitable world, professionals in the field pointed to the numerous barriers along that aspirational path.

INSIGHTS FROM INTERVIEWS

After conducting interviews with twenty-two people involved in the world of recycling, several universal findings emerged. These are outlined below and can be considered applicable to each individual community listed later in this section. There are also unique barriers to individual communities that will be outlined later in this section.

CONSUMER BEHAVIOR

- ***Apathy***: The will always be people who simply do not care about the impact of the products they consume. There are many reasons including being distracted by other issues, cultural background and belief systems. Even if people "care" about the issue, it still may be very low on their priority list.
- ***Lack of Knowledge***: Many people simply do not know how to make sustainable consumer choices or how their local recycling systems work. This may be due to language barriers, lack of information access, being new/visiting the area, and poor public messaging.
- ***Wishful Recycling***: This term has become well-known recently as was mentioned by nearly every interviewee. Wishful recycling is when people put items in the recycle bin that they either think or hope are recyclable. They often think that putting a questionable item in the recycle bin is preferable to the garbage. However, they may be unaware that this can contaminate an entire load of recycling and sometimes it will all end up in the landfill. Many people identify themselves as "recyclers" and find it painful to throw materials in the garbage, not knowing that they are actually adding to the problem.

- ***Defensiveness***: Particularly in the light of recent recycling changes, many interviewees have dealt with defensive residents. People who have been recycling for years do not like to be told that they are doing something wrong. This can create very delicate public relations and messaging issues. Although this dynamic can be found everywhere, it is particularly noted in cities like Portland and Eugene that historically pride themselves on being environmentally progressive.
- ***Confusion***: Most interviewees cite simply "confusion" as a major barrier. Whereas most people can identify an aluminum can, the vast majority of people have trouble identifying plastic types because there are so many of them and they are not labeled consistently (Figure 11). Seemingly similar products may be made of different materials which eventually disrupt the processing stage. Some products may be mostly made of one resin, but then coated with a different type making it very hard to sort. Even trained volunteers at the Lane County Plastics Round Up were confused about the content of certain materials. This common observation is supported by research, such as report that found "about a quarter of respondents (26%) in a recent survey of 2,000 adults by the Grocery Manufacturers Association (GMA) feel recycling is more difficult than assembling IKEA furniture. Another 23% find recycling more complicated than completing a tax return, and 22% find it more complex than the stock market."[19]

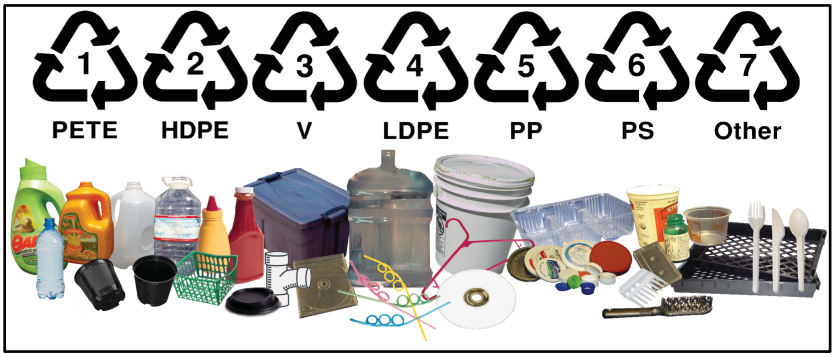


Figure 11: Variety of Plastic Types Create Confusion
Source: https://nonanoplastic.wordpress.com/2016/07/02/7-different-plastic-classifications-that-you-need-to-know/

- ***Convenience Culture***: Even those who are more environmentally minded are immersed in a culture of convenience. We have gotten so used to having cheap and easy disposable materials whenever and wherever we need them, it allows people to take those materials for granted. People are not in the habit of being responsible for materials and the ubiquity of disposables has normalized them. In many cases, people feel that they consume as much as they want as long as they can recycle. There is a pervasive feeling or belief that the act of recycling is enough to excuse wasteful actions. It ignores the impacts that the product has had up to and after the point of putting it in the recycling bin.

[19] Grocery Manufacturers Association. (2019) Reduce. Reuse. Confuse. How Best Intentions Have Led to Confusion, Contamination and a Broken Recycling System in America.

Infrastructure

- ***Limited***: There is a lack of processing facilities on West Coast, due to difficulty to site, investment needed, and little prior need. By the time populations grew enough to merit large processing facilities, the overseas shipping system was already established.
- ***Geographically Disperse:*** The scale of the West Coast creates large distances for hauling materials. There are no major material recovery facilities (MRFs) between the Sacramento Valley and Portland (Figure 12), and thus it is expensive and emissions-intensive to haul waste to domestic processors.
- ***Outdated:*** Old machinery and inability to process ever-changing product stream.

