2
The Scales of Waste

A Theory of Relationality

Situated Perspectives

Most people know waste from their everyday experience with it. But "everyday experience" varies enormously depending on when, where, and how you live to what work you do. Those of us living in cities in Canada or the United States and not working in the waste industry, for example, probably know waste as part of mundane chores like taking out the trash. There is waste to be sorted, bins to be filled, containers to be brought to the curb. If these sorts of experiences are familiar to you, then you know waste in specific ways. For example, you might have concerns about the volume of waste you see leaving your house or how much plastic packaging comes home from the grocery store.

If, on the other hand, you are in charge of managing municipal solid waste (MSW), then you know different things about waste. You might appreciate just how new contemporary waste management systems are, and perhaps you're embroiled in the logistics of something that

seems as simple as curbside pickup, which is not even fifty years old in many US and Canadian municipalities (Melosi 1981; Herbert 2007; Waring 1895; Nzeadibe 2013). You might also know that despite the challenge of managing MSW, there's a lot of industrial solid waste (ISW) that isn't accounted for in your municipal collection system (see figure 2.1); sometimes your workers encounter trucks carrying ISW at landfills. In the United States, "nationally, 3 percent of manufacturing waste is

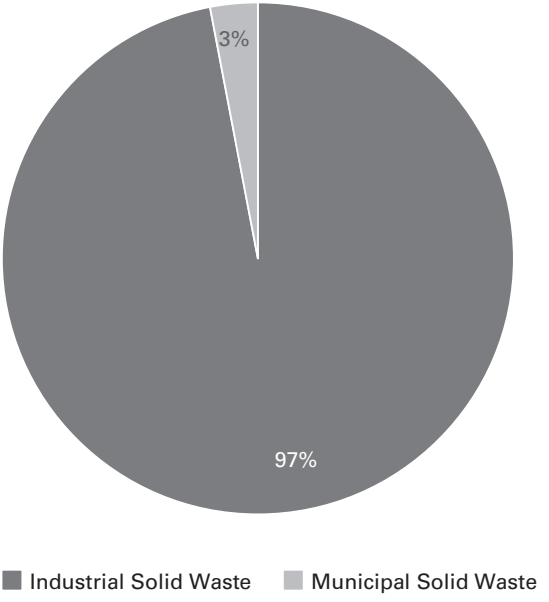

Figure 2.1
Municipal versus industrial solid waste in Canada and the United States. *Source*: Chart by the authors, based on figures from Royte 2005; US EPA 1987; MacBride 2012; Keeling 2012; Statistics Canada 2012; US Congress Office of Technology Assessment 1992.

not disposed of on site, but rather transported to off-site disposal. After leaving the site of generation, this small percentage of manufacturing waste joins municipal solid waste in landfills and incinerators permitted to receive Subtitle D wastes" (MacBride 2012, 101).

If you're an ISW manager for a manufacturer, your perspective on waste is also different. You may know, for example, that your household waste and perhaps even the waste of your municipality pales in comparison to the volume, tonnage, wetness, and toxicity of the waste you manage at work (Liboiron 2016; MacBride 2012). If your operations are located in the United States or Canada, then you know your company is required by law to report volumes of waste deemed hazardous to regulatory authorities: the US Environmental Protection Agency's Toxics Release Inventory or the Canadian government's National Pollution Release Inventory. You likely have to figure out how to create numbers for those requirements out of the processes and practices you oversee. But you also know that there are no federal reporting requirements for nonhazardous waste (the distinction between hazardous and nonhazardous waste reporting requirements in the United States is discussed in MacBride 2012; in Canada, similar distinctions are discussed in Government of Canada 2018). That means there is much more total waste than what makes its way into statistics reported to and by regulatory agencies.

Even the above three diverse perspectives do not cover all relevant knowledge of solid waste (never

mind other types of waste like nuclear waste or medical waste). Waste pickers, for example, know curbside trash and landfills in ways that are different than both households and MSW managers. In Canada, waste pickers can face arrest or legal sanction for collecting waste, and they understand waste can be a valuable and guarded property. In low gross domestic product (GDP) countries, waste pickers may reside in or near the landfills from which they collect waste, which gives them even more intimate knowledge of complex urban waste systems (for example, Srinivasamoha 2013; Campos and Zapata 2014; Samson 2015; Wittmer and Parizeau 2016; Sharma 2021).

