Trans-scalar Architectures for Earth: Rain Check

JOSÉ IBARRA
University of Colorado Denver

Keywords: geoempathy, ecology, surrealism, design build, design process.

Water is a precious and contested resource in Colorado, the seventh driest state in the United States. Throughout its geologic history, this territory has seen innumerable configurations spearheaded mostly by uplifting and erosion. During its human history, the land has also seen several important infrastructural and other changes, especially as they relate to water usage. Responding to these conditions, this pedagogical exercise recontextualized "nature" by designing for and with geological systems. The studio combined models of design-build pedagogy, paired with a continuous focus on multi-scalar relationships, water-power relations, and speculative thinking. Students developed a prototypical pavilion made to treat water, host a number of plant ecosystems, and engage human publics by educating them about water and interspecies collaborations.

Through a combination of surrealist methodologies, environmental simulations, materials assessments, applied design/research work, and reading discussions, the class responded to the pre-existing site and climatic conditions much like a surrealist artist would respond to pre-drawn lines on a page. This allowed us to reimagine forms of authorship for architecture in the Anthropocene, welcoming new agents to the design of our shared planet while engaging the extreme dryness and desertness of our environment. Ultimately, the project aims to render the Colorado water and environmental crises visible through a public space-defining installation that can remediate ecosystems.

BACKGROUND

What would it take to design a garden responsibly amidst disrupted environments? How can we engage in reciprocal relationships with Living and Non-living things? What new forms of authorship and empathy might architecture engage to respond to environments as places full of cohabitants?

These were some of the questions lingering in the undergraduate design studio, Rain Check. Using the Colorado and South Platte rivers as primary sources of knowledge, students measured, imaged, and simulated features of the landscape. This included creating narratives revealing geologic, biologic, and other features of the rivers while studying (in)visible forces of climate, culture, history, and human intervention. Seeking entanglement, collaboration, and scalar shifts, the studio engaged in strategies for survival that demanded cross-species coordinations. This practice of *becoming with*[1] the rocks, waterways, plants, and animals surrounding our site (and campus) was instrumental in unveiling the history and revealing the future of Denver landscapes. The studio decentered the human in favor of the dynamic and fluctuating forces of nature.

By using surrealist art practices and other doubt-inducing collaborative exercises, the students learned about their environment while questioning architecture's relationship to form, performance, and natural processes. Pedagogically, rather than privileging the individual genius of the architect, experimental collaborations created opportunities for rethinking architecture's parts, constituencies, and authors. These collaborations led us to the question: how might we reinvent disrupted landscapes through granular devices that foster new relationships to water? To answer, we used accident-driven simulations, exquisite corpses, and habits of care as the drivers for designing in, and with, the 'deserted' American West.

Like deserts, which have often been portrayed as empty and ready to be occupied,[2] surrealism became a way for artists to address the vacuum that is unconscious space. Through this art movement, which saw its heyday during World War II and post-war periods, and its homeland-in-exile in Mexico, the horrors of the times came to be understood through projective, future-thinking that reinvented the world.[3]

What could we learn from their collaborative practices amidst the current moments of climate and social unrest?

PEDAGOGICAL STRUCTURE AND SEQUENCE

The semester followed a series of exercises meant to defamiliarize, abstract, and transform existing conditions through a series of water studies and constructs. The structure of the class featured three nested parts that each advanced particular fundamental concepts while changing the scales of intervention: (i) conceptual projections of context; (ii) performative prototypes; and (iii) final development.

CONCEPTUAL PROJECTIONS OF CONTEXT

This initial part of the studio entailed the research, analysis, representation, and reinvention of the water systems that pertain to the city of Denver, the state of Colorado, the Mountain States, and the country at large. Working individually, students produced highly differentiated projections for sites of interest, developing design and analytical tools that crafted new stories for Earth.

Using archival and online resources, they studied and interpreted the Colorado and South Platte rivers through the lens of infrastructural projects such as the Chaco Canyon water canals (San Juan, NM, 900 c.e.), Grand Valley Diversion Dam (Palisade, CO, 1916), Hoover Dam (Clark County, NV, 1936), Chatfield Reservoir Dam (Douglas County, CO, 1975), amongst several others. Using their drawing skills, they communicated the historical genealogy and architectural essence of the geological and built works. Additionally, students worked collectively to produce a *Catalog of the Vernacular*, or a document that contained our discoveries about the soil types, flora, fungi, fauna, building and infrastructural typologies, and histories present in and around Cherry Creek, a tributary of the South Platte River which engages the city and our campus directly.

