The Zerzura Terrarium - Oasis of Migratory Species

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Edition: New Port Authority

GRADUATE SCHOOL OF ARCHITECTURE

Document Time Report: 191021

The Zerzura Terrarium - *Oases of Migratory Species*

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A dissertation submitted in partial fulfillment for the degree

Master of Technology (Professional Coursework) in Architecture
at the
Graduate School of Architecture

Supervisors: Prof. Lesley Lokko, Sumayya Vally

2019

GRADUATE SCHOOL OF ARCHITECTURE

UNIT SYSTEM AFRICA

UNIVERSITY OF JOHANNESBURG

Acknowledgments

I would like to extend my gratitude to my unit 12 leaders Sumayya Vally and Lesley Lokko. Their guidance was invaluable in the realisation of this thesis. Thandi Loewenson, Manijeh Verghese and Anna Abengowe for their energy and injection of fresh ideas into the project.

To my family for their unconditional support and sacrifices made, there were many.

To all the staff working behind the scenes at the Graduate School of Architecture. Scaling from making international field trips possible, to hosting the International Lecture Series, to arranging talented guest lecturers to fly to South Africa, to birthday cakes for fellow students. Your efforts are all appreciated.

"If you're going through hell, keep going."
- Winston Churchill

UNIT STATEMENT

'The void contains in itself all the potential of the space, all the relations not written or experienced. Void is the place of tension of something that will be, a space in power, but also the only place where the recollection of reality, the composition of the parts, the fragments of life, can happen.' — Simone Pizzagalli

Unit 12 follows the 'design research' model of architectural investigation. Broadly speaking, this approach questions the precise relationship between conventional text-driven and project-oriented approaches to architectural research education, and argues that the formation of new knowledge through actual projects (speculative or 'real') is crucial to the development of this emerging research category. While there have been numerous architect scholars since the Renaissance who have relied upon the interplay of drawings/models/textual analyses/intellectual ideas and cultural insights to scrutinise the discipline (of architecture), until recently, there has been a reluctance within architectural culture to acknowledge and accept the role of design as a legitimate part of discourse. This Unit's work sits within the context of this growing body of knowledge.

Within the Unit's timetable and framework, the year is broken into four distinct parts:

Q1: Project Exploration
Q2: Project Synthesis
Q3: Project Development
Q4: Project Resolution

The Unit Field Trip which forms a major component of the design-research driven process is crucial in synthesizing students' interests and agendas before settling on a possible site and programme. In Unit 12, where the design interest and proposition drives the choice of site and programme, rather than the other way around, the proposal is submitted after the Field Trip has taken place.

In 2019, students in Unit 12 embarked on a year-long research project following their field trip to the Atlantic Coast of Morocco, one of the oldest ports significant to the history of migration, and a region that is often considered the "gateway to Europe" for many migrants from Central and sub-Saharan Africa wishing to enter Europe. The focus of the Unit was to look at issues of hybridity, Creolisation and migration in the design of a major architectural proposal, using theoretical readings, precedents and a rigorous design research methodology.

The Dissertation comprises four main parts:

Part 1: MAJOR DESIGN PROJECT
Part 2: HISTORY & THEORY DISSERTATION
Part 3: DESIGN REALISTATION PORTFOLIO
Part 4: PROFESSIONAL PRACTICE COURSEWORK/SUMMARY & ESSAY

Supporting courses (HTD) and (DRP) were delivered throughout the year through a combination of lectures, seminars, tutorials and workshops, which have brought the students' projects to the required level of resolution in their respective fields. The Major Design Project, whilst sensitive to the scale and ambition of the student's interests, also has a number of additional proficiency requirements, from which students may select, namely: urban design; sustainability; cultural sensitivity and community engagement (relative to the project's aims, context and objectives). These are all clearly expressed in the documents that follow. The emphasis throughout the year has been on the synthesis of the above criteria, rather than the abstract demonstration of unrelated principles.

OVERVIEW

Project Statement

"The regrown limb [in salamanders] can be monstrous, duplicated, potent. We have all been injured, profoundly. We require regeneration, not rebirth, and the possibilities for our reconstitution include the utopian dream…"
- Donna Haraway (1991)

My Major Design Project is entitled The Zerzura Terrarium, an exploration into the merging of territories between Europe and Northern African. These erosions of borders take the form of a set of fictional oases located across a section running through the inhospitable Sahara Desert, to the edges of the Atlantic Coast.

Zerzura is a legendary lost oasis believed to be located somewhere in the Sahara. The thriving and eventual demise of this legendary oasis occupies a parallel place to the public imaginary of the vulnerability of societies in the face of global forces such as climate change, forced migration and conflict. It should be noted that it is not only human species who are displaced and flee man-made disaster. Although the Zerzura Terrarium does draw parallel narratives of the refugee seeking asylum in European territory, my exploration through the use of migrating bird species and plant cross-pollination analogies are conducted in a speculative realm and does not seek to provide definitive answers to the contemporary refugee crisis.

My project becomes a repository of fact and fiction, mythical and real conditions, real-world dystopias and projected utopias. It uses real geographic, climatic and biological factors from the natural world to comment on real-world issues of the migration and restricted movements of people.

Furthermore, the project is driven by an interest in an increasingly blurred boundary between nature and culture. Science fiction is often used as a political mechanism, using the future as a medium to discuss past events and revolutionary societal futures. Designed as a series of new, science-fictional insertions into the landscape, the landscape takes on cyborgian forms, breaching dualisms of different species, of nature and machine.

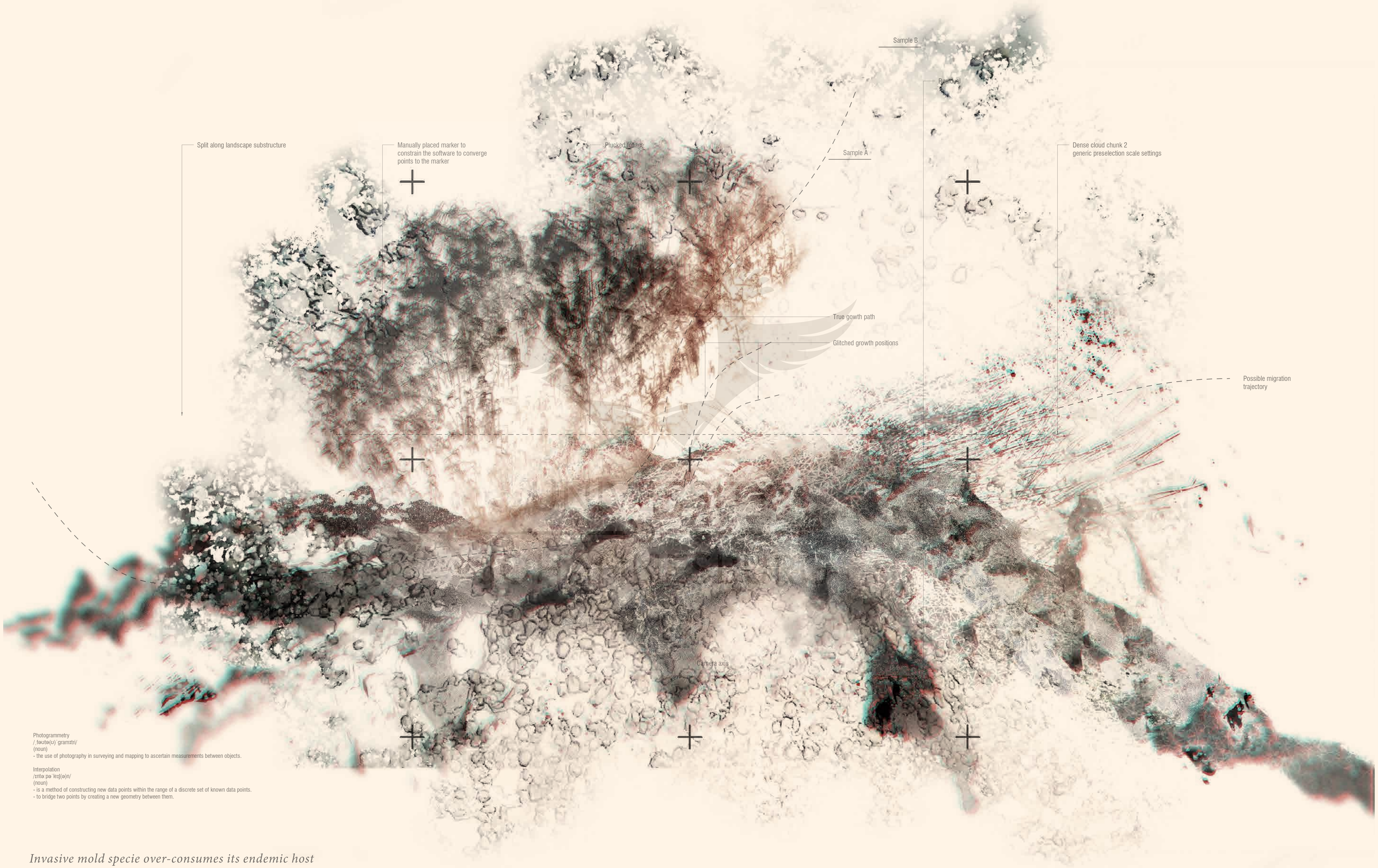
Process & Methodology

In this project, I have adopted the roles of the zoologist, archaeologist, historian, botanist and scientist; to examine and reconstruct several imaginary sites that make up an ever-shifting landscape of cross-pollination, animal species and rock formation, as an allegory for human settlement, migration and memory. It is also through adopting these roles that I am able to create a unique set of languages for the architectural profession to use, as the architect's current toolset is limited.

In order to begin shifting existing barrier conditions of my chosen sites, I carefully analysed the current requirements for migrating bird species, their optimal temperature, solar conditions, soil pH, humidity and nutritional intake. This resulted in a set of parameters to be used when glitching new landscape conditions. These speculated landscapes take the form of 'point cloud' models generated through the tool of photogrammetry software.

I believe taxonomy, as a system of classification, is over-simplified in its representation of migrating life and their place of origin. Throughout my project, I have been challenging boundaries of classification, creating blurred indexes of the hybrid. Through manipulation of geographical conditions, be it soil pH levels, humidity, colour pigment or light qualities, the hybrid is enabled to bridge the territories of their own classification and geographic location. Migrant species begin to merge DNA of Moroccan and Spain through their ingestion and inhabitation of the eroded border sites.

“We might begin to speak of ‘ruptures’ and ’ folds’, of surfaces that are ‘stretched’, of “supple and pliant surfaces” and not petrified monuments that underpin so much of Western architectural history and praxis.” - Lokko (2016)



Photogrammetry
/ˌfəʊtə(ʊ)ˈgramɪtri/
(noun)
- the use of photography in surveying and mapping to ascertain measurements between objects.

Interpolation
/ɪntəːpəˈleɪʃ(ə)n/
(noun)
- is a method of constructing new data points within the range of a discrete set of known data points.
- to bridge two points by creating a new geometry between them.

Invasive mold specie over-consumes its endemic host

Toolset

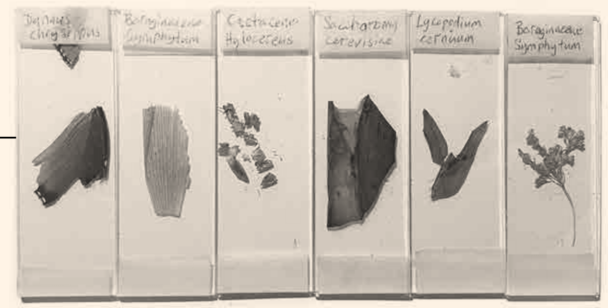
The collection of artefacts from Morocco provided clues left by migrant species to unpack and explore. Over the months, the organic samples were allowed to dry and decay under their own mass. The growth and decay of organisms provided an intuitive direction in my exploration process for speculating how these same Moroccan organisms may become grafted and hybridised with European-based matter. Through this project, some species would have to be unearth using the gaze of the archaeologist, whilst other future roaming migrants are speculated into existence using science fiction and story telling.

Image caption of objects, be it from under the microscope, Google Earth, or photographs captured on site, all play a role in the way I speculate the hybrid specie and the landscape they occupy. Plantsnap is a phone application tool I used to identify plant species based off their photograph. Photographs were also compiled and manipulated for photogrammetry software to reconstruct real-world species into a digital format.

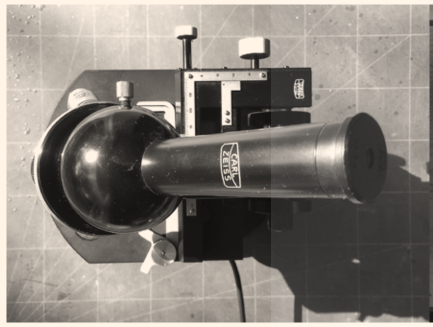
My toolset combined traditional instruments of science with 3D modeling software to glitch imagery produced with the tools-of-the-old.

- Site samples bagged for microscopic analysis

- Taxonomy playing cards to compare power relation of Endemic and Exotic species



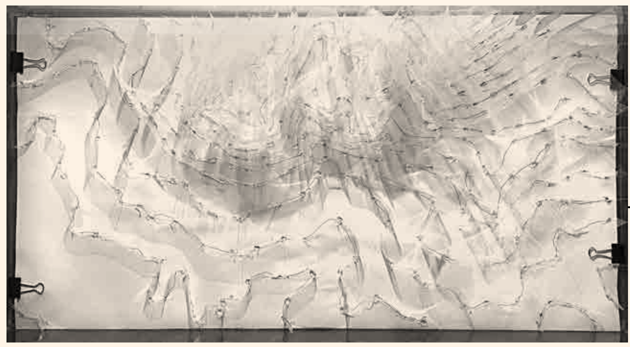
- Microscope slides of various Moroccan artefacts



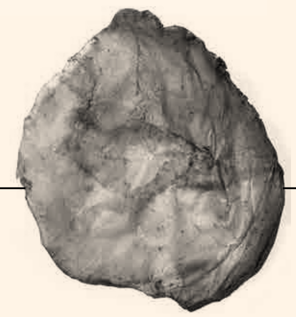
- Microscope
10/0.25 magnification
40/0.65 magnification

