

Bachelor Project Report
2024

BOTANIC ALTARS














Almindelig kællingetand © Kirsten Hjørne

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Number of Characters: 24319



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TERM DEFINITION

Grey city areas: The biodiversity existing in the built and urban areas of the city. The city's small spaces such as pocket parks, street gardens, flowerbeds, private courtyards (Teknik - og Miljøforvaltningen, 2023)

Biodiversity: The variety of life forms present in a particular habitat or ecosystem, including plants, animals, fungi, and microorganisms.

Native Species: Organisms that naturally occur and have evolved in a specific geographic area or ecosystem.

Pollinators: Animals such as bees, butterflies, and birds that transfer pollen from one flower to another, facilitating plant reproduction.

Ecosystem: A community of living organisms interacting with each other and their physical environment.

Hydroponics: A method of growing plants without soil, using nutrient-rich water solutions.

Urban: Relating to or characteristic of a city or town environment.

Microorganisms: Tiny living organisms, often invisible to the naked eye, including bacteria, fungi, and protists.

Mycelium: The vegetative part of a fungus, consisting of a network of thread-like hyphae.

Ecology: The scientific study of the interactions between organisms and their environment.

Botany: The scientific study of plants, including their structure, growth, reproduction, and classification.

INTRO



It's a sunny day, and a ladybug lands on your knee. The air is thick with humidity, carrying the earthy scent of soil. Surrounding you are trees, plants, and flowers with the buzz of life.

But within this thriving ecosystem, the insects have no rights to their respective homes; humans do. And suddenly, the vibrant landscape around you gives way to concrete, transforming this once-flourishing habitat into an urban jungle. Here, resilient species have adapted to urban life, seeking refuge in the cracks and crevices of aging buildings. But even these sanctuaries are disappearing.

And with the disappearance of pollinators, human health are at risk, as these vital creatures play a significant role in maintaining the delicate balance of life on Earth and sustaining our crops.

But in the midst of these cities dominated by gray buildings and concrete, lies untapped potential for life and diversity. We are facing a duality: the relentless march of urbanization coincides with a troubling decline in biodiversity across Denmark. According to Denmark's Environmental Surveys, 27% of Danish species are now either extinct, threatened, or vulnerable - a downward spiral that shows no signs of abating. Addressing this challenge requires urgent attention and action.

Recent research from 2017 reveals a staggering 74% decline in biomass over a 27-year period (Insekters tilbagegang, Aarhus Universitet), indicating a significant reduction in flying insects —a trend exacerbated by the loss of habitats due to large-scale monoculture farming and urban expansion. Areas once teeming with wild nature and vital wildflower plants, crucial food sources for insects, are now increasingly scarce sights across Denmark.

This project draws upon Københavns Kommune's biodiversity strategy (2022-2050), shaped by the input of over 13,000 Copenhageners through civic engagement processes, as well as collaboration with esteemed partners like biologist Anders Kofoed to ensure the relevance and factuality of this initiative.

By prioritizing the needs of insects first, this project endeavors to redefine our relationship with nature in urban environments, particularly in gray city areas like squares, public gardens, and other concrete-dominated spaces. It serves as a call to action, as reconnecting humans with nature is realizing how even the most minimal actions can have immersive and irreversible consequences for the world around us.

PROBLEMSTATEMENT

On my recent inspirational trip to Brazil, I was overwhelmed by how nature thrived in the urban areas. Plants and trees coexisting with concrete and brick. With every step, I could feel the rainforest below my feet, and it made me feel as if we were connected. This inspired me to invite nature closer to us, rather than seeking it elsewhere. Leading me to develop following problemstatement:

How can I connect humans with nature in compact urban environments by providing resource-habitants for native flying insects in a series of ceramic sculptures?

In my investigative research and explorations through clay, I have chosen to title this project "Botanic Altars." This title serves as a medium to grant plants, insects, and microorganisms the significance and value they truly deserve. It plays on the connotations of heightened religious and cultural values, particularly those of sacrifice and worship.

THEORY AND RESEARCH 1:2

Urban biodiversity is essential to preserve and enhance, serving as the foundation for reversing the decline of species. Within cities, man-made habitats such as parks, gardens, and cemeteries attract diverse animal and plant species, providing local nature experiences for residents and contributing to a healthy microclimate. However, there is significant potential for improvement and innovation in the gray city areas, where organisms inhabit built environments.

Small squares and spaces within the urban landscape offer a mosaic of surfaces and structures, creating diverse habitats for species adapted to city life. These areas support a wide range of flora and fauna, including species resilient to urban challenges. Pocket parks and street gardens further enhance biodiversity by connecting smaller green spaces with larger natural areas, enriching the urban environment with a tapestry of species interacting. However, urban biodiversity faces numerous challenges, including pollution, road salt and damage. To mitigate these impacts, resilient species capable of thriving in urban conditions must be prioritized.