Our research into the surroundings of our sites entailed transscalar investigations conflating local, regional, and global scales. Amongst other things, we found that throughout the territory's geologic history, this land has seen innumerable configurations driven mostly by uplifting and erosion: from being submerged under water and south of the equator, to being lush green and in the northern hemisphere, covered by sand, flooded by water again, taken over by volcanoes, eroded by glaciers, and now exhibiting a combination of high-desert and mountainous landscapes with waters draining both into the Gulf of Mexico and the Pacific Ocean. Throughout its human history, the land has also seen several important changes, especially as they relate to water usage. From the Anasazi, Ute, Navajo, Arapaho, and Cheyenne peoples (whose prehistoric water basins and low stone masonry check-dams allowed them to capture and store water for irrigation and domestic usage), to the first Hispanic settlers (whose acequias became important water distribution systems that created community-based governance over water for its sharing during times of scarcity).

These findings made it clear to us that the uses and availability of water were a precondition to life in this area; in other words, there is no inhabiting Colorado without understanding water.

PERFORMATIVE PROTOTYPES

Following the initial research, students worked in groups to develop material and formal prototypes that considered Colorado's water futures. Proposing that Denver's waterways and tectonic plates are in direct connection with several cultural, social, and ecological systems that go beyond geopolitical boundaries, students engaged in simulation projects that studied and exaggerated geological processes such as drought, flood, subsidence, erosion, and weathering. These projects oscillated between precise architectural and technical works, to the far-fetched embellishment of processes as design outputs.

For the surrealists, creating "imagery by chance rather than through conscious control" was a generative practice that spoke to the collective unconscious. Processes such as *decalcomania*,[4] where a design was transferred from prepared paper onto another surface, made possible innumerable configurations where a given context—the two surfaces, the paint, the air, and so on—contributed to the authorship of the artwork. In the studio's case, the continuous negotiation between our available materials and information, such as site topography and our understanding of geological processes, allowed for new surfaces, materials, and conditions to 'accidentally' arise.

Using different modeling techniques that invited dynamism and entropy, the students understood—and demonstrated—that architecture must mediate with fluctuating environments, material degradation, structural failure, and other volatile conditions. Some of these techniques included clunky syringes, which administered liquids that would erode or create new materials, and machine-operated water pumps, which mediated water flow in toxic substrates. All works used fiction as a tool for approaching time and space differently, generating images of new realities that provided points of access to critical climatic states. This splicing across time periods and geographies, which abstracted economic and social formations,[5] allowed for a departure from architecture's assumed fixed, static, and "completed" projects for which time, weather, and environment are excluded. Instead, these and other factors were welcomed into a process that was understood as ever-changing and fluid.

In addition, the surrealist practice of *cadavre exquis*, or exquisite corpse, became an instrumental tool in the studio: a playful means to engage in collaboration with surprising results. Multiple surrealist artists would use a single sheet of paper, usually folded into equal sections, to collaborate in a process of image- and meaning-making by responding to a preexisting condition (a few lines on the page) and an agreement about the orientation of the artwork, and the nature of its exploration. This method of drawing yields unexpected results that can reveal unconscious drives behind not one, but multiple parties. The

game often results in "monstrous" figures: incongruous parts of multiple species grouping things together that should not be.[6] For instance, André Breton, Jacques Hérold, Yves Tangui, and Victor Brauner's *Figure*, drawn in 1934, features a multispecies disparate organism. The drawing shows a nude figure on a picnic blanket that has become a fluid hand-turned-amoeba, which becomes a two-headed duck with a body-becoming arm, holding a hairy mirror with a reflectionless face. Importantly, the

Figure 1. Overview of the *Catalog of the Vernacular*, several trans-scalar drawings of water infrastructure, and a simulation model.
(Catalog by author and all students in the course. Trans-scalar drawings of water infrastructure by Cassaundra Hicks, Xavier McGee, Riley Wines, Christopher Holm, Khanh Pham, and Alycia Thomas. Simulation model of the Colorado River's process of *erosion* by Cassaundra Hicks, Ben Olson, and Xavier McGee.)

exquisite corpse is tied together by a mutual agreement on the physics and gravity of a pre-existing environment on the canvas. This invisible, yet pointed gesture, can be perceived through the growing flowers at the bottom of the drawing, and the weighted hairs (or grasses) falling from the mirror and ducks' mouths. This incongruous co-authored system elucidates the need for entangled and symbiotic relationships between animate and inanimate matter, for which the environment becomes a restorative and bonding medium.