- 700 x 500mm Light-box

- Sample collection



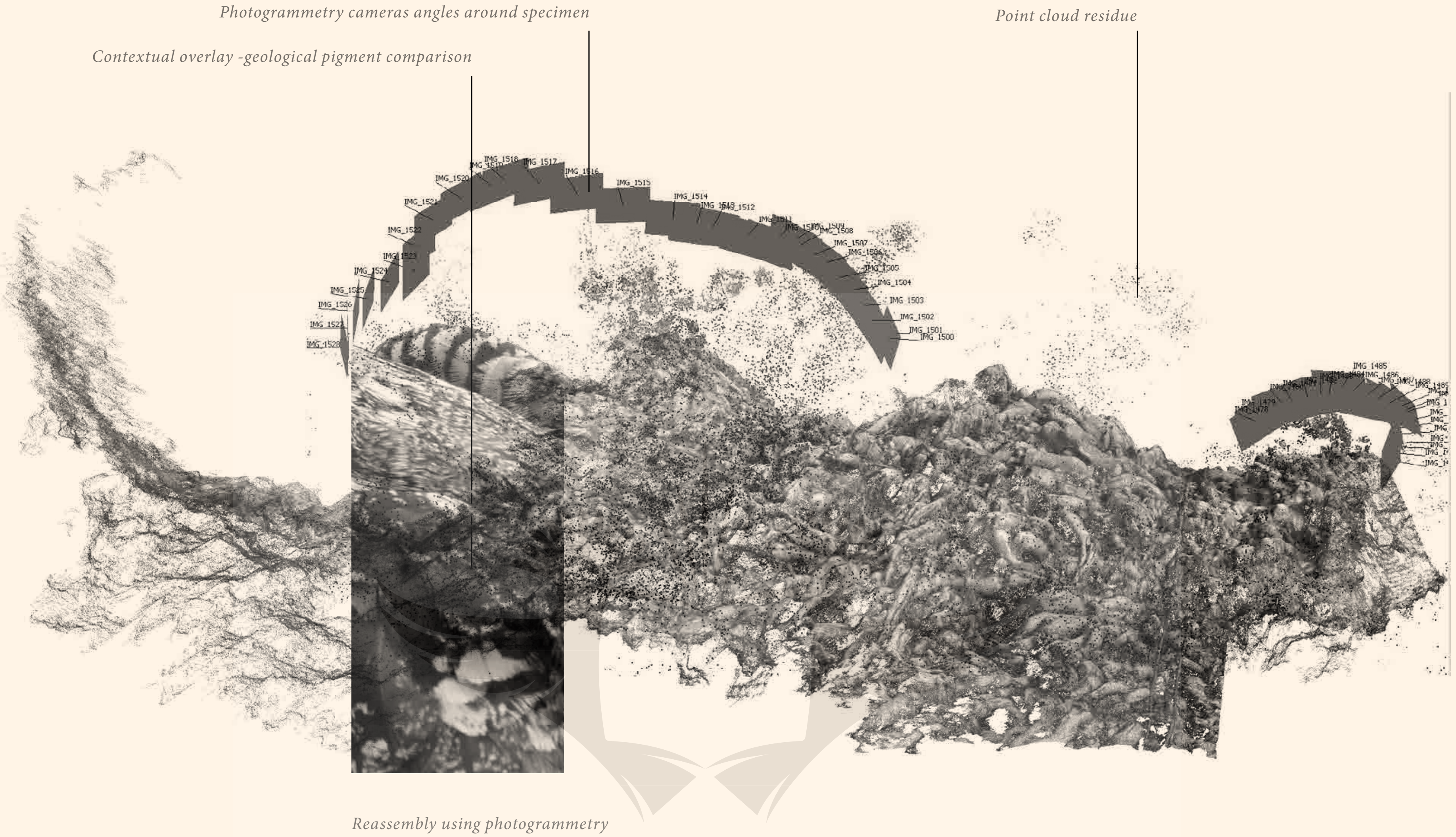
- 600 x 300mm Artificial landscape

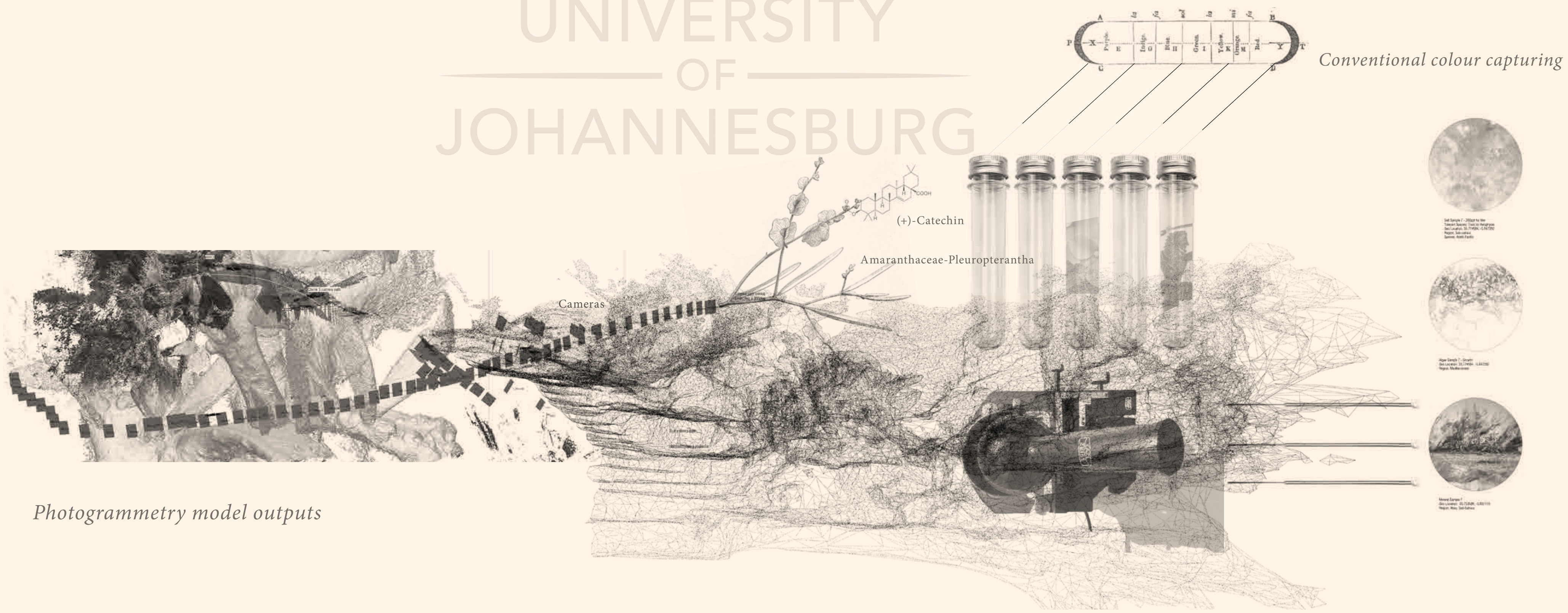


- Membrane sample

- Resin capture

- Glass terrarium

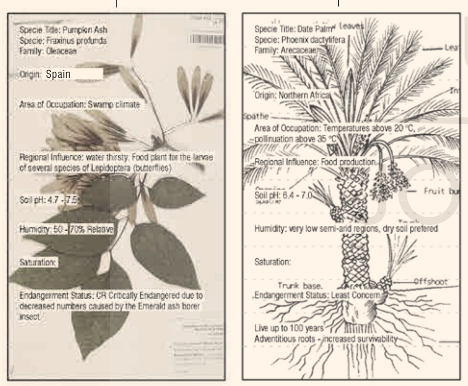

Photogrammetry cameras angles around specimen
Contextual overlay -geological pigment comparison
Point cloud residue
Reassembly using photogrammetry


Conventional colour capturing
(+)-Catechin
Amaranthaceae-Pleuropterantha
Cameras
Photogrammetry model outputs

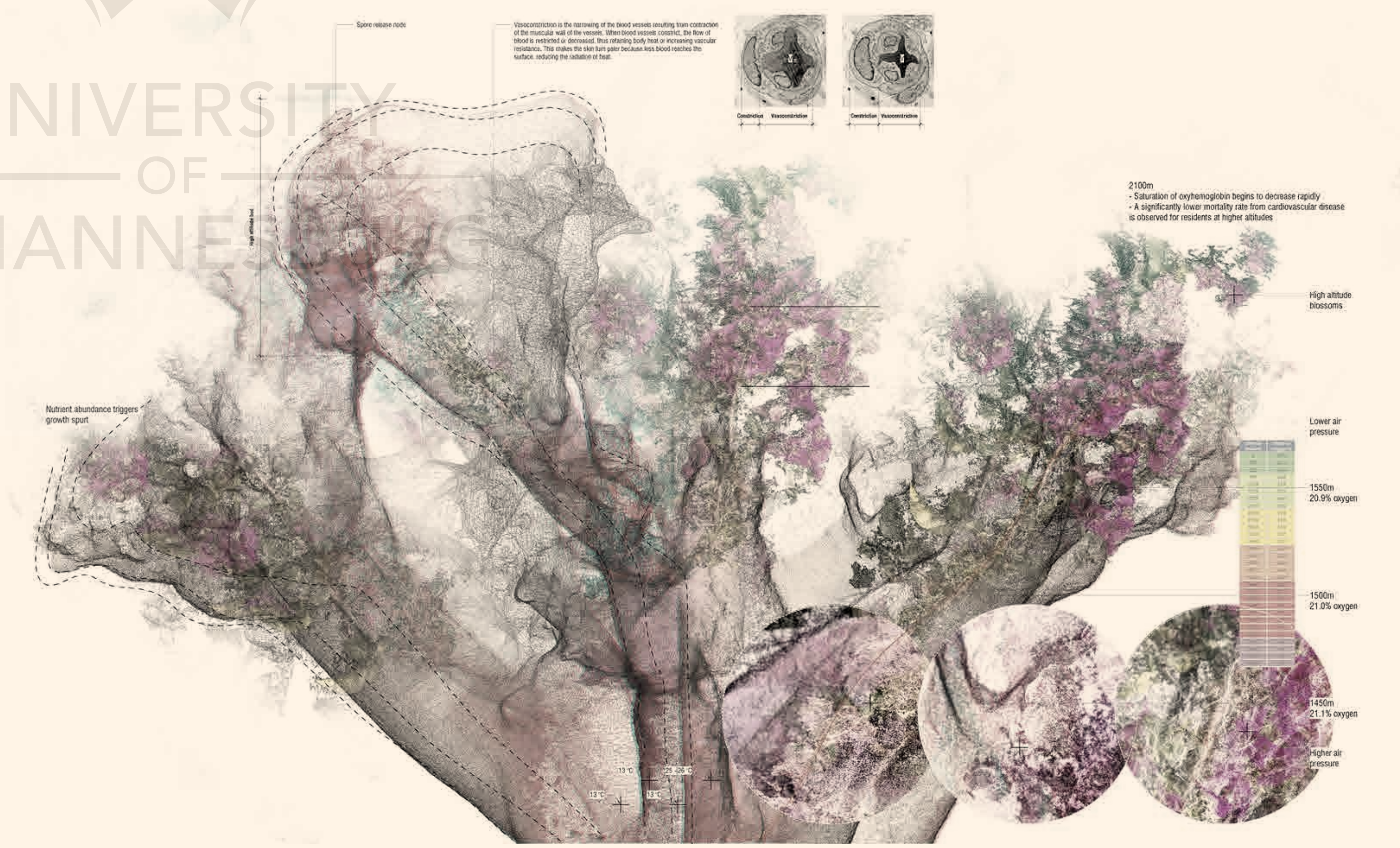
The Atlas mountain range poses a physical barrier to the African flamingo migrating through this site on its way into Spain. In 22 000 years, a gradual tilt in the Earth's axis will shift trade winds Northwards over the African continent, bringing rain to the Sahara once again. A monsoon hits the mountain range, gradually eroding it and allowing species to pass through.

Using various disciplinary roles, these drawings are generated from fragments of living matter and soil, while scientific research is also used to further analyse the Atlas mountain geography; unpacking its various barrier conditions to the migrant.

Oxygen levels at altitudes could become altered by editing the existing indigenous flora with water-thirsty exotics from Europe to suit the rainfall phenomenon. Within the soil condition, roots of the indigenous African *Phoenix dactylifera* (Date palm) begin grafting with the Spanish *Fraxinus profunda* (Pumpkin ash). As the Pumpkin ash roots do not require the depth of the Date palm to escape the Sahara's scorching heat, a new cryptogenic hybrid emerges from this relationship. It's pigment changes the light quality around it. It's lush leaves release a higher rate of oxygen into the atmosphere for the migrating specie.



Pumpkin ash   *Date palm*



Adaptations of a Flight Vessel

Thermal regulation
Some birds like gulls, herons, ducks or geese can regulate their temperature through their feet.

Countercurrent exchange - The arteries and veins intertwine in the legs, so heat can be transferred from arteries back to veins before reaching the feet. Gulls can open a shunt between these vessels, turning back the bloodstream above the foot, and constrict the vessels in the foot. This reduces heat loss by more than 90 percent. In gulls, the temperature of the base of the leg is 32 °C (89 °F), while that of the foot may be close to 0 °C. However, for cooling, this heat-exchange network can be bypassed and blood-flow through the foot significantly increased (giant petrels). Some birds, also excrete onto their feet, increasing heat loss via evaporation (storks, New World vultures).

Patella
At the knee above the cnemial crest is the patella (kneecap).
Some species do not have patellas, sometimes only a small extension of the cnemial crest.
In grebes both a normal patella and an extension of the cnemial crest are found.

Fibula
The fibula is reduced and adheres extensively to the tibia, usually reaching two-thirds of its length.
Only penguins have full-length fibulae.

Tibiotarsus
The foot's upper bones (proximals) are fused with the tibia to form the tibiotarsus, while the centralia are absent. The anterior (frontal) side of the dorsal end of the tibiotarsus (at the knee) contains a protruding enlargement called the cnemial crest.

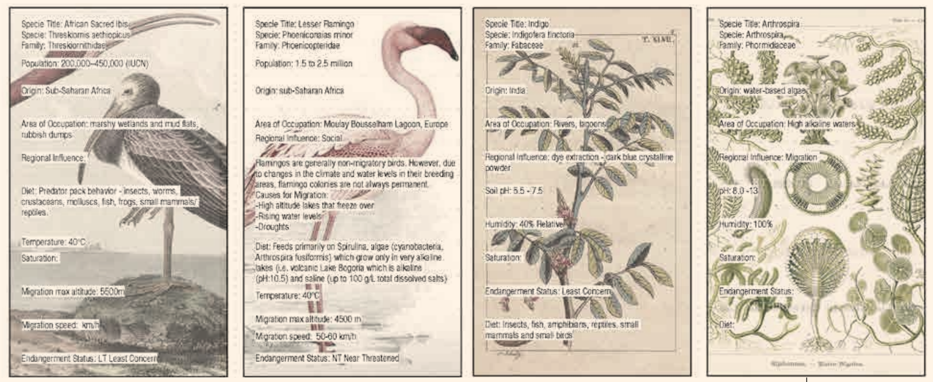
Tarsometatarsus
Some lower bones of the foot are fused to form the tarsometatarsus – a third segment of the leg specific to birds. It consists of merged distals and metatarsals II, III and IV.
Metatarsus I remains separated as a base of the first toe.
The tarsometatarsus is the extended foot area, which gives the leg extra lever length.

African lesser flamingo foot structure adapts with environmental moisture content

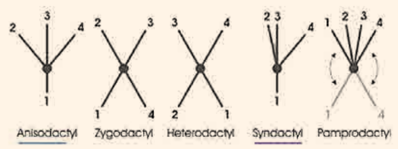
The Bahariya Oasis site is located in the Western Desert of Egypt (coordinates: 28.384111, 28.908787). In 22 000 years, this oasis undergoes a dramatic rise in water levels from the monsoon, eroding nearby clay soils and changing the water pH quality to become more Alkaline. *Arthrospira* (algae) attaches to the foot of a migrating *African Sacred Ibis* returning from the dead, and contaminates the oasis water. This specific algae specie thrives in high Alkaline water conditions, which in turn perpetuates the *Carcinus maenas* (European green crab) population. The African flamingo relies on these crustaceans for nutrients which alter its feather pigment. A increase in the European green crab population directly affects the birds survivability for migrating into Europe.

This drawing analyses the way the African flamingo's legs have historically allowed it to traverse these shallow oasis waters until now. In order to access crustaceans located at depths greater than 900mm, the bird begins to adapt its leg structure accordingly.

These butterfly effect events may seem inconsequential at first, but speculating small edits to them alters the landscape and flora, with resulting hybrid species beginning to emerge.

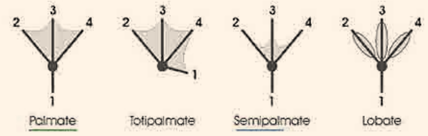


- **Anisodactyl**: three toes in front (2, 3, 4), and one in back (1); in nearly all songbirds and most other perching birds.
- **Zygodactyl**: two toes in front (2, 3) and two in back (1, 4) – the outermost front toe (4) is reversed. The zygodactyl arrangement is a case of convergence, because it evolved in birds in different ways nine times.
- **Heterodactyl**: two toes in front (3, 4) and two in back (2, 1) – the inner front toe (2) is reversed; heterodactyl arrangement only exists in trogons.
- **Syndactyl**: three toes in front (2, 3, 4), one in back (1); the outer and middle (3,4) are joined for much of their length.[1] Common in Coraciiformes, including kingfishers and hornbills.
- **Pamprodactyl**: two inner toes in front (2, 3), the two outer (1, 4) can rotate freely forward and backward. In mousebirds and some swifts. Some swifts move all four digits forward to use them as hooks to hang.



Right foot toe arrangement

- **Palmate**: only the anterior digits (2–4) are joined by webbing. Found in ducks, geese and swans, gulls and terns, and other aquatic birds (auks, flamingos, fulmars, jaegers, loons, petrels, shearwaters and skimmers). Diving ducks also have a lobed hind toe (1), and gulls, terns and allies have a reduced hind toe.
- **Totipalmate**: all four digits (1–4) are joined by webbing. Found in gannets and boobies, pelicans, cormorants, anhingas and frigatebirds. Some gannets have brightly colored feet used in display.
- **Semipalmate**: a small web between the anterior digits (2–4). Found in some plovers (Eurasian dotterels) and sandpipers (semipalmated sandpipers, stilt sandpipers, upland sandpipers, greater yellowlegs and willet), avocet, herons (only two toes), all grouse, and some domesticated breeds of chicken. Plovers and lapwings have a vestigial hind toe (1), and sandpipers and their allies have a reduced and raised hind toe barely touching the ground. The sanderling is the only sandpiper having 3 toes (tridactyl foot).
- **Lobate**: the anterior digits (2–4) are edged with lobes of skin. Lobes expand or contract when a bird swims. In grebes, coots, phalaropes, finfoots and some palmate-footed ducks on the hallux (1). Grebes have more webbing between the toes than coots and phalaropes.



