

Biodegradable

Biodegradable fashion is made from materials that easily break down in the environment, helping to reduce the energy used in manufacturing, minimizing landfill wastes, and protecting oceans from plastic pollution. Bet you never thought about whether you could compost your fashion!

THE ENVIRONMENTAL PROBLEMS WITH NON-BIODEGRADABLE PRODUCTS

Non-biodegradable products are a luxury of the developed world. These materials – including things like plastic, glass, and metal – which are sometimes called durable goods will not quickly break down in the natural environment. Whereas biodegradable materials have a chance of naturally being converted into something new (decomposing into rich organic matter in the form of compost), non-biodegradable materials take a very, very long time to break down, whether they're tossed by the side of the highway or sent to the landfill.

Most of the waste we send to landfills is non-biodegradable. Just take a look in your trashcan the next time you take it out to the curb. How much of that could you bury in your backyard and then dig it up again in a year to find it still there? The problem with products that are made from non-biodegradable materials is that if not properly recycled, they represent a huge waste of energy, raw resources, and landfill space. The result: a huge environmental burden, as you'll soon see.

HOW LONG DOES IT TAKE FOR MATERIALS TO DECOMPOSE?

To give you an idea of what is biodegradable and what is not, the following are some estimates for how long it takes various materials to break down:^{i ii}

- Banana peels: several days
- Newspapers: two to five months
- Rope: three to 14 months
- Painted wooden stake: 13 years
- Boot sole (conventional): 50 to 80 years
- Tin can: 80 to 100 years
- Aluminum can: 300 to 500 years
- Plastic bags: between 500 years and 1,000+ years
- Glass bottle: even longer!

Note that biodegradable materials like banana peels and newspaper take less than a year to break down, whereas non-biodegradable materials like tin cans and glass bottles take much longer. Think

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of the time it takes materials to break down as idle time in terms of being cycled through the natural resources system of the planet. The longer they take to break down into individual components like hydrogen, carbon, and so on, the longer those natural resources are locked up and unusable.

Even worse news is that time estimates are even longer when materials are dumped in landfills. That's because for sanitary reasons, landfills are lined with clay and plastic, and then sealed up in order to prevent leachate (the toxic liquid flowing out of landfills) from escaping into soil and groundwater. As a result, landfills are deprived of the decomposing assistance of oxygen and sunlight. Materials – biodegradable and non-biodegradable – break down even more slowly in landfills.

NON-BIODEGRADABLE MATERIALS AND LOST RESOURCES

Believe it or not, landfill mining may be the next big thing in natural resource extraction. That's because lost resources are perhaps one of the greatest tragedies of today's throw-away lifestyle. When we buy and toss cheap goods made of glass, plastic, metal, and other materials, we're actually throwing away resources that could be put to good use if upcycled, recycled, repurposed, and otherwise turned into something new. The most high-value materials sent to landfills include non-ferrous metals like aluminum and other scrap metals. But other useful materials include plastics, biodegradable waste (including wood, food waste, and organic textiles), and glass are also lost when tossed into a landfill.

In case you hadn't noticed, the most valuable landfill resources are also the least biodegradable because they simply don't breakdown within a human timescale. As a result, our landfills essentially become a treasure chest of materials that could be mined. Consider these two facts together:ⁱⁱⁱ

- Americans make up only 5% of the global population but consume 30% of the resources.
- The average American throws away 4.5 pounds of waste every day, much of which is non-biodegradable. That represents a huge waste of natural resources that take forever to break down in the environment!^{iv}
- We're running out of landfill space: The UK had 6 to 9 years left in 2007,^v the US had 20 years, so we will face serious landfill constraints in the next 10 years.^{vi}

But one man's trash is another man's treasure! Many enterprising companies recognize the potential of landfills and are looking for ways to recover these materials. Instead of cutting down forests, blasting the earth to get metals, or turning sand into glass, today many companies are looking into the vast natural resources that are contained in our landfills. Landfill mining involves the excavation, processing, treatment and recycling of deposited materials.^{vii}

One project in Belgium will dig up 16.5 million tons of municipal waste dumped in a landfill since the 1960s, recycling 50% of it, and converting the rest into renewable energy. The project will produce enough power for 60,000 homes.^{viii} The growing popularity of landfill mining is an

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economic – and environmental – indicator that we’re wasting an incredible amount of valuable resources, and it’s a trend we hope continues in the years to come, until we can develop a 100% recycle and reuse system instead.