(Pictures, Teknik- og Miljøforvaltningen . (2023)



Examples of grey city areas: Dybbølsgade, Vesterbro & Strandgade, Christianshavn

Lack of suitable habitats and limited food and water sources pose significant threats to species well-being and survival. In many municipalities, neglected areas offer untapped potential for conservation efforts, such as small triangular plots or irregular spaces. At Nørreport Station in Copenhagen, we encounter a prime example of this challenge. Although flowerpots are planted with a variety of flowers, they may not adequately support younger individuals such as eggs or larvae. As highlighted by Anders Kofoed, the availability of resting places and egg-laying opportunities for insects must also be considered.



01; Biologist Anders Kofoed in front of ornamental flowers in Nørreport, Copenhagen



02; Rotting tree log with holes from insects

The research behind this project is based on verbal statements from an interview with biologist Anders Kofoed, Copenhagen Municipality's proposal for the biodiversity strategy 2022-2050, and fieldwork in and around Copenhagen.

THEORY AND RESEARCH 2:2

Furthermore, weeds often prove to be more attractive to insects, offering essential resources and natural habitats. Examples include dandelions, nettles, and other resilient species that thrive in urban environments and are native to Denmark, compared to ornamental flowers. Allowing these plants to thrive would not only prevent people from destroying or disturbing them, but it would also give animals the opportunity to create their natural habitats.

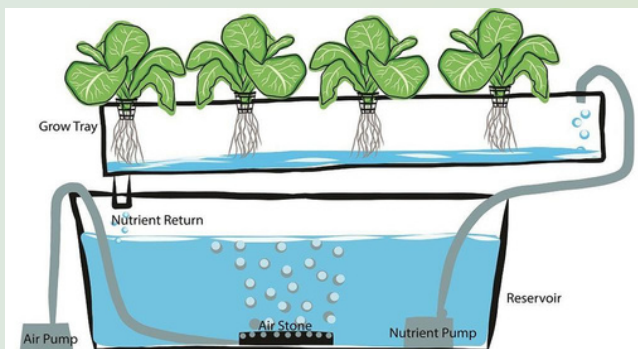


Functional green spaces dominate urban landscapes, featuring lawns, flower beds, and shrubbery. These areas are often characterized by uniform bushes like snowberries which unlike natural habitats such as meadows or ponds, often fail to provide adequate food sources for local wildlife. Decomposing organisms, such as rotting tree stumps, serve as vital habitats for various species, including rare insects, fungi, and plants. These habitats are also essential for the nesting and roosting of birds and bats.

Urban areas are key battlegrounds for biodiversity, with most people residing here. This offers a unique chance to educate, engage, and underscore the importance of the natural world around us. It is especially the sensory impact that nature provides us that plays a central role in our mental well-being, as clearly documented through a research project on lifestyle and nature quality in urban areas (Petersen, L.K, Hald, A.B., & Jensen, A., 2011).

When we talk about nature, water is synonymous with life. Therefore, it is obvious to integrate water as the central circular element. In a hydroponic growing system, plants thrive by absorbing nutrients directly from a water-based solution instead of soil. The system delivers essential minerals and oxygen to plant roots efficiently, promoting faster growth. Since water and nutrients are supplied in a controlled environment, plants can grow year-round with less water usage and fewer pests compared to traditional soil-based methods.

Low-fired clay is porous, allowing it to absorb and hold water effectively. When clay is fired at low temperatures, it retains tiny pores and capillaries. These pores create a network through which water can be drawn in and held. The capillary action enables the clay to soak up water, storing it within its structure. This property makes low-fired clay useful for irrigation, as it can slowly release the absorbed water to surrounding soil and plants, maintaining moisture levels efficiently.



METHOD

“The conceptual methodology was one whereby the iconography, symbolism and technology of ceramic was by turns picked apart, questioned, contradicted, and restructured. Ceramic was applied to new situations, made to explore ideas from outside itself, and it was subjected to criticism of values previously thought to be immutable.” (Greenhalgh, Paul, 2021)

Conceptual methodology within art is grounded in an idea-centric approach that prioritizes the artist’s concept over traditional aesthetics, integrates interdisciplinary insights, and emphasizes process, context, and viewer engagement. It often involves experimental techniques, critical commentary on societal issues, and documentation, reflecting a dynamic and expansive exploration of ideas that challenges conventional artistic boundaries.

