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Biodive

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To the Dean of the Graduate School:

We are submitting a thesis written by Morgana Faucett entitled "Biodive".

We recommend acceptance in partial fulfillment of the requirement for the degree of Master of Fine Arts in Studio Art

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BIODIVE

A Thesis

Presented to the Faculty

Of the

College of Visual and Performing Arts

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Of

Master of Fine Arts

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By

Morgana Faucett

Abstract

Humans exist among an intertwined series of ecosystems and environments. As a species, we curate the spaces, these environments, that surround us to suit our internalized visions of the world. While such curation is not inherently negative, humanity's industrial process of constructing our visions is not always handled with sustainable methods. This paper analyzes my creative work through the framework of architecture's role in climate change and human impact, highlighting past and present building practices. Solutions for future practices will also be considered, specifically targeting the questions of construction material, building function, and repurposing of older buildings to achieve a net zero and energy positive future.

Within my artistic work, I craft installations and sculptural pieces inspired by architecture and humanity's conflict with nature to translate my research into an accessible, three-dimensional format. This work culminates into my thesis exhibition, *Biodive*, comprised of both installation and sculptural works inspired by architectural frames, constructed from manmade and organic materials. My thesis exhibition draws inspiration from biomimicry, bioutilization, and biomorphism while addressing the planet's current environmental situation. If the climate-related warning signs from our planet are not heeded, and our practices remain unchanged, then the consequences of our actions will become irreversible and projected solutions will not be enough to save our species.

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Biodive

Introduction

Humans exist among other species and organisms, to which our life cycles are interlinked. We depend upon each other and our respective functions to thrive and survive. As humans, we find ourselves shaping the natural environments that fill our planet. Altering and shaping these spaces allows us to make homes and places where we can expand and grow. These spaces are curated and arranged to reflect our vision of the world, a world which we have shaped and left our imprint upon. However, the process of building an envisioned world is not always constructed in the most careful nor sustainable way. When constructed haphazardly, humanity's quest to shape our world and its environments turns to desolation and destruction for the planet, other living organisms, and ourselves.

My work explores humanity's impact upon other living organisms and our environment through sculptural and installation works exploring the subject matter of architectural structures, architectural biomimicry, and sustainable practices. In my artistic work, organic and manmade materials are combined to reflect humanity's tension with nature. These works are often constructed from steel, wood products, or found domestic items contrasting against natural or living elements such as moss and insect specimen. Installation and sculptural works based on architecture and the fundamentals of biomimicry, where nature inspires sustainable solutions, allow for the works' viewers and myself as the artist to reflect upon our collective impact and future.

Biography

My artistic career and practice began at an early age. As a child, I was close friends with a doll designer who gave me my first set of colored pencils. This would be my medium of choice until I began my undergraduate work. I did not have a set plan of what I wanted my work to convey or communicate yet, but I began drawing animals. By age thirteen, my work primarily focused on animal subjects with themes of endangerment and extinction. It was also during this time that I was inducted into two artist guilds, had my first solo exhibition, and regularly participated in adult juried exhibitions. Although I once enjoyed depicting animals, I did not feel content with the work I was producing. It felt as if there was a wall between myself and the body of work I was known for. Adults pressured me to continue with the works regardless. Eventually, I reached a breaking point. In my last two years of high school, I stopped producing physical work. I did not participate in exhibits, stopped renewing my guild memberships, and stepped away from publications.

These last two years were also spent attending an online school, where the bulk of a day was spent staring at a blinking screen. In my case, this was not necessarily a negative. I taught myself HTML, CSS, and JavaScript when I was supposed to be completing schoolwork. Designing and coding websites for others became a small hobby of mine. I also began working on digital illustration and graphic design commissions. Through all three avenues, I met several bloggers that introduced me to a multitude of music subcultures. Two that immediately caught my interest were Seapunk, an electronic genre with the aesthetic of aquatic life and pastel colors, and Vaporwave, another electronic genre with an aesthetic centered on nostalgia and neon colors. Exploring these two subcultures led me to discover the 1980s architecture & design group Memphis Milano. Their use of pattern, bright colors, and geometric shape to create functional yet stylized objects captivated me. I dreamed of one day creating sculptural works like theirs or becoming an architect.

Resources were limited in my undergrad years, so I began painting pastel, foggy landscapes. These works were fueled by watching forests of my hometown be slowly cleared for failed building projects, all of which remain abandoned presently. Having felt like a stranger in that town for quite some time, seeing it constantly change and lose places I once knew made that feeling grow stronger. By graduation, even a forest I had taken photographs of during my first commute to campus had been torn down. Both my neighborhood and long car rides were no longer recognizable, with nothing put in place of the empty spaces except fallen scaffolding or torn down signs that once promised infrastructure. I would explore areas of flora that remained on regular nature walks. During these walks, variations of moth and butterfly species caught my attention. Entomology would become a hobby of mine as a result of these creatures.

Long nature walks spent collecting dead insect specimens, identifying them, and turning them into display objects was a typical morning. I began working with professional entomologists and other amateurs like myself to better document lesser-known species. Though my specialty was moths, with not much interest in butterflies, a colleague introduced me to the Xerces blue butterfly. Its story was always presented simply: it lived in California until land development killed it. Proceeding into my graduate years, I was not content with that being the whole story. It was time to revisit the artistic themes of endangerment and extinction that my childhood self was so fond of, as well as my teenage dreams of being an architect.

Xerces & The Issue of Accountability

In my time spent researching the Xerces blue butterfly, it seemed as though something was missing from the picture. With this species being noted as the first American insect species to perish at the hands of human impact, specifically land development, there was a surprising lack of information on the specifics of its extinction. Across the scientific journals and Californian resources at my disposal, all sources mentioned the species' extinction and attributed it to land development, yet the conversation ended there. The fact that the butterfly died at the hands of humans was already known information, but what seemed to be unknown across all sources was who was the responsible party.

I would not necessarily call this dilemma an act of withholding information. It is plausible the specifics were not documented, or perhaps poorly documented and lost to time. I would not expect the scientists nor writers behind these sources to include fragments of broken information rather than summarizing everything as a simple, factual statement. It is true that the Xerces blue died at the hands of humans. If subsequent information about its death cannot be fully validated or is lost, the truth of such statement becomes questionable. Some may be content with the reality that a small, dead species' history is partially unknown; I am not so content.

My attention shifted from purely scientific journals and writings about the Xerces blue to the history of Californian development during the 1930s and 1940s, when the butterfly became extinct. The Xerces blue butterfly lived within the Sunset District of San Francisco, California. Its habitat was local sand dunes where its host plant resided (Grewe et al. 2021). Land development in the Sunset District was high during the 1930s, with its main development ending closer to the early 1950s (Keil 2006). While there were many developers active throughout California during this time, one in particular was most prominent in the Sunset District. A home developer by the name of Henry Doelger designed and developed homes for the San Francisco Sunset District (Keil 2006). These houses were marketed as affordable with sleek, postmodern designs (Keil 2006). Due to their square appearances and almost mass-produced quality, they were labeled "little boxes" by some critics (Keil 2006). In theory, it seemed to be a noble act. Doelger brought more home opportunities to California. He developed a part of the Sunset District's postmodern aesthetic. Such acts are not inherently negative, rather they lean on the side of progress. Unfortunately, the issues reside in how these acts were executed.

