

CONSERVING GROWTH

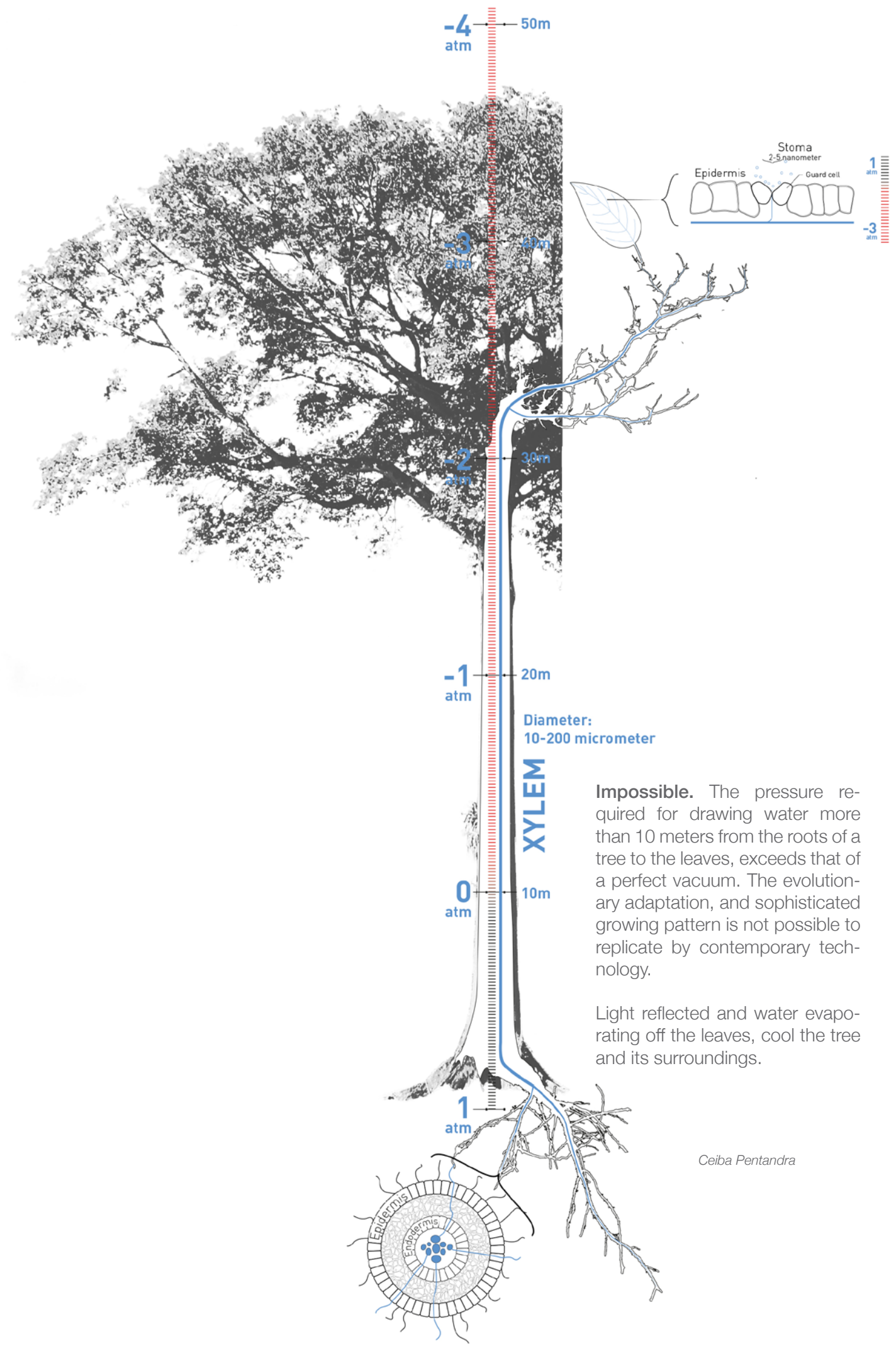
DEVELOPING A SYMBIOSIS OF NATURAL PROCESSES & PUBLIC SPACE
a public bus terminal & biodiversity conservatory MANAUS, BRAZIL



As the rainforest boundary surrounding the growing city of Manaus is pushed further back, temperature within the metropolitan area increase due to the absence of natural cooling. In effect, decreasing thermal comfort throughout the city, especially for those who can't afford air-conditioning. As a response, this thesis investigates the reinvigoration of a public bus terminal in the center of the city by employing a holistic strategy that emphasize natural processes as a service beneficial to the urban environment. A strategy in which conserving growth and endangered biodiversity is not purely an ethical discussion, but becomes a viable symbiotic driver for enhancing comfort in the city, with spatial significance for creating new vegetative typologies endemic to the urban environment.