Right foot webbing

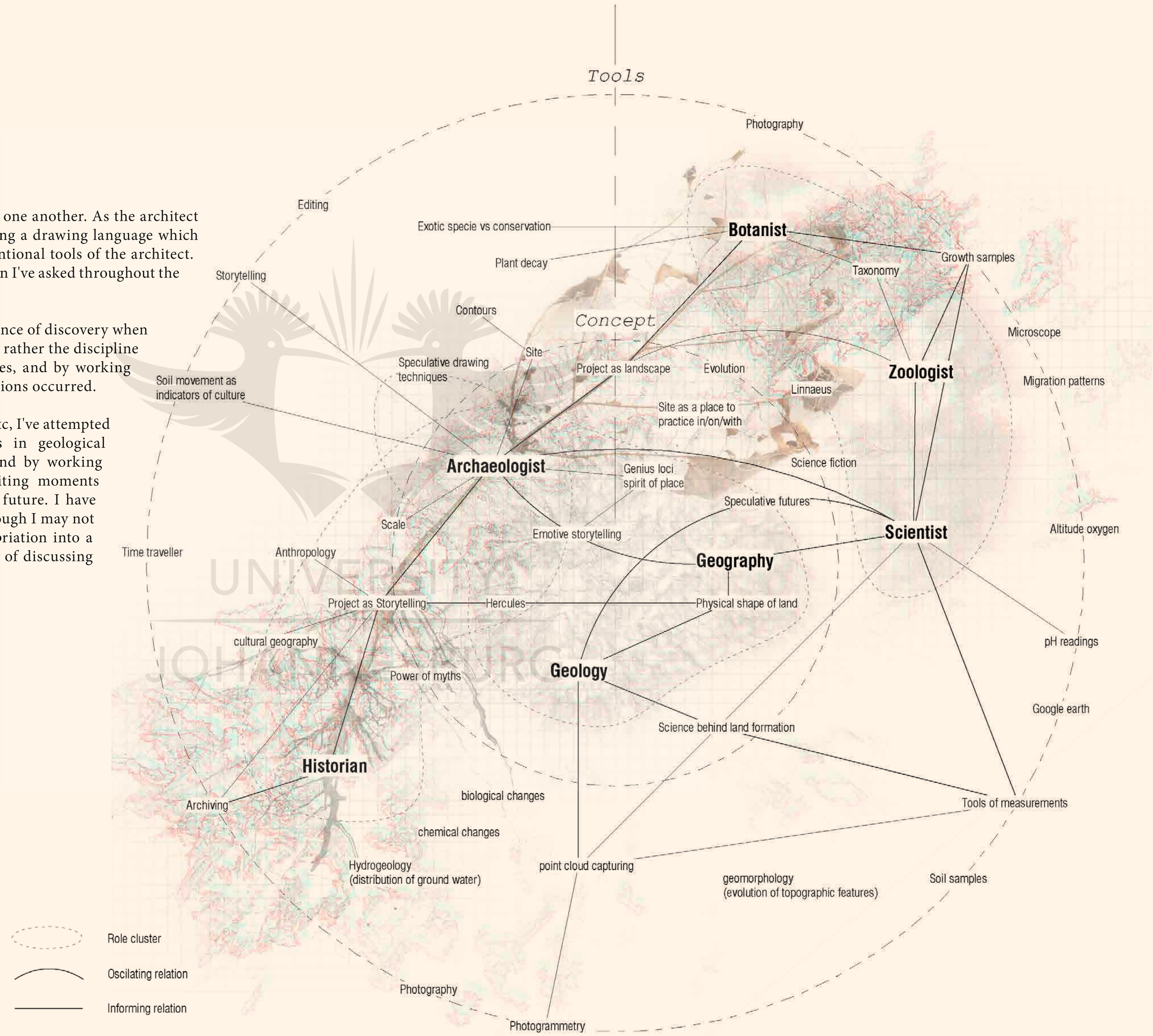
Lexicon of bird feet types

Role of the Architect

Various roles conceptualise in unique and imbricated ways to one another. As the architect in this project, I am exploring new speculative ways of creating a drawing language which can be read additionally to a currently limited array of conventional tools of the architect. '*What is this drawings' key/legend/language?*' becomes a question I've asked throughout the project, and requires invention to answer.

I am inspired by the way archaeologists key drawings. An absence of discovery when digging a ditch should not seen as nothing having taken place, rather the discipline works speculatively in retelling the narrative of such absences, and by working inventively in their drawing techniques to imagine how conditions occurred.

By working as a speculative archaeologist/ botanist/ scientist etc, I've attempted reverse-engineering the process behind 'keying' contrasts in geological soil movement, discolouration, texture and composition. And by working backwards and placing 'keys' of landscape first, I am editing moments of geography to unfold and discuss a narrative far into the future. I have found working with the other disciplines fascinating and although I may not thoroughly understand their tools of working, a level appropriation into a medium I do understand has certainly yield interesting ways of discussing complex topics.



Reflective Statement

Scale is an important aspect I've been working with when speculating these Zerzura landscapes and their inhabitants. The chemist and scientist along with their tools of the microscopic and minute analysis allowed me to better understand occurring and reoccurring changes long into the future. I believe there is much knowledge to be gained in how architecture operates when branching into other disciplines. I am personally interested in botany and micro-organism growth as inspiration for creating architectural tools and gazes. I believe this method of role switching is will continue adding knowledge to the profession, not dilute it.

Perhaps architects working alongside the chemist may be able to intercept and implement ideas quicker when working at a micro scale. And to work short term test for long term ideas.

Scale of idea inception

- Chemist
- Scientist
- Botanist
- Archaeologist
- Architect

Microscopic scale - First to implement?
- thinking small
- short term

Macro scale - Last to implement?
- thinking big
- long term

Moving forward, I see my practice of architecture remaining in a speculative realm in how issues are handled, and becoming hybrid myself in a cross-disciplinary way working with roles outside of the scale of conventional architecture.

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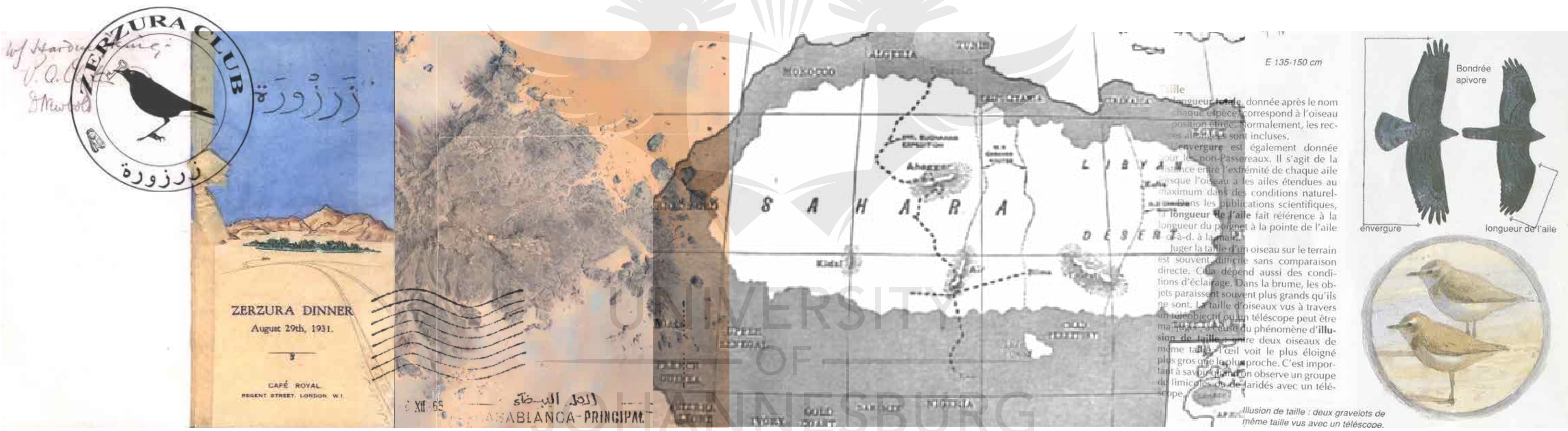
The Zerzura Terrarium

1835 - Sir John Wilkinson described Zerzura from a camel herder's account as "an oasis abounding in palms, with springs, and some ruins of an uncertain date."



"The Oasis of Little Birds"
- Kitab al Kdnuz (The Book of Hidden Pearls), 15th century.

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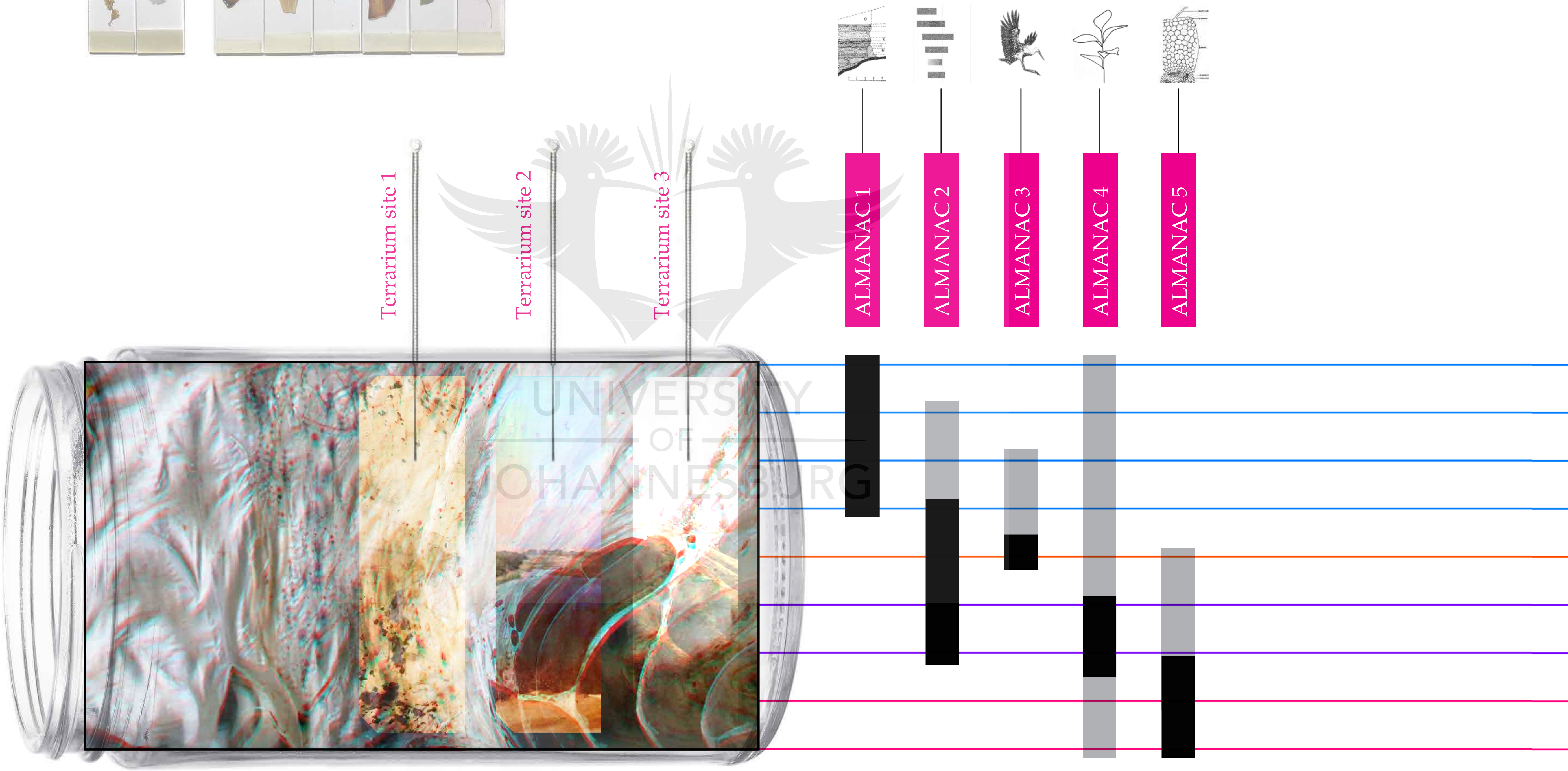
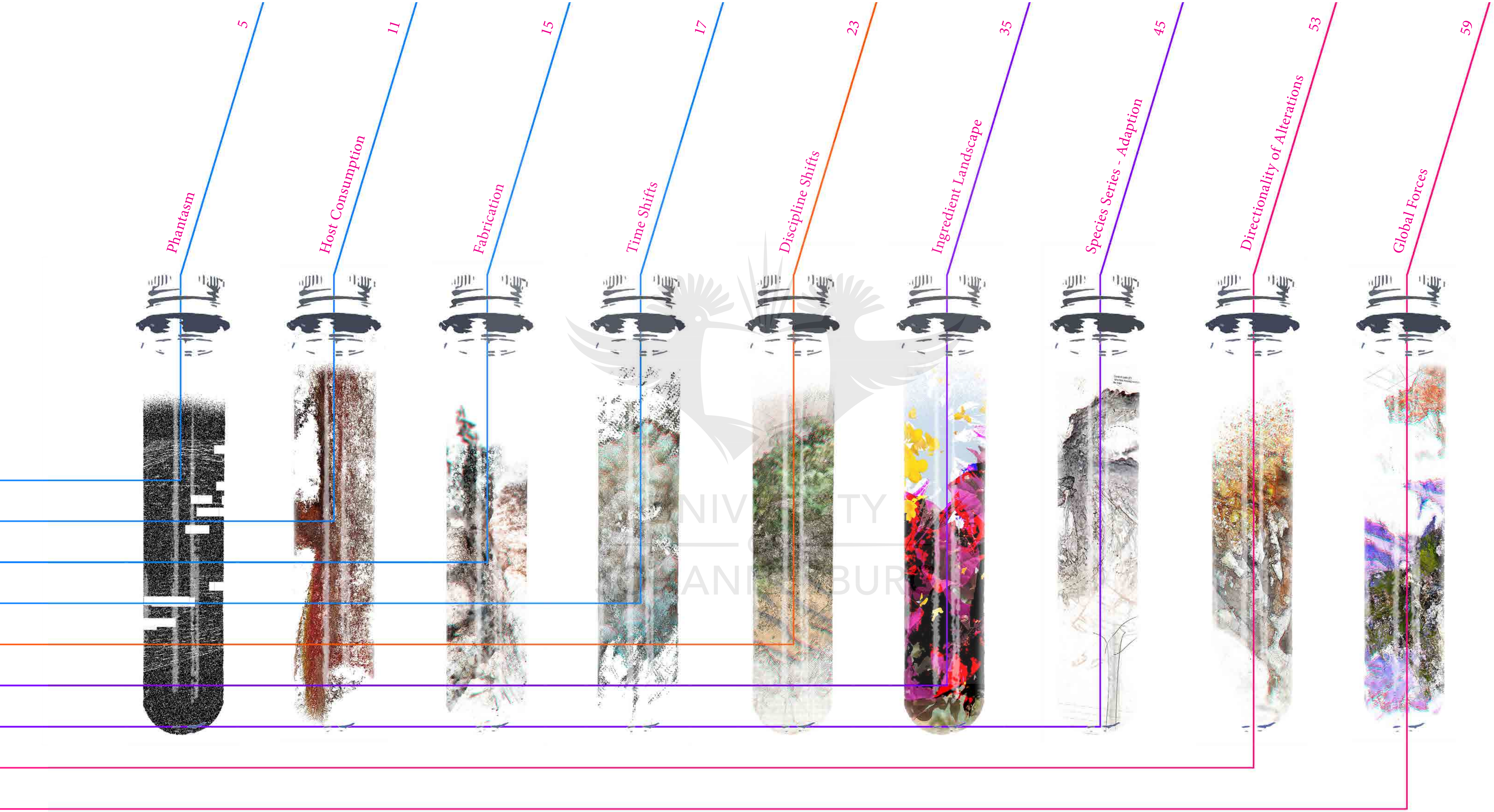


Zerzura Terrarium



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Indigofera tinctoria (indigo)
Phoenix dactylifera (date palm)
Indian/ Moroccan hybrid

Glossary

Acculturation
/əkʌltʃəˈreɪʃ(ə)n/ - noun
- is a process of social, psychological, and cultural change that stems from the balancing of two cultures while adapting to the prevailing culture of the society. Acculturation is a process in which an individual adopts, acquires and adjust to a new cultural environment.

Botanist
/ˈbɒt(ə)nɪst/ - noun
- an expert in the scientific study of plants.

Contour feather
/ ˈkɒntʊə ˈfɛðə/ - noun
- any of the mainly small feathers which form the outline of an adult bird's plumage. It is made up of a central shaft and a vane.

Cryptogenic
/ˌkrɪptəʊˈdʒɛnɪk/ - adj
- potentially native, unclear origin due to lack of evidence.

Deep Time
/tʌɪm/ - noun
- the concept of all geological time from the inception of the earth.

Endemic
/ɛnˈdɛmɪk/ - adj
- evolved to grow natural in a certain place.

Exotic
/ɪɡˈzɒtɪk,ɛɡˈzɒtɪk/ - adj
- species from other countries introduces through artificial means. Origins in the Greek sense of exo – outside.

Feather
/ˈfɛðə/ - verb
- blend or smooth delicately.

Hybrid
/ˈhʌɪbrɪd/ adj
- of mixed character; composed of different elements. A new species to bridge boundaries of categorisation and cultural prejudice.

Invasive
/ɪnˈveɪsɪv/ - adj
- species which have become uncontrollable, threatening native species. Invasive plants are aggressive in their hold of territory as well as migration to new locations and are characteristically exploitative of their surrounding resources.

Interpolation
/ɪntəːpəˈleɪʃ(ə)n/
(noun)
- is a method of constructing new data points within the range of a discrete set of known data points.
- to bridge two points by creating a new geometry between them.

Island
/ˈʌɪlənd/ - noun
- can be compared to the world-as-a-whole, a microcosm of life enclosed in a finite, bounded entity.

Native/ Indigenous
/ˈneɪtɪv/ - adj
- arrived naturally to the island by natural means. They are plants which through evolution, have evolved slowly over long periods of time to be considered ‘indigenous’ or ‘native’ to a location

Halophyte
/ˈhaləfʌɪt,ˈheɪləfʌɪt/ - noun
- salt tolerant plant species. These plants do not prefer saline environments but because of their ability to cope with high salinity in various ways they face much less competition in these areas.

Herbicides
/ˈhəːbɪsʌɪd/ - noun
- are a deliberate stress imposed onto plants by humans. This is done using chemicals to eliminate ‘unwanted’ plants species within the ecosystem.