All of these ways of knowing solid waste are valid and true, as well as fundamentally partial. They come from specific social, economic, occupational, geographical, and experiential locations and do not necessarily generalize to others. One aim of discard studies is to understand these differently situated knowledges (Haraway 1988) in relation to one another. This does not mean discovering the one true nature of discards by stitching all the situated ways of knowing together as if we can see everything from above (what Donna Haraway calls "the God trick" [1988]), since this would imply that discards are a singular type of object to be known that can be separated from their contexts (Furniss 2017). Instead, we approach knowledge as *situated* (partial) and understand there are other situated knowledges beyond our own that we may never be able to understand or capture

(Agner 2020; see also chapter 4). We work to understand the overlapping but different social, economic, material, political, cultural, religious, ethical, and power relationships between situated ways of knowing and experiencing discards that make some ways of knowing more or less likely to be taken as truth or expertise. The question "What is waste?" is only ever answered partially, in context, and, as discussed throughout this book, within structures of power and difference.

In this chapter we use the concept of *scale* to understand the situated nature of knowledge about waste. We start by talking about why scale is an important concept for attempting to describe and intervene in waste issues. We articulate scale as a way of understanding the relationships that *matter* to defining an issue, and thus of locating where and how interventions might best take place. We conclude with some provocations about how to think relationally about waste and discards using scale as a scaffolding. Our goal is to demonstrate not only why scale is a necessary and even characteristic concept for discard studies but also how scale and relationality takes on ethical and normative dimensions.

Scalar Mismatches

Problems arise when one situated way of knowing disavows its context, becomes dominant to the exclusion of other ways of knowing, or thinks it accounts

for all forms of discard. The effect of such monolithic approaches to knowledge can be termed "scalar mismatch," where one instance is taken to be the whole phenomenon, or where one perspective is assumed to work in all cases.

For example, the idea of cleaning up the ocean of marine plastics sounds like a good idea, but "cleaning up" fails to address the material distribution and scale of marine plastic pollution. In 2010, plastic pollution expert and activist Stiv Wilson did some back-of-the-envelope calculations on this scalar mismatch. Based on a conservative estimate, he calculated that

> to clean the ocean, you'd need to fill 630 oil supertankers to the brim at a cost of about $56,000 each a day to charter (United Nations Conference on Trade and Development). So, to cleanup the gyres (assuming there is actually technology out there to do it which, as of today, nothing has been proven to work), we're looking at a cost of at least about $35 million a day or roughly $13 billion a year, and about 17% of all the oil tankers in service in the world would have to be full time devoted to cleaning it up. (Wilson 2010)

More than a decade after Wilson wrote this, plastic production continues to increase exponentially (more on this below), and the number of plastics in the ocean is likewise increasing. After a decade of trying, there is still no proven technology that works to clean up something as vast as the ocean of something as small as microplastics. Even the Cleanup Array, designed to do

just that, has repeatedly failed and appears to be causing more ecological harm than good, including damaging plankton, missing the smallest and most harmful types of marine plastics, creating marine waste by breaking down offshore, and diverting significant finances from more useful activities for reducing marine waste (see, for example, Liboiron 2015a; Martini and Goldstein 2014; Thaler 2015). In short, the scale at which cleaning up operates and the scale of marine plastics are not aligned.

Discard studies seeks to move away from solutionism that treats waste and pollution as technical problems and instead consider interventions into systems. That is, discard studies takes a relational approach to determine which factors are the most important to focus on; the answer isn't always or even often the final objects of trash or pollution.

For example, a more appropriate intervention for mitigating marine plastics is to focus on the production of plastics that enter the ocean to begin with rather than end-of-pipe solutions that look at plastics after they are made. Figure 2.2 shows that since the 1950s, the production of plastics decreased only twice: during the 1970s energy crisis in the United States, when access to the natural gas and oil that make up the raw materials for plastics was drastically reduced, and in the 2007–2008 financial crisis, also rooted in the United States, which slowed and even stopped some capital-intensive extraction and investment projects. *These* are the types of events and systems that are properly scaled to address