In terms of whether these homes were truly "affordable," this claim can be disputed. The average market price for a home in the 1930s and 1940s was between $4,000 to $6,000 (Chalmers 1941). As listed on one of the Doelger home pamphlets, these houses were closer to $10,000 and $14,000 (figure 1). This places the Doelger homes above median market value, failing their promise of affordability. As for their construction, the mass-produced quality of the homes mentioned previously meant a large number could be built in a small span of time. Returning to the Xerces blue butterfly's cause of extinction, the events behind its death seemed clear. While I was not there to witness the event, and the extinction is not on Doelger's record, it seems as if Doelger's vision of shaping the Sunset District caused the Xerces blue to perish. To present this new information and give closure to the Xerces blue's story, I sought to communicate it through my artistic practice. The presentation of my culminated research became my body of work entitled *Xerces*.

I began searching through many of the Doelger pamphlets I was able to find and located a few that displayed floor plans of his home designs (figure 1). While I could not find exact floor plans for his Sunset District homes, I was able to find the plans for his Westlake homes also located in San Francisco. As an installation, I constructed a disjointed house frame inspired by one of his plans (figure 2). When viewed from the front, the frame would replicate the two-dimensional floor plan. However, as one moved through the space, the view would become more abstract, skewing the floor plan's appearance. Like the disillusioned quality of these homes, their appearance or what they represent become fragmented when closely examined. Half of the frame's wood was sourced from my hometown. This wood is unfinished, with raw bark exposed on several pieces. In contrast, the other half has a more manufactured and mass-produced quality. Some pieces contain production stamps marking the manufacturer and its sleek, industrial quality.

The house sits upon a sand dune that I created with paver's sand (figure 3). As viewers move through the gallery, their movements disrupted the sand. They have the choice to step within the frame and navigate through it or view the piece from afar. Movements and tremors on the floor will still influence the sand's placement, even if the viewer chooses to be removed. Those who walk through the frame will directly disrupt and displace the sand, with the dunes keeping a record of their footprints. Even if one has not seen the people who existed in the space of the frame before them, their impact was recorded.

Through the frame, a video is projected of myself burning butterfly sculptures constructed from wire and blue cellophane. These sculptures directly represent the Xerces blue butterfly. The cellophane does not always burn and must be relit with intention. At times, the flames become too high for the contained area, needing to be blown out immediately. This element of fire is to reference California wildfires and such events becoming more prevalent as climate change worsens. While it may seem at first glance that the Xerces blue butterfly's death does not contribute to climate change, it ultimately does. The process of land development and land use contributes to approximately 23% of human-caused carbon emissions (Levin and Parsons 2019). In addition, habitat loss like that which occurred with the Xerces blue's sand dunes causes a lack of biodiversity (McElwee 2021). In an ecosystem, biodiversity is defined by the amount of species variety in an ecosystem between living organisms (McElwee 2021). In disrupting the diversity in an ecosystem, it is unable to properly sustain itself and function in a healthy manner (McElwee 2021). How this statement matters in the context of climate change is that a less biodiverse system is not capable of adapting to new changes, such as higher temperatures (Roe 2019). To summarize, the loss of a unique species such as the Xerxes blue causes a lack of biodiversity in the ecosystem. Within the void created by the species' extinction, the ecosystem becomes imbalanced and has difficulty functioning. These difficulties make the ecosystem susceptible to new changes such as temperature due to its imbalance. This means that even the extinction of a single species such as the Xerces blue contributes to climate-related issues.

While the Xerces blue's case was resolved in my mind, what remained unsolved was the question of current practices. When reflecting on how our current climate has shifted in a more dire direction, with temperatures rising and climate attributed disasters rising in occurrence, I had little hope that our methods of development had improved. I decided to research the effects of architecture on a global, collective scale rather than an isolated American case to seek answers going forward.

Carbon Emissions Through Materials

It is important to note that I regard buildings and spaces where we reside to be of high importance in our daily lives. Our spaces are curated with collected objects, furnishings, and perhaps photographs of our lives. They reflect the world we wish to live in and what we wish to surround ourselves with. When it comes to examining architecture in my work and its effects, I am not interested in arguing that architectural structures are inherently negative forces. I do not think one should be ashamed of their need to inhabit a safe dwelling or living residence. As someone with a passion for architecture and a desire to build, it is not the object itself that is the issue. Where the issue truly resides is in the way we handle our production, perhaps over production, of architecture. While homes can overlap with this concept, such as in the case of the Xerces blue butterfly, housing is not the issue at hand. Our lack of sustainable practices, especially our haphazard handling of the environment, is where our issues reside.

Analyzing architecture on a global scale, the construction of new buildings generates 40% of global carbon emissions (The American Institute of Architects 2020). In contrast, transportation accounts for approximately 23% of global carbon emissions or nearly half the amount of architecture (The American Institute of Architects 2020). The production of this carbon can be most attributed to the methods in which the building is constructed, such as the materials utilized. In order to better examine our material choices for these architectural structures, I shifted focus to common building materials and their respective industries. Two such materials are that of concrete and wood.

While it is sturdy and durable, it should be noted that concrete produces a substantial amount of carbon emissions. The material produces 2.8 billion tonnes of carbon dioxide, or 4-8%, of greenhouse emissions per year (Franklin-Wallis 2021). In addition, production of concrete contributes to 10% of the world's collective water use (Miller et al. 2018). When comparing concrete's impact to that of wood, structures made from wooden frames generate less carbon emissions (table 1) (Laurent et al. 2018). Despite such data, the consensus between building practitioners and analytical data is mixed. Concrete based construction associations such as The Global Cement and Concrete Association (GCCA) present the argument that despite its emissions and water use, concrete is a sustainable resource (Global Cement and Concrete Association n.d.). GCCA also states that the cement industry where concrete is produced has lowered their emissions by 19% from the 1990s to present day (Global Cement and Concrete Association n.d.). Despite the lower rate, I would argue that this is not enough of a change. In our current situation where it seems temperatures are hitting a new record high almost monthly, if not weekly, a 19% decrease across two decades is not enough.

There are, of course, considerations to be made when working with wood and the timber industry. While trees can be planted and grown as a renewable resource, cutting down too many trees due to high demand results in habitat loss and deforestation. With this concern also comes the reality that deforestation is the leading cause of species extinction (Cho 2019). Therefore, if wood were to become the primary material for architectural structures going forward, heavy regulations would need to be enforced. These regulations may include limits on sources for the wood, how many buildings can be constructed within a duration of time, and how much wood can be sustainably harvested for production. Currently, I do not have much hope for this idea.

While it may create structures with less carbon output at its peak health, the rotting and decomposition of wood actively releases carbon (Liang et al. 2020). The amount of this released stored carbon can also be significantly high in comparison to other materials (table 2). This leads parts of the structure to become waste products and nonreusable. Concrete faces its own issues when it comes to recycling, however, the difference between it and wood is that old sections of concrete do not decay, and they do not necessarily become waste. It is possible to recycle old concrete, and it is generally an infinitely recyclable material (Global Cement and Concrete Association n.d.). The strength and durability of recycled portions can come into question, but it still important to note that it can be given a second chance at use whereas rotted wood cannot. This still does not make concrete a more sustainable resource, however, as the cement industry that produces concrete remains one of the primary producers of carbon emissions (Franklin-Wallis 2021).