Industrial melanism
/ ɪnˈdʌstrɪəl ˈmɛlənɪz(ə)m/- noun
- the prevalence of dark-coloured varieties of animals (especially moths) in industrial areas where they are better camouflaged than paler forms.

typica/ insularia
intermediate melanism morph

carbonaria
black melanism morph

Iron
/ˈʌɪən/- noun
- the primary function of iron for plants is for photosynthesis. Even though iron is a minute resource for plants, species growing soils devoid of iron can suffer chlorosis (discolouration of the leaves) and stunted growth. High concentrations of iron become toxic and plants may secrete acids from their roots to lower the pH of the soil.

Land Invaders
/ɪnˈveɪdə/ - noun
- the first successful land invading plants had to tolerate an array of abiotic stresses i.e. soils devoid of life as well as high fluctuations of temperature, radiation, and desiccation (extreme dryness).

Linnaeus
/lɪ'niəs/ - noun
- inventor of the two-part binomial nomenclature naming method. He used plant structure to tell a story of all life on earth, revealing specie relation to each other through a common descendant.

Necrotrophic
/ˈnɛkrəʊ/ - noun
a parasite that kills its host, then feeds on the dead matter

Perennial
/pəˈrɛnɪəl/ - noun
- lasting or existing for a long or apparently infinite time; enduring or continually recurring.

Photogrammetry
/ˌfəʊtə(ʊ)ˈgramɪtri/ - adjective
- the use of photography in surveying and mapping to ascertain measurements between objects.

Salt Stress
/sɔːlt,sɒlt strɛs/
- plants can be categorised to be native or not in saline environments. Saline Natives are 'halophytes' while non-native are 'glycophytes' and use their distinct cellular processes to tolerate salty environments.

Soil pH
/ sɔɪl piːˈeɪtʃ/ - noun
- is measurement of Proton and Hydrogen ions in soil and is predominantly used to manage soil fertility for optimal plant productivity. The pH of soil also has a notable effect on the physical structure, biological and chemical attributes of soil. Soil pH affects the solubility of nutrients originating from organic and inorganic materials.

Stochastic
/stəˈkastɪk/- adjective
- having a random probability distribution or pattern that may be analysed statistically but may not be predicted precisely.

Taxonomist
/takˈsɒnəmi/- noun
- the branch of science concerned with classification, especially of organisms; systematics. The namer and categoriser of species.

Third Landscape
/ θəːd ˈlan(d)skeɪp/ - noun
- existing as a lapse in time for plants for make adjustments within their genetics and tolerance, as well as becoming a physical territory for scientific observation.

Water Role
/ˈwɔːtə rəʊl/
- during times of dryness, early plants evolved more complex desiccation tolerances and this can observed in the structural makeup of resurrection ferns and resurrection angiosperms. Both of which have physiological integrity which are maintained during a dehydrated state, with advanced repair mechanisms in place to help the plant function upon rehydration.

Weed
/wiːd/ - noun
"a plant that forms populations that are able to enter habitats cultivated, markedly disturbed or occupied by man and potentially depress or displace the resident populations that are deliberately cultivated or are of ecological or aesthetic interest". - Navas, M. L. 1991

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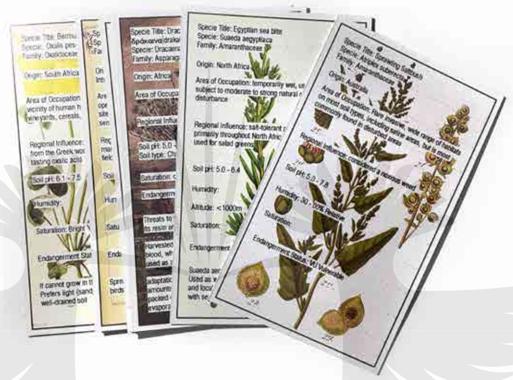
- 700 x 500mm Light-box

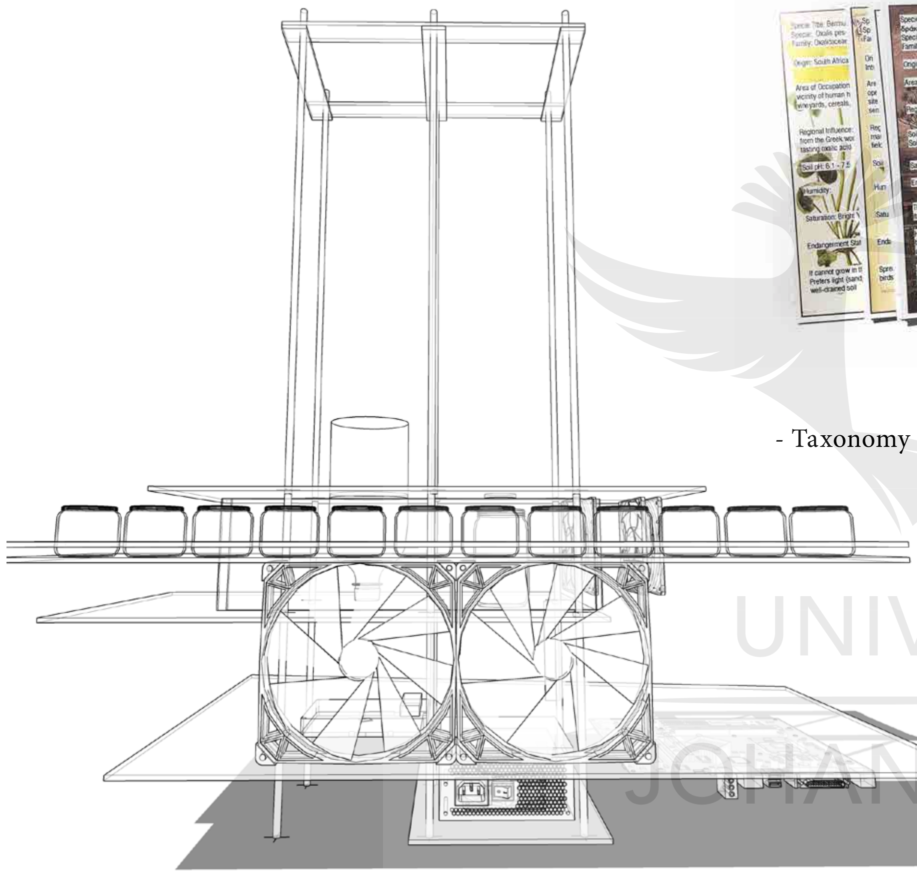
Zerzura Terrarium Meta-sensory

Terrarium layout unpacking and strategically implement various key moments for the user to experience as they traverse the speculated Zerzura sites

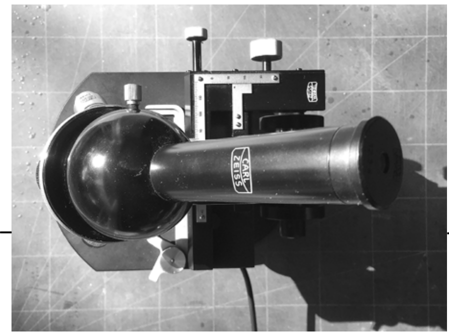


- Taxonomy species playing cards

- Microscope slides of various artefacts to the deceased.

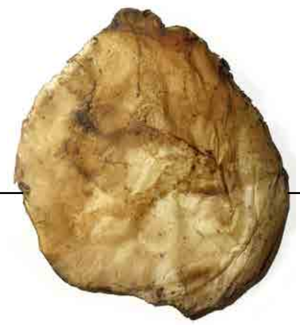


- Landscape probe



- Microscope
10/0.25 magnification

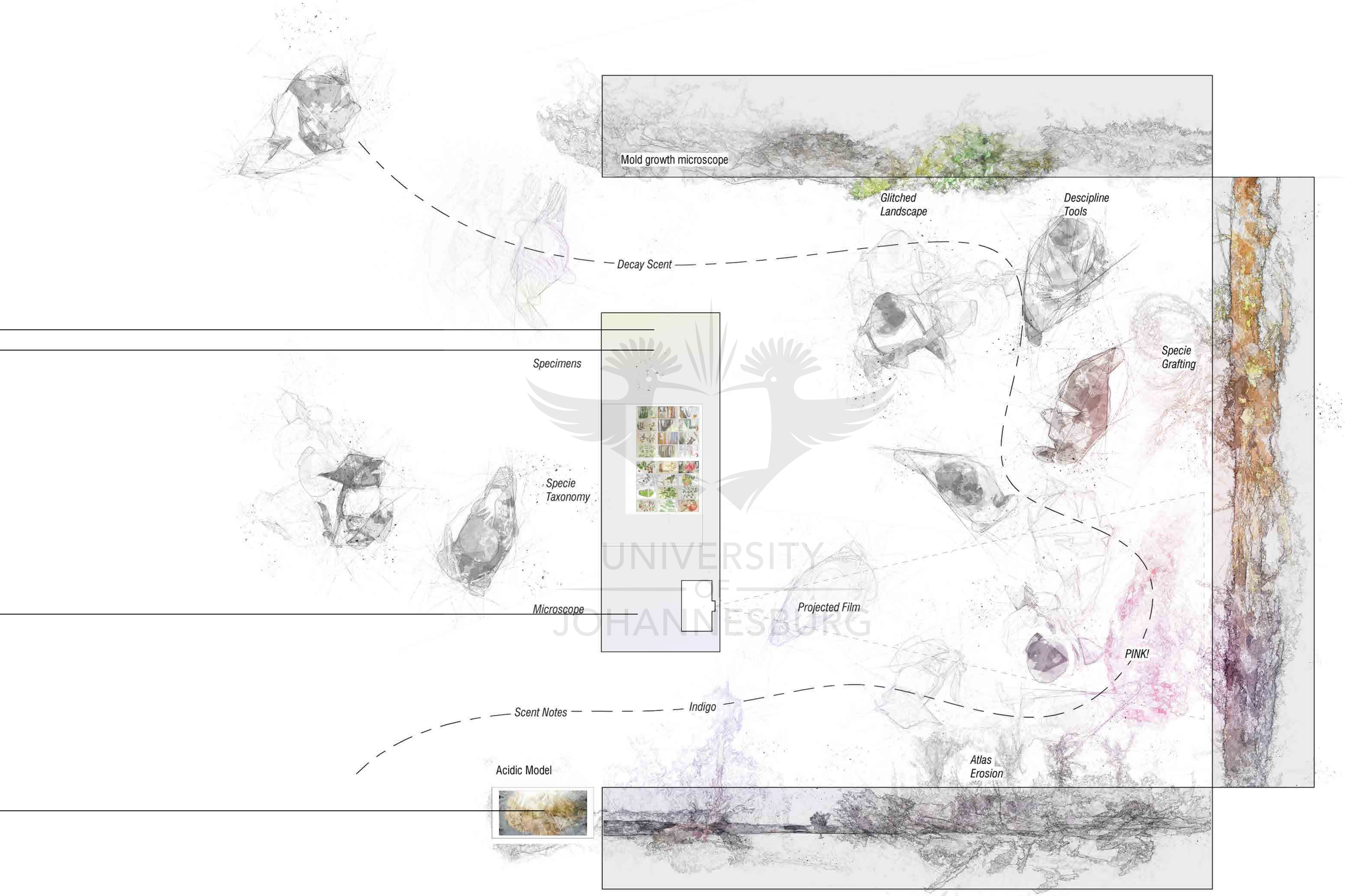
- 600 x 300mm Artificial landscape



- Membrane sample

- Resin capture

- Glass jar



Plan layout of Terrarium

ALMANAC 1

Phantasm

During the first almanac, I explored the element of the ceremony gift and how we remember those passed on. I investigated the morphing transition of organic species during the decaying process, and the symbiotic relationship between '*ghost*' and '*host*', the landscape as a decaying metaphor at the expense of the living.

During this stage of the project, I collected an array of funeral gifts, synthetic and organic samples. A mold species on the decaying material was identified as *Botrytis cinerea*, a *necrotrophic* (a parasite that kills its host) fungus that affects many plant species.

A lexicon was established as a guideline in my gaze.

Lexicon

Mutant
/ˈmjuːt(ə)nt/ - adj
permanent alteration in the DNA sequence that makes up a gene

Lapse
/laps/ - noun
a brief or temporary failure of concentration, memory, or judgment

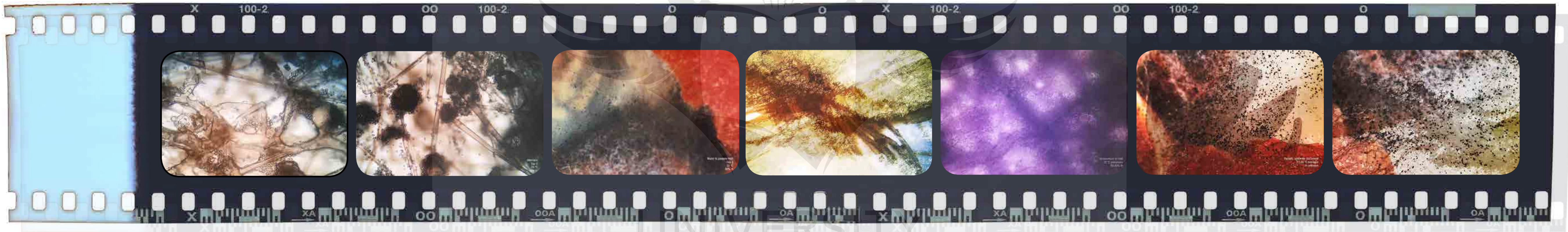
Contrast
/ˈkɒntrɑːst/ - noun
differ strikingly/ fantastically

Saturation
/satʃəˈreɪʃ(ə)n/ - noun
beyond the point regarded as necessary or desirable

Exposure
/ɪkˈspəʊʒə,ɛkˈspəʊʒə/ - noun
state of having no protection from something harmful

Extinct
/ɪkˈstɪŋkt,ɛkˈstɪŋkt/ - adj
a no longer sanctioned species

Botrytis cinerea mold

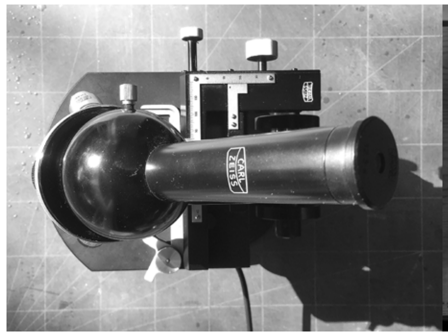


Play Media '001.mp4'

Ghost meets host
Finding new life during the decaying process.

- Microscope slides of various artefacts to the deceased.