In the studio's case, students set out to design possible occupiable pavilions in which humans and non-humans could thrive. These structures, which abstracted materials and favored different aspects of form and performance, created new images of the changing times. Although these structures were first produced digitally by individual students, they were later revealed to contain the beginnings of our desert garden. Using the corporeal analogies of 'head,' 'torso,' and 'feet,' fourteen different student projects were sliced into three parts and recombined a total of 2,744 times. With these parts and materials in mind, students set out to reinterpret and re-design the component they were assigned to (i.e., the "head," "torso," or "feet" of the structure), now using the real constraints of the site, as well as findings from the compiled *Catalog of the Vernacular*.

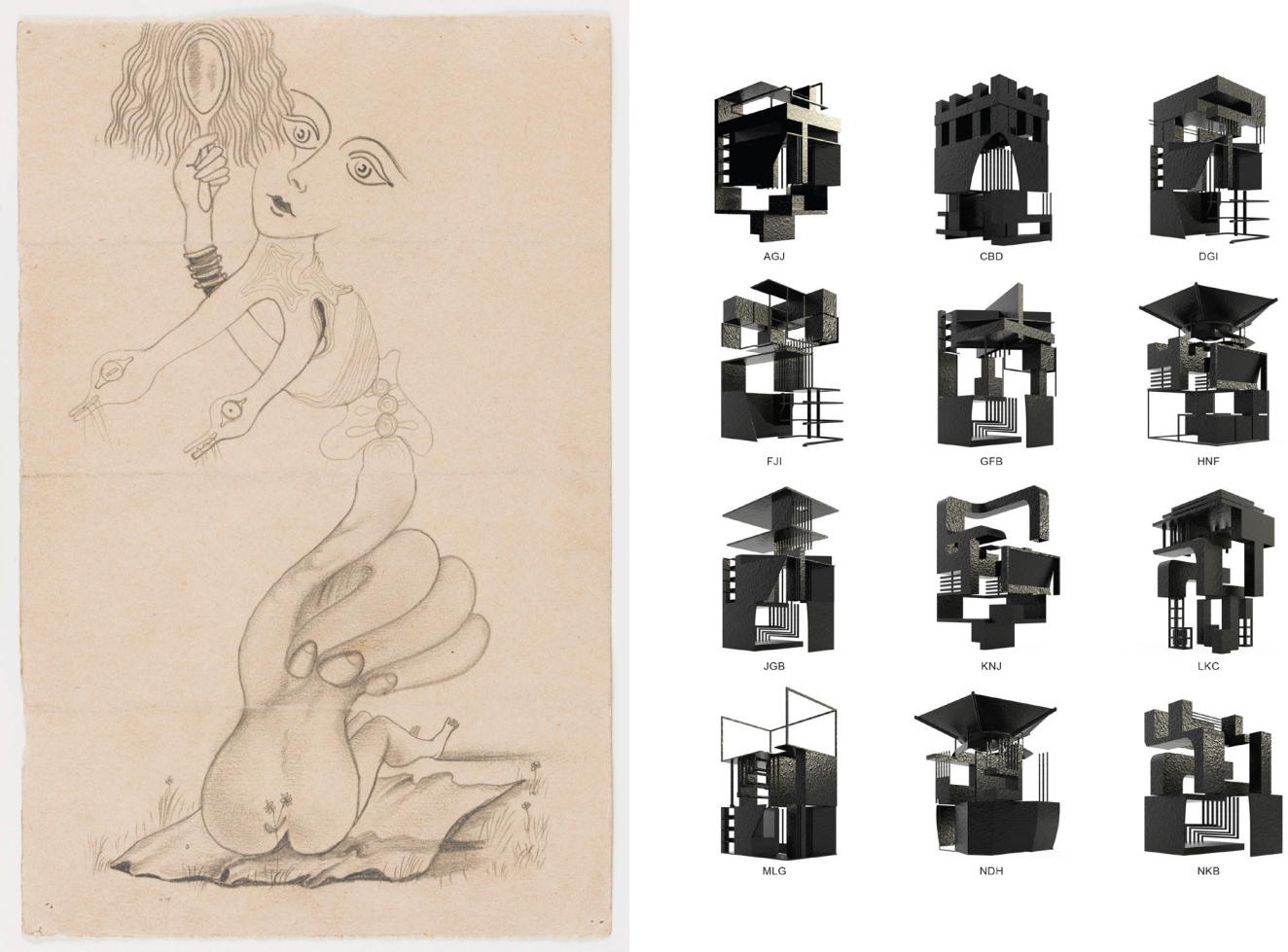

Figure 2. Surrealism in *art* (left) and *architecture* (right):

left:
Breton, André (1896-1966) © ARS, NY. With Jacques Hérold, Yves Tanguy & Victor Brauner. Cadavre Exquis, *Figure*, 1934. Composite drawing of pencil on paper. 10 1/8 x 6 1/2" (25.6 x 16.5 cm). Kay Sage Tanguy Bequest. The Museum of Modern Art/New York, NY/U.S.A. AR814681. 410.1963. Digital Image © The Museum of Modern Art/Licensed by SCALA / Art Resource, NY.

André Breton: © 2024 Artists Rights Society (ARS), New York / ADAGP, Paris; Jacques Hérold: © 2024 Artists Rights Society (ARS), New York / ADAGP, Paris; Yves Tanguy: © 2024 Estate of Yves Tanguy / Artists Rights Society (ARS), New York; Victor Brauner: © 2024 Artists Rights Society (ARS), New York / ADAGP, Paris.

right:
12 of 2,744 exquisite corpses developed for the studio. (Drawing by author, Maslin Mellick, and Christopher Holm.)

Figure 3. Desert garden designed for and with geological, biological, and ecological systems at the University of Colorado Denver. (Photograph by author.)

