The Circular Installation

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Ubiquitous in our studios and environmentally corrosive: Rigid Foam, FoamCor, Acrylic, and PVC to name a few examples, are energy intensive, toxic to produce and persistent. These persistent materials may try to find an alibi for use in the longer life of a building, but in an architectural model or installation, that alibi falls apart. A model's serviceable lifespan may be a mere twenty minute presentation followed by twenty minutes to photograph, and then into overflowing waste bins whose contents flow to a landfill where they will last through millennia (Figure 1).

The Circular Installation Studio confronts the disconnect between the nearly eternal lifespan of our materials and the exceedingly short lifespan of the physical artifacts of our design process. We confront this issue through materials research and experimentation, materials analysis, design of temporary physical artifacts, and disposal of these artifacts. Thereby the studio provides a window into material flows, from whence they come and to where they go, giving students a greater appreciation for how their choices impact the environment.

The studio is divided into five chapters: Part 1: Bodywear; Part 2: Materials Research and Experimentation; Part 3: Installation Birth and Life; Part 4: Disposal and Rebirth; Part 5: Book. Each chapter includes themed readings and creative interventions, imbuing students with a greater appreciation for how their choices impact the environment and arming them with skills to make a difference. While the studio is predicated on an ecological definition of circularity, students are provided readings and introduced to precedents involving recycling and reuse as well. They are invited to answer for themselves and through their projects: "What does it mean to be circular?".

Figure 1.Dumpsters following final reviews in studio. Image credit: Isabella Greco