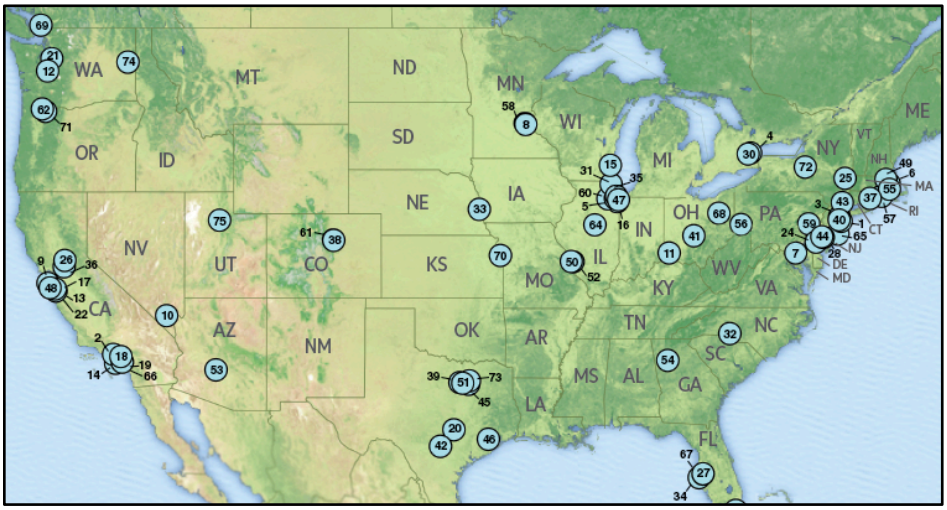


Figure 12: Locations of Large Material Recovery Facilities
Source: https://www.recyclingtoday.com/article/largest-mrfs-north-america-2017/

Producer Irresponsibility

- ***Constantly changing materials***: Unlike the simplicity of aluminum cans, plastic products are constantly changing and difficult for consumers to sort. Consumers and processors cannot keep up with the vast array of products put on the market.
- ***Mislabeling materials***: Producers sometimes mislabel products, or even label something that as recyclable that is NOT actually recyclable, in "hopes" that at some point it might be.
- ***Lack of producer responsibility***: Producers continue to flood the markets with a never-ending array of items that are difficult or impossible to recycle, promote disposability, and planned obsolescence.

Policies and Politics

- ***Health policies*** do not always align with environmental policies. As our society adapts more to disposability and convenience, more health code regulations have cropped up that disallow use of personal food containers and utensils, thus perpetuating the generation of waste. Local waste reduction specialists and those who create health code policies have little history of working collaboratively.
- ***Political climate and industry power*** can overpower progressive action. For example, several states have put forth innovative "Right to Repair" legislation that has been repeatedly undermined by powerful industries, notably Apple and John Deere[20]. While these issues have been more focused on mechanical and e-waste, they represent policies aimed at reducing waste and shows the powerful obstacles that industry can create.

National Political Climate

- ***Lack of federal support*** towards environmental progress. As of May 10, 2019, 187 countries agreed to work to stop the plastic crisis by curbing international plastic trade. The US was one of the only countries that did NOT agree to the plan.[21] Without leadership from the federal level, states must work harder to create solutions.

Funding

- ***Lack of funds*** is a perpetual barrier. This includes money for capacity building, infrastructure investments, marketing, and research.
- ***Willingness to Pay***: Recycling domestically is now more expensive, and communities are making decisions about what level of fee increases residents are willing to pay. It varies by community and is always a difficult topic. Recycling fees had previously been essentially subsidized by the inexpensive export system.

[20] Hiltzik, M. (2018). How Apple and other manufacturers attack your right to repair their products. Retrieved from latimes.com website: https://www.latimes.com/business/hiltzik/la-fi-hiltzik-right-repair-20181116-story.html

[21] Picheta, Rob. (May 11, 2019.). 187 countries -- not including the US -- agree to restrict global plastic waste trade - *CNN*. Retrieved from https://www.cnn.com/2019/05/11/world/basel-convention-plastic-waste-trade-intl/index.html

Unique Local Challenges

Along with the universal barriers, each community has its own special barriers due to any number of factors, including geography, political culture, and historical precedent. Below are a few examples of unique barriers:

- ***Geographical Distance*** from Processing Facilities (Southern and Eastern Oregon Counties): Counties that are far from processing facilities in Portland or Northern California have to make the decision whether to pay for extended transport or to apply for a concurrence for disposal.
- ***Local politics*** and aversion to "sustainability" (Marion County, Eastern Oregon Counties): Some waste reduction specialists cite the need to be very careful in their language because words like "green" and "sustainable" can be politically divisive.
- ***Lack of top-down leadership*** (Marion County): In some locations there is little governmental leadership, if any. In Marion County, there are no city staff dedicated to waste issues, so county staff must provide support to the community.
- ***Inefficient and inconsistent hauling and messaging systems*** (Eugene): Eugene is rather unusual in that is has multiple haulers for the same areas. While this creates consumer choice, it is also inefficient as three different trucks may go on the same street in the same day. Because Eugene haulers compete with each other, they are also more hesitant to reprimand customers for contamination. In locations that have only one hauler, the companies have been bolder with their messaging (Figure 13) to their clients because they are not at risk of losing customers.

Figure 13: Without Competition, Rogue Disposal Is Not Afraid To Let Residents Know If They Did Something Wrong. Eugene Haulers Cannot Afford To.