This project will involve extensive research and experimentation. Building on previous projects, I will employ various techniques such as plaster casting, press molding, and the use of local materials. Hand building and sketching will be integral, along with exploring glaze chemistry, including UV reactive materials and Silicon Carbide. Additionally, I will delve into new and unexplored fields such as botany, insect ecology, and hydroponics.

Collaboration with entomologists and environmental experts, including biologist Anders Kofoed, will be crucial to inform the development of the project. This collaborative approach will not compromise my personal artistic expression, which focuses on the soft, feminine, and human elements contrasted with bugs and “weeds” in a conceptual, and idealistic design.

The theoretical foundations will be rooted in ecological principles, biomimicry, sustainable design practices, and case studies of successful urban insect conservation initiatives.

Research and analysis will be based on a qualitative practical approach, using a hands-on method to explore both form and function. This method allows for direct interaction with materials and techniques, providing a rich understanding that informs the design process.

Finally, I will reflect on my process, drawing comprehensive conclusions based on the research and practical experimentation. This reflection will evaluate the functionality and possibilities of the design, assessing its potential impact on urban insect conservation and sustainable design practices.



INSPIRATION

Based on the theoretical foundations and methods set for this project, my inspirations and focus points for starting this analysis are mapped in a moodboard.



INSPIRATION

Drawing inspiration from “Parallel Botany” by Leo Lionni, a field guide to imaginary plants, I aim to sketch and sculpt based on some of his principles. Starting with plants traditionally seen as weeds, I will use their unique characteristics as a foundation for developing imaginative organisms rooted in the same principles of ecology. For example, how would a dandelion look if it was a tree? Or a cactus? How might insects adapt to lay their eggs in these new forms?

Celtic ornamentation, with its intricate patterns, serves as inspiration, evoking the natural growth patterns of plants. I aim for an expression that mimics the organic search for sunlight, with thick, balloon-like stems that taper from top to bottom.

I will explore creating textures and holes in the surface to serve as hideouts for insects. This effect can be achieved using glaze and materials like silicon carbide.

I am inspired by the works of makers such as Mike Goodlett and Agnes Debizet, as well as visual artist Ida Lissner. Their creations, which embody an organic, “growing” expression, are particularly influential to my work.

My target group is flying insects such as the Common Blue (Blåfugl) and the Six-spot Burnet (sekspletet køllesværmer). Crucial to their survival are specific plants like Bird’s-foot Trefoil (kællingetand), which I intend to cultivate in this hydroponic system.



*Examples of form inspiration:
inflatable cactus and showering
protector for a broken arm - found
in charity shop.*

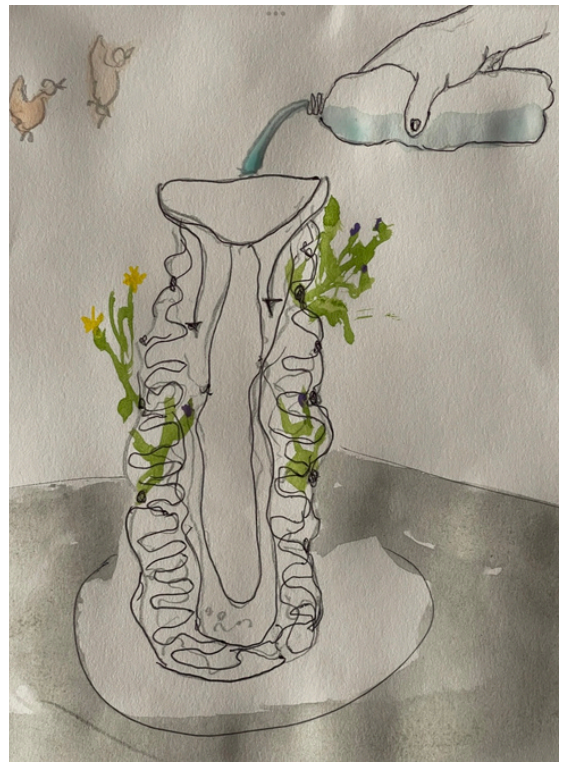
ANALYSIS - SCETCHING IN 2D

Two-dimensional sketches in hand: pen on paper and aquarelle. A: Sculptural structure in clay designed to hold water, nutrient plants, and provide shelter. B: Visualizing how water could be an engaging element for humans. C: Revitalizing grey city areas, turning them into thriving, vibrant environments.