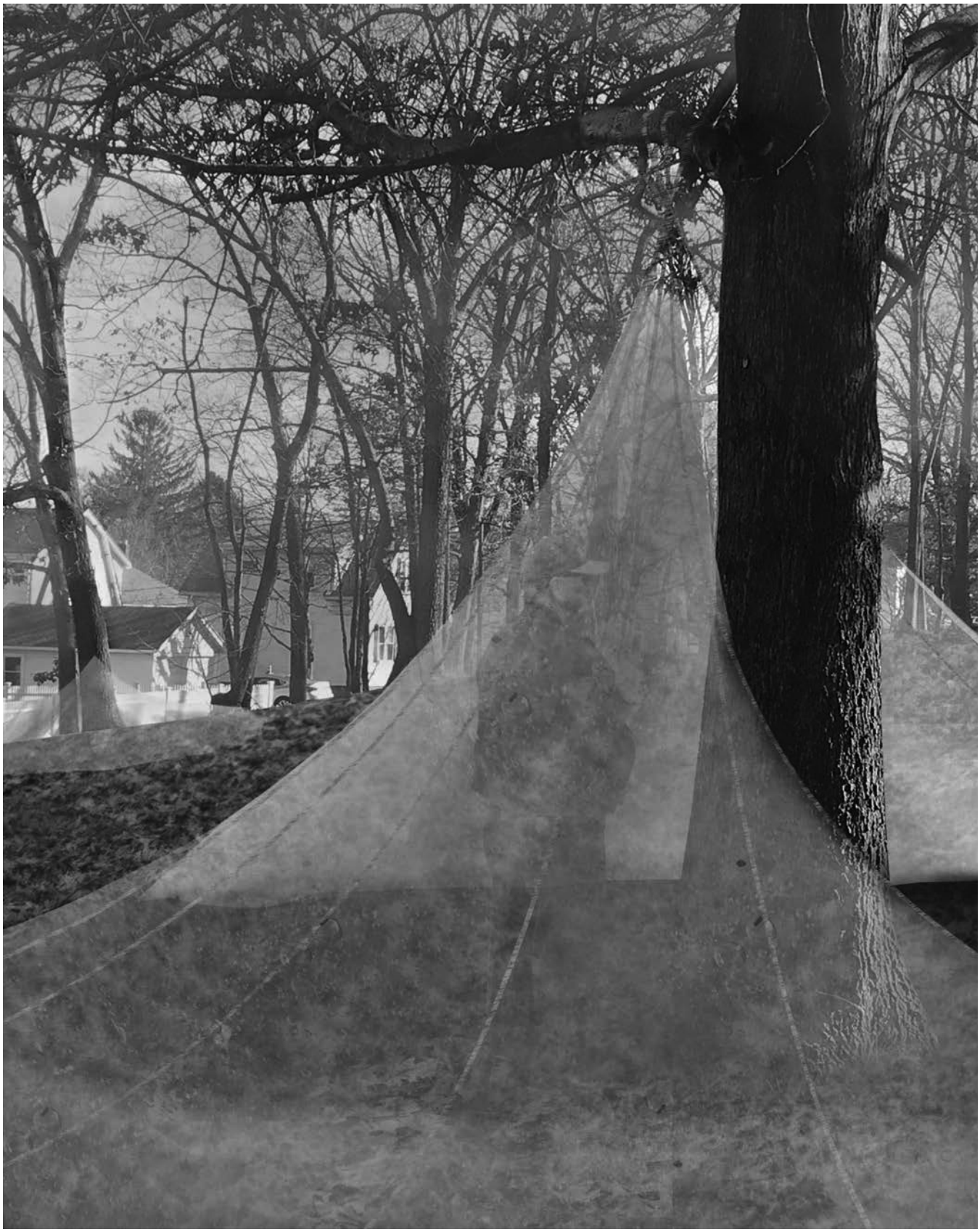

Figure 2. *Biokilt* biodegradable installation proposal. Image credit: John Branagan.

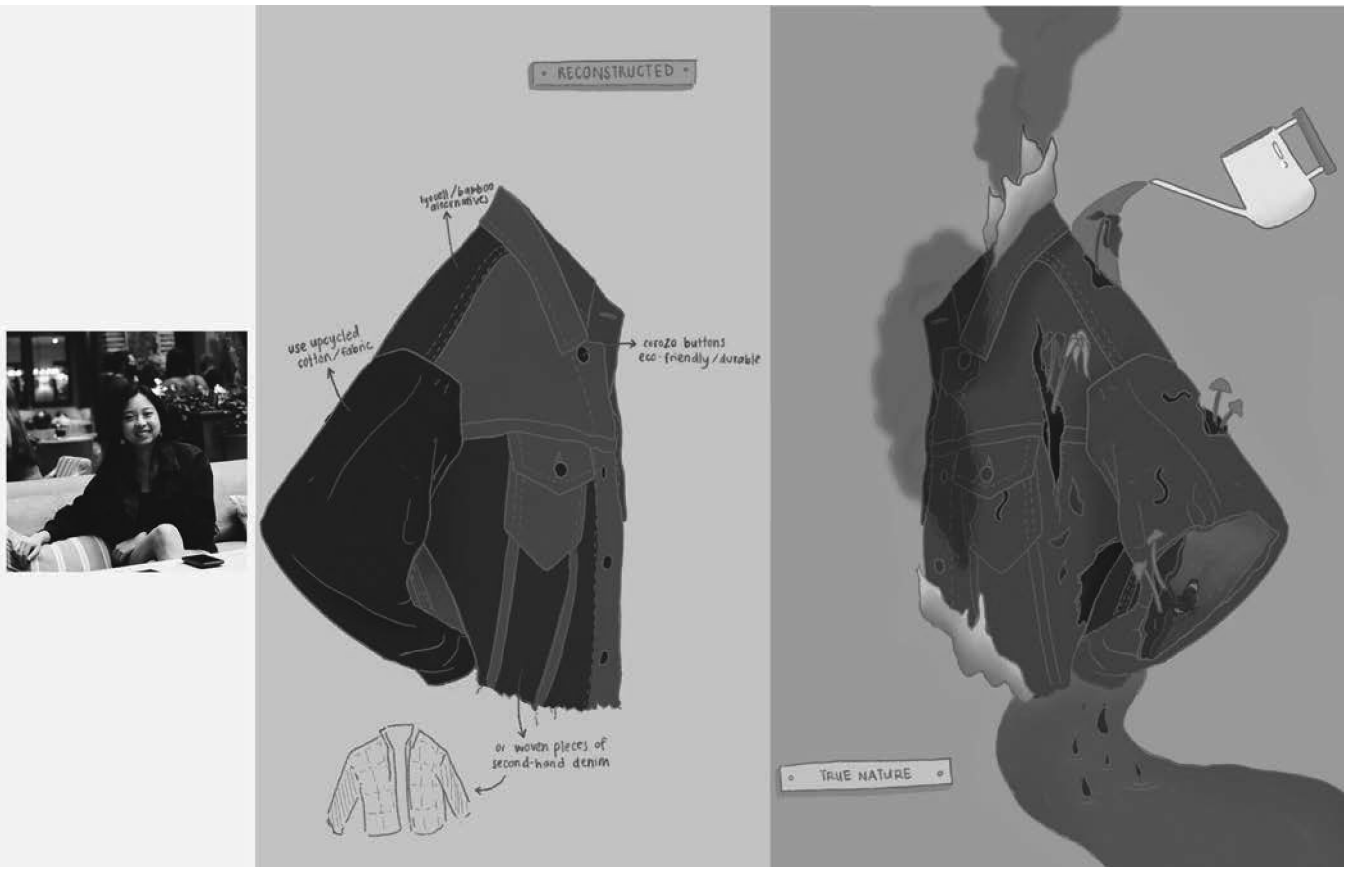

Figure 3. Bodywear narrative illustrations. Image credit: Anastasia Angkasa.