Source: Anna Greenberg

- ***Disconnected communities*** (Portland, Seattle): In some locations, particularly larger cities, there is a significant portion of the population that may not speak English, have little cultural literacy surrounding recycling, and/or lack access to information and facilities.
- ***Lack of state leadership*** (King County): Some government officials have mentioned that while there is a lot of "talk," there is not always enough action coming at from the state level.

SHORT AND MEDIUM-TERM STRATEGIES

As researchers, policy makers, educators, and activists continue to work on long term strategies for lowering consumption rates, local governments still have a major task at hand to cope with our current waste problem by whatever means necessary.

Interview findings show that different communities are creating a wide variety of short term solutions to deal with the crisis. These solutions are determined by a combination of geography, political will, creativity (or lack thereof), and resources available. While the situation for residential recycling is not as chaotic as some news outlets have painted, it is still clearly a time of significant transformation in the local systems. There will most likely be continued turbulence in the system for the next year or so. Each community has its own unique geography, history, culture, government structure and waste management system and thus each community is tackling the crisis in its own way. Rather than attempting a comprehensive assessment of all the (continually evolving) strategies, what follows a selection of highlights from the region.

TO RECYCLE OR NOT TO RECYCLE?

The initial decision a community must make is whether or not to change "the list," which refers to the products accepted by curbside recycling. Communities have taken a variety of paths in reaction to the National Sword:

- ***Retain the List:*** Some municipalities, such as Portland, that have the resources to do so and are in closer proximity to processors have chosen to keep the list unchanged, so that residents can recycle as always. Officials feel it is better to not have "knee jerk" reactions because citizens can only cope with so much change. They are looking to see what long term plans are before making changes to the routines of their residents.
- ***Change the List***: Some cities, such as Eugene have, have modified the list so that certain items are no longer accepted (Figure 14). This caused initial uproar amongst a citizenry that prides itself on being "recyclers," but it is also a reality that Eugene's geographic distance from processing facilities makes business-as-usual unattainable.
- ***Scrap the List***: And yet others, such as Milton-Freewater, have cancelled local recycling all-together.
- ***Concurrences***: The DEQ has allowed municipalities to apply for a "disposal concurrence." This happens when a municipality has exhausted all options to find markets for recyclable commodities and DEQ concurs that landfilling these materials on a temporary basis is an unfortunate, but needed option at this time. Under this option, local curbside collection systems can continue to operate as usual, but the end location for the material is the landfill. The benefit to this solution is that it does not disrupt residents' routines and waste can be collected in a well-designed way, instead of overwhelming processing facilities.

Figure 14: Messaging About Changes to *The List*
Source: City of Eugene

Plastics Round-Up

Lane County changed their accepted recyclables list so that it no longer included certain plastics such as tubs. However, as many residents continued to hold onto their plastics in hopes they would be able to recycle, Lane county has since organized two "Plastics Round Up" events, which is a day when people can bring their cleaned and sorted #2, #4 and #5 resin types to the Glenwood Transfer Station. From there, the processor Denton trucks the load to their Portland facility. The two events have proven successful for recovering plastics that would otherwise go to the trash (the recent event yielded a truckload weighing 3.12 tons) and have also worked well as community building events. For the second event, 150 volunteer community collectors stepped up to gather for their neighborhoods and thus decrease traffic to the transfer station. The efforts also worked to show people just how clean and well-sorted recyclables need to be in order to not contaminate the stream. Whether there will be another event depends on how usable the processor finds the materials. This was a great community building event and a good organized response for the short term, but it is not sustainable for the longer term and still only recovers a fraction of the plastics people use in Lane County.

Figure 15: Community Volunteers at Lane County Plastics Round-Up.
Source: Anna Greenberg

Targeting Contamination through Messaging

Local governments are using a variety of avenues to raise awareness about how important it is to clean and sort recyclables. Interviewees pointed to the following notable messaging campaigns:

- Tacoma, Washington sponsored the sold-out event "ContaminationFest 2018." Festival goers were invited to follow the flow of materials from consumer, to bin, to truck and MRF and see first-hand, how automated collection works, what comes out of the truck and what sorted bales look like.
- Rogue Disposal of Jackson County uses friendly yet pointed messaging through the use of "Oops Tags" that are affixed to individual recycling bins when there is contamination (see Figure 13). Waste management staff have found residential carts to have improved greatly as a result.
- Washington State's Department of Ecology has created a simple, clear statewide messaging campaign called "Recycle Right" (see Figure 20). The idea is to use very straight forward directives to show the importance of cleanliness for proper recycling.
- Many interviewees point to website features that allow users to search how and what to recycle in their location, included Lane County's "Garbage Guru" and Connecticut's "RecycleCT Wizard" functions.

Strategies to Promote Reusing and Reducing

Interviewees shared successful programs in their areas that specifically focus on reduction.

- Marion County's waste reduction team sponsors creative reuse events that engage the community and make reuse *fun*. Repair Fairs, Trashion Shows, Swaps, Contests, and providing Encouraging Messages (Figure 16).
- Ashland Recology has created a dishware loan program that rents reusable dishes for free for large events. Residents are encouraged to sign our the easily accessible dishware instead of purchasing disposables (Figure 17).
- King County uses their online "LinkUp Reuse Program" to enable networking for sharing of materials.
- The DEQ has given grants for local re-use pilot programs such as refillable water stations and reusable dishes for County Fairs.