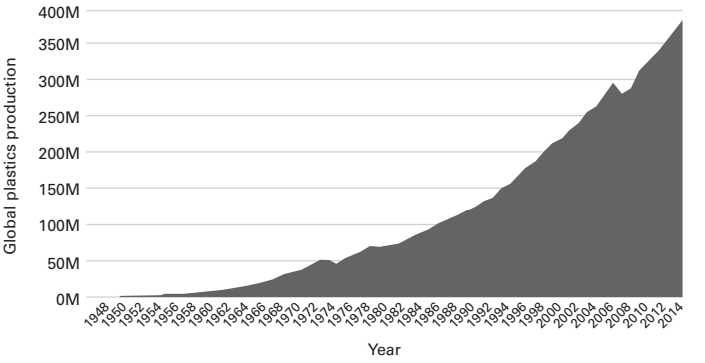

Figure 2.2
Increase of global plastic production, measured in tons per year, from 1950 to 2015. In 1950, the world produced only two million tons of plastics per year. Since then, annual production has increased nearly two-hundred-fold, reaching 381 million tons in 2015. For context, this is roughly equivalent to the mass of two-thirds of the world's population.
Source: Graph based on data from Hannah Ritchie and Max Roser 2018.

marine plastic pollution. In fact, we anticipate that plastic production has likely increased beyond the usual upward trend during the COVID-19 pandemic, not because there is a greater call for disposables but because for the first time in history, oil prices have gone negative. That is, in April 2020, oil was less than $0 per barrel (DeCambre 2020). Both the price and availability of oil and natural gas account for the sharp spikes in the graph.

But there are other aspects to plastics that are not represented in the graph at all. For instance, it does not describe why there is an exponentially increasing

trend in plastic production over time, nor why most plastic production graphs start after 1945 even though synthetic plastics have been produced since before the twentieth century. Factors that do not appear on the graph include the rise of disposable plastics in the form of packaging in the 1950s, which was enabled by a commitment to expand markets (Strasser 1999; Liboiron 2013), and the technical development of plastics during the Second World War by both the Allies and the Axis powers, whose wins were aggressively funneled into consumer goods during peacetime. Before that time, plastics were largely durable items and even replaced environmental problems such as ivory, coral, and tortoiseshell harvesting (Meikle 1995).

When we use "scale," we're not concerned with relative size differences, where cleaning up is too "small" for the "big" economic problem of marine plastics. Scale is instead about the important processes that have significant influence within a given context (e.g., Marston 2000; O-Neill and King 1998; Sayre 2005; Sheppard 2002; Smith 1993, 2004; Swyngedouw 1997). To illustrate how scale is relational, think of how gravity matters to elephants but doesn't matter nearly as much to viruses, whose local movements are more influenced by the capillary action of their host liquids. A virus's global movements are more influenced by the proximity of hosts to one another than by either gravity or capillary action, as we have learned from the COVID-19 pandemic. We have learned the scales at which the coronavirus

does and does not have effects as we live with the pandemic, including what "close" contact means and how masks significantly change relations and can scale up as an effective intervention against contagion compared to distancing and washing hands. This does not mean gravity does not exist or is not important in general but rather that it is less important to viruses compared to other forces.

This means that scale is not a continuum. You can't capture relations by slowly zooming in or out. A skin cell does not "scale up" to become an arm, and an arm cannot be chopped into smaller and smaller pieces until it is a pile of individual, undamaged cells (also, that's gross). A person is more than many, many cells, even if they are made entirely of cells, because they do not act like a collection of cells. Nor do collections of cells act like arms. They certainly influence one another, but they are not in a simple, easily scalable relationship. There are disjunctures between scales where things (e.g., cells, an arm, a person) *change* (sometimes called its ontology).

Philosopher Graham Harman (2018) offers one way to think about the genres of things, which he calls "object-oriented ontology." In his work, an object is that which can neither be reduced down to smaller bits (e.g., an arm to its cells) nor reduced "up to the entirety of all its relations" (e.g., a virus to a pandemic) and still be the thing that it is. In some (but not all) arrangements of relevant processes, cells become arms. In certain conditions, a collection of viruses becomes a pandemic.

But none of these arrangements are automatic or even obvious.