Part 1: Bodywear

Students begin by looking at wearables and the connections between the fashion industry, individual consumers, and environmental degradation. Students choose their favorite wearable item and write an illustrated love letter to it, describing its beloved features and affordances, practical and emotional. After reading excerpts from Dana Thomas's incriminating book, *Fashionopolis: the price of fast fashion and the future of clothes*, students research their wearables including: manufacturing and labor practices of the company that made the item; the materials from which the items were made; and the environmental impacts of those materials. Following this research, students represent how their feelings toward their beloved item have changed, and then sketch the transformation (Figure 3). Then students create a wearable response as a creative entrypoint into thinking critically and expressing ideas through an artistic intervention, as well as, into making at one to one scale through sewing.

Having set the stage for critically-minded interventions with a focus on environmental and social issues, and also having whetted an appetite for making physical objects during our remote semester, we begin the next chapter.

Part 2. Materials Research and Experimentation

Students receive supply kits, carefully packed and delivered by their professor. These kits include algae and seaweed-based extracts such as Agar Agar, Kappa Carrageenan, Carrageenan Iota, Spirulina, and Alginate (Figure 5). In their own kitchens, students combine these materials with glycerine, water and various other waste products like egg shells, coffee grounds, newspapers, leaves and mushroom spores, to create and cast bioplastics with different properties (Figure 4). Students share their experiments with each other and discuss the merits of these materials for practical use (Figure 6).

Following the experimentation phase and with guidance from faculty with expertise in material assessment, students perform analytical studies of the sourcing and environmental impacts of their materials to create life cycle assessment diagrams. In concert with this studio, civil engineering students in Associate Professor Matthew Eckelman's Life Cycle Assessment class, analyze a few key materials in particular through a quantitative Life Cycle Assessment. They compare polyethylene, nylon, and an algae-based bioplastic in terms of the following environmental impacts beyond biodegradability: Carbon Footprint, Acidification, Carcinogens, Ecotoxicity, Eutrophication, Fossil fuel depletion, Global warming, Non

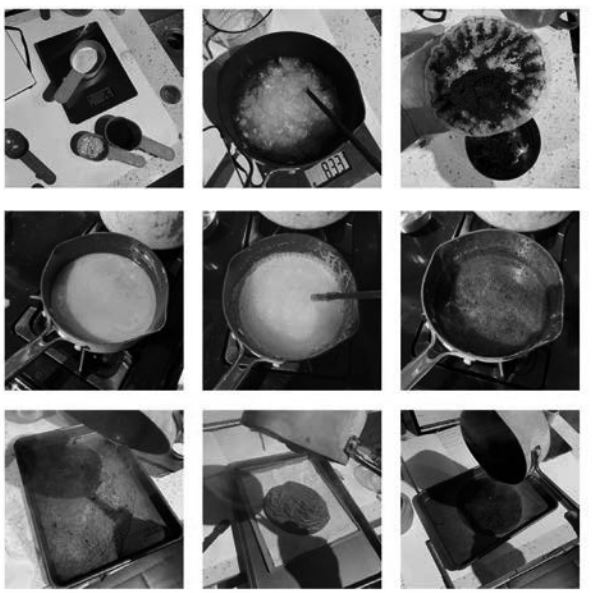

Figure 4. Materials experiments.Image credit: Jinhui Gu.

Figure 5. Start-up materials kit. Image credit: Jinhui Gu.