Figure 16: Marion County Provides Free Posters Through Their Website

Source: https://www.co.marion.or.us/pw/es/disposal?mcrecycles

Figure 17: Ashland's Reusable Dishware Loan Program

Source: Anna Greenberg

Strategies to Reduce Waste Through Policies

Some cities are in the process of developing ordinances to ban single-use plastics. While promoting responsible consumer habits is important, governments also see an opportunity to use policy to decrease plastic pollution and waste.

- Staff in Portland, Eugene, and Vancouver, BC Cities spoke about taking the initiative to ban single use plastics or create ordinances with requirements such giving straws by request only.

Strategies for Improving Infrastructure

Many interviewees mentioned the necessity of improving infrastructure to process materials domestically.

- King County officials spoke about adding improved filters to MRFs to be enable better sorting of materials and contending with contamination.
- This past year, DEQ's Materials Management Program has awarded $600,000 in grant funding to 16 local governments and nonprofits in what was the most competitive application process in the grant program's history. The funding covers projects that promote the prevention, recovery or reuse of solid wastes and is spread over nine counties.

Strategies for Community Engagement and Outreach

Interviewees spoke about the importance of involving their communities to create engaging and equitable programs.

- Washington State has hired consultants to research and help create culturally sensitive recycling campaigns that reflect the languages and backgrounds of their constituents.
- Portland METRO has created *Actions for Equity and Shared Prosperity* in their management plans and interviewees have pointed to the inequity in the current system. They are working to involve underserved communities to create programs and infrastructure that are accessibly and improve quality of life.
- King County staff spoke about having a social justice mission to understand differential impacts, and to go speak to communities about their service needs. Staff hope through that work will have more community informed approach to see if they are focusing on the right things; they want to empower and involve all communities they serve.
- The Jackson County Recycling Partnership have a popular in-school presentation program and provide facility tours so that students of all ages have the opportunity learn about recycling and reduction.

Strategies for Collaboration and Sharing

Many interviews pointed towards the importance and necessity of sharing research, models, and resources in order to improve their programs.

- Marion County staff spoke of sharing models for Sustainable Business Programs. They shared successful tactics from their *EarthWISE Business Assistance Program* to help Lane County develop their *re-Think Business Program* and hope to continue sharing ideas between counties.
- King County created a Responsible Recycling Task Force, which is a group representing a wide variety of stakeholder formed to steer efforts for harmonized messaging and education.
- The DEQ created a Stakeholder Group and Recycling Steering Committee, a statewide group of stakeholders that meets regularly to establish long-term goals, conduct research, and steer actions for materials management throughout the state.
- State Recycling Coordinators Meeting (Washington): Educators from around the state meet to share ideas and harmonize programs.
- Association of Oregon Recyclers Forums and Conferences: Events to connect, collaborate, and keep up-to-date with happenings from the entire state.

Strategies for Positive Communication with Constituents

Many interviewees spoke about the need for talking sensitively with the public in way that is relatable, friendly, and does not make people defensive. Some of the ideas they shared for speaking with the public include:

- The importance of getting "invited" to educate about recycling, rather than "talking at" people.
- Framing the "opportunity to recycle" as opposed to a mandate.
- Being regionally sensitive to word choice: Avoiding divisive words that turn people away.
- The importance of having good rapport with constituents: Using humor and having personal contact with people has proven very effective.
- Not making assumptions about people, but rather asking them questions and finding out what their concerns are.

LONG-TERM STRATEGIES

Recycling is Clearly NOT the Answer

The interviewees unanimously agree that recycling is not the answer to our waste problem. Even those who have been working in the local recycling world for decades see this fact clearly. For the amount of planning, infrastructure, and labor that goes into the plastics recycling system, there is very little positive impact to show for it. The vast majority of plastic either ends up the landfill or the ocean. And of the 9% of plastic that actually makes it the recycling stage, only 1.2% is still in use (Figure 18). It has been known for a long time that reducing and reusing are the favorite options in the recycling triangle, and now there is evidence that shows how wide the gap between reduction and recycling really is. The most definite way to lessen our impact is to avoid and reduce usage of materials. The updated version of the waste hierarchy shows recycling as several steps down from the top most preferred method (Figure 19). A variety of strategies are needed.