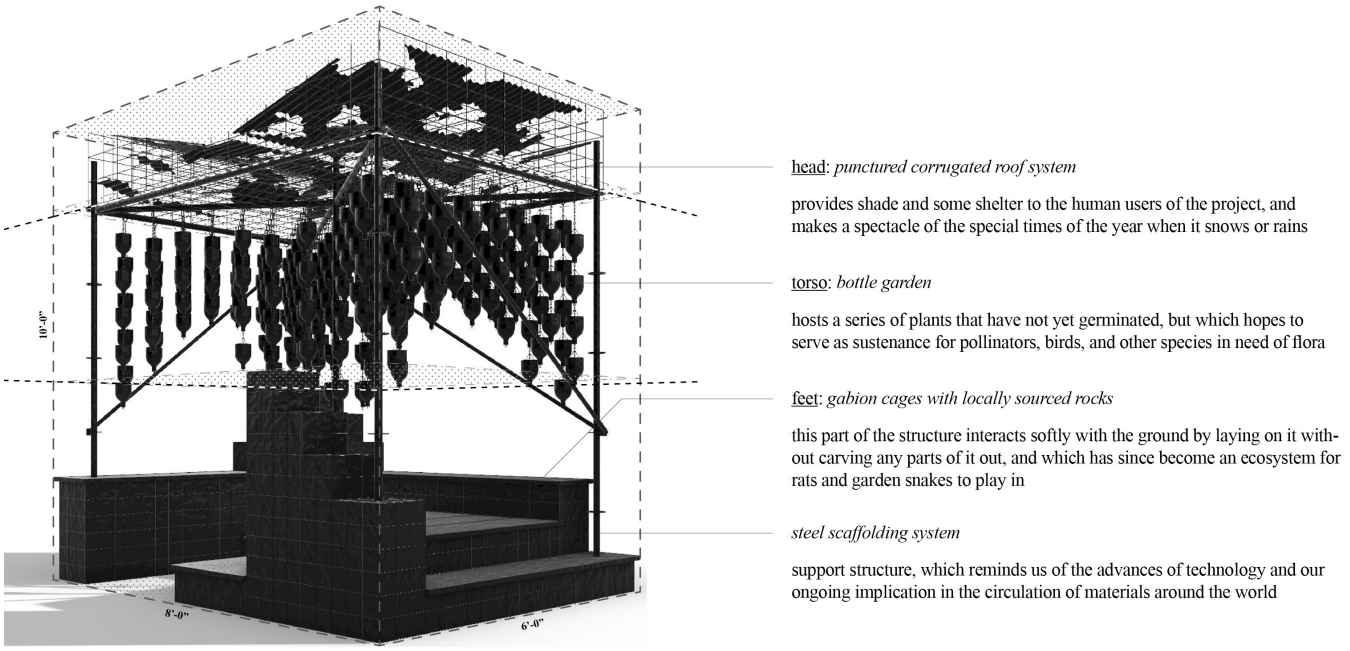

Figure 4. Exquisite corpse rendition of the pavilion structure developed for the studio. (Drawing by author and Christopher Holm.)

DEVELOPMENT: RAIN CHECK

The final stage in the studio entailed a collaborative project across all members of the class. Students worked together to design and build a movable artifact made to treat water, host a number of plant ecosystems, and engage human publics by educating them about water and interspecies collaborations.

Working in three teams, students negotiated with each other to create a 'garden' that considered the politics of the territories, environments, climates, and human and non-human peoples that it served and with which it interacted. Ultimately, they produced a 6' x 8' x 10' pavilion that arose from the exquisite corpse exercise, in which they came together to select the right combination of parts that would yield a 'desert garden.' This final structure featured: a series of gabion cages with locally sourced rocks that interacts softly with the ground by laying on it without carving any parts of it out, and which has since become an ecosystem for rats and garden snakes to inhabit; a "bottle garden," which hosts a series of plants that have not yet germinated, but which hopes to serve as sustenance for pollinators, birds, and other species in need of flora; and a punctured corrugated roof system, which provides shade and some shelter to the human users of the project, and which makes a spectacle of the special times of the year when it snows or rains in Denver. These parts are tied together with a standard steel scaffolding system, reminding us of the advances of technology and our ongoing implication in the circulation of materials around the world.

Thinking deeply through the challenges and opportunities of gardens and water systems in the desert, the students quickly realized that design alone could not thrive amidst such extreme conditions. How might architecture engage its constituencies to nurture the Living and Non-living things that it encompasses? By developing reciprocal relationships with rocks, plants, and animals, we revisited our own authorship as designers and welcomed new agents into the design process.