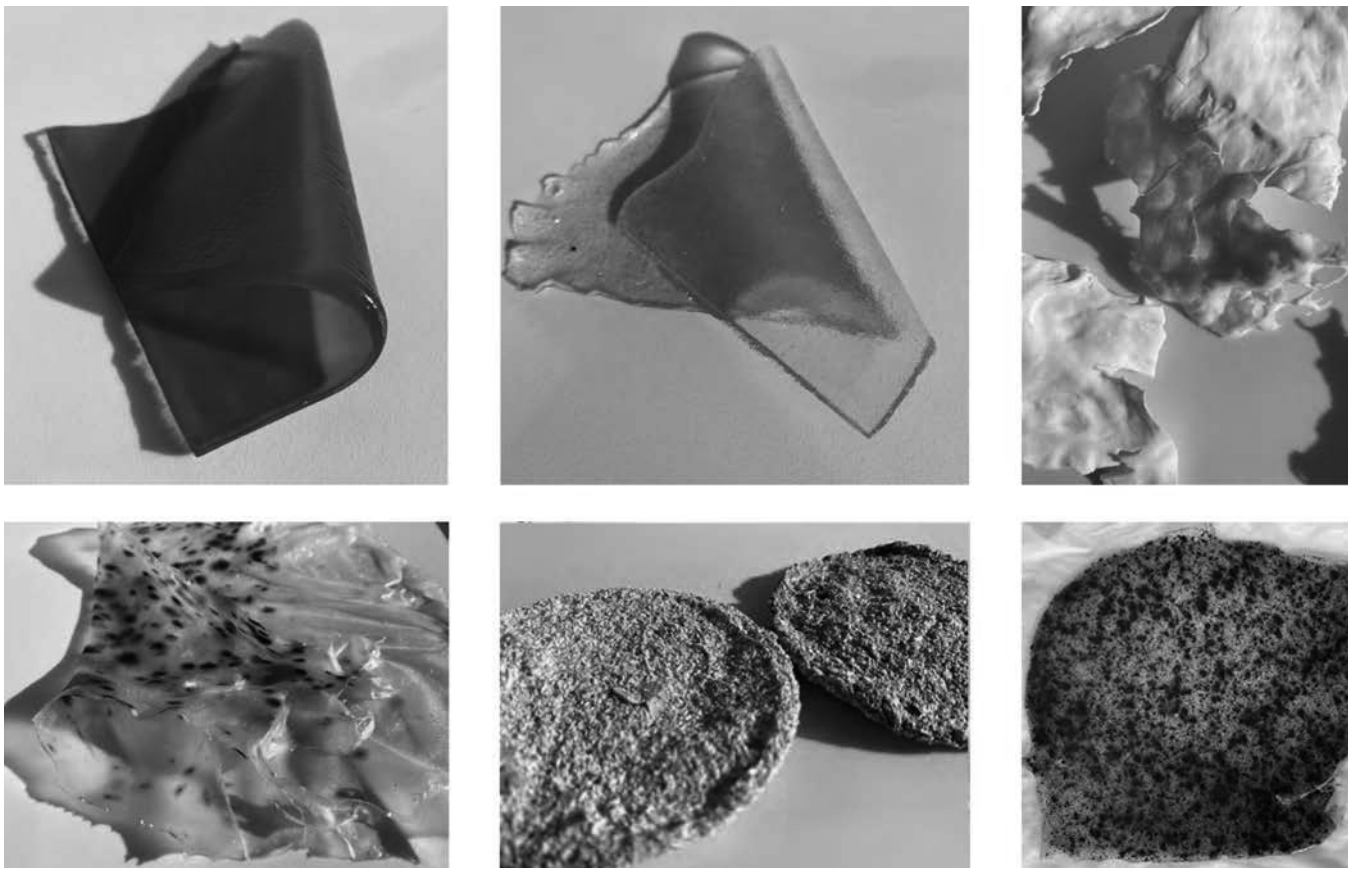

Figure 6. Materials experiments. Image credit: Mia Arenburg.

