Volume 3: What Could it Be?

Forming: Environment as Material, Landscape, Art

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This project has been generously supported by the Dietrich Inchworm Grant at Hamilton College.

Forming

Vol 3: What Could It Be?
Rebecca Murtaugh

What was surprising?
The growing connection and importance between my scientific research and its impact on my studio practice.

Soil is always in flux, it is a complex and transformative living system that can absorb, release, and filter water. I've been considering how this translates to fired ceramic and began to research the scientific and historical use of ceramic water filters in resource limited settings from antiquity to modern day.

Right:
Filter II (#17 P)
ceramic & glass
7.5" tall, 6" diameter
2025

Below:
Filter I (#17 W/Y) detail

What Could it Be?

What findings does your engagement suggest?
Each harvested clay has different physical characteristics both in the raw and fired state, such as shrinkage rate (which is due to the varied materials that naturally comprise each clay) even when harvested in very close proximity from the same site. This, in addition to the maturation firing temperature impacts its porosity potential.

Left:
Filter I (#17 W/Y)
ceramic & glass
6” tall, 5” diameter
2025

Below:
Studio view of works

To begin, I created a number of funnel shaped vessel molds made from cotton canvas on my sewing machine. I then created paper coddle forms to support them. When designing and sewing these canvas funnel molds, I've been thoughtful to consider how surface area can be manipulated. More seams increase surface area and absorption capability. Whether the canvas mold is filled with the seam on the interior versus the exterior, the surface area can be enhanced.

Five Filters
ceramic
7" x 12" x 7"
2025

The process allows for a full translation of the source material, the history of the texture of the canvas and the sewn seams. In this process, the weight of the casting slip begins to morph and contort as it is painted thicker and as it dries. It remains in flux for some time while wet and each sculpture is unique even when the canvas funnel mold is sewn from the same template pattern.

Filter III (#17 W/Y)
ceramic & glass
11” tall, 11” diameter
2025

How could you continue?
I am just beginning this series and eager to further explore its potential in the studio.

I’m driven to learn more about the potential of new sculptures to act as water filters to mitigate contaminated water. This direction in my work is the result of collaborating with Melody and Justin on this project over the past year. Bringing utility to this work and conversing with this subject is an exciting prospect.

Volume 3 References:

Baker, M. N. The Quest for Pure Water; the History of Water Purification from the Earliest Records to the Twentieth Century. American Water Works Assn., 1949.

Mellor J, Abebe L, Ehdaie B, Dillingham R, Smith J. Modeling the sustainability of a ceramic water filter intervention. Water Res. 2014 Feb 1;49:286-99. doi: 10.1016/j.watres.2013.11.035. Epub 2013 Dec 3. PMID: 24355289; PMCID: PMC3924855.

Yang, Haiyan, et al. “Ceramic Water Filter for Point-of-Use Water Treatment in Developing Countries: Principles, Challenges and Opportunities.” Frontiers of Environmental Science & Engineering, vol. 14, no. 5, 16 May 2020, https://doi.org/10.1007/s11783-020-1254-9.

Photo Credit:
Jason Mandella for Rebecca Murtaugh’s photographs.

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Vol 3: What Could It Be?
Melody Stein

What was surprising?
Over the course of a year of inquiry into constructed floodplains and wetlands, the following topics continue to surprise and intrigue me:

The Necessity of Interdisciplinarity:
The role of interdisciplinary collaboration was a constant. From Dr. Colleen Doherty speaking about her work with an optical engineer to image rare earth elements in plant cells, to Dr. Hester collaborating with chemists to design remediation experiments, it became increasingly clear that not only do the greatest breakthroughs arise from teams rather than singular individuals, but that they arise from teams of individuals who do different things.

Interdisicplinarity was one of the foundational ideas in this grant as well. Rebecca, Justin, and I met frequently and shared our at times divergent, at times convergent research throughout the year. It was exciting to see how influences, leads, and ideas sprouted differently in each of our practices.

