

Overview of Food Waste

Over the past three years, Montreal had a record one-day snowfall that cost the city over \$40 million of your tax dollars to clear up; floods that evacuated thousands from their homes, and a heatwave that killed over 50 people.¹ Montrealers are paying for the climate crisis with their money, with their homes, and with their lives. Nationally, Canada is heating up twice as fast as the world average.² The climate crisis poses direct impacts to the lives of Montrealers.

In Canada, each individual generates approximately 2.7kg of waste everyday.³ The average Canadian produces 170kg of food waste each year.⁴ When food is thrown away, it ends up in the landfill, where it rots and releases methane.⁵ Methane is a powerful greenhouse gas that traps seventy times more heat than CO₂ over a 20 year period.⁶ Wasted food in North America creates 193 million tonnes of greenhouse gas emissions, which is the equivalent of 41 million cars driving continuously for an entire year.⁷

Not only is the waste crisis a large contributor to climate change, but waste poses a multitude of social impacts as well. Worldwide one third of food produced is wasted, and one in nine people are undernourished.⁸ Why does Canada produce so much waste? Why isn't food waste being composted? This problem is only getting bigger, the Development Progress Flagship Report published in 2015 estimated that waste worldwide would double by 2025, relative to 2015.⁹

¹ Rachel Lau, "Montreal Snow Removal Operations Underway after Intense Winter Storm," *Global News*, February 14, 2019,

<https://globalnews.ca/news/4960539/montreal-snow-removal-operations-underway-after-intense-winter-storm/>)

Kalina LaFramboise, "Heat Wave Blamed for 53 Deaths in Montreal," *Global News*, July 18, 2018,

<https://globalnews.ca/news/4338998/heat-wave-blamed-53-deaths-montreal/>)

² BBC News, "Canada Warming Twice as Fast as the Rest of the World, Report Says," *BBC News*, April 3, 2019,

<https://www.bbc.com/news/world-us-canada-47754189>)

³ CBC News, "Canadians Produce More Garbage than Anyone Else," January 17, 2013,

<https://www.cbc.ca/news/business/canadians-produce-more-garbage-than-anyone-else-1.1394020>)

⁴ CBC Radio, "How Bad Is Canada's Food Waste Problem? Among the World's Worst, Report Finds," *CBC News*, April 5, 2018,

<https://www.cbc.ca/radio/thecurrent/the-current-for-april-5-2018-1.4605392/how-bad-is-canada-s-food-waste-problem-among-the-world-s-worst-report-finds-1.4606012>)

⁵ Martin Gooch, Abdel Felfel, and Nicole Marenick, "Food Waste in Canada," *Value Chain Management Centre*, November 2010, <https://vcm-international.com/wp-content/uploads/2013/04/Food-Waste-in-Canada-112410.pdf>) 2.

⁶ Climate Change Canada, "Government of Canada," Canada.ca (Government of Canada, April 1, 2019), <https://www.canada.ca/en/environment-climate-change/services/climate-change/global-methane-initiative/about-methane-emissions.html>)

⁷ CBC Radio, "How Bad Is Canada's Food Waste Problem? Among the World's Worst, Report Finds," *CBC News*, April 5, 2018,

<https://www.cbc.ca/radio/thecurrent/the-current-for-april-5-2018-1.4605392/how-bad-is-canada-s-food-waste-problem-among-the-world-s-worst-report-finds-1.4606012>)

⁸ Food Aid Foundation, "World Hunger Statistics," Food Aid Foundation, n.d.,

<https://www.foodaidfoundation.org/world-hunger-statistics.html>)

⁹ Susan Nicolai et al., "Projecting Progress Reaching the SDGs by 2030," *Development Progress Flagship Report*, September 2015,

http://developmentprogress.odi.org/sdgs-scorecard/scorecard_report.pdf?fbclid=IwAR3UIWFqxFqHzAabviyobWONooVDICMc43KZCmNNbDLgqVguJzG24pFzz3A)

Research Questions and Methods

This project maps the efforts of waste sorting and composting within public and private institutions in Greater Montreal.

The two research questions that we focus on are:

- How do we decrease waste and increase composting in public and private institutions in Greater Montreal?
- What are the needs of the stakeholders in terms of education and infrastructure around waste and compost management?