A



B

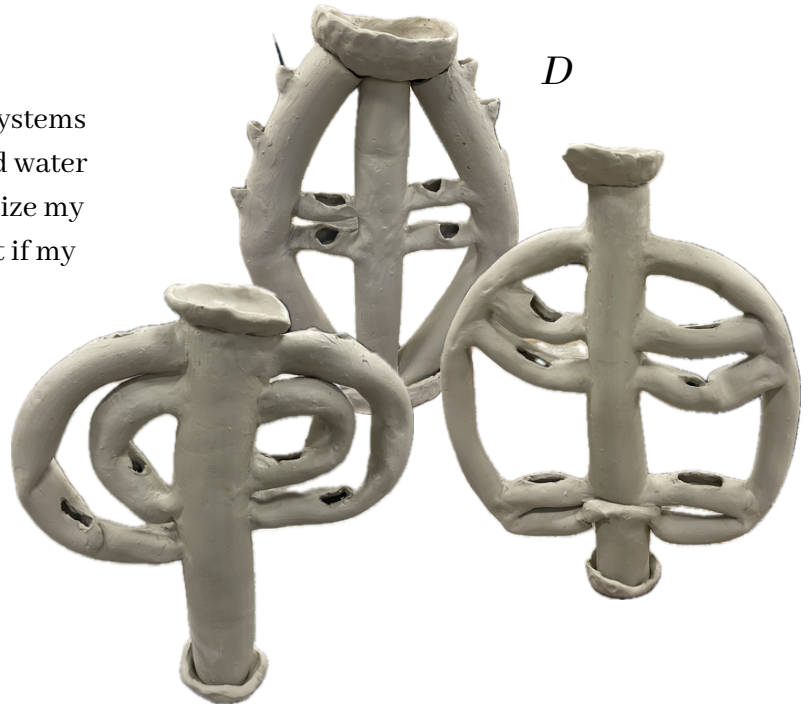


C



ANALYSIS - SCETCHING IN 3D

From my 2D scetches to 3D: Scetching in clay. D: Systems with pipe like structures and holes in order to hold water and have plants grow in clay. This way i can visualize my thoughts and ideas in a more spatial way, and test if my hydroponic system will work.



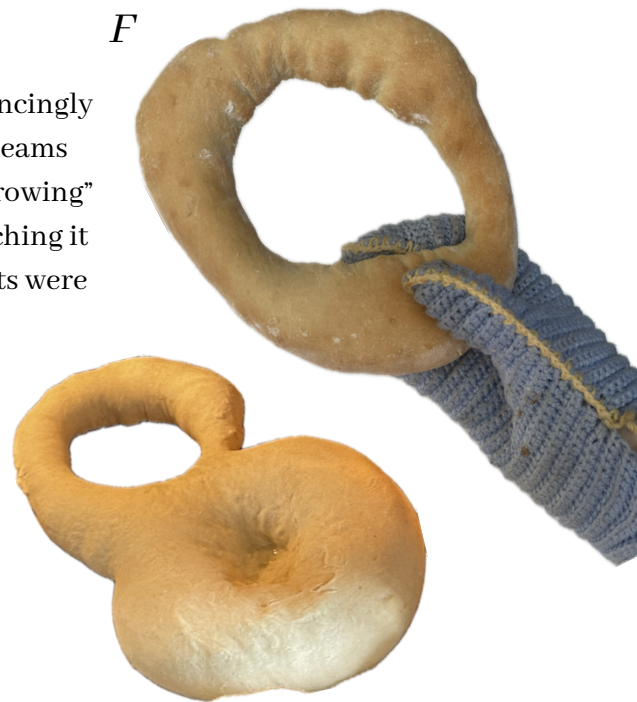
E



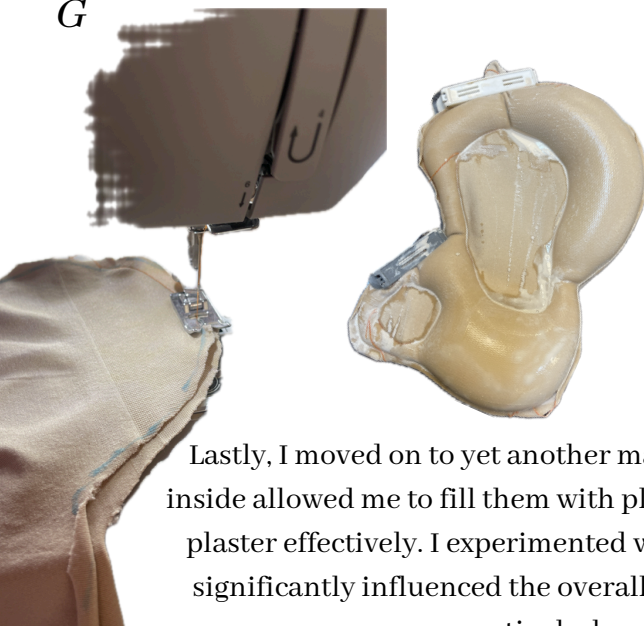
Moving on to other materials to achieve a more organism-like, growing expression that I find challenging to model in clay. E: sketches in plastic cut out with a heating iron and later inflated with air.