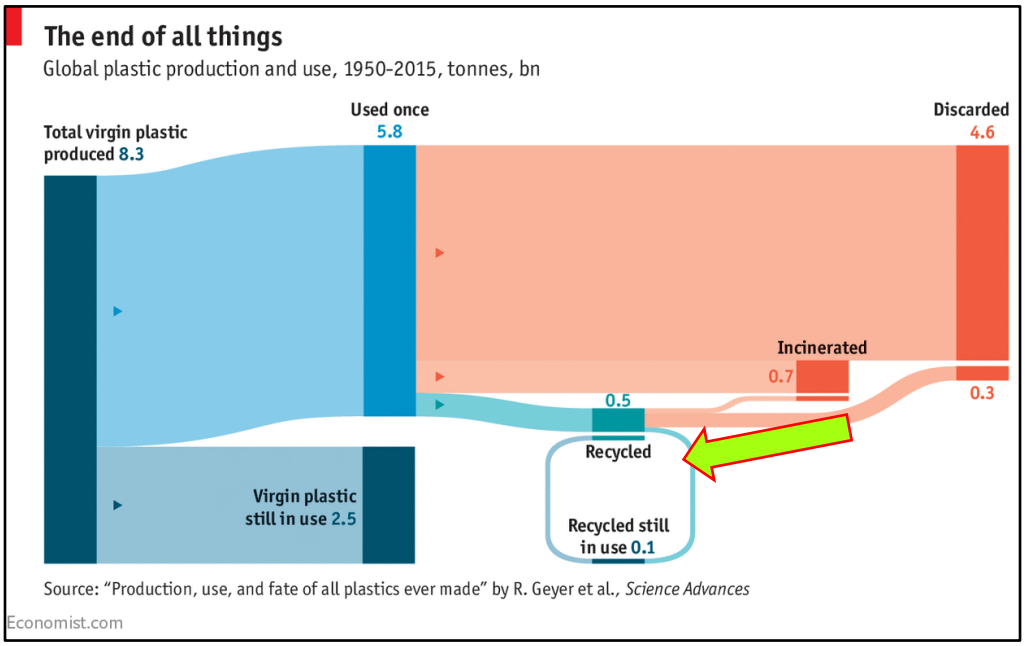


Figure 18: Only .1 billion tons, or 1.2%, of plastic produced has been successfully recycled and is still in use.
Source: https://www.economist.com/graphic-detail/2018/03/06/only-9-of-the-worlds-plastic-is-recycled

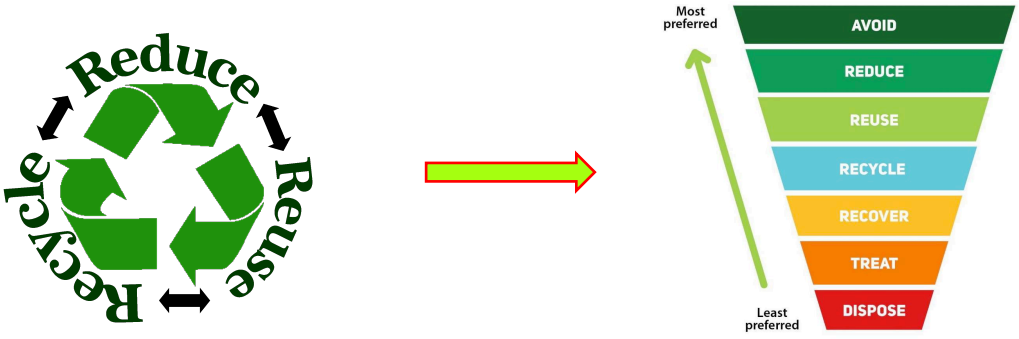


Figure 19: Waste Hierarchy

STRATEGY: SHIFTING FRAMEWORKS

Although waste prevention and reduction are clearly the goal, recycling is still part of the big picture and probably always will be. Thus, we must continue to find ways to make recycling more effective, efficient, sustainable and economical. There is a shift in framework occurring from traditional Waste Management to Sustainable Materials Management (SMM). SMM is a systemic approach to using and reusing materials more productively over their entire life cycles. It represents a change in how our society thinks about the use of natural resources and environmental protection. Whereas waste management focuses on the end-of-life management of waste products, SMM focuses on the entire lifecycle of materials and products. Another important shift is that in SMM, all industries and consumers associated with the lifecycle of a material and product are considered responsible party, whereas waste management only considers the generators of the waste as the responsible party.

It has become increasingly clear how important the use of Life Cycle Analysis is to addressing materials. However, instituting LCA as a common technique is not without its difficulties. As those developing the research are first to acknowledge, the results can be counter intuitive and even "unsettling." Oregon is working hard to put SMM and LCA on the agenda and neighboring states are listening. But it is harder to comprehend than the Zero Waste strategies that are held tightly by neighboring regions. While most people can understand the idea that throwing a fork in the landfill is negative, it is harder to understand that sometimes using a plastic fork that ends in the landfill actually has less of an environmental impact than using a "green" compostable fork. Several waste management officials pointed towards the faulty idea that the landfill must be avoided at all costs. In actuality, sometimes the landfill is preferable to the impact of repurposing a material. It will be a slow road to turn around those ideas. As one expert in the field said, it took 30 years for the acceptance of those attributes to calcify; now it will take another 30 years to decalcify.

There are other barriers to using LCA, not least of which is resources needed both in terms of funding and expertise. There are so many different materials and systems for creating and disposing of those materials, that it is an unrealistic expectation to create static ideas about material impacts in a paradigm that has so much variability and flux. The challenge ahead is figuring out how to use LCA in a manner that is practical and relatable.

Use of Life Cycle Analysis must be coupled with a focus on reducing consumption. LCA is a way of analyzing the best types of consumable materials, but those materials will *always* have a greater environmental impact than reducing and reusing. Creating large scale policies and culture that use materials more responsibly is a monumental task.