Design as Choreography:
I've been thinking a great deal about creativity: how certain disciplines, say architecture or sculpture, have different degrees of creativity, different levels of constraint. The design of functional land-based systems--landscapes, in other words-- deemphasizes and redefines creativity. Rather than creating something from nothing, landscape design organizes environmental processes and living beings using time and sequence as a medium. The design of a place is neither the pure imposition of ones will nor simply letting the land do what it would on its own, but rather is a reaction to and reconciliation of existing conditions and future intent.

What would it be like to bring reactive, reciprocal,

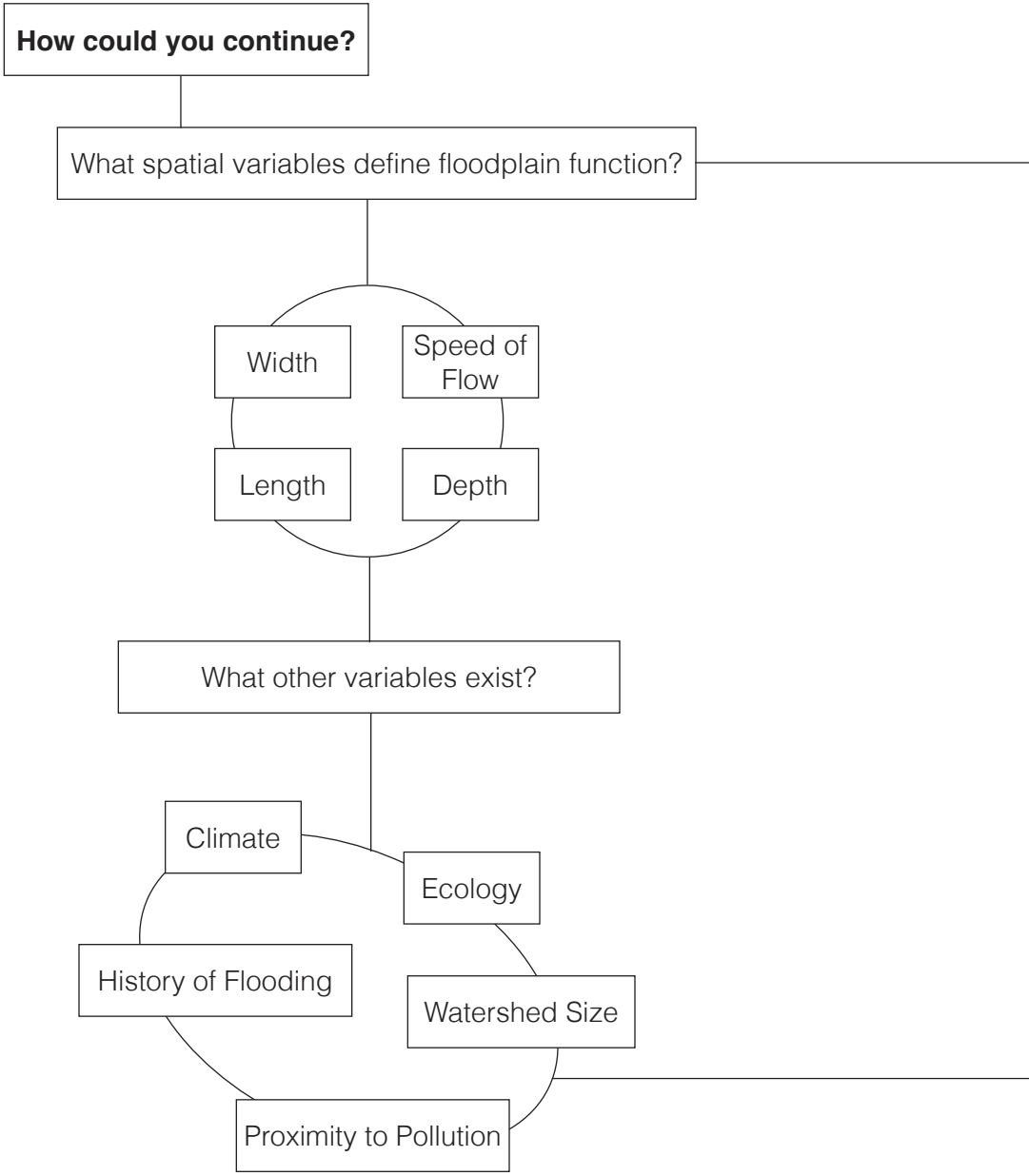
and choreographic ideas of creativity into traditionally more purely creative mediums?