Understanding scale as *relationships that matter* within a situated context has ramifications for action, from policy to management to citizen activism. If an arm is hurt, you put a bandage or a sling on it. If cells are in distress, you ensure the area around them is the right temperature, has the right salinity, and is oxygenated properly. You don't put a Band-Aid on a skin cell, and you don't salinate an arm. These examples are not silly: people often believe that scaling up or down is a quantifiable, additive process. The example above of cleaning up the ocean (one of the largest things in the world) of plastics (most of which are smaller than a grain of rice) with tank-sized vacuums is like putting a Band-Aid on a skin cell. Likewise, many, many shopping bags or straws are not the same as the marine plastic pollution problem, even if bags and straws are made of plastics, are disposable, and are found in the ocean (Liboiron 2020). Scalar mismatches regularly occur around waste and environmental activism.

We can use scale to ask questions about which relationships in waste systems matter so we can better intervene. For the marine plastic pollution example, a scalar question might be the following: What are the relationships and processes that matter to, even characterize, marine plastics, and how might those be influenced, and by whom (Liboiron 2014a; 2014b; 2021)? One of many ways to understand the history and scholarship

of discard studies is as a dedication to questions of scale. Discard studies researchers often ask what the important relationships and processes are that make up a waste phenomenon. We also spend a lot of time solving, debunking, or demythologizing common scalar mismatches.

Scalar Analyses in Discard Studies

A key example of scalar thinking occurred during the sanitation movement in the nineteenth and early twentieth centuries, first in the United Kingdom and then in the United States, where there was a significant change in how waste was understood and treated. We consider sanitarians forerunners to discard studies because one of their main questions was about which social, cultural, economic, and material forces were the most important in disease epidemics in cities. At the time, "many people associated disease with . . . the 'unclean nationalities' of New York's immigrant districts, and with the intemperate or unhealthy behaviors—from drinking heavily to spitting in streetcars—that the inhabitants of these districts purportedly indulged in more often than most city residents" (Burnstein 2006, 23). Poverty, race, and immigration status—markers of difference from white, affluent, already settled urban citizens—were understood as the main factors that produced filth and associated diseases (Zimring 2016). That is, otherness and disease

defined one another through an assumed causal relationship. But the sanitation movement sought to rearticulate the relationships that mattered in urban disease epidemics, arguing that conditions of poverty *created* conditions for disease rather than the other way around.

Arguing for socioenvironmental causes of poverty and disease resulted in completely different sanitation interventions than the ones that preceded them, moving from quarantine and avoidance to municipal sanitation for all city residents and changes in housing laws that addressed overcrowding and lack of clean water (Melosi 2008). In this way, defining a problem in particular ways leads to defining what kinds of interventions, and at which scales, are most likely to impact those problems. These arguments continue today during the COVID-19 epidemic, where researchers show that racialization and racial segregation, rather than individual choice and behavior, play a major role in disease disparities, (e.g., Price-Haywood et al. 2020; Pyzyk 2020; Rodriguez-Lonebear et al. 2020; Yashadhana et al. 2020).

Another common use of scalar analysis in discard studies is addressing the varied relationships between consumer action and waste reduction. The scale of the individual consumer as both a point of blame and unit for solution has been naturalized (made normal and unremarkable) in environmental campaigns such as riding bikes instead of driving, responsible consumerism, and recycling (which we'll explore further in a moment; see Dunaway 2008, 2015; Maniates 2001).

Individualism can be naturalized through per-capita waste statistics. Per-capita waste metrics are created by dividing the total weight of municipal solid waste by the population of a given area, which leads to statements like "Canadians produce X kg of waste per day." This gives the impression that individuals are the main generators of waste. But consumers don't "produce" waste—we are only a waypoint for objects that have been designed to be wasted (Packard 1960; Strasser 1999; Slade 2006). For the rest of this section, we'll dig into what happens to waste relations when the scale is individualized.

Research has shown that even a large number of the same individual consumer choice does not necessarily scale up to address waste production, as many boycotted or avoided products are simply moved to different markets and continue to be produced (Dauvergne 2010; MacBride 2019). This means that not buying disposable packaging whenever possible, even if lots of people agree to do the same, does not scale up to changing how much disposable packaging is produced overall, though it can have an effect on a smaller neighborhood scale (Pezzullo 2011).

For example, in a study of shoreline plastic bags in two municipalities with bag bans, Liboiron et al. (2020) found that one location had a lower percentage of plastic bags than the regional average, while the second location had nearly triple the regional average. While some studies show that bag bans reduce the local use of plastic

bags (and sometimes even plastic bags in waste streams), others show no significant results or changes in either plastic bag use or waste (Gabrielsen 2013; Homonoff 2018; AEA Technology Environment and Associates 2005; Swallow 2011; Waters 2015). This doesn't mean plastic bags shouldn't be banned, but that a bag ban might not impact the issue you're interested in changing.