NON-BIODEGRADABLE PLASTICS IN OUR OCEANS

Many non-biodegradable materials end up in our ocean, which means they pose several environmental hazards for these wild spaces. Plastic is probably the worst offender. In their raw form, plastic bags, plastic jewelry, and shiny metals pose serious hazards to marine life and birds. Approximately 44% of all seabirds, for instance, mistake plastic for food and try to eat it.^{ix} Turtles, fish, and dolphins are also known to mistake plastic materials for jellyfish and other natural foods. Of course, these creatures cannot digest these materials which wreak incredible havoc on their health.

When consumed by these creatures, these plastics can cause choking and intestinal blockages, both of which often lead to death. Some plastics, like the six-pack soda rings, pose strangulation hazards as well. By some estimates, 1 million seabirds and 100,000 marine mammals and sea turtles die every year because of ingesting or becoming entangled in plastics in the ocean.^x

But that’s not all. Non-biodegradable plastics that end up in the ocean are exposed to the sun, heat, and battered by the power of ocean waves, until they become tiny durable pieces of plastic. These tiny bits of plastic float at various depths of the ocean – some visible on the ocean surface, some not – making it virtually impossible to clean up. As a result, plastics are collecting in our seas where ocean currents collide – places known as ocean gyres. The most famous of these is the Pacific Ocean Garbage Patch or the Pacific Ocean Plastic Island. In the North Sea, Dutch scientists recently counted plastic in the ocean, estimating that there are about 110 pieces of litter for every square kilometer of seabed.^{xi}

When these plastics eventually become small enough to be swallowed effortlessly by fish, turtles, and birds, they no longer pose choking and strangulation hazards, but as they break down they add toxic chemicals to ocean water. Polystyrene (Styrofoam) for instance, decomposes in the sea leaving behind styrene trimer and bisphenol A. Styrene monomers are carcinogenic, and Bisphenol A can interfere with the reproductive and hormonal systems of marine animals and birds. This can significantly hamper the ability of various species to procreate.^{xii} That means species already at risk of endangerment, like turtles, aren’t able to reproduce quickly enough to replenish the species.

Needless to say, biodegradable materials like wood, paper, and cotton pose far fewer threats to our oceans. Even if they do end up in the ocean, they are more likely to break down quickly, and if consumed by wildlife they are often naturally digested, as long as they’re not laced with chemical finishes.

NON-BIODEGRADABLE PRODUCTION AND ENERGY CONSUMPTION

Manufacturing products made from non-biodegradable materials can also require more energy than making products made from biodegradables. When you compare wood products, for instance,

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to creating products from glass or aluminum, you find tremendous energy savings. The same is true for plastics.

- Engineered wood requires 14 times less energy to produce than glass, and 126 times less energy than aluminum.^{xiii} Hand-carved wood products save even more energy.
- Creating non-biodegradable plastic products requires 200,000 barrels of non-renewable oil daily. Biodegradable products can be made without oil, savings millions of barrels of oil every year.^{xiv}

And while it is true that plastics require less energy to create than glass or metal,^{xv} they also result in poorer-quality products that have a shorter lifespan. Plastics stop working more readily than other materials, which means they must be replaced more frequently. This can add to the lifetime energy expended to keep consumers stocked with plastic products.

NON-BIODEGRADABLE MATERIALS AND CLIMATE CHANGE

Even though non-biodegradable materials should never be sent to landfills, neither should biodegradable ones. That's because when we send biodegradable materials to the landfill, this organic material contributes to climate change. Remember how landfills are sealed up to prevent leachate from escaping? This also creates an anaerobic or oxygen-deprived environment. When biodegradable materials (often called biowaste) break down in an anaerobic environment like a landfill, they generate methane, a greenhouse gas that is 23 times more potent in terms of trapping heat in our atmosphere than carbon dioxide. Methane gas accounts for 5% of the world's climate emissions.^{xvi}

To combat this problem, some landfills have systems in place to capture methane gas and use it for producing electricity or powering vehicles. However, the US Environmental Protection Agency (EPA) estimates that only 34% of the landfills in the country have such facilities. Of the remaining landfills, another 31% of all waste goes to landfills where they let the methane escape, contributing to climate change.^{xvii}

That's right, even when you send your biodegradable waste to landfills, you contribute to climate change. So although there are many benefits to choosing biodegradable materials over non-biodegradable materials (see below), you should always handle your biodegradable waste with care. Don't worry, when organic matter is allowed to break down in a compost pile or a forest where oxygen is plentiful, these organic materials do not create methane and do not contribute to climate change.

BIODEGRADABILITY AND FAST FASHION

You'll find non-biodegradable materials all throughout conventional fashion. Consider synthetic rubber like a boot sole which can take 50 to 80 years to biodegrade. Metals used for jewelry and accessories like tin or aluminum require between 80 and 500 years to biodegrade. And plastic, which you'll find in synthetic fabrics like polyester can take up to 1,000 years to break down.^{xviii xix}

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Synthetic fabrics based on petroleum byproducts are also not biodegradable on a human time scale. At this point, there is no legal definition of biodegradable in terms of consumer messaging, so it can be hard for an eco shopper to know whether claims of a fabric's biodegradability are true or not. Virtually anything is biodegradable – it's just a matter of time – but there are definitely some textiles that break down more quickly than others.