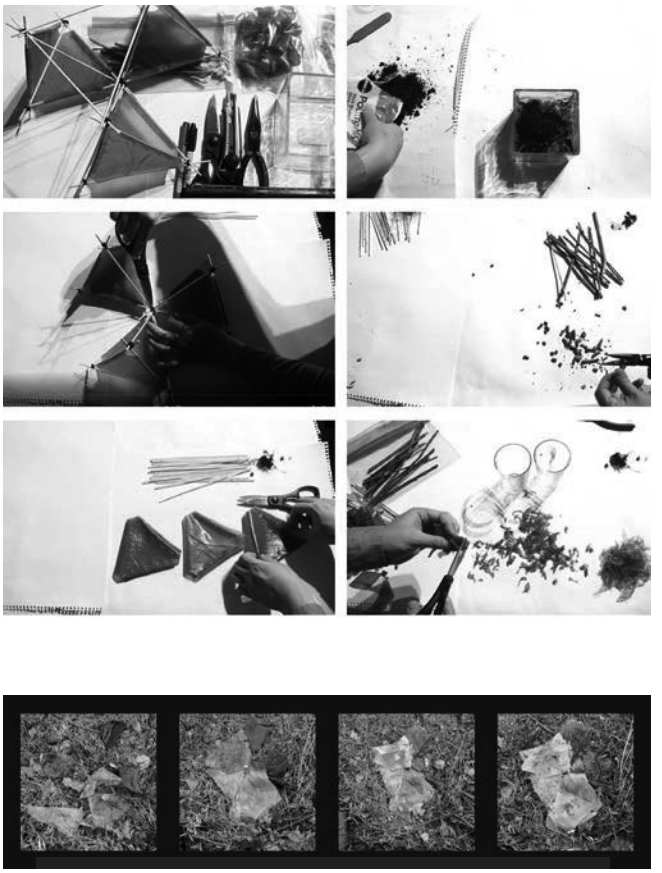

Figure 7. Composting prototypes. Image credit: Jinhui Gu

Figure 8. *Bio-folly* full scale unit prototype. Image credit: Jinhui Gu

carcinogens, Ozone depletion, Respiratory effects and Smog. The civil engineering students present their research to the architecture students. They also attend critiques and provide meaningful feedback to the designers on the impacts of their material choices.

Part 3. Installation Birth and Life

The design intervention phase builds upon materials research and experimentation, prompting students to form these materials into a temporary spatial installation for a design festival. Due to the remote nature of the studio, students work independently on projects that fit within the home workspace. Projects range from bodywear to spatial installations where students build a full-scale component of a larger project (Figure 8). Following this phase of the studio, students present their work at a virtual review juried by outside critics. Students are assessed by the conceptual rigor and craft of their projects, as well as its "nutritional" value and promise for circularity.

Part 4. Disposal and Rebirth

The next stage of the studio is the ceremonious disposal of the projects, when they are given back to the earth in the form of composting, decomposition into parts that can be reused, or even consumption by the designer (Figure 7). Students document this final act through video, drawings and analytical diagrams that tell the story of the future life of their projects as they are metabolized by human and non-human actors.

Part 5. Book

Finally, students combine all of their process work, final proposal and material disposal into a book which concludes with a personal reflection on the meaning of circularity in architectural design.

SELECTED SOURCES

1. Anne Beim, et al. *Towards an Ecology of Tectonics: The Need for Rethinking Construction in Architecture.* (Stuttgart: Edition Axel Menges, 2014).
2. J. Brizga, K. Hubacek, and K. Feng. "The Unintended Side Effects of Bioplastics: Carbon, Land, and Water Footprints." in *One Earth*, 3 (1), 45-53, 2020. ISSN 2590-3322. https://doi.org/10.1016/j.oneear.2020.06.016.
3. Beatriz Colomina and Mark Wigley. *Are We Human? Notes on an Archaeology of Design.* (Zürich, Switzerland: LarsMuller Publishers, 2016).
4. Elisa Iturbe, ed. *LOG 47 - Overcoming Carbon Form.* (S.l.: Anyone Corporation, 2019).
5. William McDonough, and Michael Braungart. *Cradle to Cradle: Remaking the Way We Make Things.* 1st ed. (New York:North Point Press, 2002).
6. Dana Thomas. *Fashionopolis: The Price of Fast Fashion & the Future of Clothes.* (New York : Penguin Press, 2019).
7. https://materiom.org/.