While concrete and wood have been the primary focus of sustainability conversations in recent years, perhaps there are other options for building materials that could effectively balance carbon emissions. One such material is that of steel. Like concrete, it can be reused and recycled. Unlike concrete, it can be recycled immediately on-site. When building my own sculptures from steel, it would not be difficult for me to cut metal from previous works and reuse it in new works. It is just as possible for me to reuse smaller pieces of metal scraps. The pieces will not decompose like wood, and they do not need to be agitated like concrete in order for me to reuse them. In terms of easily recyclable materials, steel would seem to be one of the better options.

When taking carbon emissions into consideration, steel produces around 8% of global CO2 emissions (Gerres et al. 2021). As discussed previously, concrete generates a similar percentage up to 8% (Franklin-Wallis 2021). Both materials and both industries are on par with each other in terms of carbon emissions. What can be said of the steel industry is that new processes are being developed to lower this number. At MIT, Donald Sadoway examined the process known as molten oxide electrolysis and found that it could produce steel as a byproduct (Temple 2018). This process does not require chemistry in order to produce the steel, only iron oxide (Temple 2018). What this means for future production is that small amounts of an inexpensive metal alloy could be used to produce bulk steel (Temple 2018). In addition, the process of molten oxide electrolysis produces only pure oxygen as a byproduct, meaning the emissions of steel production could be substantially lowered (Temple 2018). Despite how promising this technique may sound for the industry's future, it faces the issue of legislation. Similar to the issue of enforcing regulations discussed prior, legislation in The United States of America would need to help enforce the process. The possibility of regulations being enforced by the American government for the sake of sustainability is not one that I currently have confidence in.

So where does this leave us on the issue? Personally, I find myself using steel more than wood, and both materials more than concrete. Although I am one person and not the strength of an entire industry, and I am not crafting miles of houses nor buildings, it is easier for me to work with steel and recycle it when needed. Its durability, strength, and ease of movement when I need to carry it from place to place also factor into this choice. I am a considerably weak person when it comes to physical strength and lifting a finished concrete piece on my own feels like an impossible task. Given how large or heavy a single piece may be, it could be an impossible task for many people. However, this discussion is not one merely on an individual scale, but a national and even global one. I find myself leaning more to steel, despite being painfully aware of its emission problem, because it feels as though there may be hope for it in the future. Perhaps we could lower its emissions close to net zero, and perhaps legislation in a decade or two could enforce processes such as molten oxide electrolysis as industry standards. Earlier, I mentioned the possibility that we are at a point where the material and carbon it produces does not matter as much as the use of the building it creates. In the case of Powerhouse Telemark in Norway, this may be true.

Telemark is an 11-story building designed by the architectural group, Snohetta. It operates as a power source that generates 256,000 kWh of energy a year from its roof (Perry 2023). Telemark generates more energy than the amount needed to build and operate it, meaning, Telemark is energy positive and actively offsetting the carbon footprint produced by its material (Perry 2023). When looking at the future of architecture, it may be best in terms of building a sustainable future to repurpose older buildings in ways that allow them to both serve their communities and be energy positive rather than build new structures.

While I do not currently have the resources to repurpose an entire building, I have incorporated this notion into my artistic practice on a smaller scale. Many of my recent pieces contain components taken from previous works, recycling their materials rather than buying brand new parts. For the main installation in my thesis exhibition, the steel used to craft its framework is sourced from a local construction site of a renovated mill. These recycled parts do not require the production of brand-new materials, nor the carbon emissions associated with that production's processes. In this way, I can engage with my material of choice via a more sustainable method.

Moving forward in my research, I wanted to look for other solutions. While repurposing and recycling older buildings can be a sustainable solution for issues in the near and far future, what if constructing a new structure is required? How can this new structure be created in an environmentally friendly way outside of mere material consideration? Even if a new structure is not required, what ecological aspects can be added to older buildings to make them more environmentally friendly?

Biomimicry in Architecture

Searching for the answers to the questions in the previous section, I turned to biomimicry and its principles. To explain, biomimicry is the practice of looking to nature and its functions for sustainable solutions in the modern era (The Biomimicry Institute 2023). This does not mean that the structure necessarily has to look like an organic form or replicate a component of nature. Importance is placed more on the concept of producing an environmentally friendly structure whose mechanisms or parts function like systems within an ecosystem or organism.

Biomimicry often overlaps with two other concepts: bio-utilization and bio-morphism. In bioutilization, the emphasis is placed upon using elements sourced from nature (The Biomimicry Institute 2023). An example of this could be the incorporation of plants living within the walls of a structure, such as in the case of a living wall. In this instance, it is not the intention of the structure to function like nature but rather harmonize with it.

For biomorphism, the focus is for a resulting structure to look like an organic system in nature (The Biomimicry Institute 2023). The structure does not have to function like its organic inspiration or utilize organic material. In terms of where my artistic work aligns, I find myself favoring biomorphism as a concept rather than directly expressing biomimicry. However, the principles and ideas I wish to uphold and advocate for are those of utilizing functions in nature to find solutions to our current building practices.

Artistic References

Throughout my research and practice, several artists and architects have influenced my artistic work. Antony Gormley and his work *Matrix III* is one such example (figure 4). Gormley states the piece represents "an invisible skeleton of a concrete architecture" and "a unit of habitation (*Matrix III* 2019*)."* His works primarily explore the connections between people and their developed environments. Through this, he often explores the subject matter of constructed environments such as buildings and architecture. It is in these works by Gormley that I find the most inspiration within my own practice.

Another inspiration is that of Isabelle Bonte and her sculptures identified as "wire landscapes" (figure 5). Her sculptures are constructed of steel wire with fabric accents that combine to form small scenes of homes and buildings. These sculptures have a natural fragility to them in their thin lines and intricate care. Even the fabric across these works has a translucent appearance, providing it with a ghostlike quality. Her work is partially inspired by her time as an interior designer. In her own words, her works represent "hope worlds, proposals for architecture in reinvited landscapes, where the human being remains evoked and modest, listening to nature, attentive to the visible and invisible" (Bonte n.d.). Between Bonte and Gormley, the inspiration and motives of Bonte's work align more closely with the topics I cover within my research.

Jack Henry has served as an inspiration in his works that combine living elements or organic media with more industrial, manmade elements such as concrete (figure 6). His work explores "spaces of untamed growth remaining in the urban landscape – where mankind's conquest of wilderness is most evident" (Wasserman Projects 2021). Concrete and other manmade materials encase found plants that grow within the cityscape, highlighting the contrast that exists between humanity and nature within the modern urban landscape. Henry's work inspired me to begin working with and incorporating living elements such as plants within installation and sculptural pieces.

Artistic Practice

When considering the details of my practice, my methods and approaches to each piece varies between installation and sculpture. For installations, I find myself wanting to utilize a large-scale work that can engulf the viewer and myself. In some way, I wish to use installation to craft a reflection of our current state, where we are a force that shapes the world. It is in the communication of my research and conceptual undertones where this force can be defined as either positive or negative. In terms of sculpture, less pressure is placed upon the size of the work. I prefer to work at a more intimate, small scale when constructing pieces not meant to be installation. Both explorations of scale allow for large, looming pieces to be contrasted by smaller moments of connection and contemplation. The fragility of these small pieces can also become contrasted by their larger counterparts. For example, a large structure crafted from durable steel can exist alongside fragile wooden models crafted from matches.