STRATEGY: EXTENDED PRODUCER RESPONSIBILITY AND PRODUCT STEWARDSHIP

Oregon has been a leader in EPR but has yet to tackle plastics and packaging. However, Oregon has a proven success rate with other EPR programs and is actively working on expanding EPR possibilities. In January 2019, Lane County's non-profit partner BRING hosted a gathering in Salem titled "The Past, Present, and FUTURE of Product Stewardship in Oregon." The event was designed to educate stakeholders about product stewardship and to serve as the first step in building a broad-based coalition of organizations interested in working on these efforts at the state level. Several action plans came out of that event including, creating letters and testifying of support for the different bills being considered by the Oregon Legislature, providing public education about product stewardship, and bringing together stakeholders for education, networking, and to provide input on current and future policy decisions.

STRATEGY: HARMONIZATION

Among the many reasons for our contaminated recycling, mixed messaging and inconsistent systems looms large. Educators, policy makers, and haulers are becoming aware at how confusing that is to people making decisions about their products. Many people have pointed towards the need for harmonization of messages and systems so that people anywhere will know how to choose and manage their products. Certain countries in the EU, such as Germany, serve as models for nation-wide messaging and policy regarding packaging. Their systems are inspirational, but not always applicable to the US with its varied geography, low density regions, and lack of infrastructure.[22] Until the US is able to create nation-wide consistency, county and statewide harmony is of vital importance. There are successful models for harmony on state scale, such as Connecticut's statewide messaging program and promising beginnings for Washington's new "Recycle Right" campaign (Figure 20).

Figure 20: Washington's State Wide Messaging Campaign
Source: https://ecology.wa.gov/recycleright

[22] As of May 24, 2019, the US House Appropriations Committee has asked the EPA to collaborate with key stakeholders on a national strategy to harmonize standards, strengthen markets and reduce contamination in the recycling stream. Priority is given to evaluating the implementation of a national system of standardized recycling labels to reduce contamination and enhance the market viability of recyclable materials.

Source: D. Toto, (May 24, 2019) US House Appropriations Committee asks EPA to develop national recycling strategy. (n.d.). Retrieved, from *Recycling Today* website: https://www.recyclingtoday.com/article/us-house-appropriations-committee-proposes-epa-develop-national-recycling-strategy/

STRATEGY: FOCUS ON EQUITY

Although state agencies are doing the work of creating and analyzing material frameworks, it is up to municipalities to understand and design for their unique local issues, with an emphasis on equity for their constituents. Portland METRO and Seattle have been taking progressive leadership in this arena and setting an example for others. Cities must ask themselves who they are building the system for and what their needs are. Oregon's recycling laws state that we should ALL have the right to recycle, but that opportunity is not equitable right now due to access, education, infrastructure design, and community involvement.

A manager at Metro describes their updated Regional Waste Management Plan with these three points:

- ***Listening and learning shaped the plan.*** Metro gathered a lot of great ideas to put into the plan that help make the system work better for everyone. The input from more than 4,000 local residents will change the way the system looks and how it will serve the public in the future.
- ***Solutions by the community, for the community.*** The plan's goals and actions were generated in partnership with people most affected by historic injustices and inequities: people of color, immigrants and refugees, people with low incomes, residents of multifamily housing communities and English language learners.
- ***Benefits will be shared by all residents.*** The plan moves us towards a system where barriers and disparities are eliminated and includes actions designed to correct previous wrongs and honor the differences among people, no matter their race, immigration status or income level.[23]

The conscientiousness the Metro displays towards equity is the cornerstone for creating local systems that work for all.

STRATEGY: THE IMPORTANCE OF COLLABORATION, STAKEHOLDER GROUPS, AND RESEARCH

From local recycling groups, to the West Coast Climate and Materials Management Forum, all players in the field recognize the importance of collaboration and sharing. Rather than re-invent the wheel on local programs, communities are sharing successful ideas with each other. Oregon's DEQ is sharing their research on LCA and webinars, summits, conferences, and forums abound.

[23] Metro (March 2019). 2030 Regional Waste Plan Equity, health and the environment. Portland, OR.

RECOMMENDATIONS

The problem is large and the system complex. No one knows exactly the right steps to solve old problems and create new systems, but there are clear recommendations for all levels of government that have emerged through this research:

STATE LEVEL:

- As more processing takes place domestically, seek to minimize health and environmental risks of waste disposal.
- Devise new legal framework between players in the system including state and local laws, ordinances, policies and practices, contracts, and roles and responsibilities of public and private entities that collectively provide the governance structure for the Recycling System.
- Framework should include policies for Extended Producer Responsibility and Utilize Life Cycle Analysis to understand material impacts.
- Invest in Infrastructure and award grants for local materials processing.
- Collaborate across the region, share resources and knowledge by continuing to share research, support stakeholder groups, and meet regularly.
- Harmonize and simplify messaging to as great a regional extent as possible. Consumers throughout the region need to have a simple and uniform understanding of best practices for consuming and disposing of materials.
- Take leadership AND action, as states have the power to make serious change. Without the ability to depend on Federal leadership, states must take command and more forward with ideas and implementation.