To map this issue, we conducted interviews with stakeholders within the waste management ecosystem in Greater Montreal. We have reviewed the literature to draw on sources that provide insight into the environmental impacts, psychological aspects and history of waste. We base our understanding on 4 years of experience running the “Waste Not, Want Not” compost collaboration at Concordia University during which we have had many thoughtful discussions with a diverse range of community members.

The History Behind Waste

In the last century, the culture around food waste has changed drastically, before the industrial revolution, there used to be a cultural expectation that frowned upon food waste.¹⁰ Cookbooks used to include sections about how to use up leftovers and avoid creating food scraps.¹¹ Since the industrial revolution, waste creation has grown exponentially. This is largely to do with a cultural and economic shift that has changed the ideologies, cost, and politics of food production and consumption.¹² When the industrial revolution began in the 1950s, new policies directed farmers to produce as much food as possible, without taking the market demand into account; along with rising incomes and an increase in refrigeration, food waste began to be normalized.¹³

Why Focus on Waste in Montreal?

Canada creates the most waste per capita in the whole world.¹⁴ The consequences of poor waste sorting can lead to negative impacts on the environment and community health. In 2016, the majority of Montreal’s solid waste was sent to the landfill and 53% of dry recycling, like glass and paper, went to the landfill.¹⁵ Like many other institutions in Canada, we noticed that

¹⁰ Ibid.

¹¹ Ibid.

¹² David Evans, Hugh Campbell, and Anne Murcott, “A Brief Pre-History of Food Within the Social Sciences,” *The Sociological Review*, December 1, 2012.

¹³ Ibid.

¹⁴ Hristina Byrnes and Thomas Frohlich, “Canada Produces Most Waste in the World. The US Ranks Third.,” *USA Today*, July 2019,

<https://www.usatoday.com/story/money/2019/07/12/canada-united-states-worlds-biggest-producers-of-waste/39534923/>

¹⁵ Jillian Treadwell, Elena Bennett, and Osborne Grant Clark, “Dynamic Simulation of Phosphorus Flows through Montreal’s Food and Waste Systems,” *Resources Conservation and Recycling*, April 2018)

our institution, Concordia University, lacked coordinated efforts to approach waste sorting which resulted with Concordia having high rates of contamination in the waste streams and lots of waste ending up in the landfill that could otherwise be recycled or composted. This led us to initiate the “Waste Not, Want Not” compost collaboration between students, professors, and administration. The collaboration entails that students and professors run a grass-roots education campaign while administration provides top-down infrastructure investment by making compost bins more widespread and localizing where we compost. Since the beginning of “Waste Not, Want Not”, the Concordia community doubled annual composting, reduced overall waste by 16% per Concordian per year (that is two months worth of waste out of each year that disappeared per person), and reduced contamination in compost bins.¹⁶ The success of this multi-stakeholder approach at one institution has led us to wonder what types of strategies were being used at other public and private institutions across Montreal.

Existing Solutions

As overviewed, the main contributor to the waste crisis is the historical patterns of overconsumption that have become the cultural norm. However, as we have seen in recent years, there has been an increase in solutions to tackle the continuously growing landfills. These solutions range from zero-waste lifestyles, to municipal compost programs.

Through our interviews with public and private institutions within Montreal we learnt about various solutions that institutions were using already. Many educational institutions have awareness campaigns that are led by students.¹⁷ The advantages of student led campaigns is that the campaigns are central to students interests and offer opportunity for peer-to-peer education. The literature echoed this by emphasizing that community awareness is key to changing waste sorting behaviours and that awareness campaigns about waste sorting are able to lead to social reforms.¹⁸ However, because these types of campaigns are based around student interest, they are often inconsistent and are dependent on individual students. This leads to lots of variety, which can be interesting, but likely does not lead to institutionalization of these waste sorting practices, or leave the institution's members with a comprehensive understanding of the campaign's goals. If waste management is institutionalized within the administration it is imperative for a student campaign to coordinate with the managers of the institution's waste management to ensure consistent messaging, coordinate data collection and analysis, and to generate administrative buy-in for the campaign. As well, when campaigns are entirely student run, there are often high rates of turnover among leaders due to the short span that students are at a particular institution.¹⁹

¹⁶ Concordia Compost. “Concordia Data.” Waste Not Want Not Compost, n.d.
<http://www.concordiacompost.ca/data-2/>.