The basis for the investigation is the notion that plants are profoundly sophisticated organisms. What appear contrary to general belief the impact trees have on the climate extends far beyond carbon storage and includes microclimatic heat mitigation, air cleaning, nutrient- and water cycling. The fundamental idea is that perceiving plants as a technology and ecosystems as something we are part of, questions the design of architecture, while exposing the potentials of allowing natural processes as an active parameter in the building.

The cooling effect of plants is directly measurable. However, in order to achieve a sustainable growth environment the fundamentals of biology has to be supported rather than suppressed. The architectural concept was as a result developed to incorporate living systems that compete, change, establish its own time, rhythm and biological composition, as a continuation of spatial and technological adaptability in the relationship between the natural and built environment.

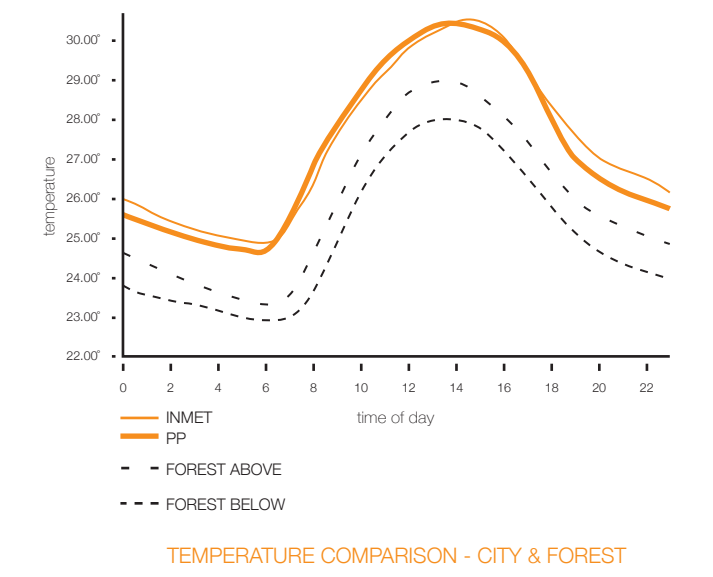


BIODIVERSITY & COMFORT



Artificial and natural conditioning. Residents relying on artificial air-conditioning in Manaus. Meanwhile, natural processes cool the rainforest through evaporative cooling.

URBAN HEAT ISLAND



Described as the Urban Heat Island (UHI), the urbanization process produces significant changes in land surface and atmospheric properties, such as the energy partitioning between urban and adjacent areas, thereby creating a new urban climate, with an average increase of 2°C. However, cooling is not the only factor, but just a part of the ecosystem services.

ECOSYSTEM SERVICES

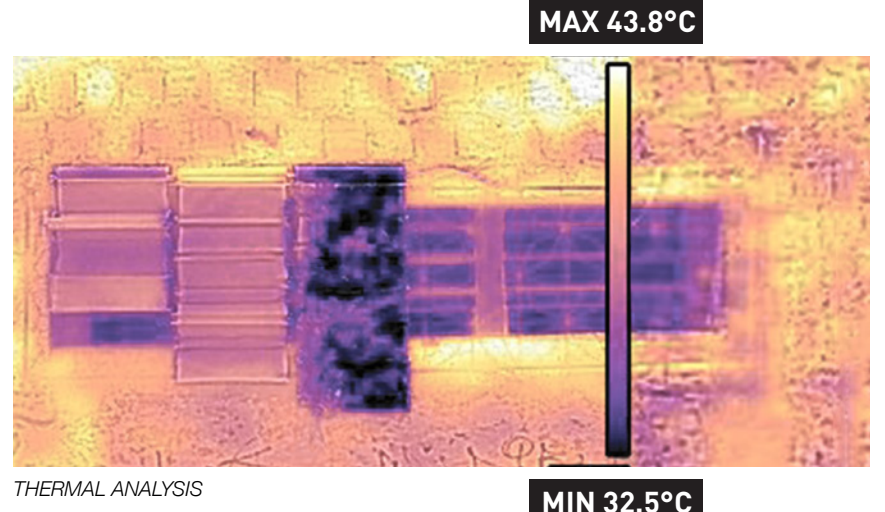
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YEAR

... is the current economic loss for society due to declining biodiversity in tropical rainforests on a global scale, of which approximately 40% exist as part of the Amazon ecology. The number covers all services provided for free by the ecosystem, compared to what it would cost otherwise.