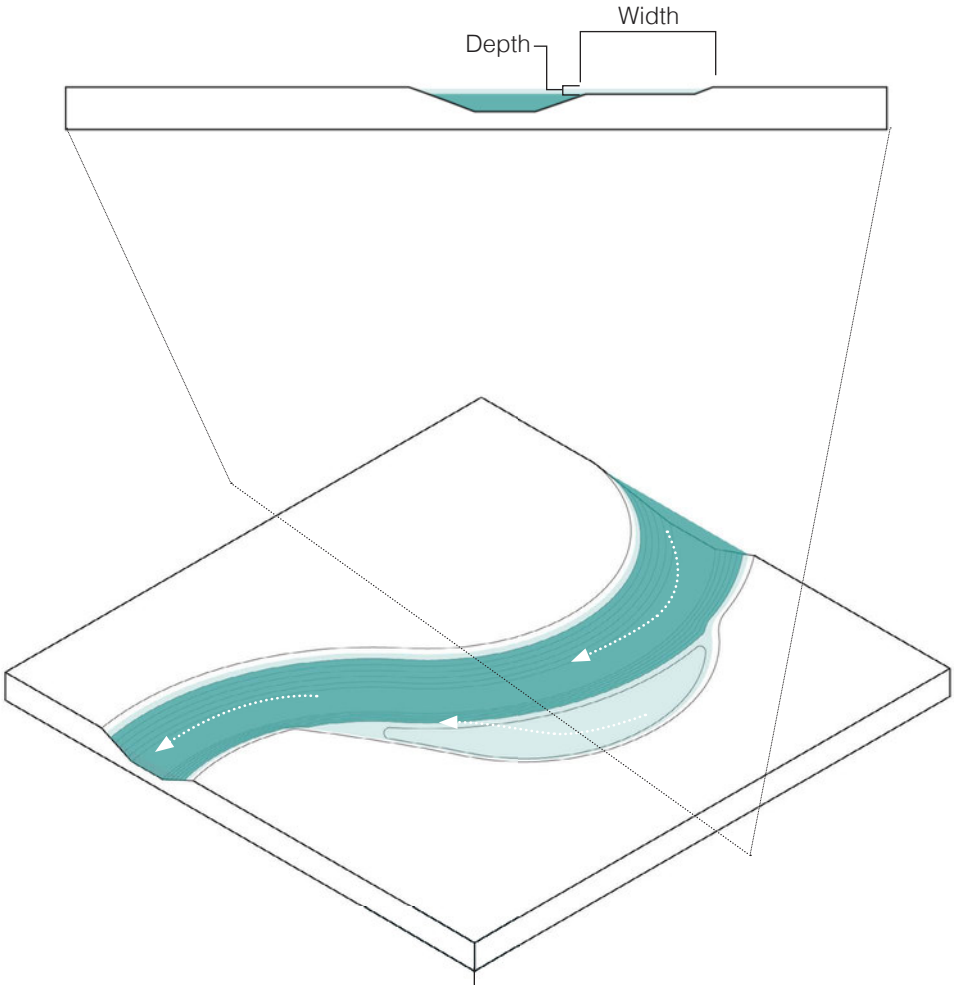
When the Answer Exists:
The past two decades have seen an explosive advancement in the fields of climate and environmental sciences. Research around Nature-Based Solutions, Green Infrastructure, and land-based systems have been substantiated at the academic and policy levels. Twin issues remain: First, bottlenecks to implementation that slow the effective inclusion of these techniques and technologies within built projects, and second, adequate impact monitoring that allow these systems to prove their value.

