

Entangled: A Studio Project Building Ecology

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Our identity as architects is still bound with the image of nature that places architecture and other human constructs strictly outside of a “wild” nature that is pure, vibrant, and untamed. This has resulted in nostalgic, exclusionary eco-narratives that curtail the architectural imagination. Understanding our role as part of an evolving ecology and its omnipresent human influence has the potential to reinvigorate the practice. Coexisting as interdependent entities (both physical and conceptual), landscape and technology can define built form that imagines productive and healthy infrastructures for a collective ecology.

This paper describes the first of a set of studios run by the University at Buffalo School of Architecture and Planning Ecological Practices Graduate Research Group, its collaboration with a parallel techniques course, and a local partner and the design build project it initiated, Silo City Trellis. The studio explored how to formulate an eco-centric identity through small scale architectural interventions, garden structures that literally and figuratively entwine themselves with the local ecology of a site that is at once a burgeoning “urban wild” and a monument to the city’s post-industrial heritage. This apparently wild site is in fact a garden. Maintained and curated, it highlights the effort it takes to maintain a “natural” environment in the highly synthetic urban context. The architecture of the garden makes it into an interface where the boundaries between nature and the man-made are perpetually negotiated providing a pedagogical model that proposes alternative ideologies about our ecosystems—both environmental and socio-political.

Silo City Trellis is a combined structure and landscape regeneration system that literally entwines architecture earth and vegetation. Emulating the work of the site’s Director of Ecology the growing infrastructure aims to suggest ecocentric solutions for the future of cities by pushing the boundaries of architecture as a provider of ecosystem services and social stewardship. The proposal envisions that in a post-nature environment architecture can play a role not only in societal enlightenment but also in the intentional cultivation and stewardship of biological ecologies.

ALMOST NATURE

The course of study framed by this studio explored how to formulate an eco-centric identity - for both students and the site - through small scale architectural interventions focusing on the dynamic and the imminent rather than the stable and the exclusionary. These were manifested as garden structures and site work that literally and figuratively entwine themselves with the ecology of a site that is at once a burgeoning “urban wild” and a monument to the city’s post-industrial heritage. Focusing on entangling the human fingerprint and the evolving rustbelt ecology led to designs that highlight the engagement of people and other than human organisms with a constructed landscape.

The University at Buffalo School of Architecture and Planning Ecological Practices Graduate Research Group (EP GRG) was offered an opportunity to address the collaborative role of human and non-human agents in our anthropogenic ecology through a design build project. This paper describes the first of three studios run consecutively to design and execute said project. One of the proposals designed by the five studio teams (E. Gilman, M. Mesi K. Lass, H. Leslie, C. Trautman), Silo City Trellis, was further developed and built in 2020.¹ Two concepts framed the semester to promote ecocentric design thinking: considering wilderness as a cultural construct, and the forest and garden as models of indeterminacy. This in turn focuses the studio on the *interesting* as an aesthetic framework,² and the formulation of *natureculture* as a design paradigm.³ Touching on practices of landscape architecture and horticulture, as a pedagogical framework projects urbanity’s potential as productive component of its biome. Ultimately the pedagogy of the studio hopes to encourage students to create a project narrative that promote an eco-ethical approach to practice.

ROMANTIC NOTIONS TO ECOLOGICAL PERSPECTIVES

An architectural intervention remakes the ecology in which it is inserted. It can also define the socio-cultural relationship of the public with it. As students grapple with this potential there is an impetus to turn to narratives of environmentalism that offer human-centered solutions. These are often tethered to 19th century Romantic icons of wilderness even thirty years after the “great wilderness debate” raged through environmental politics history and literary criticism.⁴ In one of the seminal publications of said debate, *Uncommon Ground: Rethinking*



Figure 1. Silo City Trellis (Summer) at full growth and community engagement.(E. Gilman).

the Human Place in Nature William Cronon and a varied group of scholars dissolved the mirage of the wild-out-there nature. Focusing on the acknowledgement that humans are not only embedded in the global ecosystem but part of its construction they re-entangle the biophysically and socially formed.⁵ Although fetishizing the “Big Outside”⁶ has engendered a sense of responsibility to the non-human world, it privileges iconic parts of nature at the expense of the ones we live in. Their goal was to get the environmental movement beyond the images that prevent us from engaging the nature at our fingertips with reverence and care since it is not the idealized open wild that deserves to be protected. Although our imprint has been part of dynamic ecologies for eons, one goes to the wilderness not as a producer, a maker, but as a consumer, a tourist.⁷ This has resulted in nostalgic eco-narratives that leave architects looking in from their technological bubbles.