Most consumers believe that fabrics are biodegradable, and by that, they believe textiles will “go away” within about a year. But that's not generally how synthetic fabrics behave when they're sent to the landfill or a composting facility.

Polyester and nylon: In general, polyester and nylon fabrics are not biodegradable, which means they cannot be composted. As a result, there is only one option for disposing of polyester and nylon which is through a melt spun fiber process to produce more fiber or film, that can be used in non-textile applications.

Acrylic: These textiles are also not readily biodegradable or compostable fabrics. Acrylic fabrics are made using highly toxic substances that may break down in the landfill, polluting soil and water – substances that must be carefully stored and can only be used in manufacturing processes that are closed.

Rayon, Lycra, Spandex: The same can be said for textiles like rayon, Lycra and Spandex, all of which are non-biodegradable and not compostable fabrics.

As you can see, many common textiles and other materials used throughout fast fashion are far from biodegradable. They therefore represent an environmental hazard that can be overcome by choosing fashion that is created using only biodegradable materials instead.

CREATING FASHION USING BIODEGRADABLE MATERIALS FOR A HEALTHIER ECOSYSTEM

So we know that non-biodegradable materials like plastic, glass, and metals are not considered eco-friendly because they require more energy to create new, pollute land and sea, and they take a long time to break down. If we all pledged to be held accountable for the recycling of reusable materials like plastic, glass and metals we would be in a much less serious situation ecologically. However, Biodegradable materials are an eco-product alternative! These materials, which readily decompose in the natural environment in a short span of time, provide a ton of environmental benefits. They include materials such as paper, wood, seeds, bamboo, porcupine quills, and so on.

BENEFITS OF BIODEGRADABLE MATERIALS

Biodegradable materials are those that can be added buried in the land or added to a compost pile and will biodegrade in a relatively short period of time into the most basic of components (such as water, carbon, and oxygen). Biodegradable materials are better for the environment because they do not add pollution, do not require energy for decomposition (in the form of chemicals or incineration), and add beneficial nutrients and biological matter to the ecosystem.

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Check out how choosing eco jewelry like wood or seed jewelry and other biodegradable fashion items helps the environment:

- **Conserving energy:** Generally it takes much less energy to produce products made of raw, biodegradable materials. That's because they generally undergo less of a transformation from their original state to finished product!
- **Lowering oil consumption:** The plastics industry consumes 200,000 barrels of oil daily to create the various products we buy. Products that are made without petroleum byproducts like plastic and synthetic textiles help to curb our appetite for foreign oil.^{xx}
- **Saving landfill space:** As a society, we are running out of room for our landfills, and every time we dispose of non-biodegradable materials in landfills, we use up more of this natural space for just dumping old stuff. Biodegradable materials that can be composted turn into usable compost that can be applied to landscaping and gardens. That means they don't require landfill space and instead contribute to a healthier ecosystem.

BIODEGRADABILITY OF NATURAL TEXTILES IN SUSTAINABLE FASHION

In addition to things like wood and seeds that naturally break down in the environment, eco fashion can also be created using textiles that do break down in a reasonable amount of time and do not create toxic byproducts in the process. The term "compostable" is a label that can be applied to product packaging for biodegradable textiles. This term is governed by the standards of ASTM D-6400, ASTM D6868, and EN13432, which says that if a label says "compostable fabric", a product must meet the following standards:

- 60% to 90% of the product must break down into CO₂ within 180 days in a commercial composting facility.
- 90% of the product must break down into 2mm or smaller pieces (called disintegration).
- Must break down into hummus.
- Cannot deposit heavy metals into the soil.

Here are some comparisons of non-biodegradable and biodegradable materials to give you an idea of how much better natural textiles and materials are for the planet:

- **Biodegradability of polyester and acrylic:** As acrylic breaks down, it releases toxins. What's worse is burning acrylic which can generate noxious fumes. Compared to cotton, polyester biodegrades much more slowly in a composting environment.
- **Plastic vs. wood and other natural materials:** A plastic bag can take up to 1,000 years to decompose, but a painted wooden piece of jewelry may take as few as 14 years to break down in the environment.^{xxi xxii} Materials such as wood, cork, quills, nuts, seeds, and shells

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are all biodegradable materials provided that are not overly treated with chemicals, paints, or varnishes.

