

Landfill-Free in Missoula, Montana

A Personal Account

and

How-To Guide

on

Rethinking Waste

in

The Last Best Place

and

Beyond

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Preface & Acknowledgements

Jeff Kuehn, thank you for being an inspiration for this book. You once told me that you were going to go a full year without throwing anything away. I don't know if you achieved this or not, but not to be outdone, I decided to attempt to stretch that year into a lifetime (landfill free since 2010 and counting) exploring the land of "YIMBY."

This work would not have been complete without the help and inspiration of local recycling and sustainability practitioners like Jeremy Drake, Bob Giordano, Chase Jones, Steve Nelson, Martin NoRunner, Elizabeth Schenk, Edi Stan, and Professor Vicky Watson.

Thanks to the owners and operators of the funny little recycling center outside Philadelphia that would charge a fantastic rate to their customers who would drive to a facility only to be faced with the nebulous and unguided task of sorting through a vast array of materials on their own. What a fantastic racket! With any luck, this little book will educate the homeowner and business owner on best practices on how to avoid paying for such "services."

I also owe my wife Shanta a debt of gratitude for reminding me not to waste too much of my own time on waste. Rather than wasting time on circular discussions, I turned towards Staples CEO Mark Barkley and his model of the "circular economy." Thanks, Mark and Shanta!

Thanks to my parents. "Oscar the Grouch" is happier now, and the elephant is being consumed. Thank you, Nathan Hansen. Landfills will be the elephants dotting our landscape unless we have the courage to face them with the urban mining strategies you propose.

I must also thank the operator of the Anaconda-Deer Lodge County Landfill, Timothy Flynn, for sharing with me his feelings of helplessness in the overwhelming volumes of matter that he endlessly piles up every day, and Dennis Richards for coming to me looking for a solution to the ocean-bound plastic rivers formed by discarded water bottles from our relief efforts in Haiti.

I owe the citizens of Missoula for absorbing my "externalities." My neighbors in particular have borne witness to and borne with me in the YIMBY lifestyle. Let's use this neighborhood approach to build a recycling network of composting, upstreaming, manufacturing and sustainable energy practices in Missoula for the world to follow.

This work was also made possible in part with grants from the United States Department of Labor under the TAACCCT III SWAMMEI grant and the National Science Foundation Advanced Technology Education grant DUE-1400670.

1 YIMBY

When I was a child, the garbage man transfixed me. The truck pulls up, brakes squeal, two strapping young men hop from their monkey bars, fling the week's refuse into the jaws of the waiting Kraken, the driver actuates the hydraulics, hydrogen sulfide and methane belch from the gaping maw, and then the rulers of rubbish grab hold again, hanging in space above the suburban pavement to repeat their Sisyphean task at the neighbor's house ad infinitum. What adventure!

Now that I have grown to appreciate the consequences of 400+ PPM carbon dioxide and methane in planet Earth's atmosphere, I have come to question the romantic, carefree landfilling practices of yesteryear. Rather than sit back and admit to a stalemate, I decided to lean into the problem a little and see if I couldn't "be the change" that I and many others are anxiously anticipating.

The turning point for me to finally turn away from the landfill came in the form of a scolding finger being waved my way by one of those strapping young lads sometime in the fall of 2011. I, like the famous revelers of Arlo Guthrie's "Alice's Restaurant," thought "one big pile of garbage must be better than two little piles" as I casually tossed my two or three pounds of tampons, candy bar wrappers, and perhaps a vacuum bag into the Kraken of Columbine Road in Missoula. With a gentle scold, I was reminded that I was not a paying customer of our local private landfilling service. After retreating sheepishly to my garage, I vowed to remove myself from the landfill stream.

Although I have not been 100% successful, on balance I've diverted more matter from the landfill than I've contributed to it, having intercepted clothing, vacuum cleaners, railroad ties, lawn furniture, dishes, countless plastic bags filled with grass clippings, and numerous other artifacts and organics on their way to a methanous mountain of matter slowly growing on the northern edge of Missoula, Montana.

Having lived in the land of YIMBY, or "*yes in my back yard*," the antithesis of the notorious NIMBY, "*not in my back yard*," I've learned many lessons that I've striven to share in this text.