Idealized ideas of a nature that exists outside of culture places architecture and other human constructs strictly outside a nature that is pure, vibrant, and untamed. The reality is that to maintain the appearance of an unmanaged landscape today wildernesses are often regularly massaged into some pre-defined order. It is weeded, seeded, hunted, burned and even irrigated.⁸ This opposes the “conviction that nature is stable, holistic, homeostatic community capable of preserving its natural balance more or less indefinitely if only humans can avoid “disturbing” it. Humans are making it and containing it within the boundaries we have established for it.⁹ Wilderness propagates the modern nature-culture binary but the wild (found in sidewalk cracks, fence lines, and our own bodies), together with the garden and the forest, speak of Donna Haraway’s *natureculture* paradigm.¹⁰ The dynamic sense of participatory engagement it promotes leads design that has humanity not at the center of the ecosystem, but as “just one part of a much more complex network of intersecting, inter-reliant existence.”¹¹

POST-INDUSTRIAL WILDS

Postindustrial sites are complex, and wicked, yet they can be sublime and awe-inspiring. They are some of the most challenging examples of the anthropocenic landscape when they present human-made nature. An example of this paradoxical condition, our project site, Silo City, grows, changes, and performs, rendering complex relationships between cause and effect, structure and instability, parts and wholes.

Silo City has four historic grain elevators and a small group of support buildings. The silos are a mostly defunct part of the agrarian transportation infrastructure which made this rust-belt city the world’s largest grain port from the 1850’s to the 1950’s. While one of the silos maintains its original function of storage, smaller buildings are in use as a café and meeting room., the rest of the site’s structures are unoccupied and have grown into a venue for theater, art, film and music. It hosts educational events, performances, and installations by artists, designers, and architects. Just beyond the site boundary sits Rick Smith’s Rigidized Metals, the project client and construction material resource.

While this was not a landscape of heavy industry, the facility was the point of grain transfer from water to land. Here rail lines and truck parking zones have left their mark. The micro biomes are defined by a soil structured impacted by the industry’s transportation infrastructure and waste. Native flora that established itself along the train tracks after the site went into disuse in the 1980’s has flourished. But the remaining soil composition, either compacted gravel or non-toxic slag, led the Audubon Society to label the site as dead in 2010. The 27 acres where the soil was so nutrient-poor that native species could not survive is populated by adventive species, primarily Mugwort and Japanese Knotweed. Although many would identify them as weeds, they have provided a valuable service adding nutrients to the soil through their cyclical

decomposition.¹² Although these monocultures do not provide the food and habitat that native plants do, they add other ecosystem services for more-than-human benefit. After four decades the once denuded site has evolved into an urban wild. As part of an ecological system, it can provide ecosystem services like managing storm water, creating cool islands, improving air quality, and housing vegetation and animal life in an urbanized zone.

Led by Director of Ecology Josh Smith this urban wild is under constant reconstruction for the appreciation of humans and other than humans. Here soils are enriched with compost produced on site, precipitation is collected, water is cleansed in the constructed wetland, and native fauna is gaining a foothold through culling of adventive species and new planting. Curated planting zones have been established in recent years to provide food animal and insect communities. Migratory birds stop on their way south for the winter, and monarch caterpillars enjoy the abundant milkweed along the tracks. Deer, including a mythical white deer, hide in the tall brush and high prairie grasses through the growing seasons. But as food gets scarce in the winter, they extend their range in the freed-of-human traffic following cottonwood shoots, providing a weeding service that keeps the trees from overtaking the site.