For materials, as mentioned previously, I work with both organic and manmade materials. The manmade is defined by any material that cannot exist in its current form without human intervention. In other words, it is a material that does not occur, or does not naturally occur in its altered state. One such example is that of cellophane wrapping, a holographic material that requires human interference to reach its current form. However, cellophane itself comes from the organic material of cellulose. Despite being from a natural source, processed cellophane does not naturally occur. It is with materials such as these that I find myself most intrigued. Even steel, the material I have worked with most during my research, exists in a similar manner. It is the result of the naturally occurring element of iron enduring human processes. My choice of organic, naturally occurring material centers most on plant life and ground materials. For plants, they serve as a vital oxygen producer in the case of trees and overall source of food and energy for ecosystems. Ground materials such as sand create the foundations that we build our worlds upon. They serve as the floor for our environments, the grounding force of our daily lives.

As mentioned throughout this paper, my work is based on that of architectural frames. The appearance of these frames tends to be based more so on geometric shapes such as rectangular and triangular forms. Rectangular shapes refer back to the essence of a house or building, to which we associate with rectangular or square formations. Triangular shapes refer back to a similar notion, being that of a house's roof.

Thesis Exhibition

My thesis exhibition, *Biodive*, combines installation and sculptural works inspired by architectural frames with organic, living material such as plants to express the contrast between humanity and nature. In the center of the gallery is a large installation comprised of expanded polystyrene and steel (figure 8). The expanded polystyrene takes the shape of a sprawling, organic form that twists around the gallery's central point. This material is typically used as insulation for homes, but within the installation, it becomes a structure of its own. Patterns are burned into the polystyrene, with these patterns being based heavily upon leaf veins and weathered sandstone. Both the appearance of the polystyrene walls and the designs burned into them are reminiscent of biomorphism, being inspired by naturally occurring patterns.

Inside the alcoves of the polystyrene structure are small, thermoplastic sculptures (figure 9). The majority of these thermoplastic sculptures are assembled from several petals of thermoplastic, with forms inspired by leaves and roadmaps. The appearance of these sculptures can be likened to types of flora and fungi. Some of these sculptures, however, are based upon the Chinese Lantern Plant. Within these sections, moss is housed inside a plant-like cage. The moss takes the place of what usually would be the Chinese Lantern Plant's seed. Due to the sides of the cage being fused together, the moss is sealed inside. The thermoplastic skin takes on the role of being both a protective and confining force. While it keeps the moss safe from harm, it limits its growth and keeps it locked away.

Within two recesses of the structure are two metal tree sculptures (figure 8). These sculptures resemble architectural skeletons, with geometric frameworks that encapsulate large tree branches. The inspiration for these trees came from my first few days within my first graduate studio, where the view from my window was obscured by large scaffolding. This scaffolding laid untouched for several months, allowing for vine plants to crawl along its steel bars and cover the frame. The nature of the metal tree frameworks within the installation is open to interpretation, where perhaps the frameworks existed prior and the branches grew through them, like an act of reclaiming the territory. On the other hand, perhaps the frames were built around the branches, attempting to consume or contain them. My view aligns more with the latter than the former.

Wrapping around and through sections of the polystyrene structure are large sets of geometric metal frameworks. These frames are triangular in appearance, much like the accompanying tree sculptures. The frames directly reference architectural skeletons, another similarity with their tree counterparts, and crawl through the burned patterns of the polystyrene wall. Whereas the tree sculptures consist of a thinner metal, this portion of frameworks consists of a more dense and rigid material. The frames act as almost a compressing force, trying to contain the spiraling, organic structure that is escaping through it. Rust is present across the surface of the metal, further showing the material's industrialization.

Traveling along the floor of the installation space are small, polystyrene sculptures that house plant life (figure 10). These sculptures take on the form of organic shapes and can be found inside the metal frameworks. The plants housed inside the sculptures are various living mosses that must be cared for throughout the exhibition's duration. Tree branches also sprout from these sculptures, with some branches weaving through the bars of the metal frameworks.

The installation is arranged in a circular formation, creating a round clearing in its center. Within this clearing is a walkway leading to the exhibition text, as well as a video piece projected onto the floor (figure 11). This video displays water patterns being disrupted by ink, representing oil spills. Soothing atmospheric sounds play throughout the video, creating a deceitfully calming environment. The calmness created from these sounds represents the deceitful nature of unsustainable industries, who present their unsustainable practices and products in ways that appeal to the public.

Shadows are cast along the walls and floor of the gallery space, elongating the forms found throughout the metal frameworks and polystyrene walls. These shadows elongate the installation's appearance, making it seem as if the installation is consuming the viewer and the gallery space. The replication of shadows also occurs across multiple gallery walls. Due to this replication, viewers may see their shadows duplicated across these areas. This allows the viewer to consume more space within the gallery, much like the installation itself.

Closing

Within my thesis exhibition, humanity's tension with nature and struggle to coexist is present. Moments within the installation communicate a semblance of hope for the future, such as the protective moss cages. However, even these small moments have consequences in their execution, such as the moss's growth being limited. Principles of both bioutilization and biomorphism were consulted for design choices and inspiration in the installation's function. The appearance of the work and organic patterns present within it are directly influenced by biomorphic design, while the utilization of plants within the space draw from the principle of bioutilization.

Humanity has the means to implement sustainable solutions in the realm of architecture and change our current approach for the better. These means range from changes in how industries approach their production of material, to striving for a structure to be net positive rather than net zero once constructed. Regardless, there seems to be either a struggle or reluctance to implement said changes. Humanity seems to have no issue changing the environments around them yet hesitates when faced with changing itself.

It is my hope in the future that we can change our current architectural practices in favor of ecological solutions. If the climate warnings from our planet are not heeded soon, the damage may become irreversible. If we do reach such a point, the potential solutions that are viable in the present will not be enough to save our future.