Ecosystem services include: Carbon storage & sequestration, pharmaceutical resource potentials, agricultural irrigation, pollination, nutrient cycling, climate stabilisation, sustainable logging profits, non-timber products, water detoxification & ecotourism.

FIELD STUDY

As a preliminary study a contextual experiment was conducted. Based on the idea of utilizing natural technology on a 1:1 scale, it exist not as a mimic of natural conditions, but as a direct use of biological processes, with an assembled frame to support it. Suggesting the use of collected native epiphytes (plants that don't require soil) as an active element of the building. It was designed as its own autonomous system; self sustaining, with low maintenance, as natural growth we live together with mutual benefit. The experiment became the basis of the project conceptualization.



BIOREGIONAL STRATA

To conceive a formal expression and in order to develop a language that supports the diversity of the regional flora, species were organized in horizontal and vertical sequences, based on position as well as morphology. To emphasize the natural growth, the building elements are designed to support rather than compete or initiate the residing biology - Forming a rule of design: **It is the grown that grows.**

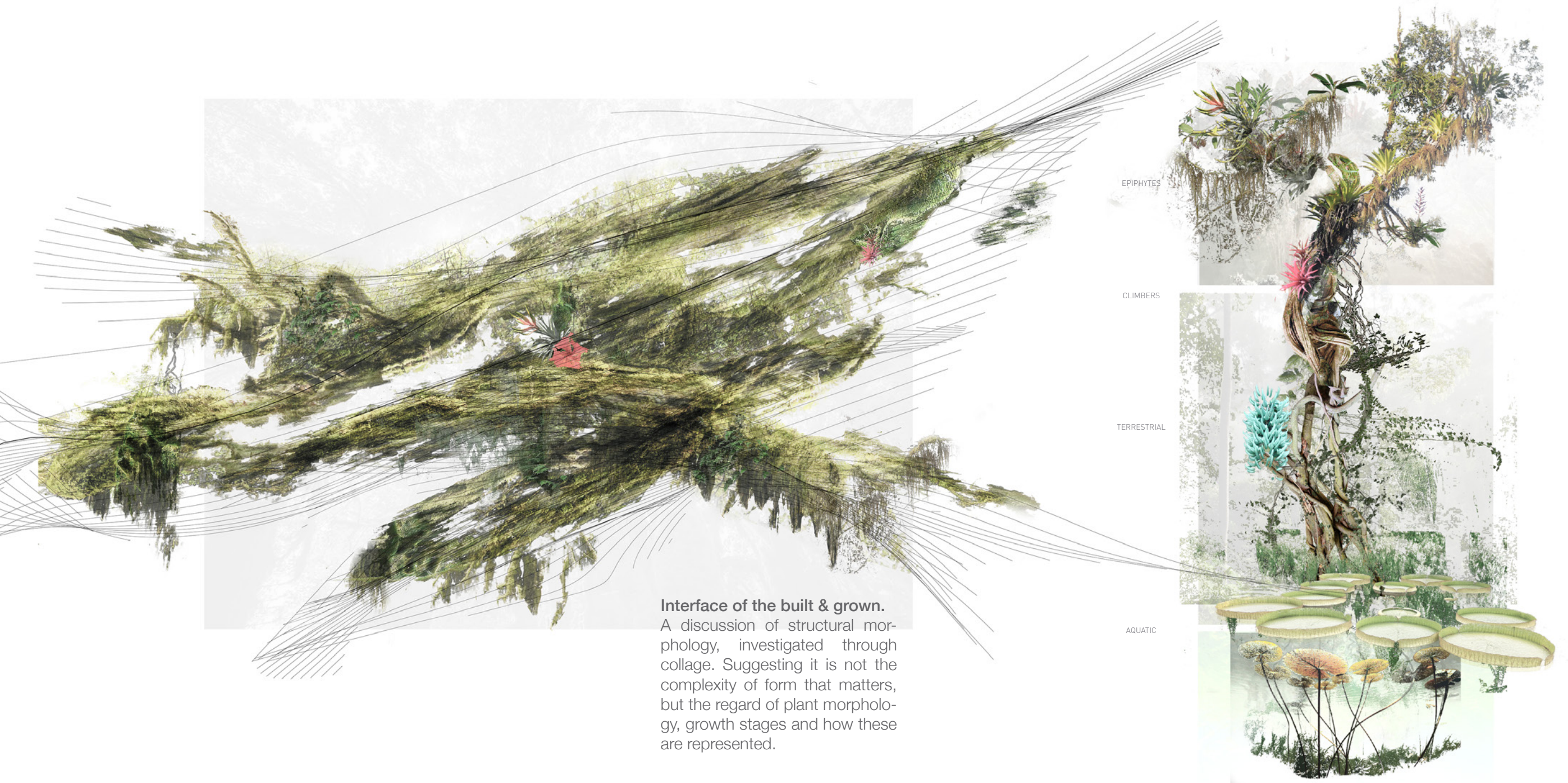


On-site investigation of microclimatic capabilities of collected epiphytic plants.

The project engages with conveying ideas and knowledge to passengers by using the entire terminal as an educational space of structure and biological morphology. Researchers and passengers encounter each other in the field and the waiting areas become viewing platforms overlooking the cultivation areas. While waiting for the bus you feel the immediate cooling and air purification effect of plants covering the platform and may learn that you have been eating your lunch on top of a vault containing the biodiversity of the entire continent. The project is not merely about employing a green comfort enhancing strategy, it is about how the potential is presented and made relevant for the general public.