THE GARDEN AS MODEL

So, this apparently wild site is in fact a garden. It is tended, designed, and redesigned. A beehive, butterfly garden and adjacent wetland garden, constructed with the help of local volunteer groups, have become popular destinations for locals, particularly school children, and swallows (that eat the bees), but also for migratory birds and cycling tourists. Unlike the wilderness, it can be enjoyed not just as an object to be looked at but as a place that is being made. Sometimes even with one's own hands as in the case of the educational programs that include collection and distribution of milkweed seeds, and the participation of volunteer groups.¹³

The garden's blending of artifice and ecology provides a vehicle to address our relationship with nature. For a while, during planting, the garden is a space of geometry and order. Rows and grids delineate layouts. Measures are relational, tied to solar access and nutrient loads. They are defined not by what is but by what will be. Expectations describe the form that will emerge.¹⁴ It is a medium where people represent and practice not only control over, but also engagement with and appreciation of nature.¹⁵ Historian Robert Pogue Harrison, through his analysis of gardens in Western literature, argues that "gardens do not bring order to nature; rather, they give order to our relation to nature."¹⁶ Recognizing that boundaries between ourselves and nature are culturally constructed is easier through the garden and can potentially promote an ecological method of architectural production. Ecological thinking focuses on relationships and processes. According to media theorist Matthew Fuller this distinguishes it from

environmentalist concerns that maintain an anthropogenic ethos and see nature as a static object:

"Echoing the differences in life sciences and various Green political movements, 'environmentalism' possesses a sustaining vision of the human and wants to make the world safe for it... [it] also often suggests . . . a state of equilibrium . . . Ecologists focus more on dynamic systems in which any one part is always multiply connected, acting by virtue of these connections and always variable, so that it can be regarded as a pattern rather than simply an object."¹⁷

GARDEN FOLLY TO POST-INDUSTRIAL ECOVENTION

In Silo City garden rooms offer views of the silos and several installations by architects, artists, and students. Along with the studio's project, these structures could be interpreted as follies. Traditionally follies are decorative garden structures built without a particular program other than to delight. They may just create a focus in the landscape or provide shelter - a place rather than just an object for contemplation, engaging visitors in observation of the life of a site that opens their senses to their surroundings. Offering an experience of diurnal flows and seasonal changes, these unconditioned spaces afford ambient comfort through passive means and can be part of the phenomenological play of air, water, and light. The folly can become an ecovention when it provides a space for engagement in natural processes. The term ecovention is derived from ecology plus invention. It describes an artistic project that through inventive spatial and material strategies, physically transforms an ecosystem. The ecovention may act more as a catalyst to reimagine how architecture engages and is engaged by natural systems.

Designs evolved in response to individual site observation and narrative drawings and texts. These led to structures and program statements mingling the post-industrial site, its evolving ecologies, and a space for observation. Two proposals were chosen by a jury of local professionals, faculty and the client team for further development by the studio. One of these projects, Silo City Tellis was particularly demonstrative of the potential entanglement of the material, social, and ecological drivers of the studio pedagogy.

ECO NARRATIVE¹⁸

Like any garden, the site is alive. It changes due to ambient conditions, seasonal flows, temporary and permanent design interventions, and cultural events. These transitions, framed by the monumental silos, and peppered with installations function at multiple scales. They range from the opening of a flower, to the nesting of a bird, to the opening of a once secluded room in the landscape as foliage fades.

To build the context for each project, students were asked to observe how the site is demarcated by human, industrial,

climatic, and biological agents. A parallel techniques course run by Nicholas Rajchovik supported the studio by reimagining and producing site surveys, devices, and analysis that delimit the project scope. With various measuring devices students catalogue plants, soil, water, built works, and sight lines, sonar landscapes. Combining the courses provided multiple site visits that lasted a full day. This way students could experience the change of light and seasons, note zones of heightened activity (compost pile and the constructed wetland), zones of repose (the Knotweed hiding rabbits), and zones of disuse (a gravel parking lot and a mowed lawn with its lonely swing). This revealed that while the site is frequented by people, it is lived in by deer, birds, bees, trees, and other others.