Functional Ecology Beyond Restoration:
Restoration ecology emerged as a formal field of study in the late 20th century and has all but defined the applied ecology disciplines since. Though researchers and practitioners often approach it with more nuance, restoration ecology is often associated with the common understanding of its modifier, “restore,” and a return to some prior state. When and what this goal state is have caused debate in the field and shown up largely in the discourse around native plants. Native to where? Native to when? We know now that precolonial conditions in what is now the United States were far from pristine: Indigenous people heavily modified the landscape. Subsequent centuries of trade and migration have further blurred the lines between what “natural” really means.

As environmental degradation advances, restoration ceases to become a relevant goal in many situations. Rather, a theory of functional ecology has emerged that turns the focus instead on the meaning of “ecology” itself as relational; a choreography of discrete systems and processes that form a greater, moving, living whole.

What do your findings suggest?
New models for piloting environmental research are necessary in order to catalyze its implementation at scale. Designers have a role to play as mediators of policy, technology, and form. Spatializing and contextualizing lab-based work is essential for its success. Outside of controlled settings, environmental processes can behave very differently. I leave this project without definitive solutions, but rather new questions and prompts to explore.


How could you continue?
What spatial variables define floodplain function?
Width
Speed of Flow
Length
Depth
What other variables exist?
Climate
Ecology
History of Flooding
Watershed Size
Proximity to Pollution



How can these variables be tested?

Where can these variables be tested?

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Vol 3: What Could It Be?
Justin Morris-Marano

What was surprising?
Metal uptake in plants is a compelling biological process, and I was continuously taken aback by the behaviors that underpin it. The granular microfluorescence images of metal distributed throughout a plant body; the sweaty greenhouses full of differentially bred Pokeweed; the collision of engineering and biology, were all startling to experience. As our research came to a conclusion, it occurred to me that I never once saw a sample of the Rare Earth Elements that had been harvested via phytomining. It didn't matter. The story, the people and the opportunity that overwhelm the process was so compelling, that the outcome was less relevant than ever.

What findings does your engagement suggest?
I am leaving the project with a number of distinct realizations:

- To develop phytomining into a viable technology, researches need to quickly move to test the entirety of the process in the field and at scale before moving forward with optimizing highly specific biological and engineered components. Without this foresight, researchers remain too siloed and unable to predict the challenges and opportunities that inevitably surface when turning science into technology.
- The positive federal funding landscape and attention being given to REE's is an increasingly rare runway that must be seized. Wether end-use application is eventually positioned more towards bioremediation, phytomining, or some unforeseen third thing, the field should leverage this momentum, now. The topic is timely.
- Narrative storytelling and entertainment is almost nonexistent around plant uptake for positive use of contaminants as resources. What does exist is often focused on the uptake of contaminants by agricultural crops

as detrimental to human health. This follows a larger doom and gloom trend within the climate-tech and climate-science spaces that is largely unproductive. Opportunity exists for creative, narrative-driven projects that share not only communicate phytomining but are directly entangled with and influential on the development of it's critical technology.

How could you continue?

There are many ways to continue. This investigation began with questions that explored the positive use of environmental contaminants. We discussed whether these contaminants could be leveraged, rather than resisted. Phytomining reframed metal contaminants as a human-driven resource. I'm curious how plants engage with these metals as resources, and how the environment engages with them as well. I will continue to explore this topic both in and outside of phytomining. More immediately, I would like to be directly involved in the progression of the phytomining technology at scale and on site. Our trip to North Carolina was the start of a meaningful relationship with the Doherty Lab. I'm excited for what's next.

What could it be?