COUNTY LEVEL:

- Harmonize and simplify messaging between neighboring cities to avoid confusion and promote confident choices among consumers.
- Regional business outreach and best practice sharing within the county and with neighboring counties.
- Create robust, mandatory education programming with in-school visits and facility tours. Start young so that this knowledge becomes second nature.
- Nurture partnerships with local industry and non-profits. Unified team effort for education and outreach is necessary to create efficient systems and community buy-in.

CITY LEVEL:

- Create ordinances for Single Use Plastics. Learn from successful policies from other cities and engage constituents frequently for ideas and feedback.
- Promote knowledge and ideas through Community outreach programming in schools, libraries, other social centers.
- Involve community in system planning to increase equitable access. Understand constituents and communicate accordingly.

- Create community surveys, focus groups, and hold community meetings to share and learn from citizens about their needs and ideas. Craft messages that are in line with community values.
- Use humor and positive feedback for residents. People are more receptive, engaged, and likely to act when treated with friendliness and understanding.

A NOTE ON LIMITATIONS, SCOPE AND AREAS FOR FUTURE RESEARCH

This project in the end is a rather big picture survey of the state of plastic materials management in the Pacific Northwest. Materials management programs are large, multi-faceted, and always changing. It is impossible to properly present all of the information, especially at a time where so much is changing fast. Rather than homing in on one aspect or location, this research offers glimpses of multiple levels of government, different stakeholders, varied geographies and demographics, and small and big ideas. The challenges since the National Sword are so sweeping and unprecedented.

This report seeks to highlight certain aspects of the recent months along with ideas to guide government and industry forward. It is by no means comprehensive, but rather a broad picture with a limited number of significant details that rise to the surface. There certain groups that would have been beneficial to interview in each area to get a complete picture, but it was not always possible. This project also did not consult specifically with regional tribes.

The scope of recycling, waste reduction, and materials management is enormous. China's National Sword Policy has also affected other materials such as paper. Research also shows that organics (i.e. food waste) is a major problem in terms of waste volume and greenhouse gas emission. However, in order to keep this project somewhat hemmed in, the primary focus is on plastics, which still remains an unwieldy topic.

Future research may involve going into greater analysis of certain factors, such as successful business incentives, formulation of policies or increasing infrastructure efficiency. Analysis in any number of arenas would be helpful in aiding governments to create more effective plans.

CONCLUSION

The dust of the crisis is beginning to settle, and now people are taking a deeper breath and assessing long-term strategies. Even from the start of this research to this point, headlines have changed from a tone of confounded drama to one of strategic developments.

For so long, Americans have been able to hold onto an "out of sight, out of mind" mentality regarding the plastics we toss in the recycling. The National Sword has put recycling in front of our faces and shown us that recycling has never worked well and that our plastic problem is truly a crisis. Creating solutions on our own soil to effectively dispose of post-consumer plastics will take a multi-pronged approach involving all levels of government and industry. The even larger problem at hand, however, is the consumption rate to which we have become accustomed. No amount of progress in material production and processing will ever solve our waste crisis if people do not change their consumption habits. Whether those habits change due to education, or are forced to change through policy, a significant shift will have to occur.

Every day, breaking news flashes before us highlighting the problems that we humans have put ourselves and the rest of the world in danger. On May 6, 2019 a landmark report by the UN stated that one million plant and animal species are on the verge of extinction, with alarming implications for human health, and water and food security. That paper is the first of its kind to link this devastation directly to human activity, not the least of which is plastic pollution and resource extraction. In other words, to stem the tide of this terrible trend, humans need to change their behavior on a vast scale and it needs to happen soon. But as we know, behavior change does not happen overnight and must be courted very delicately and deftly. Governments cannot tell their citizens to simply stop their over-consumptive ways or else face destruction. There is a weighty tension between the urgent action needed, and the careful planning, communication, and politics that enable action. And the forces of industry must be treated as partners with incentives for sustainable production. Thus, a multi-pronged approach of education, infrastructure, policy, and partnerships remains key to any sort of progress.

At the appropriate levels of leadership, governments must take policy approaches that:

- Extend Producer Responsibility
- Ban Single-Use Plastics
- Harmonize Messaging
- Prioritize Education
- Engage with Communities and Focus on Equity
- Foster Collaboration and Sharing
- Lead, Act, and Implement: This problem will not solve itself

Throughout this evolving journey, everyone must remember to keep sight of the forest, and not just the tree. It is easy to lose sight the big picture of material use when focusing on the smaller picture of recycling. Everyone involved in the system, from consumers to industry to policy makes, need to take a wider view of materials. When collecting recyclables in a new trash bag, think not only of whether those products were necessary in the first place, but also whether you need a new bag or even bag at all to collect those products. A holistic understanding of materials will need to become common if we are to steer this ship around.

It is a daunting yet exhilarating time to be involved in materials management; the obstacles are enormous, but so is the energy, passion, and intelligence of the people tackling it.

APPENDIX

KEY TERMS

For a complete list, see The Connecticut Department of Energy and Environmental Protection's *Glossary of Recycling & Solid Waste Terms, Abbreviations and Acronym* (https://www.ct.gov/deep/cwp/view.asp?q=438548)

Circular Economy: An economic system aimed at decreasing waste and maximizing use of resources. This approach aims to regenerate, in contrast to the traditional linear economy, which has a 'take, make, dispose' model of production.