In the first studio exercise, students examined our ever-changing notion of nature by constructing site histories that layer the natural biota, tribal mythology, topography, solar access mapping, vehicular circulation, building technology, commerce, art and culture. These histories were a way of understanding the site through temporal and cyclical patterns, and portraying the site's visible and invisible features through both human and more than human eyes. The goal was to instil these perspective in the reading and narrating of the site so that it would direct the development of the design proposals. Responses included new garden-city maps, silo/plant blueprints, and even a theater program. The *Playbill*¹⁹ by Mitch Mesi advertised *natureculture* as a collaboration of human and non-human actors literally described the site as a performance where climate features, caretakers, bees, deer, and silos are cast, crew, and production personnel in seasonal play. As a memento of a shared event, it situates the observer simultaneously in a tactile phenomenon, an imagined ecology, and a remembered experience. A tale by Elisabeth Gilman observes the site through a protected seedling which grows to provide shelter in winter storms evolved into a collage depicting a malleable structure that responds to the actors of the *Playbill*. Christa Trautman created a triptych based on Hieronymus Boch's *The Garden of Earthly Delights* that highlights the aesthetic value of the *interesting* rather than the clearly beautiful or the overwhelming sublime which the original could be argued to present. In it, waste drives the site's regeneration from a wasteland to an Edenic garden populated by real and mythical creatures and characters. The central panel which bridges heaven (the site) and hell (the grocery store) is a diagram communicating the workings of compost heaps. Processes, including decomposition and growth draw our interest and hold it. The site's biota, best appreciated by direct engagement like the *Playbill* describes, is an event of seasonal duration and annual repetition with the same cast and a (climate) changing script. These three Eco-narratives influenced the design and programming of the Silo City Willow Trellis.

WEAVING WILLOWS TO CULTIVATE SYMBIOSIS

The willow tellis is a growing infrastructure where a tectonic dome, earthwork, horticulture and a framework for an

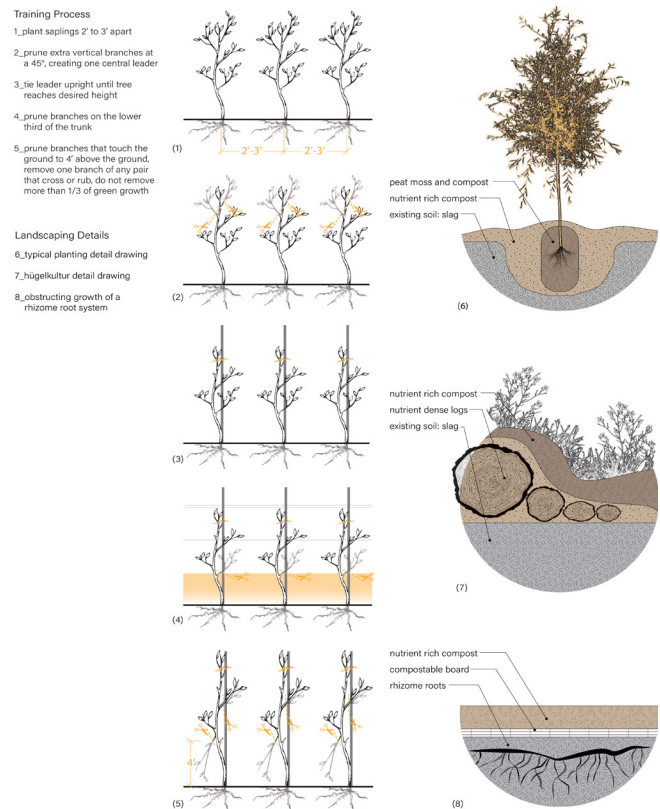


Figure 2. Hugelkultur and willow training diagrams (M. Mesi).

educational program about local ecology merge to house community events and habitat enriching plants. Willows will weave through the wiry dome to fill out the enclosure. From afar, the metallic matrix will blend into the sky until willows encase it. Its diagrid form disappears in the summer as it provides shelter from the sun and reappear in the fall, to show its shiny tangled limbs. By the time the verdant mass is fully formed overhead, the willow reeds will have merged to become a singular organism.