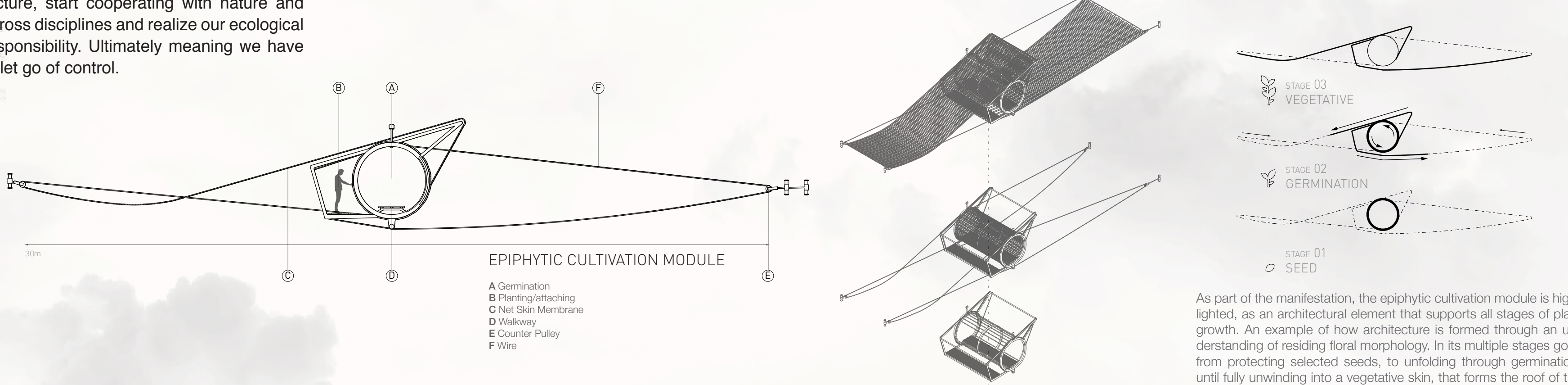
The idea of succession is perceived through time in order to understand the temporal development of the project. Over time it grows to become more of a sprawling public garden and knowledge hub than a bus terminal. With the potential of developing new traits and species adapted to the urban context, specialized plants can be distributed to homes across the city using the flexible bus infrastructure, making the project a catalyst that reaches far beyond its local context.

In conclusion, the problem is not regarding potential or whether the plants will grow - it is there and they will. The question is if we are able to accept a level of uncertainty in designing architecture, start cooperating with nature and across disciplines and realize our ecological responsibility. Ultimately meaning we have to let go of control.



Interface of the built & grown. A discussion of structural morphology, investigated through collage. Suggesting it is not the complexity of form that matters, but the regard of plant morphological growth stages and how these are represented.

ARCHITECTURE OF CULTIVATION



As part of the manifestation, the epiphytic cultivation module is highlighted, as an architectural element that supports all stages of plant growth. An example of how architecture is formed through an understanding of residing floral morphology. In its multiple stages goes from protecting selected seeds, to unfolding through germination, until fully unwinding into a vegetative skin, that forms the roof of the platform. When fully grown it can be retracted, harvested and the process repeated.