- **Biodegradability of cotton:** Cotton in its natural state readily biodegrades. Even cotton with finishing treatments, like scouring and bleaching, softener added, and resin added, cotton biodegrades relatively quickly compared to polyester fabrics.^{xxiii}
- **Biodegradability of hemp:** This natural fiber is derived from the woody part of the plant, called the bast. It is made using material from the plant known as cannabis sativa. This highly durable fiber can be easily composted along with your kitchen waste, breaking down relatively easily.
- **Biodegradability of silk and wool:** Silk, alpaca, and wool are all used in a relatively unprocessed state and derived completely from natural resources, and therefore readily biodegradable fabrics.
- **Biodegradability of linen:** Here's a natural fiber made from the fibers of the flax plant. These fibers are broken down by bacteria through a process called retting (though there are also chemical retting methods which are less sustainable), and then spun into yarn. Linen is a 100% biodegradable fabric – even the byproducts of the flax manufacturing process are recyclable.^{xxiv}
- **Biodegradability of rayon:** Also known as art silk or viscose rayon, rayon is considered a semi-synthetic because it uses wood fibers (pine, spruce, hemlock) or even cotton, which are chemically changed to create a new textile.
- **Biodegradability of soy:** Soy fabrics require a bit more processing during manufacture, but the fabrics are still biodegradable.
- **Biodegradability of ingeo:** Ingeo fabrics can be composted in commercial composting facilities.^{xxv}

Our eco fashion Hearts line of products uses all sorts of other biodegradable materials to keep the environmental impact low. Here are some of the biodegradable fashion materials we use:

- **Abacá fiber and banana:** Made from the pulp of bananas or banana leaves, abacá fiber is used to make handbags and eco clothing. Abacá is usually cultivated in the Philippines, Ecuador, and Costa Rica, and is readily biodegradable.
- **Cork:** This is a material that is harvested from the bark of cork oak trees without harming the tree. Cork renews itself naturally over the period of 10 to 12 years after which it can be harvested again. And like the other plant-based fibers used in our eco fashion line, cork is highly biodegradable.^{xxvi}
- **Leaf fibers:** Pandanus tree fibers are harvested from the pandanus tree. The leaves of the tree can be made into ropes which are used to create bags, mats, and decorations. Piña fiber

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is derived from the leaves of pineapple plants and can be combined with silk or other fibers to make textiles used for eco clothing and handbags.

- **Seeds, shells, and nuts:** From acai berries, to tagua nuts, to tento seeds, to coconut shells, many of our biodegradable jewelry pieces are created using the fruits of trees and other plants.
- **Wood:** Wood jewelry is a hallmark of traditional handcrafts. And because it's composed of plant-based materials, wood jewelry and other wooden accessories are very biodegradable.

With each of our biodegradable fashion pieces, Hearts helps to reduce our consumption of oil, saves energy, reduces the need for landfills, and produces fashion that can be composted for a quick cycling of natural resources back into the planet.

GREEN LIVING TIPS FOR INCREASING THE BIODEGRADABILITY OF YOUR LIFESTYLE

If you want to incorporate more biodegradable materials in your life to reduce your impact on the planet, these tips will help:

- **Look for products made of natural materials:** If you have the choice, give preference to products made from things like wood, paper, seeds, nuts, and other plant-based materials. These will be composted and will quickly break down.
- **Reduce your packaging consumption:** You'll probably find the greatest quantity of non-biodegradable materials in the packaging you consume when you shop. Whether you're purchasing a new laptop or buying yogurt from the grocery store, the packaging you consume likely contains some plastic and metal. If you have the choice, always choose the least-packaged option, and definitely go for paper and cardboard before choosing plastic.
- **Process your waste responsibly:** While it is encouraging that some companies are mining landfills for resources, it is far more efficient to reduce your natural resource waste. Do this by 1) Consuming fewer non-recyclable goods (i.e. choose biodegradable), 2) Composting those goods that will readily decompose, and 3) Recycling those durable goods that can be turned into something new. In other words, don't toss your non-recyclable, non-compostable goods in the landfill hoping a company will reuse them!
- **Reduce your contribution to landfill greenhouse gas emissions:** The most effective way to overcome the (methane) greenhouse gas problem associated with the disposal of biodegradable materials is to ensure you send anything biodegradable to a compost facility or your own backyard compost pile. These systems should be rich in oxygen and other beneficial bacteria that break down the materials quickly without generating as much greenhouse gas emissions. So don't just dump your biodegradable fashion items like wood jewelry and organic cotton handbags in the trash – send them to be composted instead! Not only does this mean you'll shrink your carbon footprint, you'll also help create rich, bio-

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beneficial compost that can be added to your own yard or the landscaping in your city. Compost helps stimulate vibrant soil ecosystems, retain water, prevent disease and pests, and nourishes plants and other living creates.

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