Since moving to Missoula, home of "A River Runs through It," downtown surfing, epic fly-fishing and numerous other outdoor adventures, in 2010, I have been landfill-free in this self-proclaimed Last Best Place. With one exception where time and sanitation did not allow, I have not placed any materials or artifacts into a waste stream that was headed directly for a landfill. The YIMBY philosophy has brought many materials and artifacts to my house, for the purposes of soil-building, construction or energy. This book is thus a tale of adventures in the land of YIMBY and has been written in a spirit intended to encourage others to join.

But before the long-winded academic writing style takes us too far afield, let me share with you the basics of zero-landfill practices in a one-page Quick Start Guide to help you and your family continue on your own path towards a sustainable future.

1.1 **QUICK START, 12-STEP GUIDE TO BECOMING LANDFILL FREE**

1. Make a vow to avoid putting anything in a landfill stream – that is, any place where it will become trash headed toward what we traditionally call “the dump.” This vow might seem daunting at first, but quickly becomes its own reward once you’ve experienced its practicality and sustainability.
2. Swear off “garbage can liners.” These masks hide our waste, and perpetuate the burying and piling up of plastics, metals, ceramics, clothing, topsoil, glass, paper, organics, food and complex chemicals in what are perhaps better dubbed as “landfulls.”
3. Start and maintain a compost pile or partner with a neighbor who has one. This is *the* solution to diverting all organic material from the landfill and creating invaluable nutrient-rich topsoil that our planet is losing at an alarming rate.
4. If you have a backyard, build, buy, or barter for a chicken coop and get two or three chickens. They will eat their way through most of your kitchen scraps. They’ll also entertain and feed you!
5. Put like materials with like materials. The goal is to “touch it twice:” once while the container, tissue, or wrapper is being used, and once as you send the chunk of spent matter on its way to be repurposed.
6. Get to know your neighbors. You’re bound to find someone as passionate about sustainability as you are. Swap trade secrets, materials, and various recycling tasks with him or her to build a strong and trusted network.
7. Be conscious of what you buy. It will help you avoid materials that can be challenging to recycle. Your home or apartment is merely a waypoint for the matter you bring into it. What comes in must go out eventually. You will determine the path of that Popsicle stick, chewing gum wrapper, pizza box or sofa cushion. Each of these artifacts came from nature and will ultimately return to nature either mindfully or by default.
8. Ensure that all your old clothes and fabrics make it to your local Goodwill or thrift store. Share this task with a neighbor. You might even find a treasure or two along the way.
9. Take old shipping and packaging materials to your local Shipping Depot or other packaging and shipping store. You’re likely to be rewarded with a discount on your next transaction.
10. Put your unwanted items up on Freecycle, Craigslist or eBay. If you’re too busy, give them to someone who will. There is a market for absolutely everything.
11. Donate your used electronics to a local charity that accepts them. The precious metals in these old gadgets will be put into service again, rather than becoming toxic landfill sludge or a hazardous gas to be inhaled by an innocent pair of lungs halfway around the planet.
12. Organize a triage station in your garage, mudroom, shed, or other transition zone to clean up your recycling piles and to make sorting easier. This will be the laboratory that saves you \$200 to \$400 per year: a buck a day for your commitment to sustainability.

1.2 INTRODUCTION: THE WORLD WITHOUT US¹

In the beginning, if in fact there was a beginning, there were no humans. That much we can agree upon. Before the dawn of humankind, stuff like light, matter, and a lot of empty space existed. After the supernova that gave birth to our galaxy exploded and cooled, and our solar system began its spiral dance, our molten proto-Earth cooled from the “waste matter” of that fateful explosion of the heavier elements. These heavier elements, especially carbon, nitrogen, oxygen, and phosphorous now constitute and fuel our metabolisms and our technologies (Chaisson 2001).