¹⁷ Shirley Fagnan (Polytechnique Montreal), interviewed by Nell Perry and Ribal Abi Raad, Montreal. (February 18th 2020)

¹⁸ Qing Ye et al., “China’s Green Future and Household Solid Waste: Challenges and Prospects,” *Waste Management* 105 (February 2020)

¹⁹ Shirley Fagnan (Polytechnique Montreal), interviewed by Nell Perry and Ribal Abi Raad, Montreal. (February 18th 2020)

We learnt that there is a need for accessible and affordable compost facilities and programs. Institutions who did not have composting frequently said the main limitation was access to infrastructure and access to affordable composting processing.²⁰ The City of Montreal has introduced pilot projects to expand the city composting to educational institutions below a certain size around the Island, a few of the institutions we spoke with were a part of the pilot. The pilot project solves the issue of lack of infrastructure; however, it seems that the difficulty is communicating and dividing responsibility between the different stakeholders in the project, from city to administration of an institution, to sustainability coordinators.²¹ This was mirrored in the literature review where there was an emphasis on the need for accurate communication between the different stakeholder groups in order to have effective household waste management.²²

Interviewees also expressed difficulty with engaging individuals who are not interested in sustainability issues.²³ As a response to this problem interviewees emphasized the need for more signage in order to habituate waste sorting, even if individuals lacked personal motivation.²⁴ However, from our work at Concordia, we know that improved signage and communications alone are not able to create sustainable change, especially within unmotivated students. The literature echoes this as well and found that individual waste sorting behaviour is a result of interpersonal, intrapersonal, institutional and community based policy.²⁵

Since the 1980s, recycling has been a widely used model in Canada as a way to reduce plastic, glass and aluminium waste t in the landfill.²⁶ However, only 9% of what we put in the recycling bin in Canada actually gets recycled, while the other 91% ends up in the landfills or oceans.²⁷ On paper, the concept of recycling seems great, however, the system is used as a greenwashing strategy by companies that produce plastic.²⁸ The regulations behind the recycling

²⁰ Stéphane Béranger (Université de Montréal), interviewed by Nell Perry and Ribal Abi Raad, Montreal. (March 3rd 2020)

²¹ Shannon Holton (English School Board of Montreal), interviewed by Nell Perry and Chantal Fourges, Montreal. (February 25th 2020)

²² Qing Ye et al., "China's Green Future and Household Solid Waste: Challenges and Prospects," *Waste Management* 105 (February 2020)

²³ Myriam Lefebvre (CEGEP De Vieux Montréal), interviewed by Nell Perry and Chantal Fourges, Montreal. (March 10th 2020)

²⁴ Shirley Fagnan (Polytechnique Montreal), interviewed by Nell Perry and Ribal Abi Raad, Montreal. (February 18th 2020)

²⁵ Qing Ye et al., "China's Green Future and Household Solid Waste: Challenges and Prospects," *Waste Management* 105 (February 2020)

²⁶ Jeff Lewis and Molly Hayes, "Reduce, Reuse, Recycle, Rejected: Why Canada's Recycling Industry Is in Crisis Mode," *The Globe and Mail*, May 2019,

<https://www.theglobeandmail.com/canada/article-wish-cycling-canadas-recycling-industry-in-crisis-mode/>

²⁷ CBC Radio: The Sunday Edition, "Why Your Recycling May Not Actually Get Recycled," *CBC News*, April 2019,

https://www.cbc.ca/radio/thesundayedition/why-your-recycling-may-not-actually-get-recycled-1.5099103?cmp=FB_Feed_CBCMmain&fbclid=IwAR0L_VSFwZmTUVVtjKV-BO7T-4Nm6RE4d1dg4yNE8IUC66W-q_zDq9Ols

²⁸ Schlossberg, Tala, and Nayeema Raza. "The Great Recycling Con." *The New York Times*, December 2019. <https://www.nytimes.com/video/opinion/10000006841131/packaging-recycling-myths.html>.

stamp are not clear and allow companies to put the recycling stamp on products that are not really recyclable as a marketing tactic.²⁹ For instance, five of the seven types of plastic are almost never recycled.³⁰

