MISSISSIPPI STATE UNIVERSITY EXTENSION

Recycled Glass Sand: An Introduction to Repurposing Waste Glass in Your Community

Figure 1. A) Small household glass crusher that can be purchased through online retailers. Photo by Dr. Sherry Surrette. B) An industrial glass pulverizer from Andela Products.

What is glass sand?

Glass sand is any glass that is crushed into sand-sized particles. The technical term "cullet" refers to crushed glass at any grain size, from a fine powder to gravel-sized particles. There are a variety of ways to crush glass, ranging from industrial crushers or pulverizers to at-home crushers (Figure 1). There are even handheld crushers available for purchase.

Glass is originally made from silica sand, which is obtained through mining and dredging. This sand is mixed with sodium carbonate, calcium magnesium carbonate, and limestone (all minerals found naturally in the environment) and melted at extreme temperatures. As the glass cools and solidifies, an amorphous silica structure is produced.

Sand is the second most used resource on Earth, after water, and is considered a nonrenewable, limited resource. Not all sand is the same because it varies by grain size and structure. Therefore, not all sand is suitable to be used for construction, agriculture, or glass manufacturing purposes. Due to a global demand for suitable sand, more sand is now consumed than is naturally produced, which has caused sand shortages in some parts of the world.

Glass is considered 100 percent recyclable and can be endlessly recycled without losing quality. However, only

31 percent of glass is recycled in the U.S. each year. Using waste glass cullet as a substitute for natural sand in glass manufacturing and construction has numerous benefits: it can prevent environmental damage that occurs through the mining and dredging of natural sand, free up landfill space, reduce greenhouse gas emissions, and save energy during the glass manufacturing process.

Is glass sand sharp?

No, glass sand is no sharper than regular sand! Although glass become shards when you drop a glass container, the process of crushing glass helps round out the particles, allowing it to be handled the same way we handle sand (Figure 2). Research at Tulane University shows that recycled glass sand is very similar in roundness to natural dredged sediments after it has been crushed or pulverized.

Figure 2. Glass sand made by Glass Half Full, a glass recycling company in New Orleans. Photo by Ansley Levine.

Is glass sand safe?

Glass sand is biologically inert, meaning that it does not leach any hazardous toxins into the environment above the regulatory thresholds for natural sand. Glass sand is also thought to be safer than natural sand when used for construction purposes such as grinding, crushing, or blasting. This is due to the amorphous silica structure of glass sand, whereas natural sand has a crystalline silica structure that is known to be carcinogenic. Health problems can occur when workers repeatedly inhale crystalline silica sand. To learn more about the health impacts from crystalline versus amorphous, visit the Agency for Toxic Substance and Disease Registry website.

Note: protective eyewear, dust masks, and gloves are recommended when working with glass sand or natural sand.

What are the demonstrated benefits of glass sand?

Chemical and geotechnical research studies have shown the suitability of crushed glass as an alternative to natural silica sand for construction, beach nourishment, and glass manufacturing. In addition, a variety of ecological research has been conducted that demonstrates the suitability of glass sand for plant growth, animal habitation, and human exposure. To learn more about ongoing research assessing the safety and suitability of glass sand in coastal communities, visit the ReCoast website.

Can plants grow in glass sand?

Glass sand has better drainage and compacts less than gardening or fill soil. At the Mississippi State University (MSU) Coastal Research and Extension Center in Biloxi, Mississippi, two outdoor mesocosm experiments were set up to compare coastal marsh plants' ability to grow in recycled glass sand versus local fill soil (Figure 3). Results from the experiment showed that glass sand can serve as a beneficial addition to rain gardens, restoration sites, or any location where drainage, as opposed to compaction, helps promote plant growth and reduces rainwater surface runoff and flooding.

Figure 3. Recycled glass sand experiments for coastal marsh plant growth at the MSU Coastal Research and Extension Center in Biloxi. Photos by Ansley Levine.

Figure 4. MSU Extension's Sustainable Communities Program has a laboratory-sized glass pulverizer.

Figure 5. Educators deliver programs about glass sand uses, such as in landscaping.

Figure 6. Extension offers garden demonstrations highlighting the benefits of glass sand.

Figure 7. Extension also provides youth and adult recycling programs.

What can I do with glass sand?

Crushing glass for local uses can reduce glass shipping costs while also saving landfill space and reducing greenhouse gas emissions. Crushed glass can be used locally for various applications, including home gardens, landscaping, swimming pool filtration, sand blasting, and golf course sand traps.

The MSU Extension Service's Sustainable Communities Program at the Central Mississippi Research and Extension Center is currently performing educational outreach and research on the benefits of increasing community recycling. Identifying ways to recycle glass waste is a top priority of the program because very little glass is recycled in Mississippi. This is primarily due to the lack of availability of local recycling programs and glass manufacturers. However, opportunities still exist to recycle glass locally and educate the public about the benefits of recycling. Figures 4–7 highlight how this is being done by MSU Extension.

Not only can glass be crushed at home or at local businesses, but local municipalities can also purchase glass pulverizers to make glass recycling available to their community. For instance, the Mobile County Commission was recently awarded a grant from the Alabama Department of Environmental Management to purchase a glass pulverizer.

Want to learn more?

The following Louisiana-based companies are pioneering solutions for recycling glass to promote sustainability in their local communities.

- Glass Half Full in New Orleans
  - Founded in 2020, Glass Half Full has expanded their residential and commercial glass recycling program from New Orleans to Baton Rouge, Bay St. Louis, and Birmingham.
  - Visit Glass Half Full's website to learn about how they expanded from a backyard operation to a successful business to promote glass recycling and more sustainable communities in the Gulf South.
- Backyard Sapphire in Lafayette
  - Founded in 2021, Backyard Sapphire crushes glass into mulch for home garden and yard uses in their community.
  - Backyard Sapphire has partnered with local businesses and organizations to promote community-driven glass recycling efforts in the southern portion of the state.
- Glass Act Recycling in Alexandria
  - Founded in 2021, Glass Act Recycling offers residential glass pickup in Alexandria.
  - The company sells their crushed glass to make a variety of products, including landscaping materials, sandbags, sandblasting materials, glass jewelry, and construction drainage materials.

Links

Andela Products. https://andelaproducts.com/

Backyard Sapphire. https://www.facebook.com/BackYardSapphireRecycling/

Cost Savings. Strategic Materials, Inc. https://www.smi.com/glass-recycling-financial/

Glass Act Recycling. https://www.glassactrecycling.com

Glass Filtration Media. https://www.ecosmarte.com/glass-pack-filter

Glass Half Full. https://glasshalffull.co/

Glass Cullet. https://ftp.dot.state.tx.us/pub/txdot-info/gsd/pdf/yrr_feb.pdf

Recycling Glass for Coastal Restoration (ReCoast). https://www.recycleforthecoast.org

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Peduzzi, P. (2014). Sand, rarer than one thinks. *Environmental Development, 11*, 208-218.

Waste 360. Beach in a bottle. https://www.waste360.com/industry-insights/beach-in-a-bottle

Notes

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