As the Earth cooled further and the oceans condensed, the land came alive with a multitude of organisms, some of them light-loving: plankton, algae, plants, etc. Next to emerge was an equally impressive array of organisms who made a living eating these light-lovers: platypuses, ducks, antelope, and the like (Dawkins 2004). In turn the metabolic mode of carnivorism emerged. This new set of meat-eating organisms makes a living gleaning energy on the go. Sharks, lions, and old *T rex* prefer their meals warm, fresh, and spunky. And most recently, our own ancestors emerged on the global scene as peculiar organisms capable of either eating or rendering edible nearly every living species on the planet (Pollan 2006). Our leftovers are consequently consumed by a multitude of microorganisms that methodically munch their way through the biosphere’s leftovers, and Earth’s gravity and weather consumes and sequesters whatever remains.

Regardless of how it all started (Campbell 1990) we’re here now living in what remains of the garden (Figure 1-1) that may be mythically or historically considered as the last point at which humans lived without technology, or perhaps at the dawn of what some Big Historians are calling the Anthropocene (Genet 1997; Christian 2008; Christian 2011). This garden era, either mythical or literal, was also certainly a time when we lived much closer to thermodynamic equilibrium (Prigogine 1990) with our natural surroundings.



Figure 1-1. Picture of the Garden of Eden with a vague reference to the food chain. Note the lack of waste receptacles (Jan Brueghel the Elder and Pieter Paul Rubens).

With the invention of the first technologies such as the hand-axe (Otto and Obermaier 1909; Anonymous 1910; Moir 1931; Moir 1932; Cornwall 1946; Mildenberger 1958; Seddon 1966; Josselyn 1967; Leakey 1973; Lalman 1978; Weber 1980; Mannchen 2001; Scott and Gibert 2009; Richter 2013), we began in earnest partitioning the matter contained in nature into “goods” and “waste.”

¹ Section title inspired by: Copyright Collection (Library of Congress) (2007). The world without US: a documentary, Weisman, A. (2007). The world without us. New York, Thomas Dunne Books/St. Martin's Press.

“Goods” and “waste” are not terms to be taken lightly. They are relative terms, of course. That sandwich wrapper, which is on its way to becoming *waste*, was quite *good* at keeping mayonnaise off your silk scarf. The ceramic butter dish that you just dropped on the tile floor had served you well for decades, did it not? Nevertheless, the sandwich wrapper and the broken dish are now part of your waste stream. But what to do with them? For the majority of modern Americans, the answer is to simply throw them “away.” But away to where? As it turns out, “away” is getting closer all the time. We’ll look into this in detail shortly through the eyes of sustainability guru Ted Carnes (2011). For now though, start to think of “away” as literally being out of sight, either down or up – buried or burned. Everything else is in between and still “here,” being built with.

Some of our more recent ancestors who left the Garden proceeded to invent a vast array of ways to harness the physical process known as “combustion,” or in common parlance “fire,” to make life safer, more comfortable, and all-around much better for themselves (Boyle 2004; Everett, Boyle et al. 2012). These “combustion technologies,” such as wood stoves, steam engines, internal combustion engines, coal-fired power plants, etc., not only made life safer and more secure for a substantial number of individuals of our own species, but also made many otherwise hazardous foods palatable and safe to eat through the practice of cooking (Perry, Kistler et al. 2015).

Eventually, money was invented, and for many humans who possessed the wherewithal to harness fire and technology, this trait generated tremendous monetary and material wealth for those who wrought them either to develop agricultural technologies or weapons technologies (Diamond 1997; Layton 2012). Through fits and starts, the Industrial Revolution eventually began, and the race was on to churn out bigger, more powerful, smarter, and deadlier technologies (Figure 1-2).