Recycling in Quebec has complex rules, the consignment recycling system has not been updated since the 1980s.³¹ This shows in the recycling rates, for example Quebec's metal recovery rate is only 52%.³² Further, Canada largely depends on paying other countries to deal with our recyclable waste, and shipping it overseas to be processed.³³ Overseas recycling plants that are predominantly located in Asia create tonnes of greenhouse gas emissions in transportation and cause major health crises due to our poor sorting.³⁴ As a result, China has banned the import of Western recyclables with contamination levels higher than 0.5%.³⁵ After this decision it was found that China had reduced Canadian plastic imports by 96% and Canadian paper imports by 65%.³⁶ This has impacted a recycling company that operates two recycling centres in Montreal to cease operations in the near future.³⁷ The under-development of the Canadian recycling industry has caused lots of 'recycling' to end up in the landfill since China's plastic ban. Additionally, recycling companies in Canada have no legal obligations to actually recycle what they have received from institutions, such as Concordia University, if they cannot profit from it.³⁸

Compostable plastic is often seen as an alternative to non-compostable plastics. However, most municipal plants do not have the necessary conditions or machinery to compost compostable plastics.³⁹ As a result, most compostable plastic ends up in the landfill.⁴⁰ Another model that is used to reduce waste in landfills is donation. Donating used objects that are no

²⁹ Ibid.

³⁰ Ibid.

³¹ Rachel Lau, "Quebec Introduces New Deposit System for Glass, Metal and Plastic Bottles," *CTV News*, January 30, 2020

³² Charlotte Côté, "Un Système Aux Multiples Exceptions," *La Presse*, July 2016

³³ Jeff Lewis and Molly Hayes, "Reduce, Reuse, Recycle, Rejected: Why Canada's Recycling Industry Is in Crisis Mode," *The Globe and Mail*, May 2019,

<https://www.theglobeandmail.com/canada/article-wish-cycling-canadas-recycling-industry-in-crisis-mode/>

³⁴ Kemiko de Freytas-Tamura, "Plastics Pile Up as China Refuses to Take the West's Recycling," *The New York Times*, January 2018, <https://www.nytimes.com/2018/01/11/world/china-recyclables-ban.html>

³⁵ Ibid.

³⁶ Jeff Lewis and Molly Hayes, "Reduce, Reuse, Recycle, Rejected: Why Canada's Recycling Industry Is in Crisis Mode," *The Globe and Mail*, May 2019,

<https://www.theglobeandmail.com/canada/article-wish-cycling-canadas-recycling-industry-in-crisis-mode/>

³⁷ Kalina Laframboise, "Montreal's Recycling Operations to Continue If Sorting Centres Close: Plante," *Global News*, January 2020, <https://globalnews.ca/news/6467663/montreal-recycling-crisis-valerie-plante/>

³⁸ Katie Pederson et al., "We Asked 3 Companies to Recycle Canadian Plastic and Secretly Tracked It. Only 1 Company Recycled the Material," *CBC News*, October 2019,

<https://www.cbc.ca/news/technology/marketplace-recycling-trackers-b-c-blue-box-1.5299176>

³⁹ Makda Ghebresslassie, Eric Szeto, and Steve Niles, "The Label Says 100% Compostable Plastic. But It's Likely Ending up in a Landfill," *CBC News*, March 2020,

<https://www.cbc.ca/news/technology/plastic-packaging-compostable-plastic-marketplace-1.5487617>

⁴⁰ Ibid.

longer wanted to a thrift store is often seen as a way to reduce waste and repurpose old items.⁴¹ However, the average thrift store in the US only sells one third of their donations, and the rest ends up in the landfill.⁴²

As overviewed, there are various feel-good models that are used to superficially justify the creation and purchasing of new items. However, these models are largely flawed and do not have the capability to actually recycle, or eliminate objects and waste that have already been created. On the other hand, throwing away less food reduces 31 times more greenhouse gas emissions than composting.⁴³ The only solution to 'recycling' waste, is not creating it in the first place.