The plastic was surprisingly effective for making sketches that convincingly resembled organic forms. I tried filling some with plaster, but the seams didn't hold liquid well. Moving on, I experimented with creating a "growing" expression by making dough, adding lots of baking powder and watching it rise in the oven. This method was fun and challenging, but the results were not very solid and difficult to work with. F: Scetches in dough.

F



G

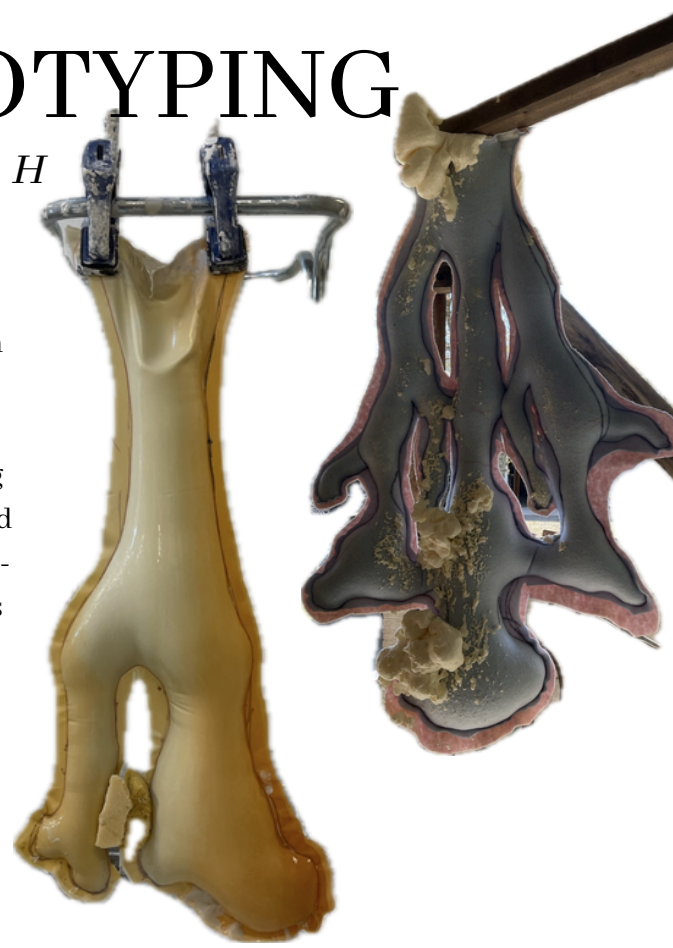


Lastly, I moved on to yet another material: fabric and sewing. Sewing up shapes and leaving them hollow inside allowed me to fill them with plaster. This was easier to work with, and the sewn shapes could hold the plaster effectively. I experimented with different fabrics, discovering that the surface texture of the fabric significantly influenced the overall expression. Water-resistant fabrics, such as shower curtains, worked particularly well. G: Sketches in sewn fabric filled with plaster.

ANALYSIS - PROTOTYPING

Based on my form experiments, I transitioned from sketching to prototyping. Continuing with sewn fabrics, I scaled up in size, cutting out shapes approximately 50x50 centimeters in dimension and sewing them together. Next, I filled them with plaster, using approximately 10 liters of material. Filling them from the bottom encouraged a natural, upward growth, evoking a sense of reaching for sunlight as gravity pulled the weight downward. Once hardened and the fabric removed, these prototypes took on an organic, plant-like expression. I also explored other fabrics and materials such as felt and PU foam. However, I encountered difficulties with this method when attempting to transfer it to a mold, as the felt and foam tended to adhere to anything it touched. H: Sewn shapes filled with plaster and PU foam

H



I



After allowing everything to harden and removing the fabric, I attempted to create a large plaster mold from the shape. This approach would enable me to press-mold clay into the plaster mold, replicating the shape and organic quality of the sewn forms. I: Plaster casting of large mould, and press-molding red clay into that same casting

J



Once the prototypes reached a leather-hard stage, I carefully removed them from the large plaster mold. While I admired the expression, I noticed that there was too many fragile points where the shape became too thin to support its own weight. This vulnerability meant the shapes were prone to breaking over time and while drying to a bone hard stage. Consequently, I decided to start over, creating new sewn plaster shapes and new plaster molds for a revised prototype. This time, I would ensure they were thicker and with fewer delicate areas in their construction, furthermore using another clay with more grog. J: Initial prototype in stoneware with fragile construction.