Tools



- Microscope
10/0.25 magnification

- Light-box

- Glass jar

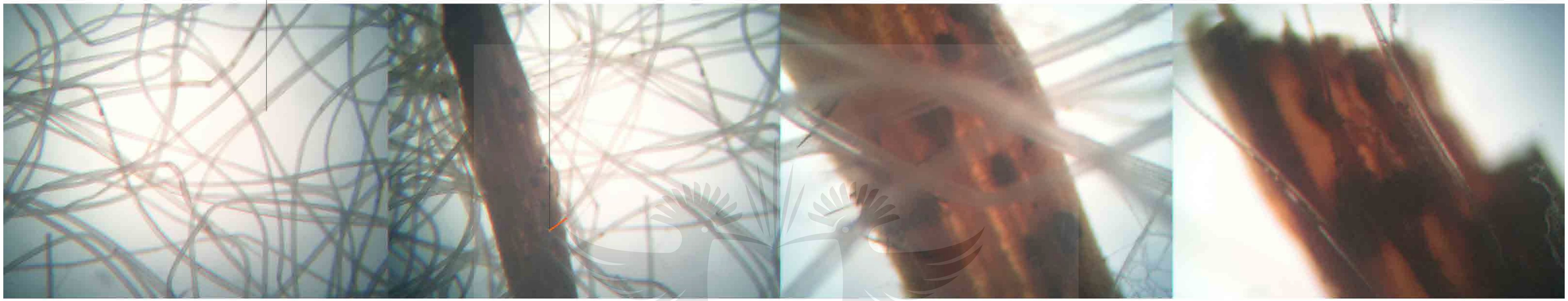
Scent Parcel 1

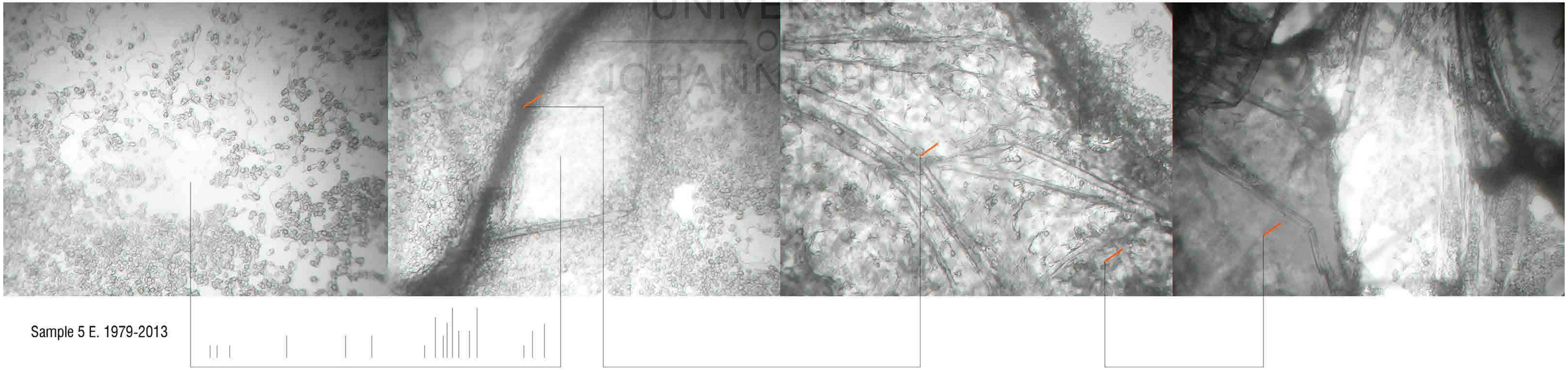
Offerings 1 - Synthetic and degradable

Offerings 2 - Organic biodegradable

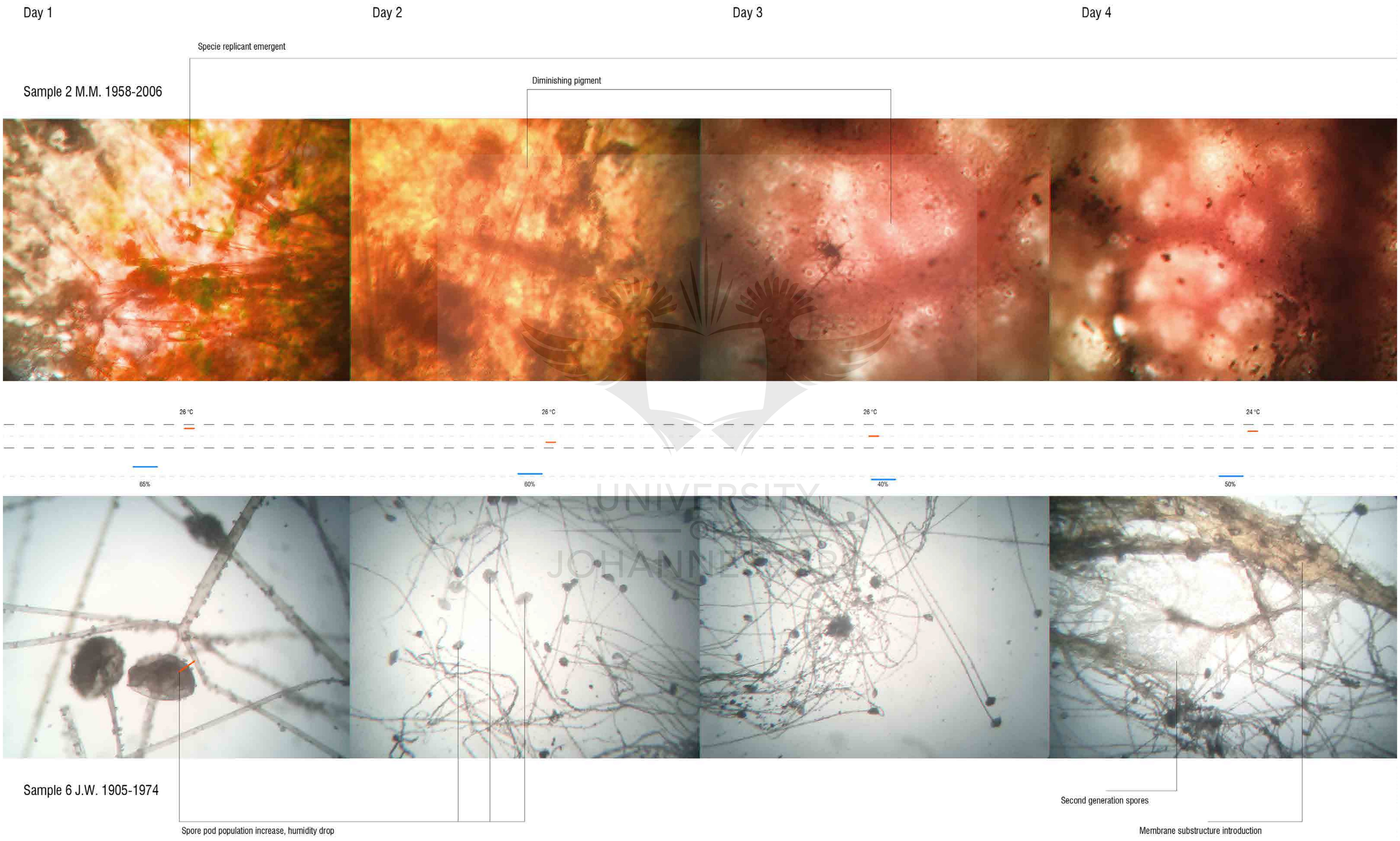
Day 1 | Day 2 | Day 3 | Day 4

Sample 1 A.M. 1946-2009





Sample 5 E. 1979-2013


Day 1
Day 2
Day 3
Day 4
Specie replicant emergent
Sample 2 M.M. 1958-2006
Diminishing pigment
26 °C
26 °C
26 °C
24 °C
65%
60%
40%
50%
Sample 6 J.W. 1905-1974
Spore pod population increase, humidity drop
Second generation spores
Membrane substructure introduction

Day 1 Day 2 Day 3 Day 4

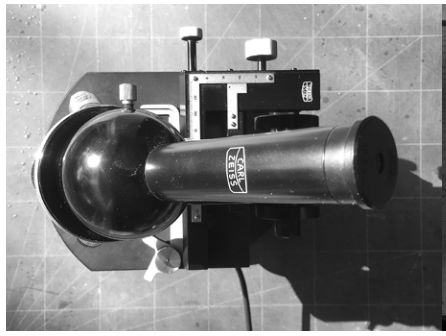
Sample 4 R.N. 1949-2011

Host Consumption

The opportunist landscape parasite

Revealing a killer among its host. In this scenario, a chaetomium mold species attaches to a paw paw (asimina tribola) host, slowing establishing itself in the landscape. Spores from a secondary Botrytis cinerea fruit mold is hidden with the paw paw, slowly taking over the landscape and claiming it.

Tools

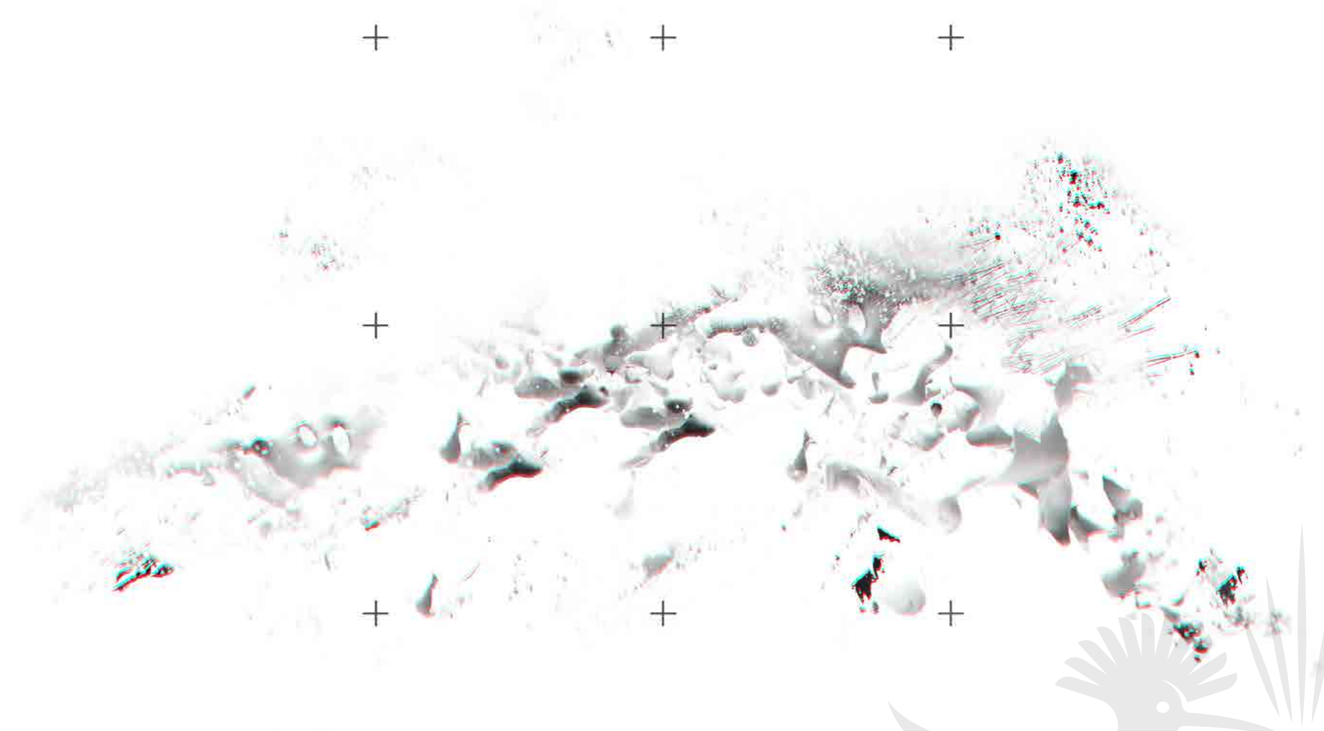




- Microscope
10/0.25 magnification
40/0.65 magnification

- Light-box

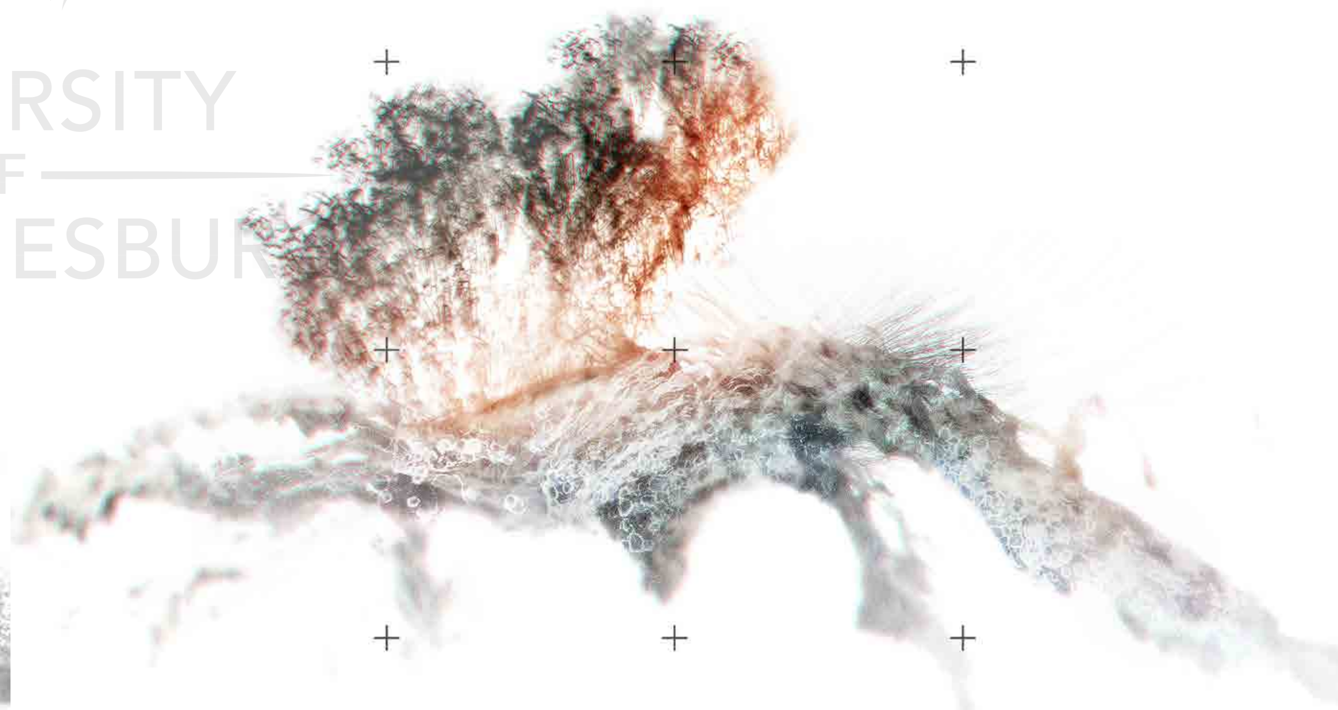
- Sample collection



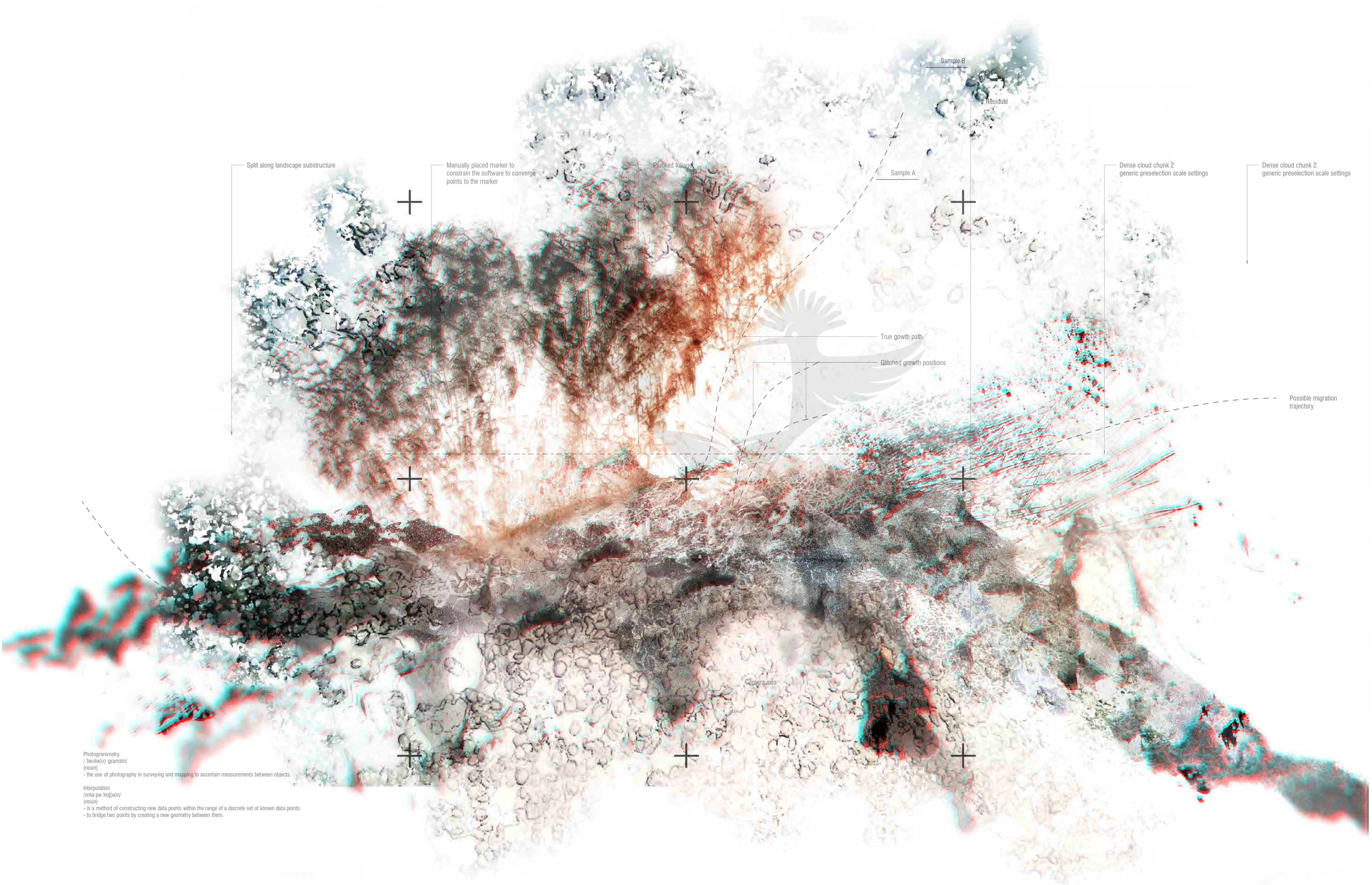
Phase 1
Pigment characteristic of the chaetomium becomes less apparent. Botytis cinerea specimen feeds off the pawpaw's rich fructose concentration.
21 °C room temperature
60% relative humidity increase as matter is broken down

Phase 2
Solidarity of cell counts
21 °C Unchanged
50% Unchanged

Phase 3
Cell grouping density in petri dish.
21 °C room temperature
50% relative humidity

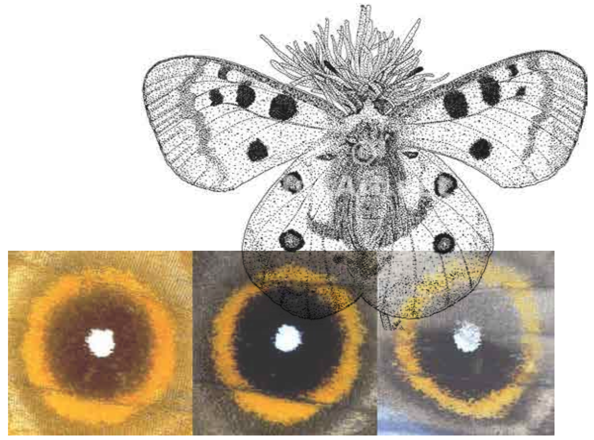


Phase 4
Chaetomium structure/ network expands exponentially beyond the confinements of the petri dish, creating airborne spores to seek other hosts
21 °C Unchanged
50% Unchanged

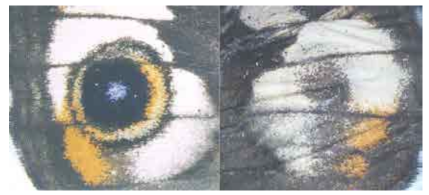


Invasive mold over-consumes its endemic host

Mutations to the structure of the Bicyclus anynana butterfly



Researchers cut out a gene known as spalt to alter wing colours of the squinting bush brown butterfly of East Africa Bicyclus anynana, resulting in changes to the scales' surface structure and rigidity, as well as colour.