SHELTERING LIMBS

Metalwork, vegetated berms, and willows entwine to create a breathing protective canopy that envelopes visitors and wildlife alike a cooling forest-like environment. Construction technology and parametric formal development of the tectonic system respond to the constraints of the landscape components, and use materials available on site, logs from trees felled by a recent storm, and a cache of Vipertex. These proprietary hollow rods, with a characteristic dimpled surface which makes them stronger than tubes of similar gage and girth, were catalogued and their size set the scale of the construction. The domes diameter is limited by the growth of the willows, the length of the Vipertex, and the aim to create a central gathering space. Responding to these requirements the structural diagrid meets the ground three internal points and at three perimeter arcs. The footprint of the funnel columns and the perimeter are parametrically adjustable. Entry arcs

and central spines are reinforced by bundling arcs that splay at the ground to provide more stability. The willows follow the intersections to register a counter pattern to the diagrid.

EARTHY DELIGHTS

Soil amelioration and reduction of the dense monoculture of Japanese Knotweed and Mugwort through an ecologically conscious approach are part of the design proposal. The team researched techniques to avoid chemical herbicides which led to a space defining German horticultural technique, *hügelkultur*. These berms provide a no-till substrate and form a cradle that nestles the dome. With its height defined by the available material, the growing medium takes the role of architecture. It directs the flow into and around the dome, shelters shoots and visitors from winter winds, and changes the relation of the interior to the horizon.

Being a space of interiority and formlessness, the forest model not only inspired the wiry matrix of intersecting metal tubes, but it focused the team's attention on underlying processes.²⁰ Cottonwood trees toppled in recent storms on the site provide the base material. The hard wood's gradual decay will provide nutrients for several decades, and since composting generates heat the berms will also extend the growing season. Like the spongy forest floor, decaying logs and branches store and release moisture during drier times and act as a carbon sink. The berms will be planted with willows (at the dome), and crops, shrubs, grasses, and herbaceous perennials which regulate greenhouse gases, sequester carbon, and produce atmospheric oxygen through photosynthesis.²¹ Like forest biota bound in connected food chains to regenerative decomposition, the willow trellis provides regulating ecosystem service as well as ecosystem supporting services, but it makes people a conscious part of the chain.²²

CULTIVATING ARCHITECTURE

The process of weaving the willows is used to cultivate symbiotic relationships which provide cultural ecosystem services.

The ecovention joins other living classrooms at the site that serve as models of habitat restoration for regional schools.²³ The dome is a teaching space and a teaching tool about the processes of growth and decomposition that promote biodiversity. Programming the experience of the visitors into the evolving form of the willow dome and adjacent ecology through this lens was intrinsic to the design. In this regard, the project takes additional cues from the garden that are critical to horticulture but that are an under examined part of architectural production: a timeline. This encompasses the razing of the monocultures in the Spring, mounding in the Summer, and raising the arcs to be completed in the Fall. But it also includes cyclical operations that will determine the architectural expression and the programming of the space: training the willows, collection of compost material, sowing and dormancy periods, as well as community engagement and educational programming linked to horticultural practices. Providing cultural ecosystem services, through aesthetics and education, is as integral to the student's process as the growth chart that communicates how the form will change, until - in fifty years - the willow trunks support and reshape the decaying steel arcs.

INTO FABRICATION: SPRING AND FALL 2020

The willow trellis continued to evolve through 2020, with a growing team.²⁴ Through material testing and analysis students developed the Vipertex structure and its foundation into construction documents under the direction of Professor Joyce Hwang. Working with an engineer attention was given to defining the connection system, and analyzing the environmental forces impacting the structure. After further assembly tests conducted on site, construction began in the Fall of 2020 under the leadership of Professor Rajkovich. The Rigidized Metals team, Josh Smith, UB faculty, consultants and staff participated in the fabrication and installation process. Director Smith completed the terraforming preparing the site for spring sowing and initiated the willow planting. The design build process itself embodied the engagement of educational and volunteer programs which was foundational to the design.