ANALYSIS - EXPRESSION

Moving forward, I delved into my glaze explorations. I encountered challenges in crafting a bubbly, crater-like structure for the insects to inhabit. Experimenting with anything from hydrogen peroxide to yeast and baking powder, aiming to induce bubbling in the glaze. Additionally, I tested materials known to produce such effects, such as silicon carbide, magnesium, and zinc. Despite my efforts, none of the approaches proved successful, as my glaze tests consistently collapsed and melted in the kiln. K: Yeast and baking powder, L: Failed glaze tests



K



L

Finally, seeking guidance online, I found that it was not the recipes but the temperature that was crucial. Upon many tests, I finally found a recipe and firing schedule that would work. Creating small holes and crater-like structures. M: Successful glaze tests with structure, craters and holes

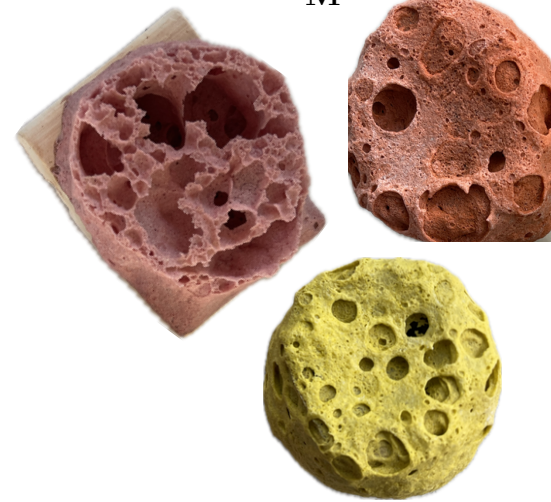
Recipe:

- Nepheline Syenite 60
- Strontium Carbonate 14
- Kaolin 12
- Silica 10
- Silicon Carbide 2
- Titanium Dioxide 2

Firing Schedule:

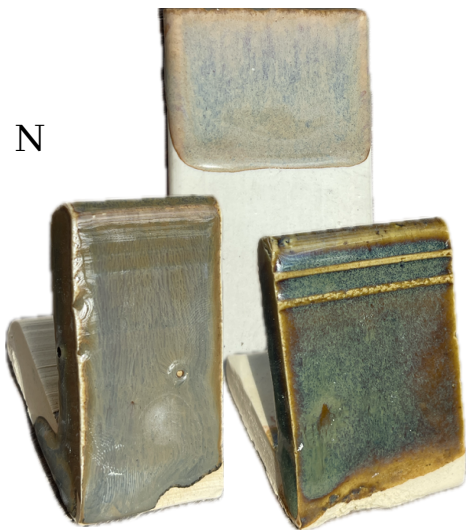
- 100°C/h to 100°C
- 150°C/h to 920°C

- 100°C/h to 1220°C; 10 min. hold
- 100°C/h to 800°C; 30 min. hold



M

N



Since the firing temperature needed to be around 1220°C, I had to develop new glazes to match this temperature, as my usual firing temperature is 1260°C. The sculptures in red clay will be left unglazed to maintain their natural, raw appearance. However, I wanted to create glazes for stoneware to showcase my glaze skills and achieve a more refined and processed look. In these glaze tests, I aimed for a natural aesthetic with significant depth and a flowing, runny, crystallized look to enhance the effects of the glaze, especially when it interacts with the bubbly, crater-like structure. N: Selected glaze tests with optical illusions, O: Glaze testing on larger structure.



O

ANALYSIS - FUNCTIONALITY

P

While conducting my clay and glaze experiments, I also tested my green thumb. I gathered native flowers and weeds around town, known for being high in nectar and pollen, and experimented with growing them from seeds. I started by using coffee grounds as a growth medium, and small sprouts have begun to appear. Once these sprouts are stable, I will transfer them to a nutrient water solution and begin the hydroponic growing method. P:

Cornflower growing in gray city area.