Tables

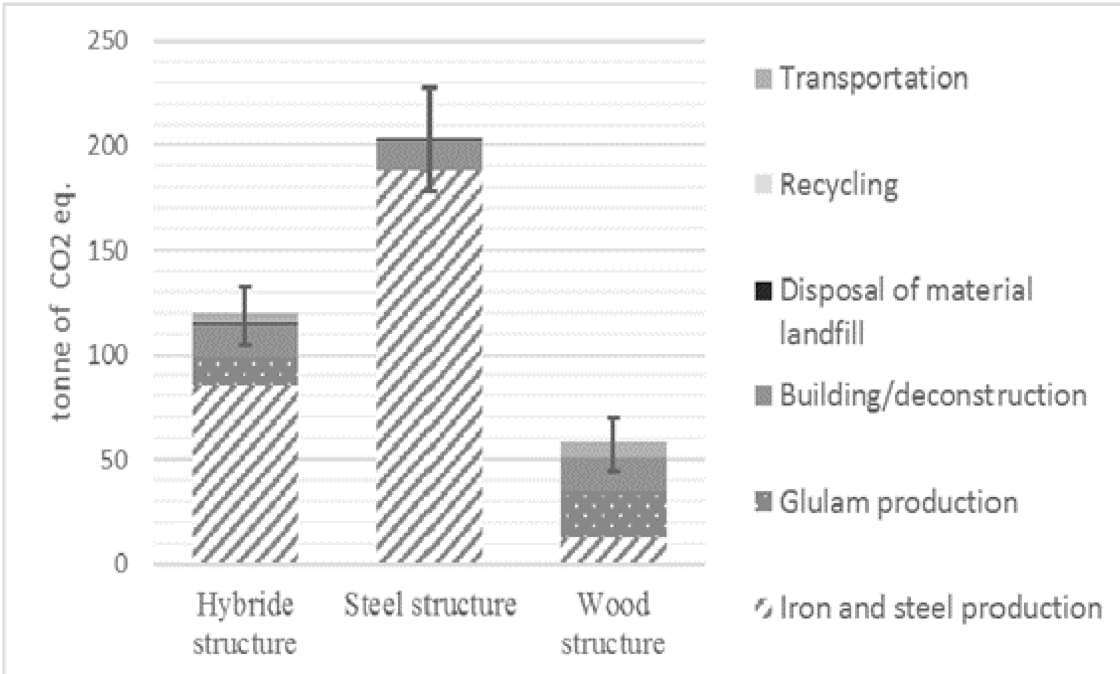

Table 1

A table comparing the carbon emissions of steel, wood, and hybrid structures. The emission rates are divided between procedures that occur for each structure such as material disposal and steel production.

https://www.researchgate.net/figure/Wood-structure-carbon-footprint-comparison_fig4_329781689

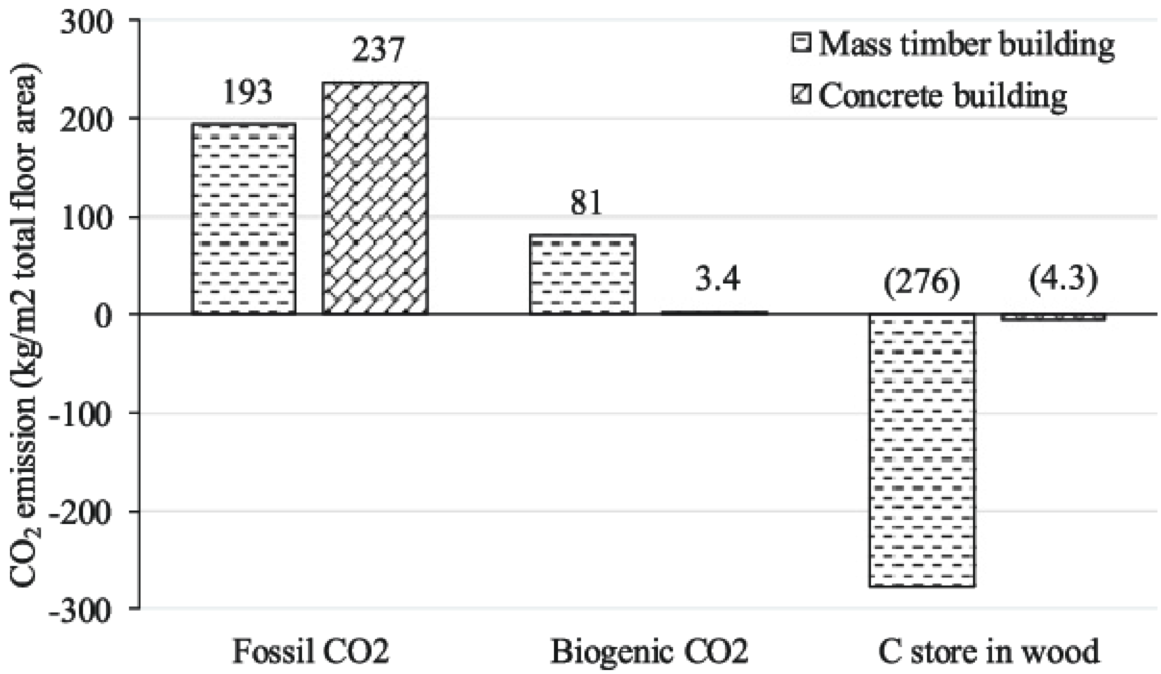

Table 2

A table comparing the types of carbon emissions produced by timber buildings and concrete buildings.

https://www.researchgate.net/figure/Comparison-of-CO-2-emissions-for-mass-timber-and-concrete-buildings-under-different_fig3_340960305