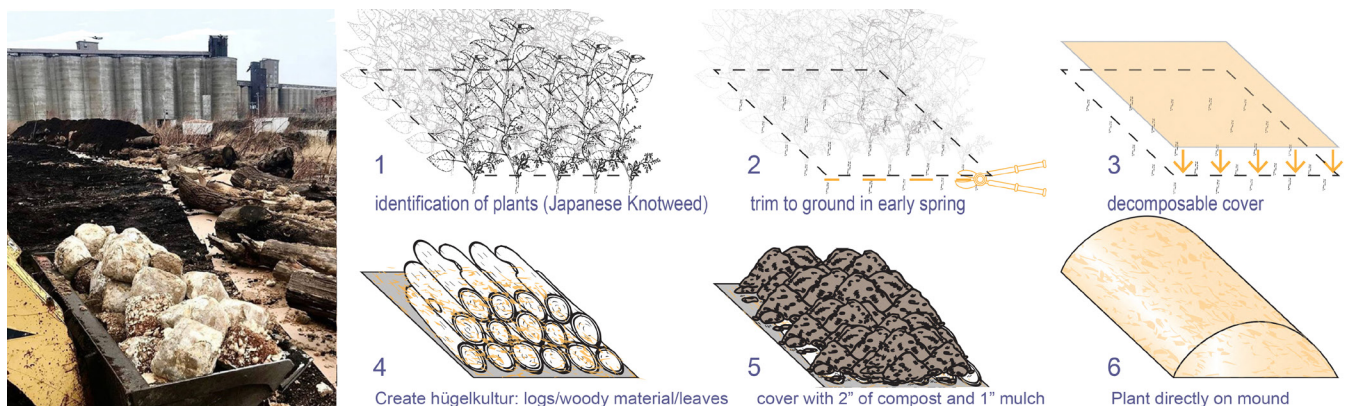


Figure 3. In spring, plants are cut back and soil is covered with a long term, biodegradable board obstruct rhizomic shoots. Mounds are constructed by burying decaying logs and compostable biomass. Topsoil, compost mulch produced from materials on site, encase the stack. (M. Mesi).