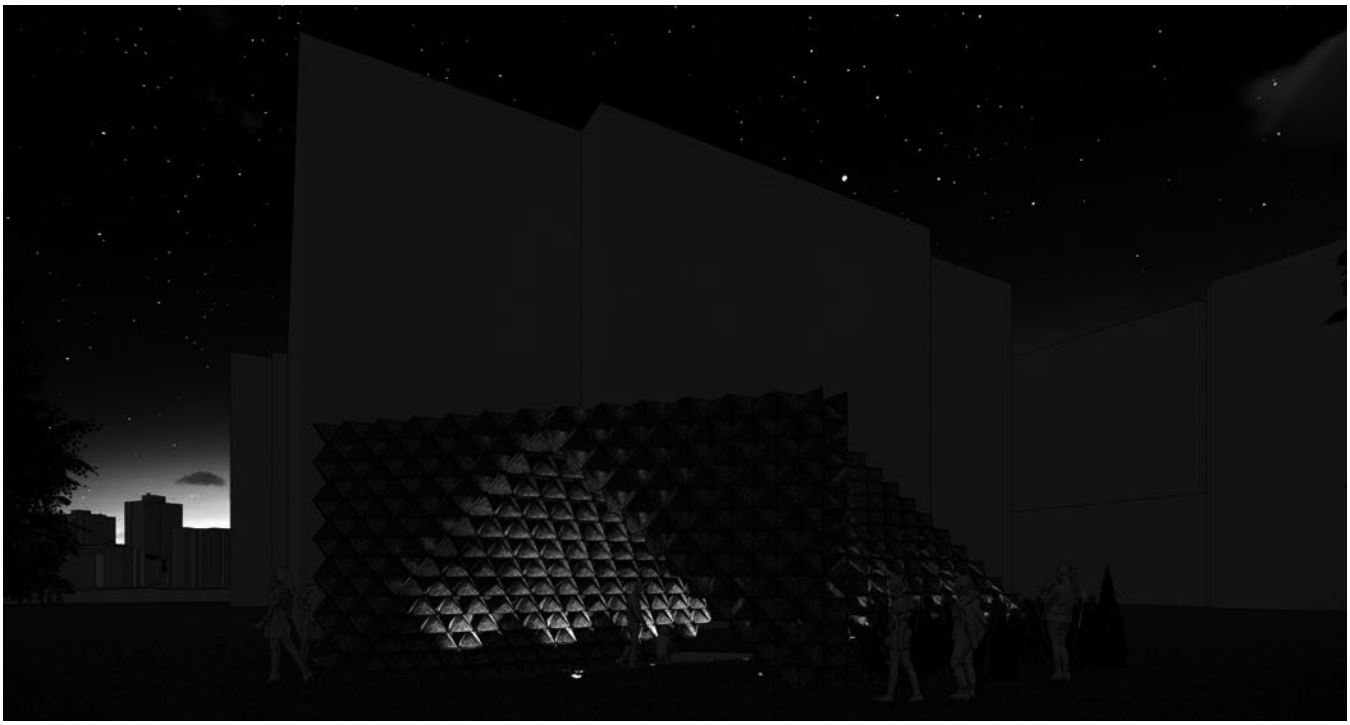

Figure 9. *Bio-folly*. Biodegradable installation formed from algae-based film and twigs. Image credit: Jinhui Gu.