As figure 2.1 shows, the rise of environmentalism, curbside recycling, packaging boycotts, and green consumerism since the 1970s have not decreased the production of plastics at all; quite the opposite, as the production of plastics continues to increase exponentially. Indeed, plastic packaging remains the largest category of plastic product worldwide (PlasticsEurope 2019). Thus, plastic bag bans do not appear to "scale up" to impact the production of plastics or local shoreline plastics, even if they might affect other things.

Scalar mismatches in the context of recycling is another core area of study and concern in discard studies. One of the foremost thinkers in this area, Samantha MacBride, director of research at the New York City Department of Sanitation, analyzes which relationships do and do not scale (come to matter) in the impact of recycling on the environment:

> How can we evaluate the assumption that plastic recycling reduces the need to extract fossil fuels; or the separate but related claim that manufacturing with recycled inputs uses less energy, meaning lower fuel use economy-wide, meaning diminished

> carbon emissions? It is well known that only a small percentage of global fossil fuel extraction is used directly in plastics production. So even recycling every shred of plastic would not, on its own, diminish the need to drill at current rates by much. . . .
>
> Let's say more Americans recycled their plastics, and this resulted in an influx of more recycled plastic onto the market. Even with robust closed loops achieved, does anyone really think that the executives at one of these multinational [oil corporations] would get to the point of saying, "well, you know, it's good that the need for input materials is being met by recycled plastic, and that means that this year we can scale back production a bit. We don't need to open up a new offshore platform. It isn't required to meet society's needs after all!" . . . in the area of plastics waste we have perhaps the most egregious misuse of claims that recycling is going to address problems related to pollution and climate change. (MacBride 2019, n.p.)

MacBride's work interrogates the assumptions of statements like "recycling saves the environment" by using empirical data and close attention to the details of recycling processes to think about scale (MacBride 2012). Again, this doesn't mean recycling is a useless practice, but that what recycling is useful *for* is not necessarily saving raw materials or conserving the environment.

A strong trend in discard studies is to look at the scale of economies. In the 1960s, American journalist Vance Packard (1960) wrote *The Wastemakers*, which argued that planned obsolescence, overconsumption, "growthmanship," fast fashion ("styling"), and disposability were

the result of marketers and advertisers changing the terms of buying and wasting. Scholars credit his work with shifting the meaning of the term "consumerism" from a positive word about consumer practices to a negative word meaning "excessive materialism and waste" (Glickman 2009). Crucially, Packard's use of the term was about systems of production, not consumer behavior.

Packard's work came close on the heels of industry's strategic use of disposability to expand markets. Just a few years before *The Wastemakers* was published, the editor of *Modern Packaging, Inc.,* Lloyd Stouffer, addressed plastic industry representatives at a conference in 1956: "The future of plastics is in the trash can. . . . It [is] time for the plastics industry to stop thinking about 'reuse' packages and concentrate on single use. For the package that is used once and thrown away, like a tin can or a paper carton, represents not a one-shot market for a few thousand units, but an everyday recurring market measured by the billions of units" (Stouffer 1963).

Vance Packard (1960) and historians such as Susan Strasser (1999), Kristin Ross (1996), Jeffery Meikle (1995), and many others have written about how consumerism and disposability, as new patterns of wasting, had to be accompanied by massive efforts by producers and their allies to teach people how to waste, particularly given existing cultures where people valued frugality, making do, and reuse.

In changing economies, waste takes on new meanings and dimensions. This didn't start with consumer

culture and disposability. Jesse Goldstein's historical analysis of the meaning of "waste" in eighteenth and nineteenth century Britain charts how the term "wastelands" originally denoted common areas "between cultivated strips in an arable field, the spaces lining pathways and roads, or entire fields and forests without other designation . . . [that] can best be understood as a productive remainder. A wide range of occupations for cottagers, very literally 'cottage industries' relied on the waste's resources." (Goldstein 2013, 8, 9). Goldstein describes how these productive commons came to be understood as undercultivated, underused, and unproductive—and thus wasted—by state and private interests seeking to create a capitalist economy of ever-growing value. These wasted lands were enclosed, privatized, and then worked via wage laborers (many of whom had been dispossessed from their own lands) so land could produce surplus value "properly" and no longer be wasted (see also Harris 2004; Bhandar 2018).