Deleting the gene not only caused the butterfly to have extra eyespots, but to have shorter legs and antennae.

Osgood, M. 2016

Fabrication

Fleeting reliefs for an ever-shifting landscape

The early exploration into the splicing of material, capturing organic flora with sandstone.

"The pick is withdrawn. The time has come at last when the experts can close their notebooks, for there is nothing else unfound. We see Zerzura crumbling rapidly into dust. Little birds rise from within and fly away. A cloud moving across the sun makes the world a dull and colourless place."

- Ralph A. Bagnold. (1935). Libyan Sands - Travel in a Dead World

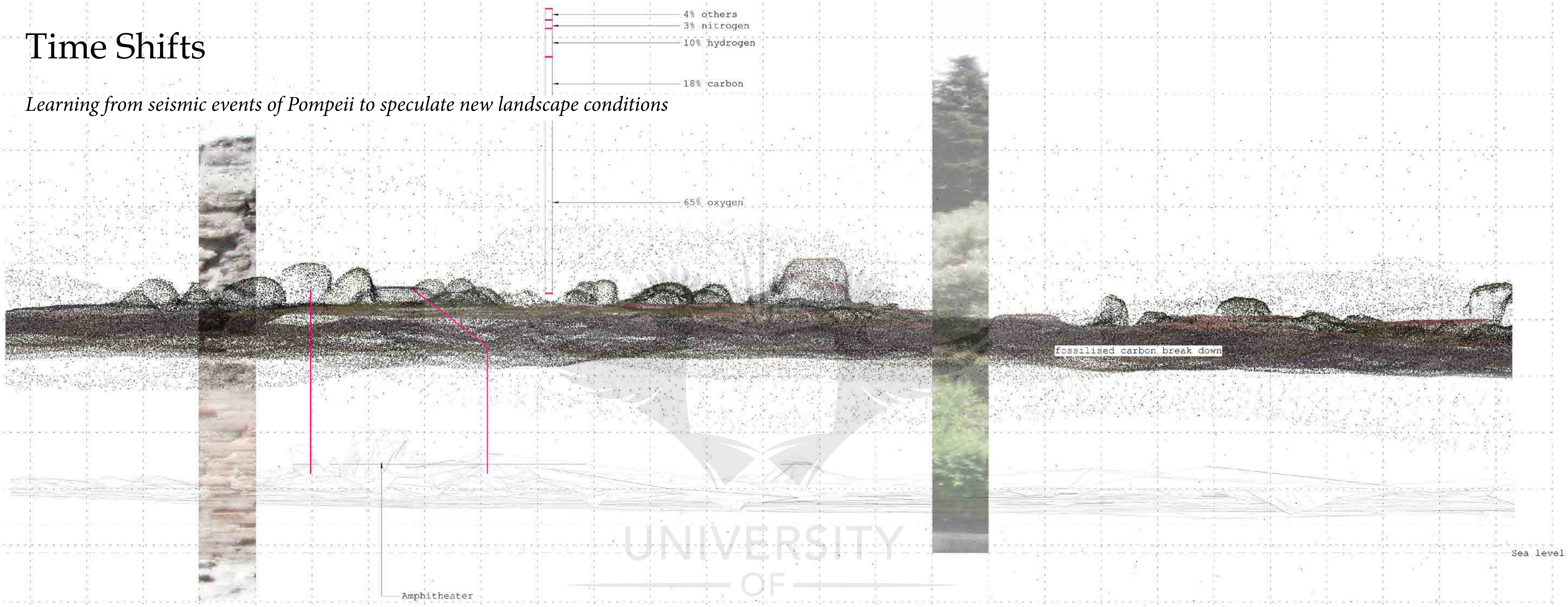
Soil pigment capturing.

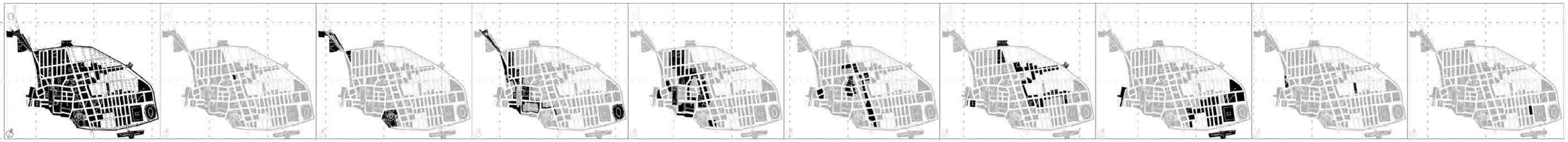
Intricate plantscape capturing

Geological/ biological DNA splice speculation

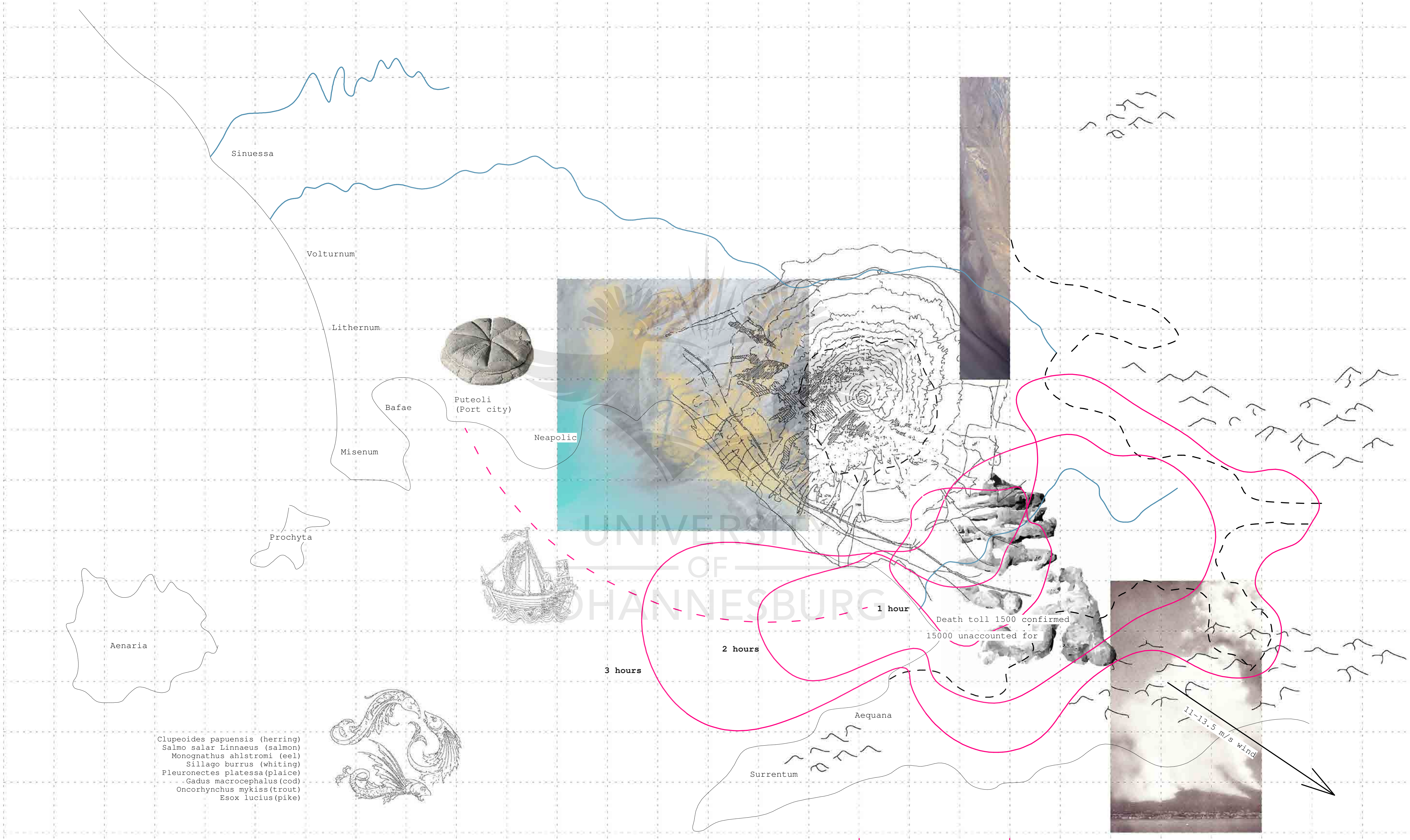
Time Shifts

Learning from seismic events of Pompeii to speculate new landscape conditions

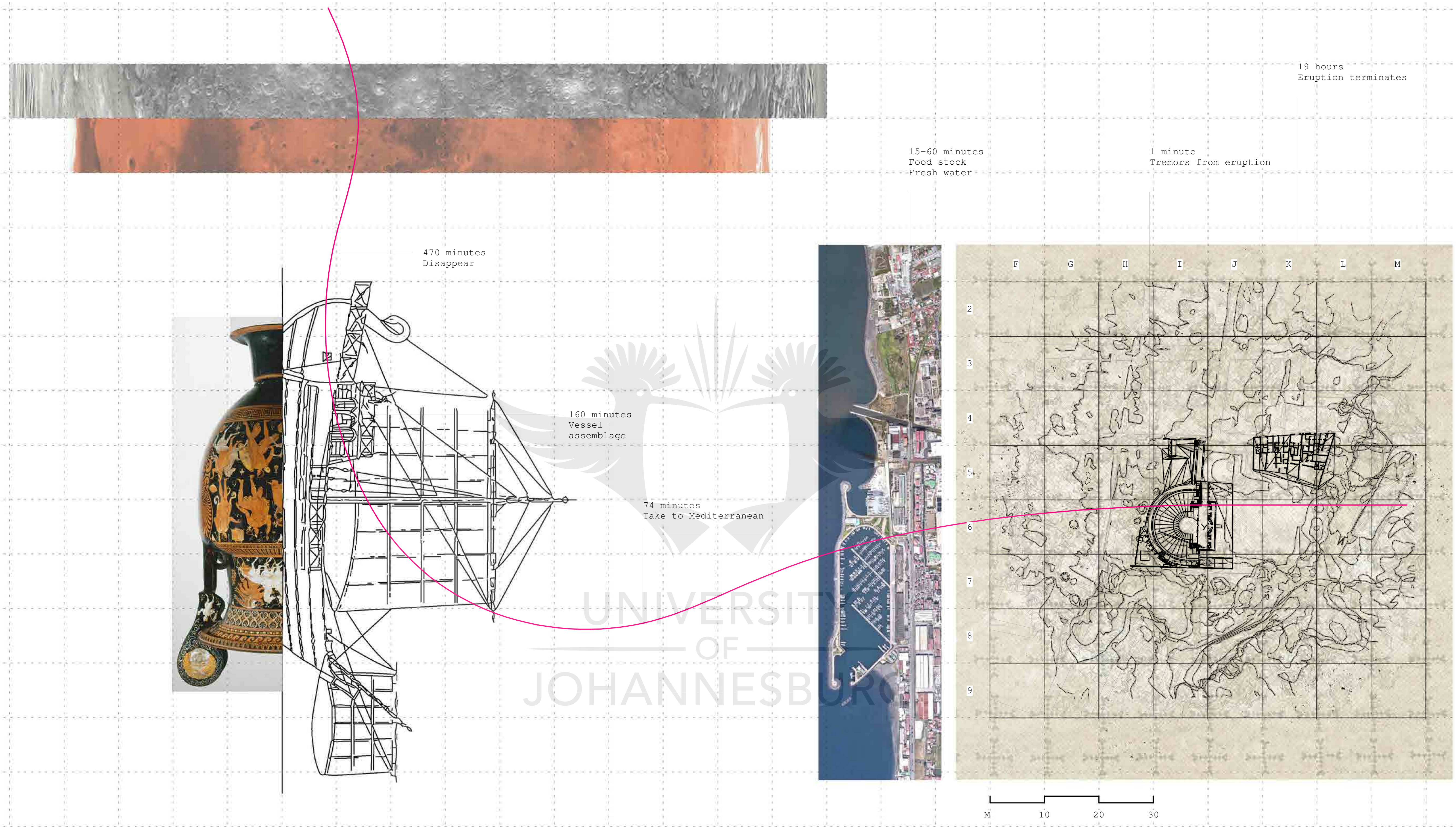




Pompeii: Archaeologists exploration of landscape



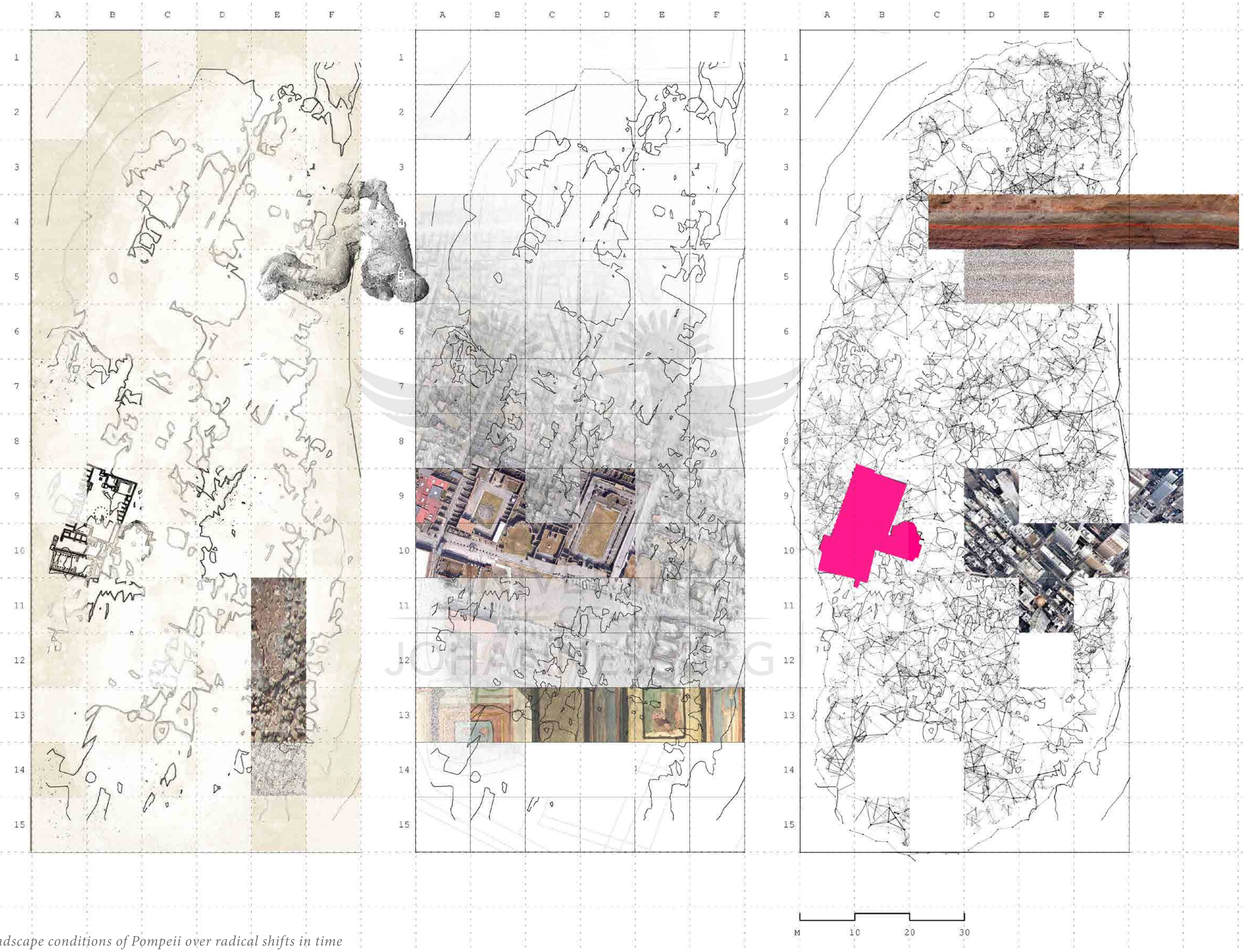
Speculative migration routes of the Pompeii refugees following a seismic event



Askold Vessel Technical Data
Overall length 16.3m
Beam overall 4.4m
Draught 0.9m
Displacement 10t
Sail area 57m²
Passengers 40persons

OVER THE COURSE OF THREE DAYS IN A.D. 79, the cities of Pompeii and Herculaneum were covered by hot ash, pumice, and molten rock from the eruption of Mount Vesuvius. Archaeologists have accounted for some 2,000 inhabitants of those cities from voids in the ash, but their combined population at the time was around 15,000 people. So where did everyone else go?