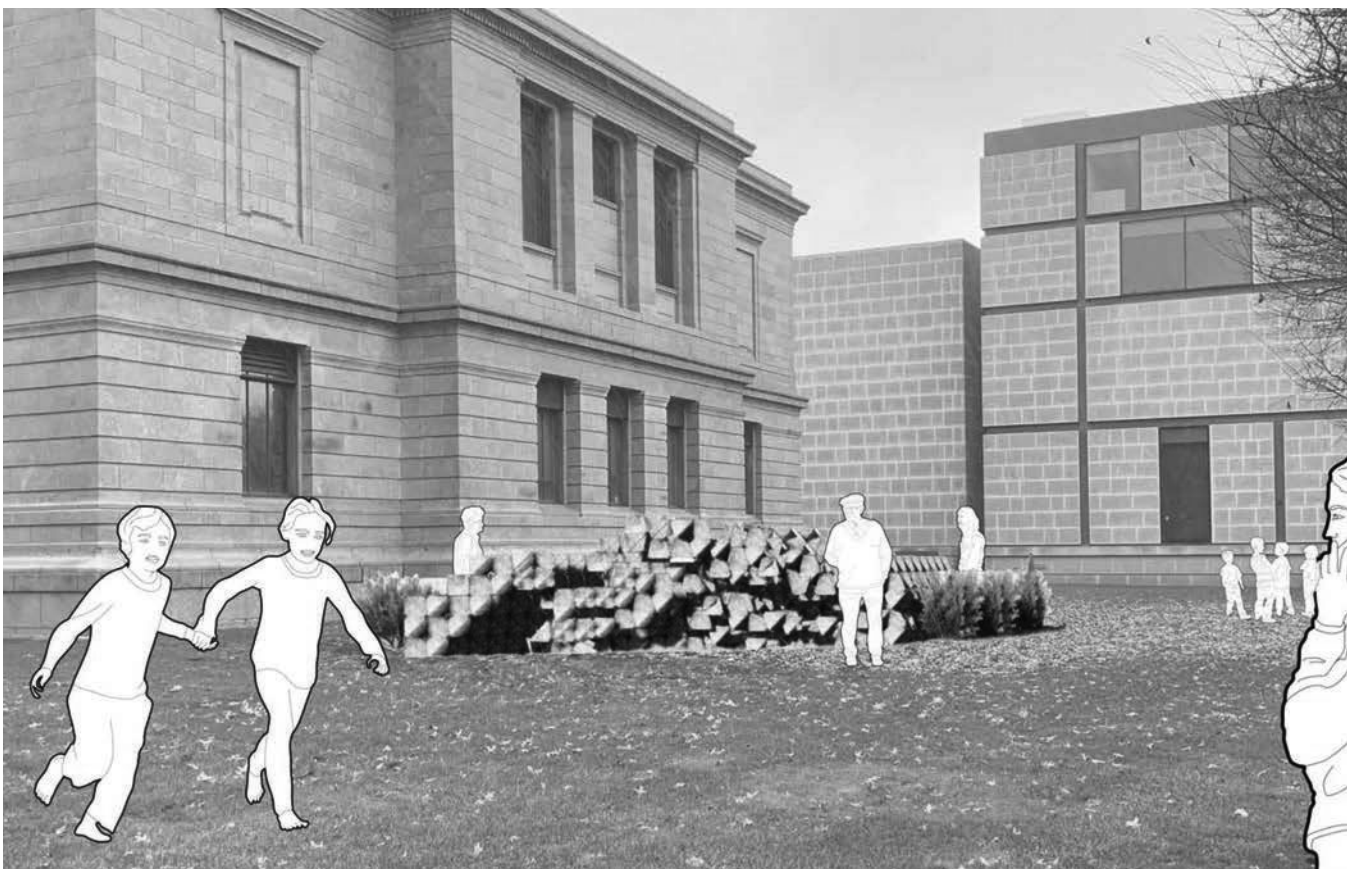

Figure 10. *Bio-folly* decomposing on site. Image credit: Jinhui Gu.