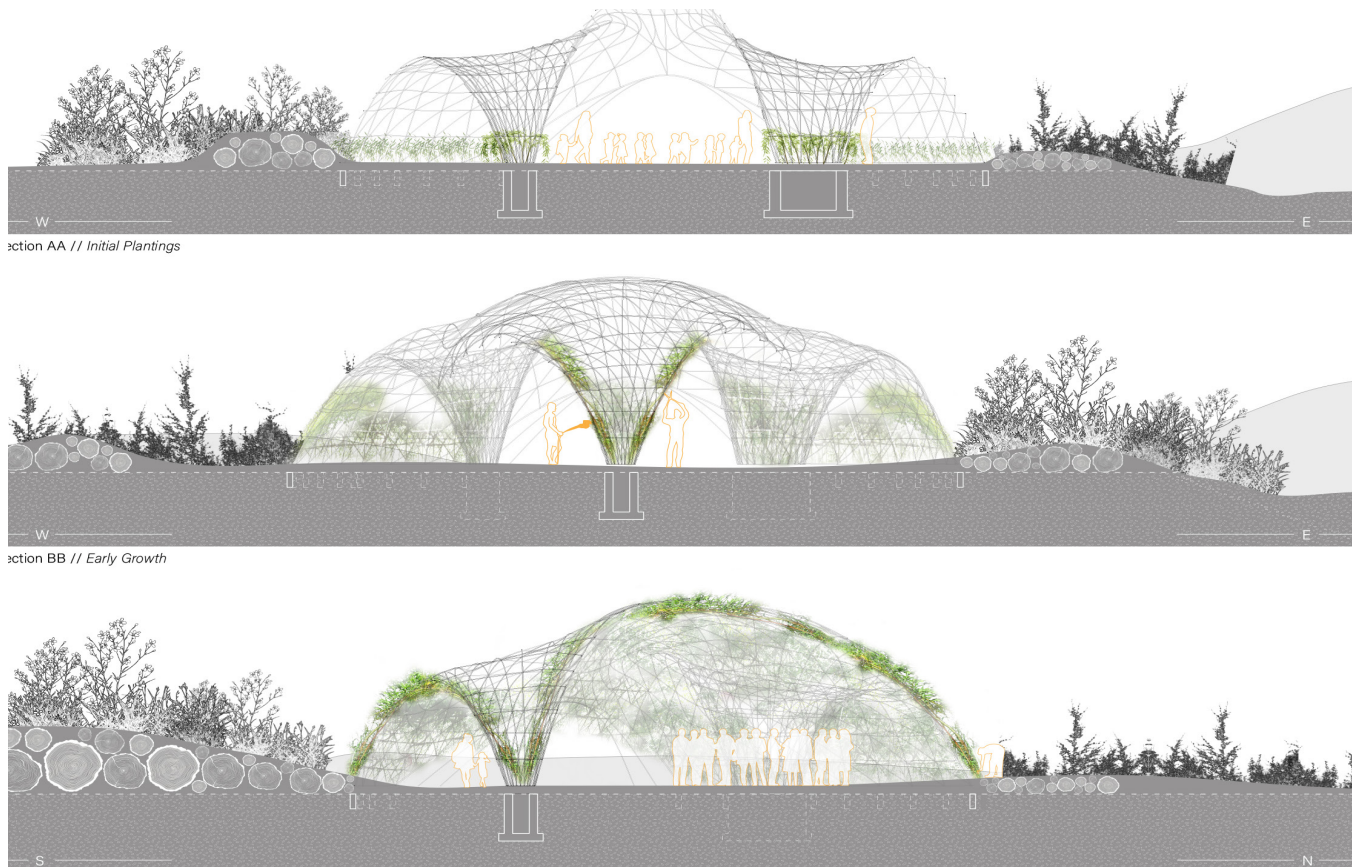


Figure 4. Time lapse sections: growing willows and evolving habitats (E. Gilman and M.Mes, K.Lass H. Leslie, C.Trautman).

A DIFFERENT BLEND

Highlighting the entanglement of architecture, natural processes and the site’s constructed natural and industrial landscape, the studio hopes to promote a built fabric that functions like the forest biome, what Jana VanderGoot defines as “a material archive that produces, reproduces, sustains, and regenerates.”²⁵ The hands-on nature of the second and third studios extends into the life of the willow trellis as it engages communities of human and other organisms and grows the project. In the selected design build project, people, soil, bacteria, metal rods, willows, and decaying trunks, mingle in a space defined by walls of living soil and fluttering leaves. The verdant structure will continue to evolve under the stewardship of the Director of Ecology, community volunteers, school groups, and local NGO’s, sun, rain, decomposing logs, pollinating bees, and most critically - the hungry deer.

This space for environmental reflection, awareness, and understanding envisions that architecture can play a role not only in societal enlightenment but also in the intentional cultivation and stewardship of biological ecologies by designing a mutual ecology as much as an architectural form. An understanding of the web of climate, ecology, energy flows and living systems may evoke ecocritical responses to humanity’s role in the world from the soon to be architects involved in the project, and the adults and children who will meander through, or sit for a class, in the willow dome. This is particularly important if we hope to co-construct more complex, supportive, relationships that entangle human and more than human agents.



Figure 5. Detail of project timeline. (E. Gilman and M.Mes, K.Lass H. Leslie, C.Trautman)

ENDNOTES

1. Formerly known as Willow Way the project was developed by a team led by Elisabeth Gilman and Mitchel Mesi that included Katie Lass Heather Leslie, and Crista Trautman. The studios were run (in order) by Professors Laura Garofalo, Joyce Hwang, and Nicholas Rajchovik.
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10. Haraway, 2008.
11. Pietari Kääpä, *Ecology and Contemporary Nordic Cinemas: From Nation-building to Ecocosmopolitanism*, Bloomsbury Publishing Inc, New York, 2014 p 4
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18. "an approach to storytelling that strives to compose with, not for, its nonhuman characters" see Donly, C. 2017, Toward the Eco-Narrative: Rethinking the Role of Conflict in Storytelling, Humanities, <https://doi.org/10.3390/h6020017>
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