Vessel of hybridity. Retaining ones identity during forced migration



The archaeological landscape conditions of Pompeii over radical shifts in time

Play Media '002.mp4'

01 seconds

04

07

12

16

21

25

29

34

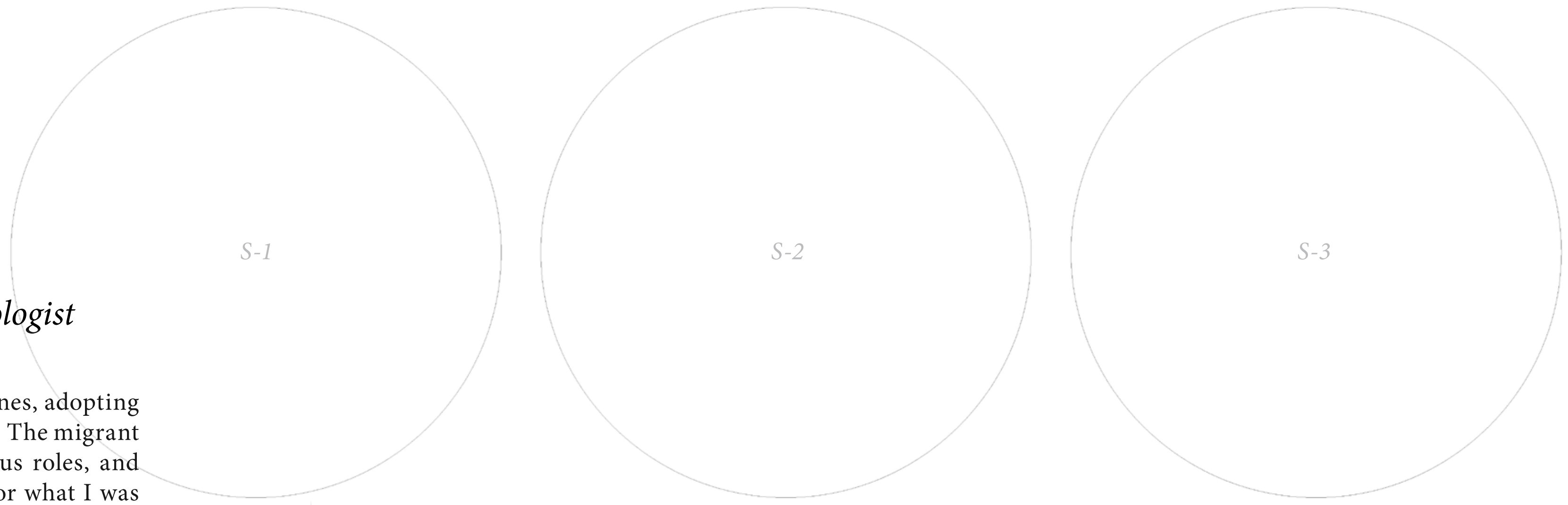
Timeline

"Romans were fond of bloodshed. North Africa was one of many places where the Roman Empire had its arenas. It was their amphitheater which, with the passage of time, had enlarged with the vanishing of many rocks." - Waheed Ibne Musa, Johnny Fracture

Thermal material exploration of a Zerzura rock/ soil composite under extreme temperatures

ALMANAC 2

Discipline Shifts



Discovery through lens of the Botanist, Scientist, Archaeologist, Zoologist

During this almanac, I explored three Zerzura sites under the gazes of various disciplines, adopting and combining tools and methods to better understand the conditions of the landscape. The migrant species passing through the sites, be it flora or fauna, were probed under the various roles, and new conditions were speculated upon. A lexicon was used to keep research focused for what I was investigating in these new speculated scenarios.

Lexicon

Axis
/ˈaksɪs/ - noun
a fixed reference line for the measurement of coordinates

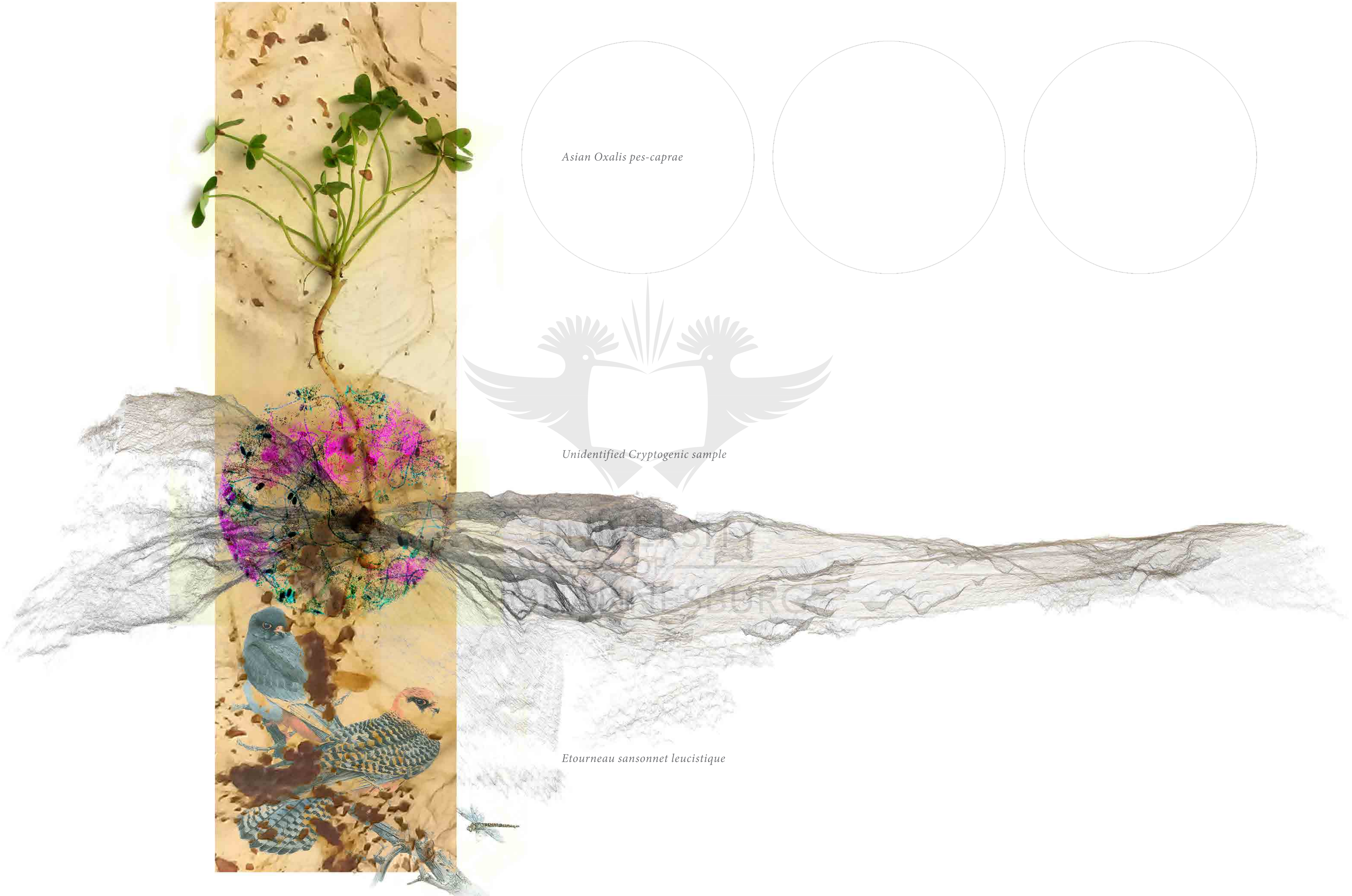
Point
/pɔɪnt/ - noun
an important phrase or subject, especially in a contrapuntal composition

Symmetry
/ˈsɪmɪtri/ - noun
exact correspondence between different things

Saturation
/satʃəˈreɪʃ(ə)n/ - noun
beyond the point regarded as necessary or desirable

Adapt
/əˈdapt/ - verb
become adjusted to new conditions

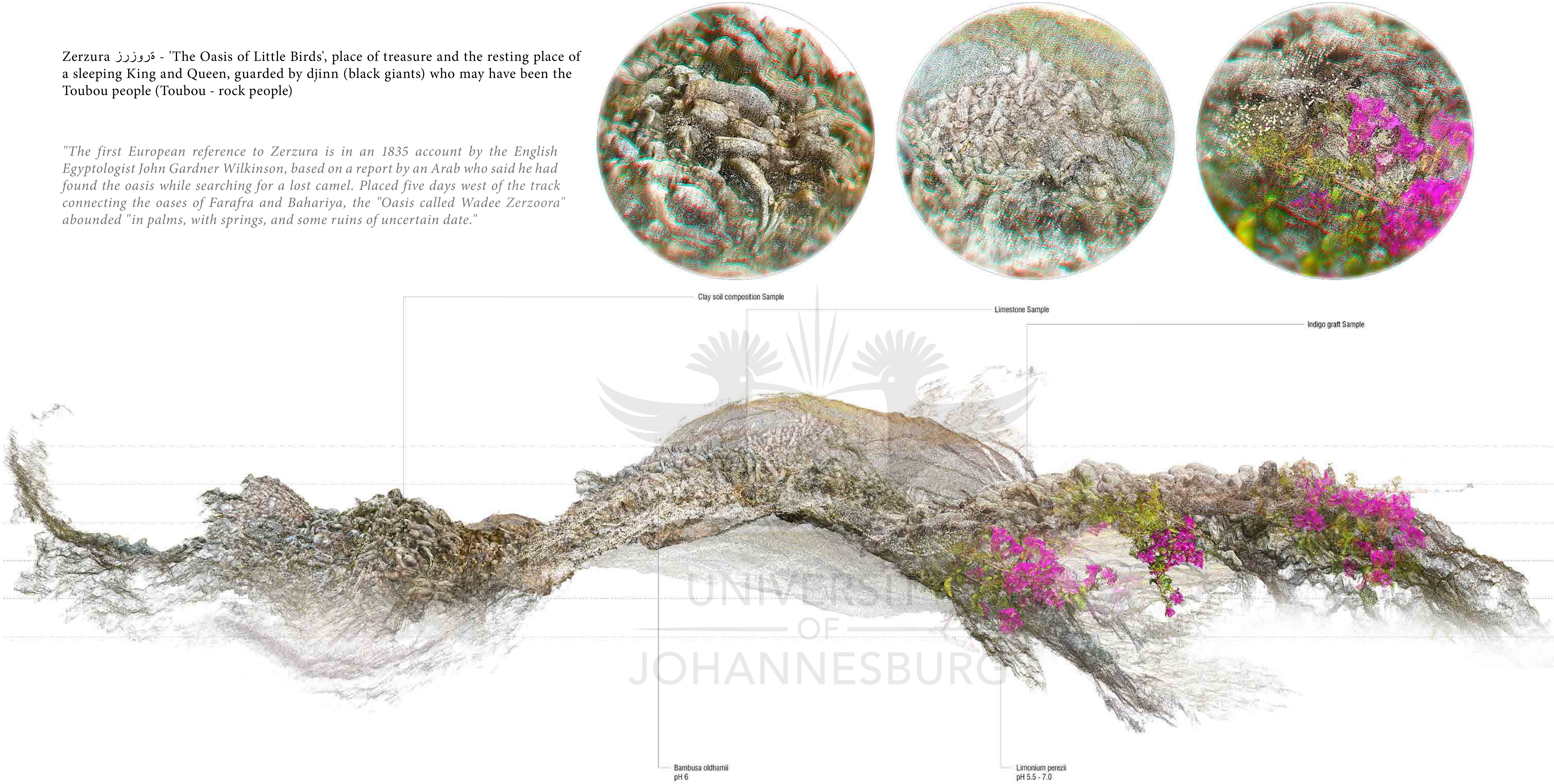
Rhythm
/ˈrɪð(ə)m/ - noun
regularly recurring sequence of events



Discipline shifts analyse a landscape

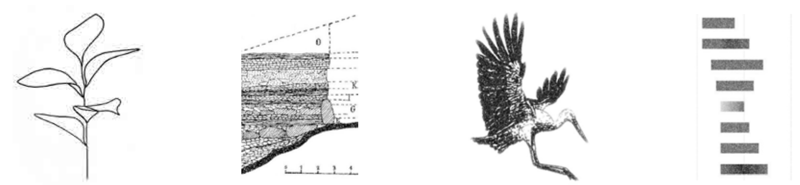
Zerzura زرزورة - 'The Oasis of Little Birds', place of treasure and the resting place of a sleeping King and Queen, guarded by djinn (black giants) who may have been the Toubou people (Toubou - rock people)

"The first European reference to Zerzura is in an 1835 account by the English Egyptologist John Gardner Wilkinson, based on a report by an Arab who said he had found the oasis while searching for a lost camel. Placed five days west of the track connecting the oases of Farafra and Bahariya, the "Oasis called Wadee Zerzoora" abounded "in palms, with springs, and some ruins of uncertain date."



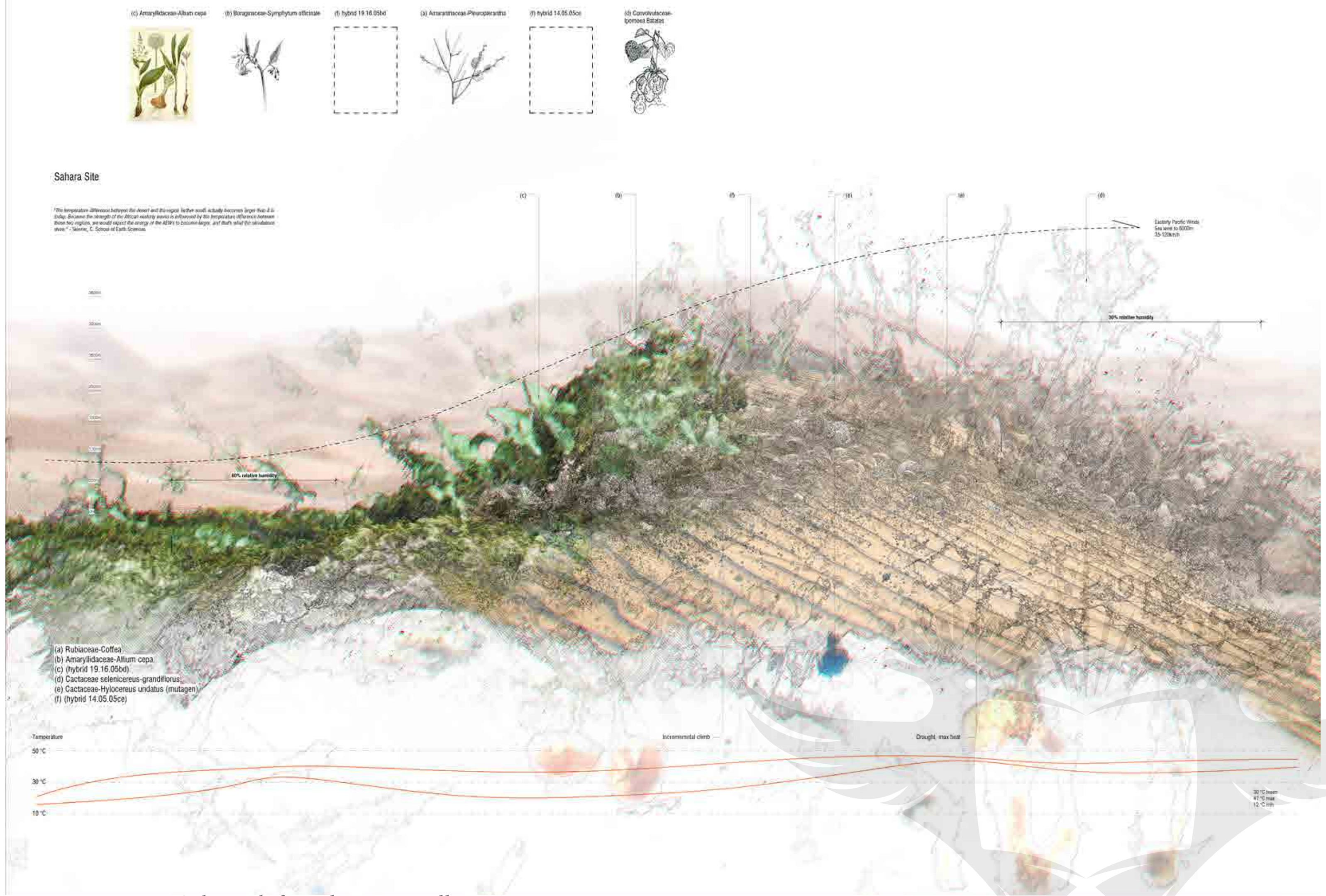
Zerzura landscape speculation

2.5 hrs	0.5 hrs	1 hrs	0.5 hrs



Botanist	Archaeologist	Zoologist	Scientist

Scientist
Role
- Observation at microscope scale
- Seeing big to reveal hidden elements
- Shifts in time scale, rapid growth



Sahara shifts to barrier or allow specie migration

Section - Sahara

100 000 years ago, rivers flowed throughout the Sahara. The scientist speculates a very different landscape condition, ultimately determined by changing global climates over long periods of time.