Contamination: Refers both to cleanliness of individual recyclables as well as the intermixing of recyclable and non-recyclable products.

DEQ: The Oregon Department of Environmental Quality, the chief regulatory agency in Oregon responsible for protecting and enhancing the state's natural resources and managing sanitary and toxic waste disposal.

Disposal Concurrence: When all options to find markets for recyclable commodities have been exhausted, DEQ concurs that landfilling these materials on a temporary basis is an unfortunate, but needed option at this time.

Department of Ecology: The Washington State Department of Ecology, or simply, Ecology, is an environmental regulatory agency in Washington. The department administers laws and regulations pertaining to the areas of water resources, shoreline management, toxics clean-up, nuclear waste, hazardous waste, and air quality. It also conducts monitoring and scientific assessments.

EPA: Environmental Protection Agency, a federal agency designed to protect people and the environment through regulations, research, and enforcement.

EPR: Extended Produce Responsibility, a policy approach under which producers are given a significant responsibility – financial and/or physical – for the treatment or disposal of post-consumer products.

GHG: Greenhouse gas. GHG emissions are known to be a contributing factor to climate change.

Greenwashing: A form of spin in which green PR or green marketing is deceptively used to promote the perception that an organization's products, aims or policies are environmentally friendly.

Haulers: Companies and individuals who pick up curbside garbage and recycling.

The "List": Common term what materials/products are accepted for recycling in a given community.

MRF (pronounced "murf"): A materials recovery facility is a specialized plant that receives, separates and prepares recyclable materials for marketing to end-user manufacturers.

MSW: Municipal Solid Waste, more commonly known as trash or garbage—consists of everyday items we use and then throw away, such as product packaging, grass clippings, furniture, clothing, bottles, food scraps, newspapers, appliances, paint, and batteries. This comes from our homes, schools, hospitals, and businesses.

Planned Obsolescence: An economic or industrial design policy of planning or designing a product with an artificially limited useful life, so that it becomes obsolete (i.e., unfashionable, or no longer functional) after a certain period of time.

Right to Repair: Refers to government legislation that is intended to allow consumers the ability to repair and modify their own consumer electronic devices, where otherwise the manufacturer of such devices require the consumer to use only their offered services or void the product's warranty.

Sustainable Consumption: The use of products and services that have a minimal impact on the environment so future generations can meet their needs.

Sustainable Materials Management (SMM): A systemic approach to using and reusing materials more productively over their entire life cycles. It represents a change in how our society thinks about the use of natural resources and environmental protection.

Upstream: Refers to the materials needed for production.

INTERVIEWEES

Location	Title	Name
Lane County, OR		
	Waste Reduction Specialist	Sarah Grimm
	Division Manager, Waste Management Division	Jeff Orlandini
	Master Recycler Program Manager	Kelly Bell
	Executive Director, BRING	Carolyn Stein
	Education and Events Manager, BRING	Emily Shelton
	Operations Manager, ToolBox Project; Consultant, Sustainable Consumption Toolkit	Anya Dobrowski
Eugene, OR		
	Waste Prevention and Green Building Program Manager	Michael Wisth
Portland METRO		
	Resource Conservation and Recycling Manager at Metro	Pam Peck
Oregon DEQ		
	Solid Waste TA	Cathy Brown
	Natural Resource Specialist	Jason Mustard
	Senior Policy Analyst	David Allaway
	Material Recovery Coordinator	Brian Stafki
Jackson County, OR		
	Jackson County Recycling Partnership	Denis Barnes, Laura Leebrick
Marion County, OR		
	Waste Reduction Coordinator	Jessica Ramey
Ashland, OR		
	Recology Ashland	Jamie Rosenthal
Vancouver, WA		

	Environmental Resources Manager	Rich McConaghy
Bellevue, WA		
	Conservation & Outreach Program Administrator	Jennifer Goodhart
King County, WA		
	Market Development Program Manager, Recycling and Environmental Services	Andrew Smith
Vancouver, BC		
	Zero Waste Research; Solid Waste Strategic Services	Andrea McKenzie
	Single Use Strategis	Julie LeBlanc
CONNECTICUT		
	Environmental Analyst, Sustainable Materials Management, Planning & Implementation	Sherill Baldwin

INTERVIEW GUIDE

Introduction to self and project. Reminder of consent.

Can you describe your job? Your department?

What is the current focus of your work? Projects?

What, if any, programs or policies does your department have for plastic waste reduction?

Is there more focus on recycling or reduction?

Is the term "Sustainable Consumption" used and are there any programs regarding it?

Have any policies or programs changed since China stopped accepting plastic waste?

Are there both short term and long-range plans for reducing plastic waste?

What avenues have proved most successful? What has not worked as well as planned? Are there barriers between ideas and implementation?

- Education?
- Partnerships?
- Policies?
- Infrastructure?
- Repair and/or sharing economy?
- Other?

Any policies or programs that you WISH were in place??

What are barriers implementation?

What are major lessons learned?

Where do we go from here?

Are there other comparable cities/counties/governments that are doing work you find inspiring? What about other countries?

Is there anything else you would like to add?

Can I follow up with you if I have more questions or wish to quote you in my report?