As environmental humanities scholar Catriona Sandilands puts it, "in tending specific plant relationships, we can learn not only about what and who plants are to us, but also *what and who we are to plants*: What gifts do *we* bring to vegetal relationships?"[7] This is especially important as we consider the great gift that plants already provide to us: "either directly or indirectly, plants also provide, through that light-transforming magic [that is photosynthesis], food for every single other living creature."[8] Moreover, plants also reduce greenhouse gasses by 'sucking' the carbon out of the atmosphere and holding it in their cells.[9] In this way, and following the completion of our desert garden, we engaged in a celebration where we commissioned individual planters to different community members: faculty within the college, guests who were local to the region, other students, and friends interested in developing reciprocal relationships with plants. Through habits of maintenance and care, humans and plants became entangled systems.

Throughout the winter, humans and non-humans surrounding the site experienced the extremity of the weather and landscape. The pavilion became the home to an ecosystem of rodents and occasional garden snakes. Although the water systems at play were mostly frozen, the structure and animals' agility to become enmeshed with one another demonstrated a first successful attempt at blurring the boundaries between architecture and site.

Figure 5. Individual planter whose care was commissioned to a community member at the University of Colorado Denver. (Photograph by Troy Drake.)

Throughout the spring and summer, the structure welcomed informal gatherings between surrounding (human) community members. Despite the aridness of the land, some vegetation grew as humans tended to their planters, while others perished due to lack of care. Similarly, different animal-human relationships were established: for instance, a community of squirrels, rabbits, and birds often visited, gathering seeds and nutrients left for them by different human actors. The remaining months of the year were devoted to the continued tracking and nurturing of animal-plant-human-mineral relationships, and to discovering new empathic processes to design as entangled systems.