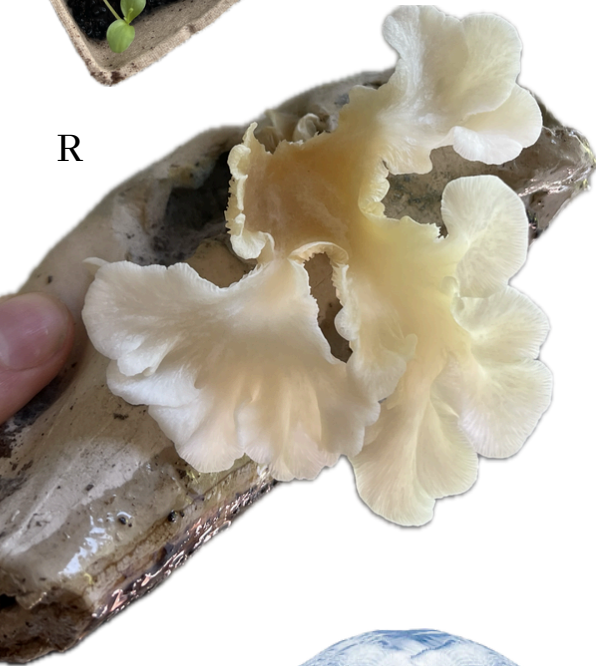


Q



I moved on to test the low-fired clay to see how well its porous structure holds and distributes water. I filled a small low-fired clay structure with coffee grounds and mycelium, then placed it in a tray with water. A few weeks later, oyster mushrooms began to sprout, demonstrating the natural capabilities of low-fired clay. Q: Birdsfoot trefoil (kællingetand) and Belgian Endive (cikorie) spouting. R: Oyster mushroom spouting from clay structure.

R



For the non-porous stoneware structures, I found a small submersible water pump to experiment with once the pieces are fired. This pump will facilitate water circulation within the sculpture, allowing nutrients to travel throughout and nourish the plants. S: Submersible water pump, 50x50 mm.

Lastly, I hand-built thick triangular shapes using the coiling technique in groggy stoneware to serve as the water tank and stabilizing base for the large structure. I ensured that the structure fits perfectly onto this base by allowing them to dry together, wrapped in plastic. T: Drying bases for the sculptures serving as a water tank.

S



T



BODY OF WORK

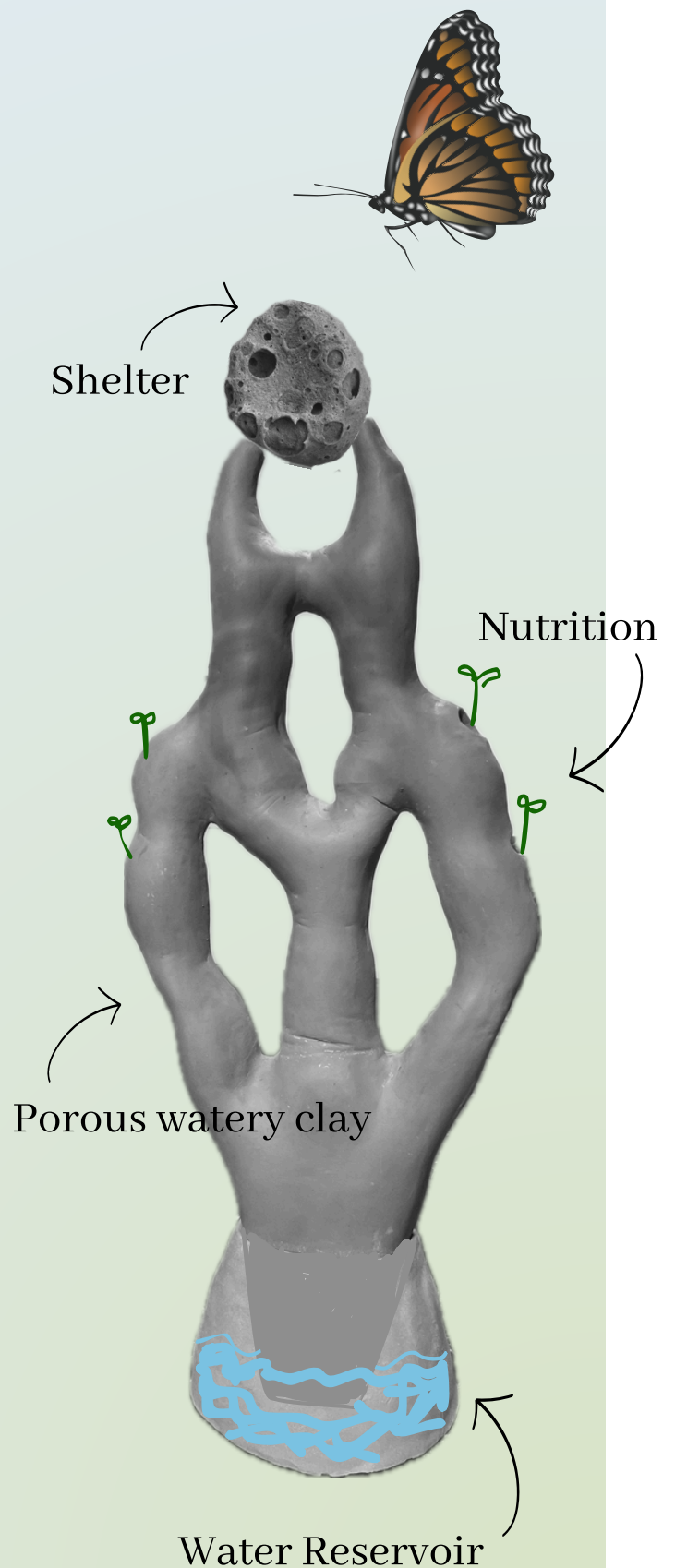
As all the pieces come together, I can start to see the final design taking shape. A sturdy, yet elegant structure, crafted from porous clay, combining several difficult techniques at once.