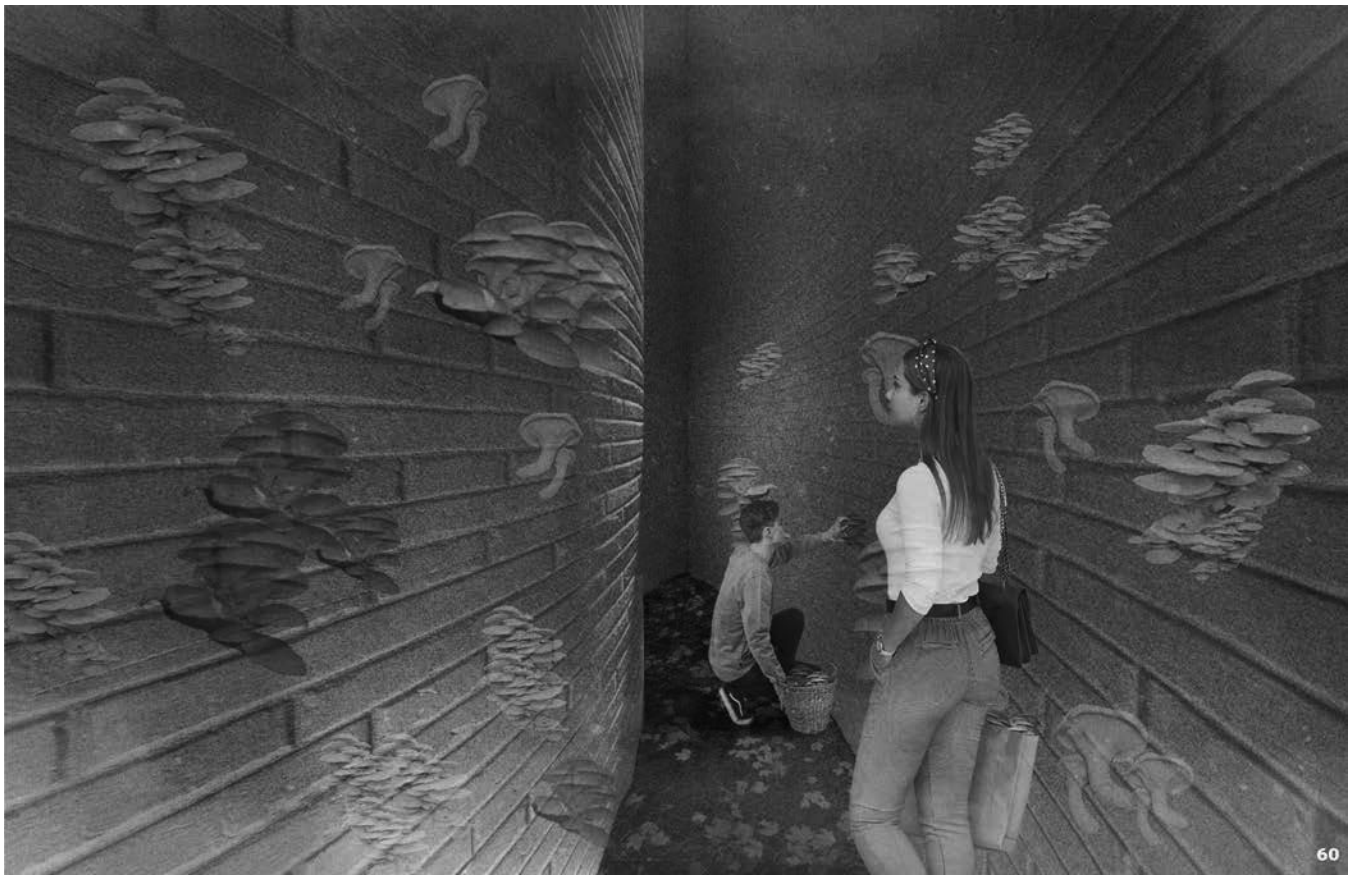

Figure 11. *Charnel Meditation* urban agriculture and meditation space from baked and active mycelium blocks. Image credit: Matthew Miller

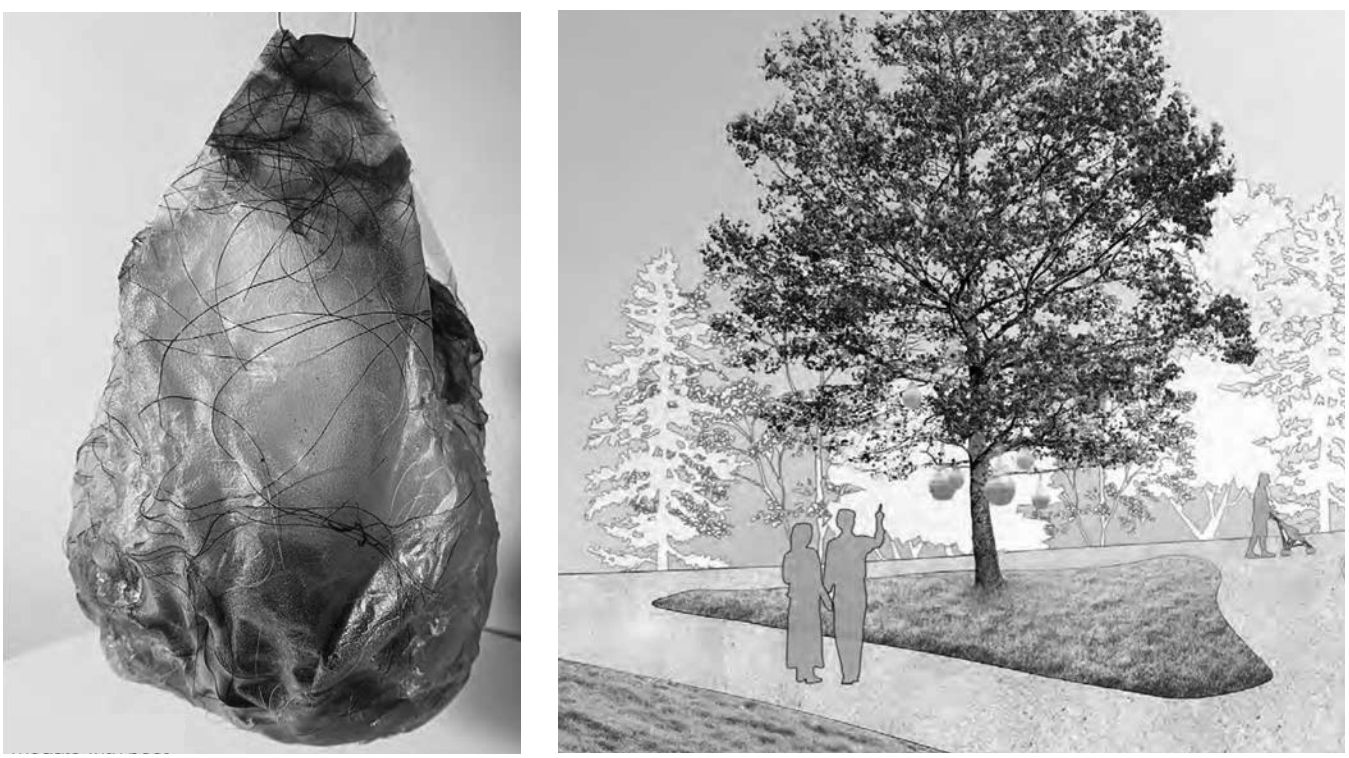

Figure 12. *Trophic Terrarium* prototype for a DIY biodegradable guerilla gardening tool. Image credit: Mia Arenburg