Illustrations

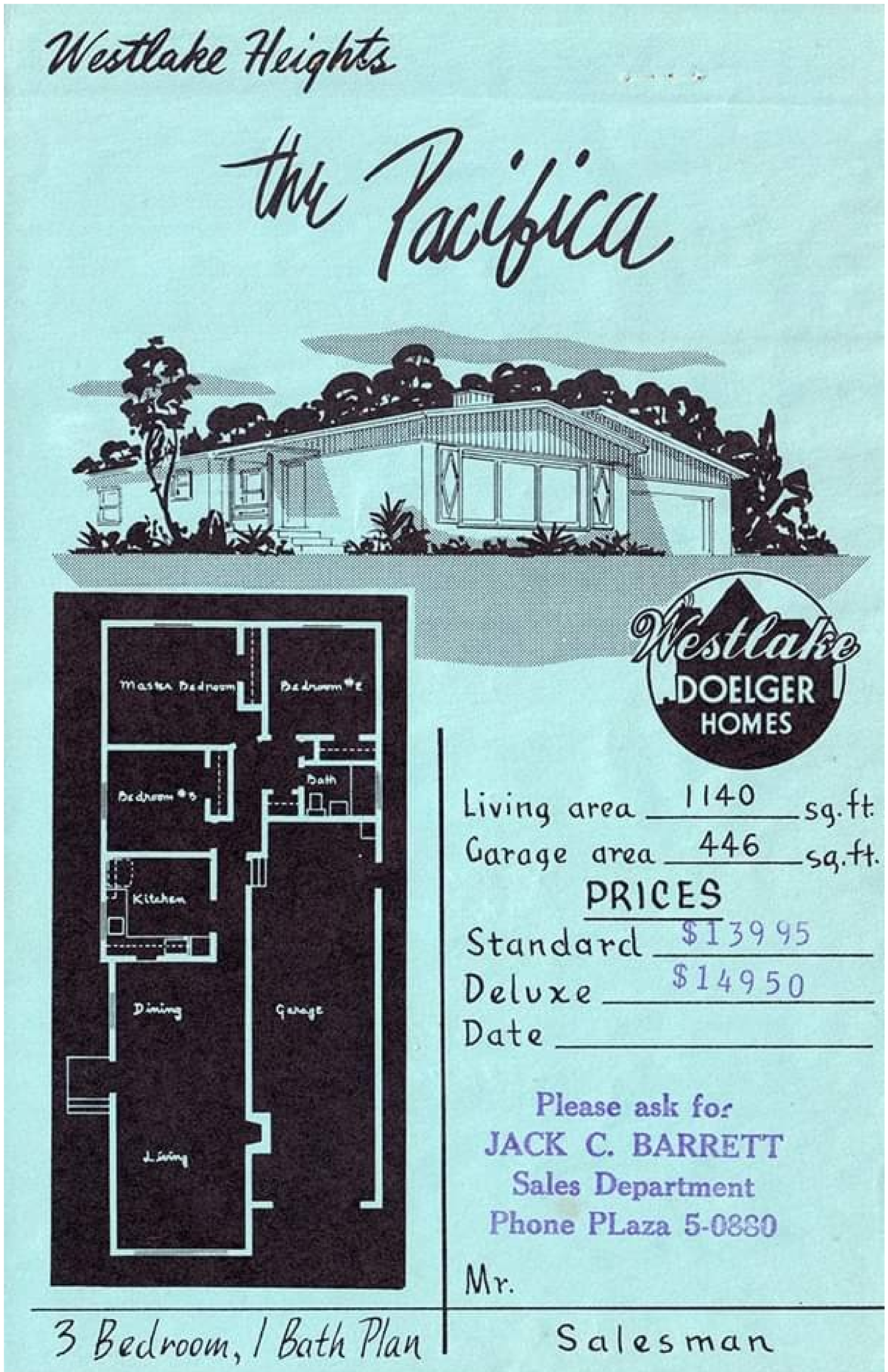

Figure 1. One of Henry Doelger's pamphlets for his Westlake homes. Courtesy of Rob Keil: https://tinyurl.com/4wne8hp4.

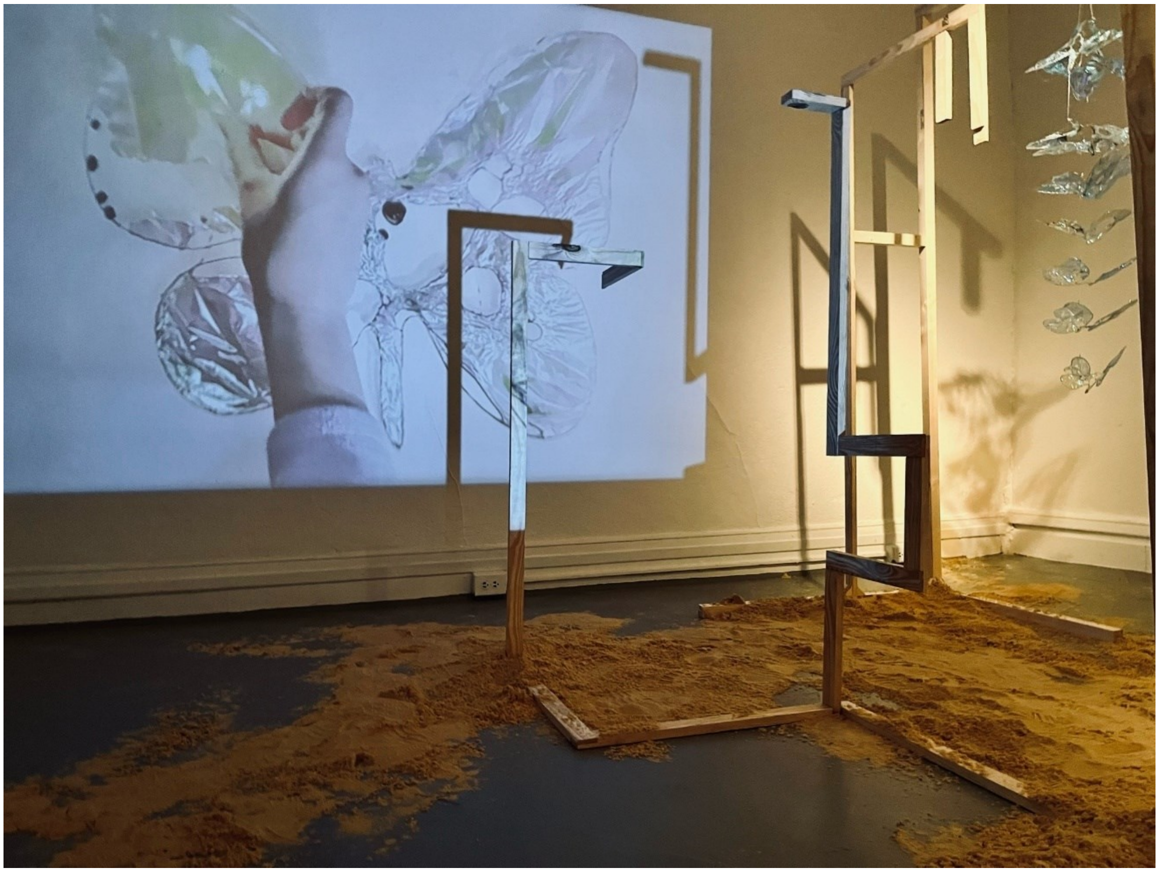

Figure 2. *Xerces.* 2021. Wood, sand, cellophane, wire, video projection.

Figure 3. *Xerces*. 2021. Wood, sand, cellophane, wire, video projection.

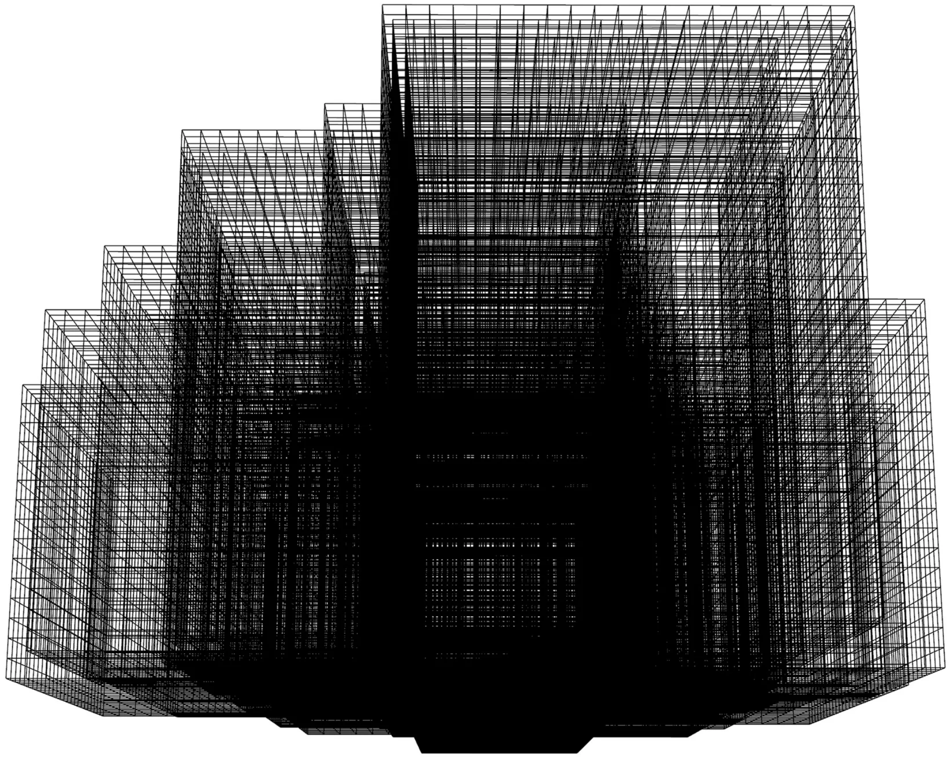

Figure 4. Antony Gormley. *Matrix III*. 2019. Steel. Royal Academy of Arts, London.