In a similar vein of looking at the role of economic systems in making certain forms of waste, Marxian analyses of waste often focus on how capitalist economies based on increasing growth and profit must create some waste, from consumer items to landscapes, to produce value over time (e.g., Yates 2011; Horton 1997; Gidwani and Reddy 2011). While capitalism, where surplus value is the primary economic goal, certainly does lead to specific patterns of waste, some discard studies scholars have argued that *any* economic system predicated

on growth, including socialism and communism, will result in mass externalizations and waste. Growth requires accumulation and extraction that results in waste, no matter how labor, value, and the means of production are arranged (for work on growth and its relationship to waste, see Mueller and Passadakis 2009; Lepawsky and Liboiron 2015; for work on noncapitalist economies that produce waste because of their dedication to growth and production, see Gille 2007; Kao 2013). This is a crucial area of study, and much more work is needed in this area.

However, economic systems aren't necessarily the best or truest scale to understand waste from a discard studies perspective. Waste and wasting, pollutants and pollution, disposables and disposability, all happen at multiple scales and across multiple systems, events, and terrains. Discard studies must consider multiple scales and processes to understand waste. In fact, one trap within waste and discard studies is the allure of generalizing to the biggest scale available: the universal scale. So often we hear attempts to answer the question "what is waste?" once and for all, or we see statements such as "humans are wasteful!" or "we are all destroying the planet!" (we discuss the deep political problems of positing a universal "we" in environmental experiences and crises in chapter 4, but for an early view, see Heglar 2019; Whyte 2016b). These are examples of a tendency to universalize—to take instances and make them the whole, one of the greatest scalar mismatches of all.

Chapter 4 focuses on universalism, a theory that "certain principles, concepts, truths, and values are undeniably valid in all times and places and, by extension, the characteristics of phenomena are invariant. Universal knowledge is therefore the opposite of local, particular, and situated knowledge. It is transcendental, placeless, and untouched by context" (Castree, Kitchin, and Rogers 2013). Many critiques of universalism, including our own here and in chapter 4, argue that rather than locating one true version of the world, universalism is a type of aggressive "self-portraiture" that imperialistically expands a particular situated standpoint and understanding as the proper understanding of the world (Daston 2006; Somsen 2008).

As one quick example of this type of criticism of universalist assumptions, consider how the popular, pro-environmental ban on plastic straws that framed them as pollution was sobered by reminders from disability rights activists that

> able-bodied people are on board with the [plastic straw] ban because it has little effect on their everyday lives and leaves them feeling like they've done something ethical. . . . But a blanket ban could mean people unable to use their hands will need to rely on being fed by a person or carer. . . . By making them available only upon request you've put someone's quality of life in the hands of someone with little knowledge of disability (Bakar 2018; Wong 2019; Jenks and Obringer 2020).

There is no universal waste or discard. Wastelands used to be commons for shared use, until they became understood as spaces of wasted resources. Plastics were designed to replace the ivory and tortoiseshell goods that were endangering wildlife, then became an environmental problem of global proportions (Meikle 1995; 99% Invisible 2015). But neither are cases in isolation—both changes occurred within economic systems, geopolitical moments, advertising and legislation that served some needs over others. Discards are always defined and known through complex systems at multiple scales that can never be known by a single point of view, scale of analysis, or mode of study (Furniss 2017).

Defining Waste?

How might we deal with producing usable knowledge about something that is fundamentally relational? Brian Wynne, a scholar of science and technology studies, argues that a key characteristic of how waste is defined and practiced in regulatory structures that require standards, definitions, and categories is "indeterminacy" (1987). Indeterminate systems, he argues, are fundamentally open. It's not simply that there is a range of things waste can be and we simply don't know which items are waste at a given time (which would be uncertainty); rather, there is no finite and knowable range.

One of Wynne's examples is how two jurisdictions, the United Kingdom and the United States, regulate the same class of chemical compounds—polychlorinated biphenyls (PCBs)—as a category of hazardous waste (1987). PCBs are used in electrical equipment as coolants and insulators, as a plasticizer in paints and cement, and in plastic coatings of wires in electronics, among other applications. They are also toxicants known to be carcinogenic and to disrupt endocrine functioning in humans and other animals (UN Environmental Programme 2008). PCBs are central to the iconic pollution story of Love Canal, New York, where PCBs and other toxic chemicals were landfilled in an area that would later be sites for schools and homes, resulting in widespread cancer clusters in children (Gibbs and Levine 1982; Gibbs 2010; Newman 2016).