These are the solutions that are currently being tried, however there are gaps that exist within these models; the most impactful gap, is that the existing models do not use a comprehensive, collaborative approach from the different stakeholder groups⁴⁴ These models are taken from an individual approach, such as zero-waste lifestyles or bulk-buying. Although these lifestyle changes have endless positives, they are changes that individuals make on a personal level. When solutions are based on individual changes, there are often particular groups of individuals that end up bearing the responsibility; such as women making up the vast majority of zero-wasters.⁴⁵ Further, individualized solutions are dependent on individuals' continuous efforts, whereas community based solutions are able to be institutionalized within communities or institutions to enable the solution to persevere through turnover and culture changes. The waste crisis will only continue to grow if a systematic approach is not taken.

Solutions

The research has shown that the challenges of waste creation and diversion are multifaceted. We have identified four concrete strategies that can work together to decrease waste:

1. Reduce the waste that is generated
 - a. REthink
 - i. Increased and clear regulations against planned obsolescence.
 - ii. Promotion of zero-waste and minimalist lifestyles, both for individuals and institutions.

⁴¹ Terry Gross, "The Best Thing You Can Do Is Not Buy More Stuff,' Says 'Secondhand' Expert," *NPR*, December 2019, https://www.npr.org/2019/12/04/784702588/the-best-thing-you-can-do-is-not-buy-more-stuff-says-secondhand-expert?fbclid=IwAR3XBe7GGEQxdyl_H1964m0HfRjhh1Ip7jWPVvjSw2VXitMspyi2_806GZs)

⁴² Ibid.

⁴³ Drew Kann, Judson Jones, and Sean O'Key, "The Most Effective Ways to Curb Climate Change Might Surprise You," *CNN*, April 19, 2019, <https://edition.cnn.com/interactive/2019/04/specials/climate-change-solutions-quiz/>)

⁴⁴ Qing Ye et al., "China's Green Future and Household Solid Waste: Challenges and Prospects," *Waste Management* 105 (February 2020)

⁴⁵ Alden Wicker, "The Complicated Gender Politics of Going Zero Waste," *Vox*, May 2019, <https://www.vox.com/the-goods/2019/5/9/18535943/zero-waste-movement-gender-sustainability-women-instagram>)

- iii. Incentive programs for individuals and institutions that implement zero-waste or less-wasteful policies and programs.
 - iv. Increase education around waste creation and management.
 - 1. Ex. Workshops about waste, how to reduce waste, how to make zero-waste swaps.
 - 2. Ex. Zero waste events.
 - b. Increase the availability of bulk items and items with minimal packaging.
 - c. Donation to
 - i. Increase the availability and affordability of reusable items.
 - ii. Repurpose waste materials: building materials, art materials, clothing, plastics
- 2. Better sorting of the waste that is generated
 - a. Education
 - i. Increase in effective signage.
 - ii. workshops.
 - iii. in person.
 - b. Demerit systems, fines for improper sorting.
 - c. Increase accessibility to sorting centres with a larger variety of acceptable recyclable materials.
 - d. Simplify and increase the accessibility of recycling and composting systems
- 3. Divert waste away from landfills
 - a. Biogas generation and composting.
 - b. REcycle
 - i. Implement policy for eco-fees for large electronics and appliances
 - ii. Increase capacity to recycle packaging
 - iii. Increase consignment programs.
- 4. Increase reuse, recycling and composting local infrastructure capacity
 - a. Increase capacity of local infrastructure for recycling and composting
 - i. Montreal is investing in 5 facilities to increase the city's capacity to sort, recycle and compost.⁴⁶ This type of centre is very expensive and one costs at least a quarter of a billion dollars.⁴⁷
 - b. Increase funding to sorting centres
 - i. Sorting centres are often financially challenged.⁴⁸

⁴⁶ Linda Gyulai, "Montreal to Have 'Most Expensive Composting Plants in This Universe'," *The Montreal Gazette*, August 2018,

<https://montrealgazette.com/news/local-news/montreal-to-have-most-expensive-composting-plants-in-this-universe/>

⁴⁷ Ibid.

⁴⁸ Kalina Laframboise, "Montreal's Recycling Operations to Continue If Sorting Centres Close: Plante," *Global News*, January 2020, <https://globalnews.ca/news/6467663/montreal-recycling-crisis-valerie-plante/>

These four strategies are essential in creating an approach to waste reduction that includes all stakeholders. Each of these four solutions are currently implemented to a certain extent. However, the gap remains that each of these solutions is being applied in isolation. The most important piece to reducing waste is that these four solutions need to be coordinated together to create a multi-stakeholder approach to reduce waste. For example, if leaders at the governmental or organizational level put an important policy in place, such as a zero-waste mandate, the important initiative would lack coordination between all of the stakeholders and the initiatives would have overwhelming barriers. This can discourage funders and founders of waste projects. We saw an example of this while running our project at Concordia University where composting was put throughout one of the main buildings of the university but had to be taken away a few months later due to contamination issues. When large scale composting was suggested again, the administration was very reluctant to retry despite using a new approach.