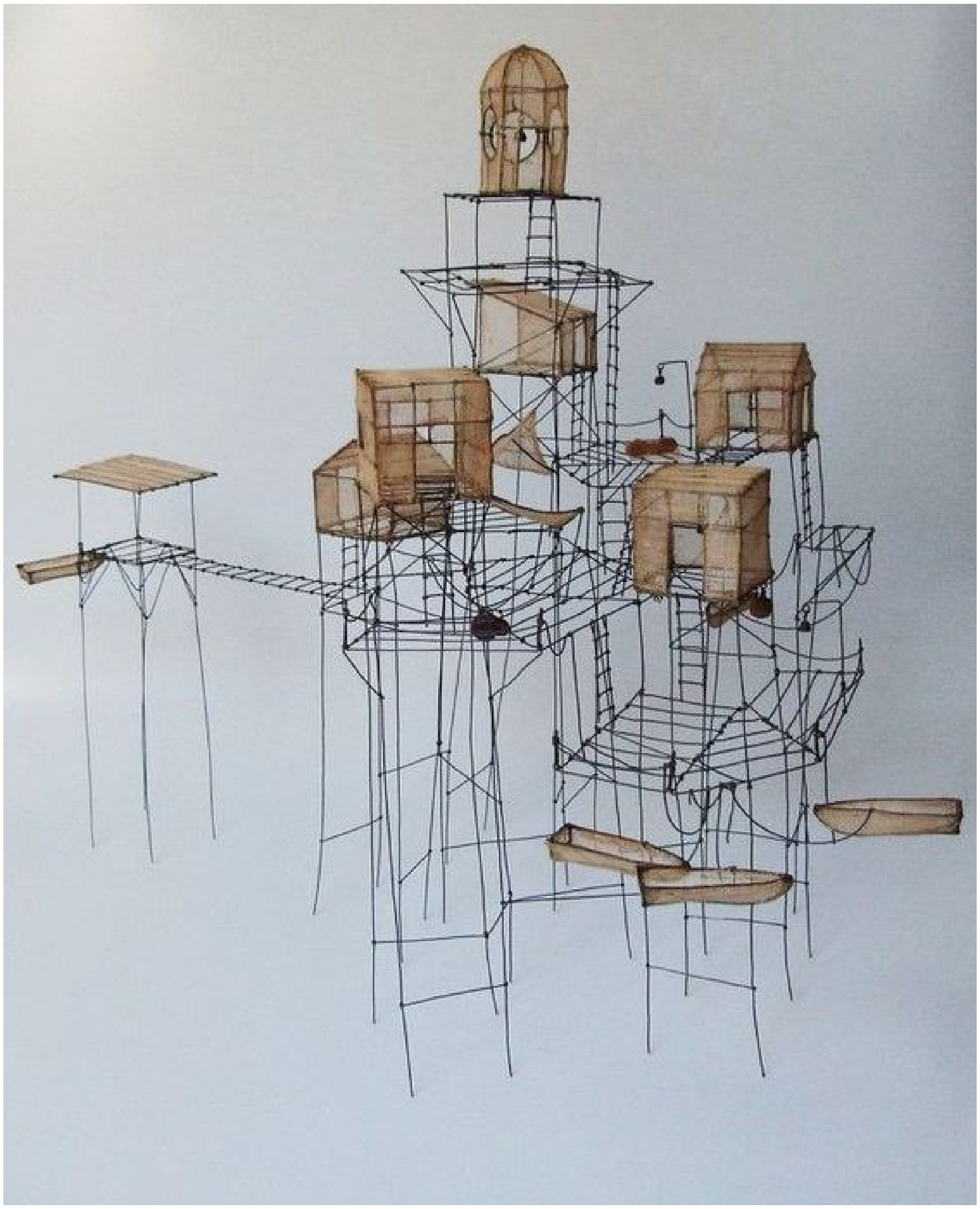

Figure 5. Isabelle Bonte. *Wire Landscape*. Steel wire, fabric. N.d.

Figure 6. Jack Henry, *Untitled*. 2019. Cement, plant-life, found material. 34”x24”x2”

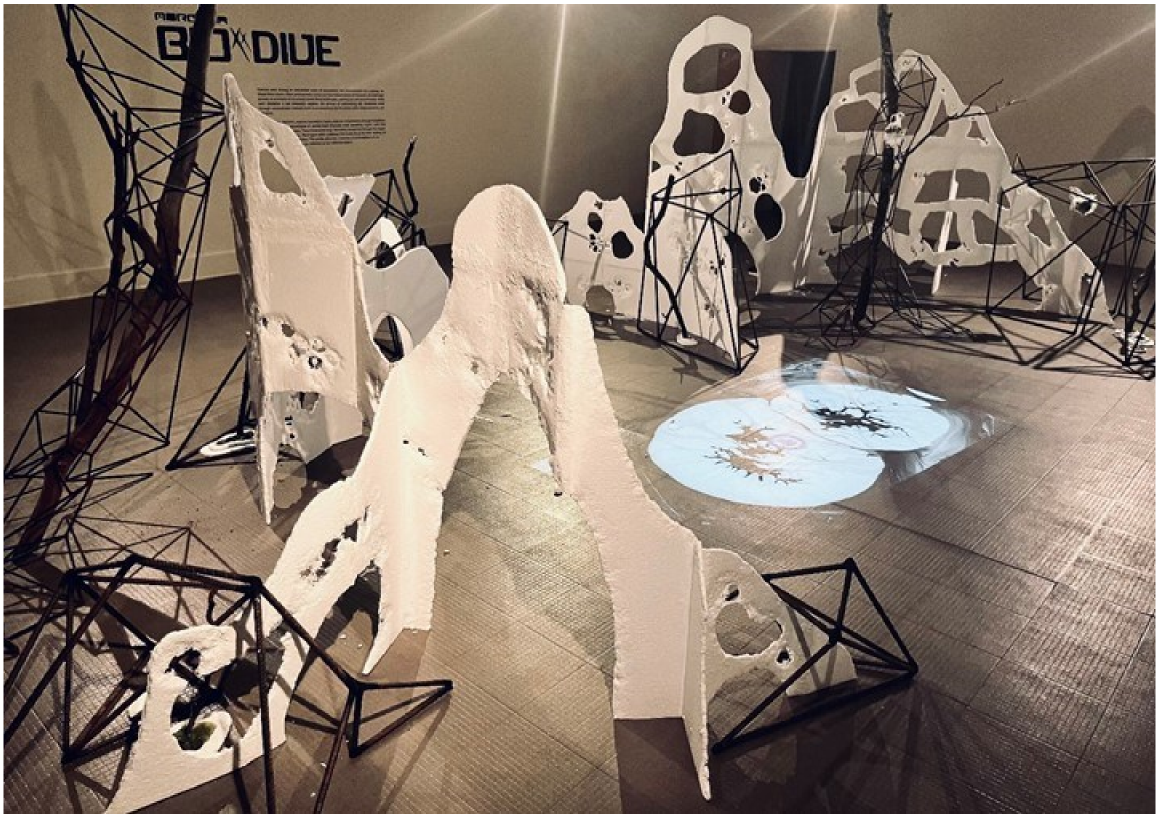

Figure 7. *Biodive*. 2023. Steel, polystyrene, thermoplastic, moss, tree branches. Approx. 25’x 30’