Despite the *known* toxic characteristics of PCBs, the United Kingdom and the United States regulate them quite differently. In the United Kingdom, concentration limits for PCBs in landfilled materials are set at 10 parts per million (ppm). In the United States, limits are set at 50 ppm, five times higher. While science can tell us that PCBs are toxic, it cannot say exactly which concentration limit is the best one. Not only are these limits simultaneously right and wrong (right from their own jurisdictional perspective, wrong from the other; right from some laboratory studies and metrics, wrong from other ways of knowing; right for some relationships between government and industry, wrong for others)

but also there is no neutral third party to which regulators or concerned citizens could turn to pass definitive judgment on whether one limit is ultimately right and the other wrong. Wynne writes that even though "waste" and "hazard" can be meaningful terms, those meanings "exist in a twilight zone where no clear, 'natural' definition of them can be given" (Wynne 1987, 1; Balayannis 2020).

This does not mean that "action to mitigate [waste] should be deferred until we have certainty about it. [Instead, discard studies is] concerned with quite a different problem: what is the right thing to do with waste despite the inherent uncertainties [and indeterminacies] that come with any attempt to know it?" (Lepawsky 2018, 105). Waste's indeterminacy can be a tricky issue when it's introduced into debates on what to do about waste (Hird 2012; Gille 2013; Hird 2013).

For example, the problem of indeterminacy can be used cynically by those who are interested in maintaining a status quo, a move made by US tobacco companies from the 1950s until the 1990s and again by climate deniers today (Oreskes and Conway 2010). Such interests may demand certainty about the actual or potential harms associated with toxicants before new or more stringent regulations on their use are enacted, even if such certainty is time-consuming, unavailable, or impossible to achieve scientifically because of indeterminacy. These techniques have, indeed, been used in plastic and chemical pollution debates (Oreskes and

Conway 2010; Shapiro, Zakariya, and Roberts 2017). Such demands are premised on an idea that indeterminacy is something that can be overcome by science and that only once the science is settled should regulatory changes be considered. However, as Wynne (1987) and many other scholars have shown, while science can offer trustworthy knowledge, it cannot ever offer universal proof (Cayley 2010; Jasanoff 2014; Rovelli 2014). Thus, demanding this kind of proof (i.e., certainty) as a precondition of regulating toxicants allows an indefinite deferral of action and the maintenance of the same (Oreskes and Conway 2010).

For discard studies, the intersection of indeterminacy, situatedness, and context poses crucial questions: How do you best act in situations where specific wastes can never be known with full certainty, where relationships aren't fixed? What is the right thing to do despite the indeterminacy of wastes? Where does the drive to define waste once and for all come from, and what work is it doing to reproduce some forms of knowledge, values, and worldviews and not others? While we argue that to define waste universally and ultimately is to misunderstand the situated and contextual nature of waste, we also know that waste definitions and classifications are not merely subjective and random. In the next chapter we talk more about the role of values and power in defining and controlling systems and their discards, but for now we might follow philosopher of science and technology Annemarie Mol (2002) and ask, When

people, places, or things are discarded by systems, what goods are being sought? What bads are being fought? And how is "the good" being set up as good in the first place?

Mol's questions are helpful guides for critically analyzing assumptions about what is good and right (normative assumptions) built into practical questions about what to do about waste. But normative assumptions are also part of how discards are theorized and conceptualized in the first place, including defining waste as a consumer problem; the goodness of cleanup as a solution to waste; the goodness of eradicating plastic straws; understanding recycling as a process that "saves oil" or trees or carbon emissions; and the idea that change happens when individuals collectively do small things. All are assumptions to be questioned: *How* do we know or assume these things and *why* do these truisms and facts circulate while others do not? Who benefits? Which truisms jump scales and obfuscate certain relationships, and to what ends? This line of questioning makes discard studies unique among types of research about waste and wasting—the shift from studying materials that are assumed to be stable, universal, and completely knowable as waste to a focus on the premises and assumptions about discards and how those assumptions reproduce systems of value and power.