The solution we are proposing is a coordinated approach to waste management that includes implementing the four solutions by including all of the stakeholders in the waste management ecosystem. Our solution was reflected as the most effective approach in the literature review, where it was found that by increasing awareness about composting and having individuals separate their food scraps they became more aware of the food waste they create.⁴⁹ This type of thinking is thought to be more important than composting itself.

The literature review demonstrates that our solution is the most effective approach, it is clear that increasing awareness about composting and encouraging individuals to separate their food scraps, fosters a culture of conscious consumption.⁵⁰ This means that education, infrastructure and culture change all need to happen as a collaborative movement. Initiatives that advance these goals need to be backed by policy changes from governments and institutions that support new legislation and infrastructure; alongside grassroots education that needs to be brought from the bottom up. The research has confirmed that the most impactful scenario for Montreal would be to implement the Waste Not Want Not model city-wide. This would include working with the Province and the City to create policy that promotes sustainability, zero-waste and better waste management. A new policy could be that the City offers to pick up organic waste from all public institutions, eliminating the current size threshold. The demand and supply chains should be bound by a legal framework that encourages them to address waste-related factors in production and packaging.⁵¹

This would be joined by working with individual companies, institutions, neighbourhood associations and school boards to create effective education. Awareness campaigns have been shown to improve the ability of individuals to address environmental issues and create behaviour

⁴⁹ Belinda Christie and Vivienne Waller, "Community Learnings through Residential Composting in Apartment Buildings," *The Journal of Environmental Education*, 2019, <https://doi.org/10.1080/00958964.2018.1509289>

⁵⁰ Ibid.

⁵¹ Qing Ye et al., "China's Green Future and Household Solid Waste: Challenges and Prospects," *Waste Management* 105 (February 2020)

reforms.⁵² Awareness campaigns and education can increase ecological literacy in the city which would create culture change and increase the intention of individuals and institutions to adopt green behaviour.⁵³ With a shift in behaviour and intention, consumers will be more likely to reuse than buy new, which would reduce the amount of waste created at the source. As composting increases within communities and institutions, individuals have been shown to become more aware of their food waste when they must separate their food scraps for compost.⁵⁴ An important part of the solution is that the majority of individuals do not want to create waste and have a negative impact on the environment. It has been shown that 85% of people feel guilty when they have created food waste.⁵⁵ The problem is not that individuals do not care, but that they need the education, infrastructure and policies to help change the culture around waste and to give them tools to reduce the environmental footprint of their family, co-workers and city.

Key Insights

- The waste crisis is environmentally and socially damaging, and contributes to the climate crisis, global inequalities and world hunger.
- Existing models such as recycling, donation, and compostable plastic are ineffective feel-good excuses enabling the root cause that is overconsumption.
- The only way to effectively tackle the waste crisis is to not create the waste in the first place.
- Getting people off autopilot by thinking through sorting, motivates them to also rethink their consumption habits and reduce their waste.
- A multi-stake holder approach coupling top-down commitment and policy with broad impact grassroots education is vital.
- Campaigns within educational institutions need to be institutionalized in order to see long-term, sustainable impact.
- In person education activities are much more effective than signage.
- There is a big need for accessible and affordable composting plants for educational institutions.

⁵² Ibid.

⁵³ Ibid.

⁵⁴ Belinda Christie and Vivienne Waller, "Community Learnings through Residential Composting in Apartment Buildings," *The Journal of Environmental Education*, 2019, <https://doi.org/10.1080/00958964.2018.1509289>

⁵⁵ Felix Septianto, Joya Kemper, and Gavin Northey, "Thanks, but No Thanks: The Influence of Gratitude on Consumer Awareness of Food Waste," *Journal of Cleaner Production* 258 (2020), <https://doi.org/https://doi.org/10.1016/j.jclepro.2020.120591>.