Figure 8. *Biodive*. 2023. Steel, polystyrene, thermoplastic, moss, tree branches. Approx. 25’x 30’

Figure 9. *Biodive*. 2023. Steel, polystyrene, thermoplastic, moss, tree branches. Approx. 25’x 30’

Figure 10. *Biodive*. 2023. Steel, polystyrene, thermoplastic, moss, tree branches. Approx. 25'x 30'

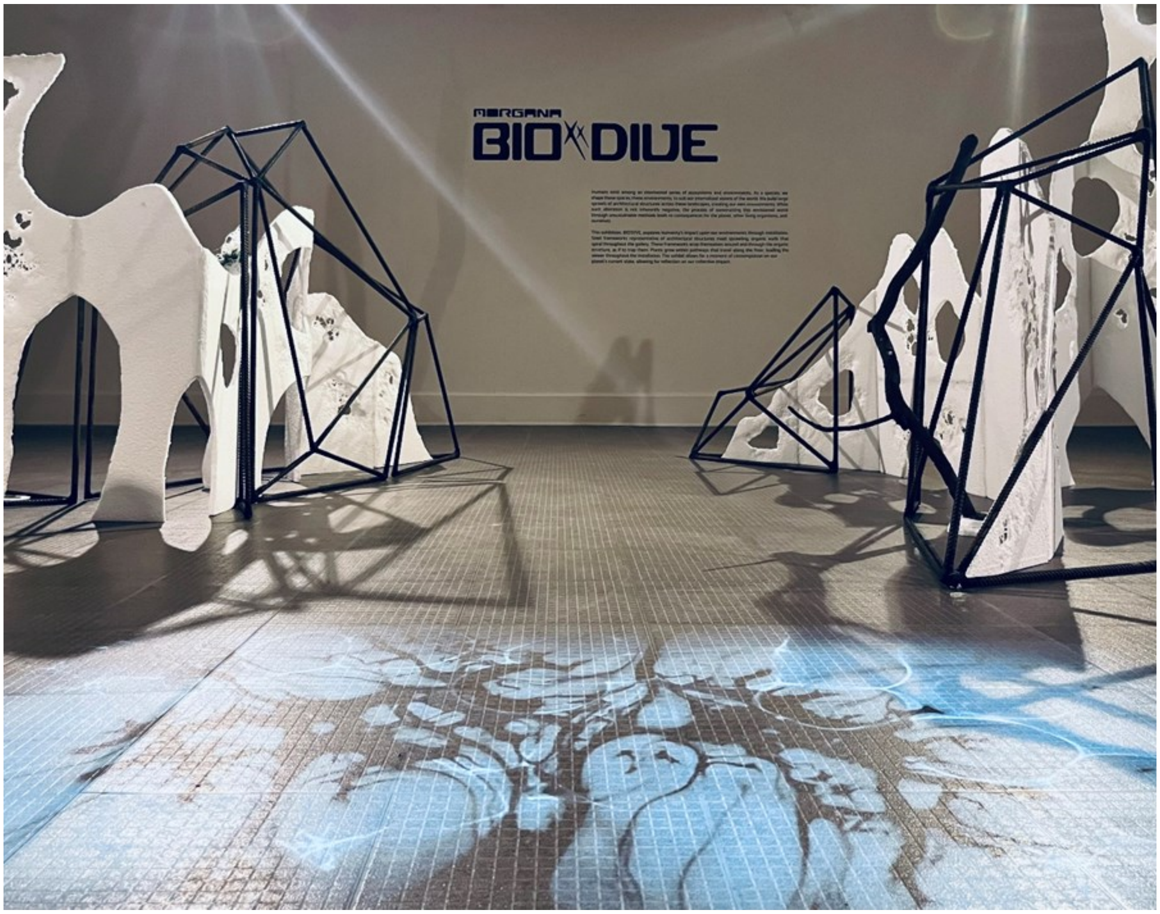

Figure 11. *Biodive*. 2023. Steel, polystyrene, thermoplastic, moss, tree branches. Approx. 25’x 30’

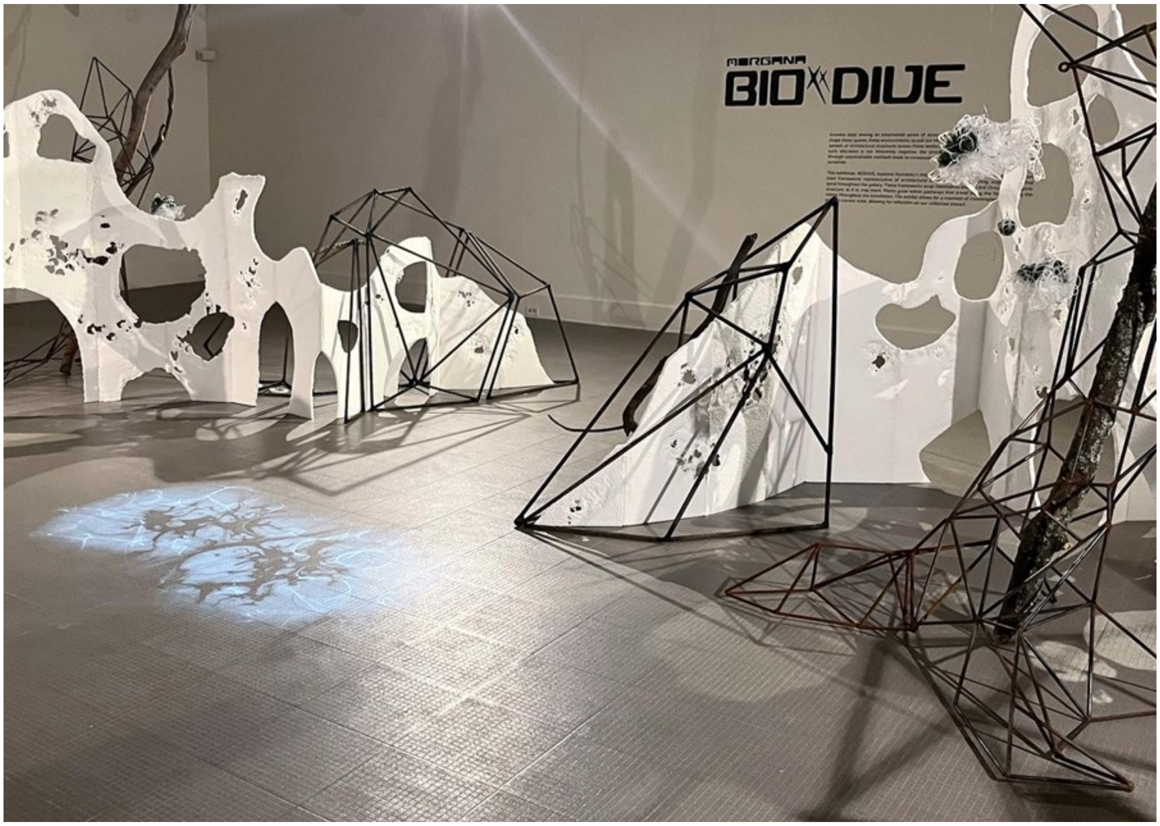

Figure 12. *Biodive*. 2023. Steel, polystyrene, thermoplastic, moss, tree branches. Approx. 25’x 30’

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