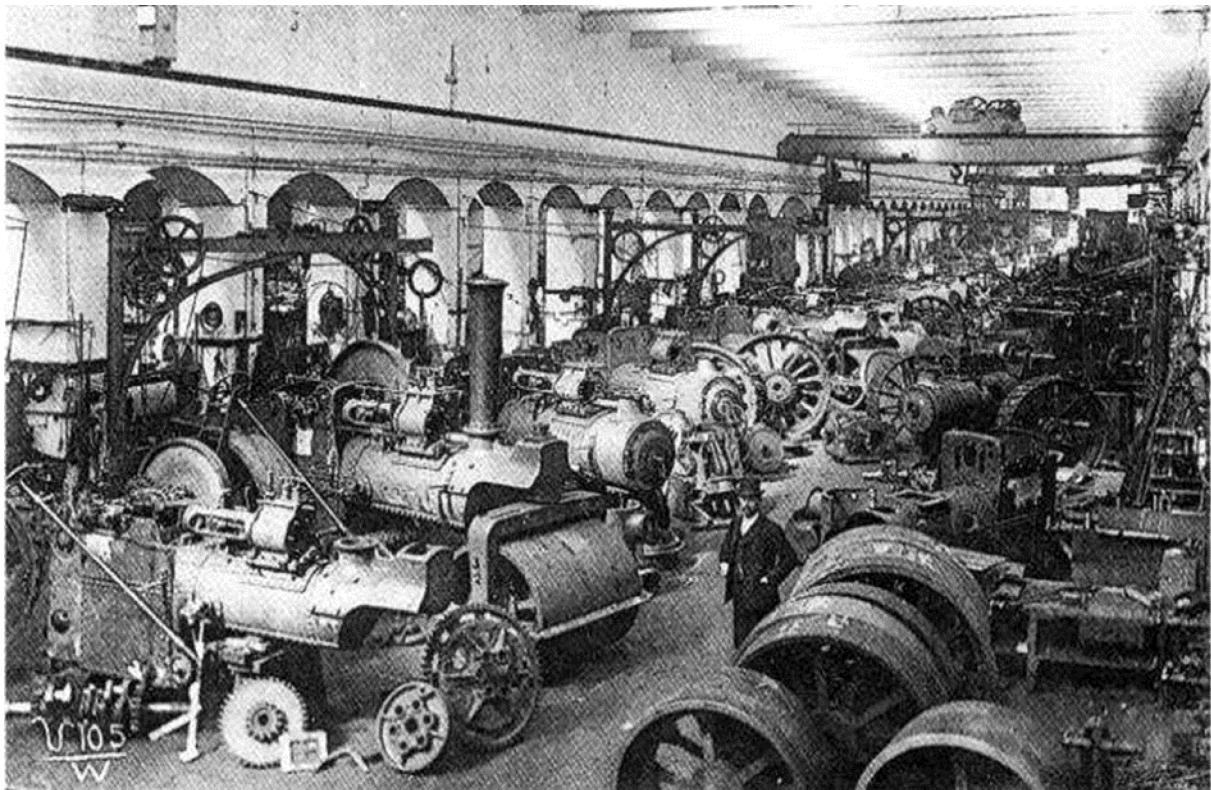


Figure 1-2. An example of early industrial technologies (Ruston Proctor Steam Engine Erecting Shop, c. 1910)²

Many of these technologies, such as forges, looms, and kilns, were capable of consuming [materials](#) and converting them into [artifacts](#). We had become so good at using the thermal energy released by fire to create useful materials and artifacts that we continued to do so, eventually finding even more exotic materials and modes of sculpting fire to craft the technologies that we know, love, and in some cases literally cannot live without (Figure 1-3).

Despite their life-saving, life-giving, and life-enhancing power, all of the technologies depicted below and indeed **all** technologies will ultimately meet their fate of being “worn out” and thus destined to be piled up or disassembled and distilled to their constituent elements. Recycling happens, either intentionally and mindfully in the present or “naturally” and valuelessly -- and in some cases harmfully -- in the future. What remains to be seen is whether “nature” will be able to process our waste in a sustainable manner, or if we will be further compelled to stay ahead of ourselves and the mounting waste streams we produce.