REFLECTIONS

As the studio shifted gears from designing objects to processes, we commingled with parts of the vegetal, mineral, and animal worlds that had been neglected or unaccounted for in the past. This exquisite corpse architecture, which created itself through the adaptation of informed and uninformed decisions by the class, continues to consider all potentials of its objectness, intended and unintended, by engaging in new modes of shared authorship. Involving students in a radical composition technique such as this was not only enjoyable and productive, but it gave students tools for understanding the world as a shared design project, rather than an individual's—or a species's—solo endeavor. Moreover, the accidental-making processes embedded within surrealist art practices gave students the chance to ask complex questions of architecture and other spatial disciplines while entertaining experimentation and even failure.

While the studio ended in the winter of 2022, this project was alive for over a year, as it continued to *become with* its environment on a daily basis.

STUDENT LEARNING OUTCOMES

The fifth studio in the undergraduate sequence at the University of Colorado Denver asked students to consider the scales of analysis and design intervention, from the large scale plan to the construction detail. This course expanded on fundamental concepts of architectural design and representation while emphasizing a research-based approach around geology.

Throughout the semester, students were assessed in their development of: analytical skills aimed at tracing logistics, territories, and network systems; conceptual ideas and theses that manifest clearly through spatial and experiential means; methods of thinking and making that foster iterative design processes; two-dimensional and three-dimensional representational skills; skills of making that include the understanding of the structural, constructive, and spatial characteristics of materials; methods to study the climatic, technological, socioeconomic, and cultural factors that have shaped design projects.

ACKNOWLEDGMENTS

The author would like to express his appreciation and gratitude to all the students (B.S.Arch '23) who trusted the course's experimental process and designed *with* human and non-human peoples: Mónica Cárdenas Bernal, Suzanne Chang, Troy Drake, Puncha Her, Cassaundra Hicks, Lance Holland, Christopher Holm, Xavier McGee, Dania Morelli, Eric Moore, Ben Olson, Khanh Pham, Alycia Thomas, and Riley Wines.

In addition, thank you to Chair Marc Swackhamer for his trust and support, to Don Johnson and the Dr. Bixler Family Foundation for generously funding our experiments, to Erik "Rick" Sommerfeld for his guidance and donation of additional materials for the project, to Matt Gines for helping secure the site and sharing his expertise, to Maslin Mellick (M.Arch '22) for assisting teaching the class, and to Christopher Holm (B.S.Arch '23) for continuing to work alongside the project.

ENDNOTES

1. Per Donna J. Haraway, *becoming with* is a process of encountering and connecting with more-than-human agents that allows for a new form of world-making exceeding human exceptionalism. See Donna J. Haraway, *When Species Meet* (Minneapolis: University of Minnesota Press, 2008).
2. Consider Reyner Banham's provocation that "nothing officially exists" in the desert. For important counterarguments, see Samia Henni, *Deserts Are Not Empty* (New York: Columbia University Press, 2022).
3. Consider the works of different surrealist artists for whom the war became a catalyst for important explorations. This includes Colin Middleton, Kay Sage, Leonora Carrington, Max Ernst, Remedios Varo, amongst many others.
4. This technique was adopted by surrealist artists such as Max Ernst. Per the Museum of Modern Art, decalcomania is "a transfer technique, developed in the 18th century, in which ink, paint, or another medium is spread onto a surface and, while still wet, covered with material such as paper, glass, or aluminum foil, which, when removed, transfers a pattern that may be further embellished upon. The technique was adopted by the Surrealists to create imagery by chance rather than through conscious control." See https://www.moma.org/collection/terms/decalcomania for more information.
5. For more on this splicing, see W.J.T. Mitchell's essay, "Spatial Form in Literature: Toward a General Theory" in *Critical Inquiry*, Spring 1980 (pp.542–544), which explains that "the common mistake of regarding space and time as antithetical modalities is reflected in the tendency of literary critics to speak of spatial form as 'static,' or 'frozen,' or as involving some simultaneous, instantaneous, and wholistic impression of that which is 'really' temporal."
6. For more on the monstrous, see Erwin Panofsky, "The History of the Theory of Human Proportions as a Reflection of the History of Styles" in *Meaning in the Visual Arts* (Chicago: The University of Chicago Press, 1955).
7. Catriona Sandilands, "Plant/s Matter," *Women's Studies* 50:8 (07 October 2021): 776–783.
8. Sandilands, "Plant/s Matter," 776–783.
9. Sandilands, "Plant/s Matter," 776–783.