It's designed to blend seamlessly into its urban surroundings in grey city areas, while being a sanctuary for plants and insects suffering here, providing both shelter, water, and nutrition.

The clay's unique properties make it ideal for holding water, which nourishes the plants growing within. Picture vibrant greenery spilling out from every crevice, creating a striking contrast against the urban backdrop. And hidden beneath the surface, a clever hydroponic system ensures that everything stays hydrated and healthy.

But it's not just about the plants – the top surface of the structure has intricate textures and holes, providing shelter for insects, and adding another layer of life to the sculpture.

Water serves as the heart of the design, inviting engagement and awareness to the local community. Imagine encountering this structure in a city square, where water flows gently, reminding us of our connection to nature and the impact of our actions. It's a simple yet powerful reminder that our choices matter.



BODY OF WORK

I envision my work showcased in an exhibition displayed on white, round podiums. The use of soil not only enhances the means of the project but also stimulates yet another sense; the smell of fresh dirt, adding dimension to the experience.

Title:

Botanic Altars

Dimensions:

Aproximately 80x45 cm.

Materials:

Red Stoneware, White Stoneware, Glaze, Water, Biological Matter.

Techniques:

Sewing, Plaster Casting, Press Molding, Coil Building, Glazing.



BODY OF WORK

A visualization of my work functioning as sanctuaries for insects integrated in grey city areas and private homes.



CONCEPTUALIZATION

To further expand, elaborate, and conceptualize this complex project, I have condensed my design into a more manageable and practical product.

This small cup is crafted from locally sourced low-fired clay from Sose Strand. The cup features a funnel filled with seeds of crucial native plants and flowers, accompanied by a bubbly crater glaze covering its sides.

You can insert this cup into the ground, whether in your garden, yard, town square, or any suitable outside location. When rain comes, the cup collects water, and thanks to the natural porosity of the low-fired clay, the water slowly seeps through the funnel, releasing the seeds into the soil.

When time comes, this small yet ingenious cup provides water, nutrition, and shelter for insects in the area, fostering their thriving and breeding. It's a simple initiative that can be easily scaled up, produced, and deployed, making a meaningful impact on urban biodiversity.



REFLECTION

Undertaking this project within a relatively short timeframe posed significant challenges due to its size and complexity. Balancing multiple functionalities while adhering to deadlines proved to be a daunting task. Additionally, the use of improper materials, such as stoneware without grog, and insufficient consideration of drying times and construction fragility, led to some setbacks.

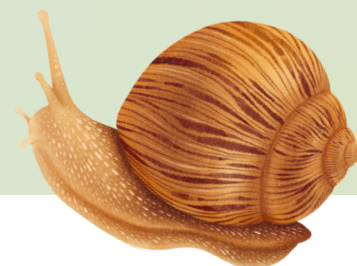
Combining personal expression with complex functionality was a key aspect of this project. Learning from critiques of past endeavors, I focused on enhancing the conceptualization and delivery of my work. This involved paying meticulous attention to detail in both the craftsmanship of my pieces and the presentation within this report. Emphasizing thorough fieldwork, accurate descriptions, visualizations, and utilizing valid sources were integral to achieving this goal.

In conclusion, this project effectively addresses the core problem statement: *How can I connect humans with nature in compact urban environments by providing resource-habitats for native flying insects in a series of ceramic sculptures?*

By integrating biodiversity into urban spaces, the project achieves this goal by offering opportunities for residents to engage with their local environment. Through the creation of ceramic sculptures that serve as sanctuaries for urban insects, it bridges the gap between city life and the natural world. These sculptures not only provide essential resources for insects and microorganisms but also foster a sense of awareness and connection to this urban ecosystem.

Moreover, the project has undergone further conceptualization to enable upscaling and deployment. By simplifying the design and focusing on practical solutions, it becomes more accessible and adaptable for widespread implementation across various urban settings.

In fulfilling this problem statement, the project not only enriches the lives of urban residents but also contributes to the sustainability and resilience of urban environments. By promoting biodiversity and creating spaces for urban wildlife to thrive, it lays the groundwork for a healthier and more harmonious relationship between humans and nature in densely populated urban areas.



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Small Submersible Waterpump [Picture S]. (.). .. <https://ihrm.or.ke/small-water-pump-for-aquarium/aquarium-submersible-water-pump-dc-6-12v-5w-500l-vv-26746988>

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