² <http://www.oldengine.org/members/ruston/History1.htm>

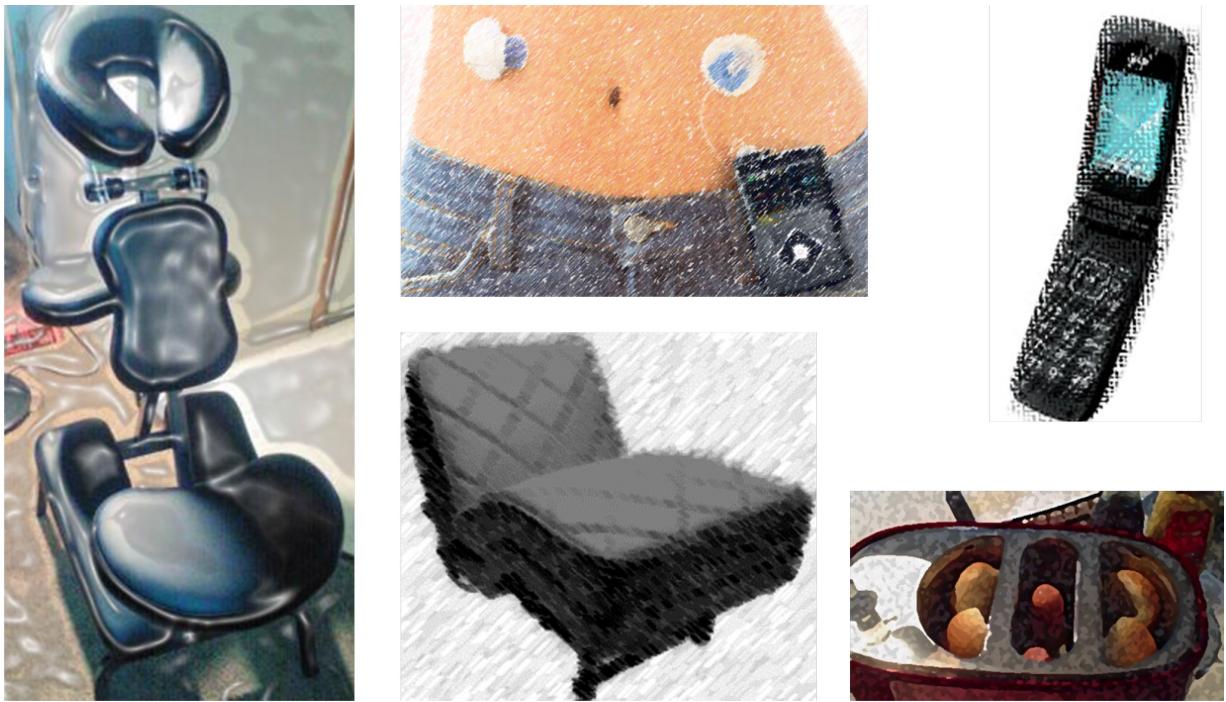


Figure 1-3. *Massage chairs, insulin pumps, cell phones, adjustable beds, and hot dog toasters represent technologies that have emerged very recently, are made of a large number of materials and components, and will ultimately have the fate of being “worn out” and thus destined for the landfill or a recycling stream.*

Our progression of cutting meat from bone, separating wheat from chaff, and now engineering the fabric of life itself to serve our metabolic needs has run in parallel with our technological ability to do things like extract ores from rock to make knives, cut boards from trees to make bowls, and condense oxygen from the atmosphere at the large scale to keep sick lungs from failing.

As nanotechnologists, we have now begun sifting through DNA fragments, purifying drugs and sorting other small molecules at the nanoscale in the medical and related fields. This sorting, separating, and purifying requires energy, and the primary challenge for coming generations will be how to continue sorting safely, efficiently, and harmoniously, without taxing the biosphere to the point of collapse.

Throughout history, we have always had the problem of ridding ourselves of and processing our own personal **biological waste**. Ineffective disposal and treatment of toxins or infectious agents leaving our bodies has resulted in and continues to lead to disease: cholera, food poisoning, MRSA, etc., are all examples of how the microscopic organisms that are fighting fiercely for their own survival are eating whatever biomass they can invade. Many leaps forward in science have been the result of exploiting microorganisms such as *Thermus aquaticus*, *Saccharomyces cerevisiae*, and *Penicillium chrysogenum*. One key to sustainable waste practices is the understanding and exploitation of the metabolic pathways of these microorganisms so that they can do the nanoscale sorting for us. (Calheiros, Rangel et al. 2014; Carvalho, Basto et al. 2014; Garcia-Rodriguez, Matamoros et al. 2014; Gupta, Chatterjee et al. 2014; Koptzik 2014; Padmavathiamma, Ahmed et al. 2014; Dadrasnia, Salmah et al. 2015; Fernando, Duarte et al. 2015; Gall, Boyd et al. 2015; Gomez-Sagasti and Marino 2015; He, Gao et al. 2015; Iqbal, Ahmad et