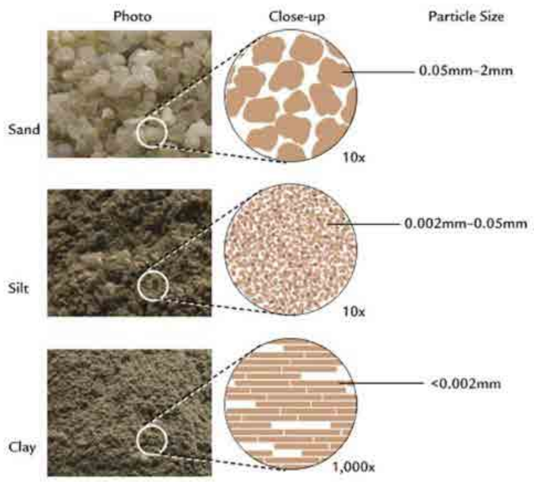
Sahara site drought analysis with migrating species

Mountain range of the Rift, that rise over the town like two horns, thus giving the name to the city Chefchaouen (in berebér this means: "watch the horns")
660m altitude

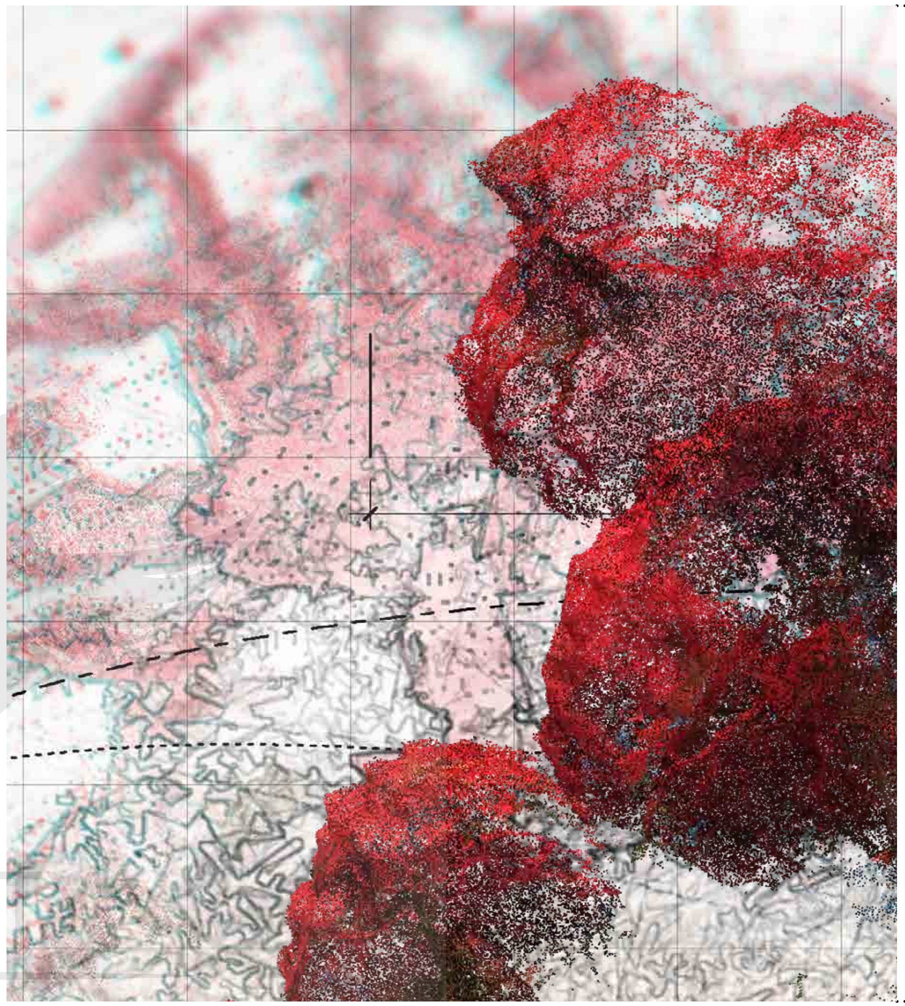
Geologist/ Paleontologist
Role
- Emphasis on soil types, identifying & quantifying mineral deposits
- Geographic comparison between Morocco and Spain

Section - pH extraction

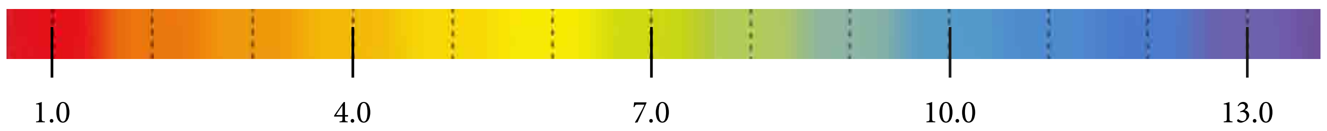
Careful, yet deliberate alteration of indigenous terrain to allow the transplantation of exotic species



Basic soil structural composition

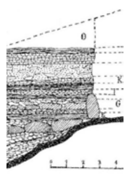


Pigment mutation in Indigofera tinctoria, creating a new identity of place.



1 hrs | 1 hrs | 0 hrs | 1 hrs

Botanist



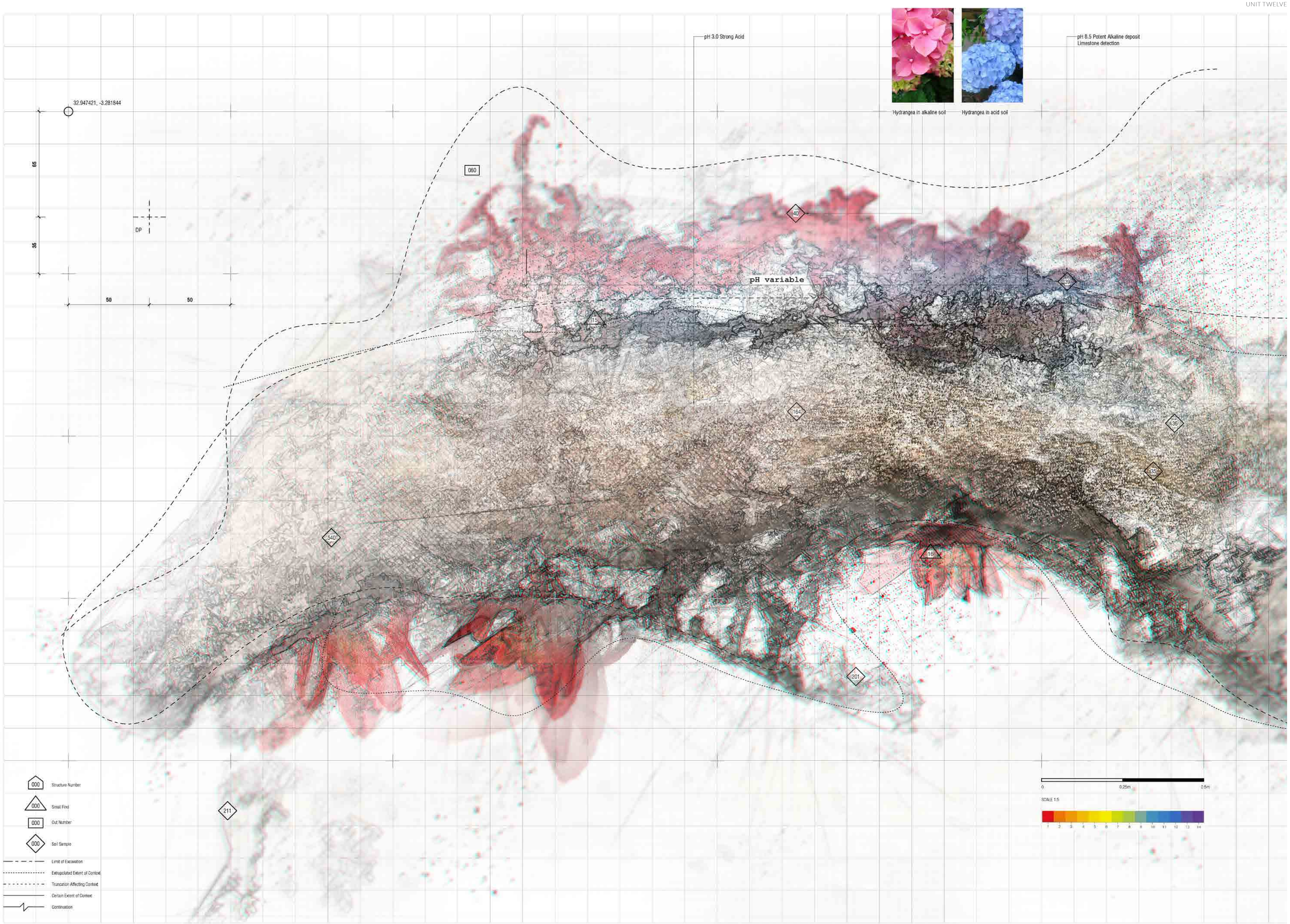
Archaeologist

Zoologist

Scientist

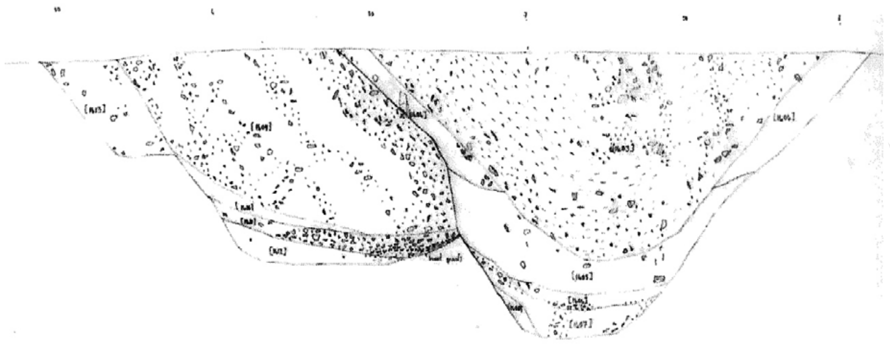
Botanist/ Geologist
- Plants occupy the world at vastly different scales of time than humans.
- Linnaeus' taxonomy order. We can determine the origin of species through their structure

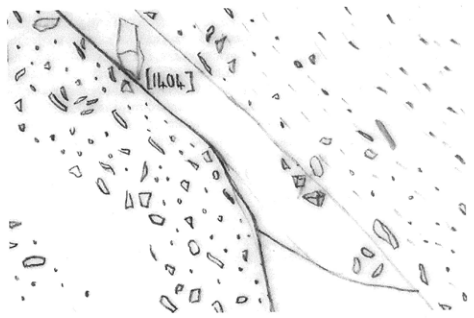
Role
- Altering landscape flora through pH manipulation
- Sampling flora/ fauna, and their methods of migration
- Altering terrain to allow introducing of new species.

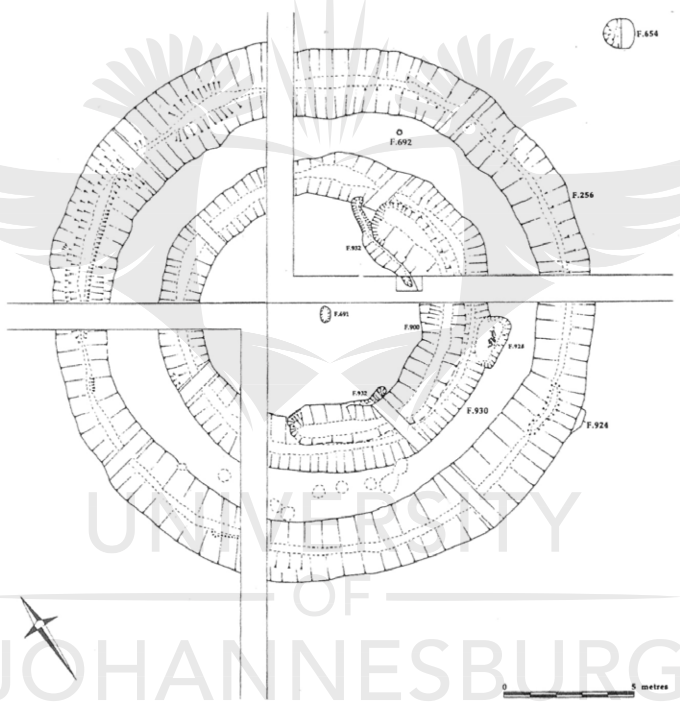

pH 3.0 Strong Acid
Hydrangea in alkaline soil
Hydrangea in acid soil
pH 8.5 Potent Alkaline deposit
Limestone detection
32.947421, -3.281844
65
35
DP
50
50
060
140
pH variable
115
164
540
16
201
211
Structure Number
Small Find
Cut Number
Soil Sample
Limit of Excavation
Extrapolated Extent of Context
Truncation Affecting Context
Certain Extent of Context
Continuation
0
0.25m
0.5m
SCALE 1:5

Archaeologist Plan - Excavation

The unearthing of the mythical zerzura guardian using the tools of the Archaeologist.

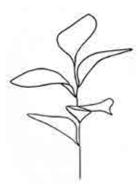






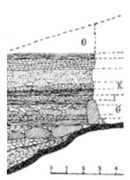
Plan of Bronze Age ring-ditch
- Lesley McFadyen

0 hrs



Botanist

4 hrs



Archaeologist

0 hrs

Zoologist

0.5 hrs

Scientist

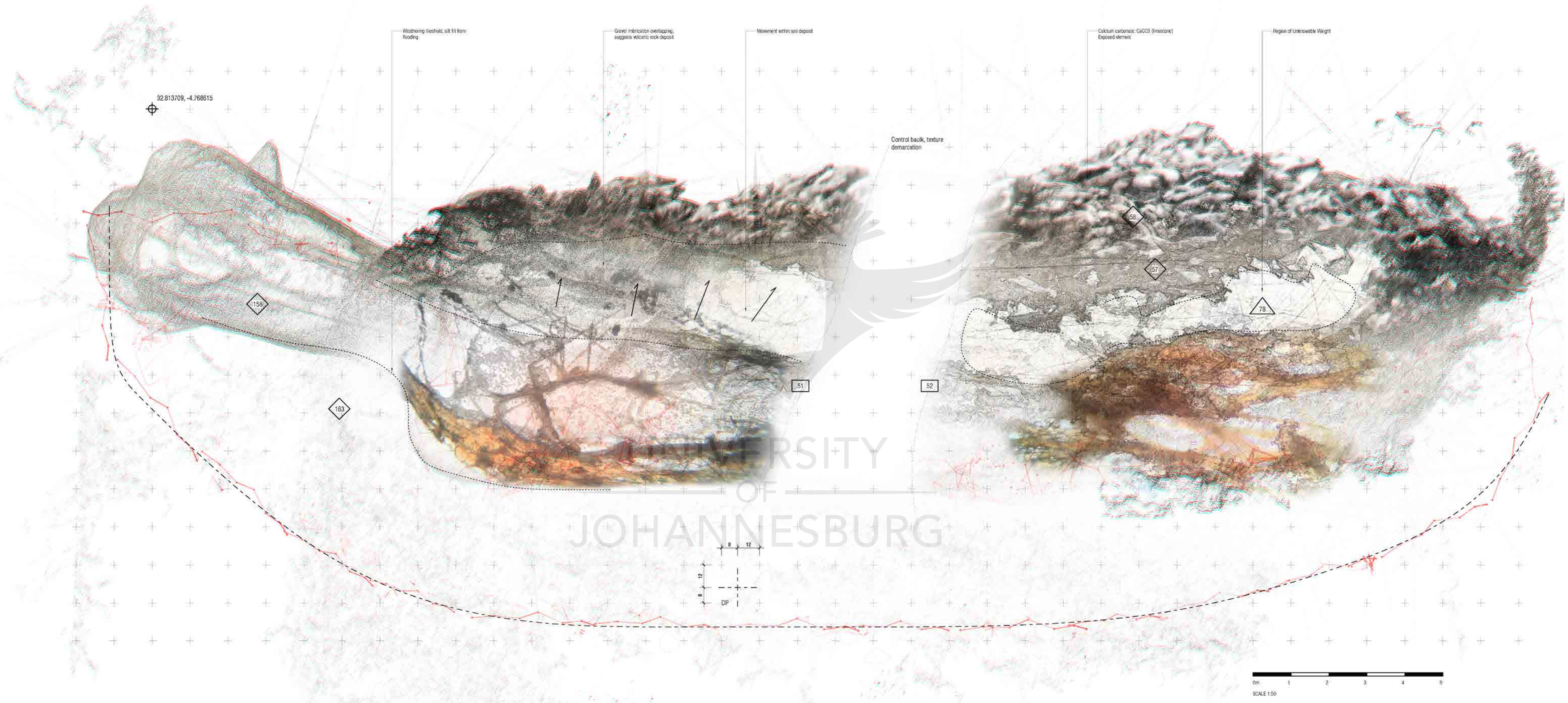
Archaeologist
-Uncovering the past, using emotive reasoning to fill in gaps
-Arguments from silence - Just because nothing is unearthed doesn't mean there is nothing there.
Role
- Archaeology as intimately linked to the architecture of 'making'
- The act of drawing as an ongoing and creative process, using emotive reason to 'fill gaps', working experimentally with other creative disciplines.
- 'Empty' spaces as not void of action - An 'argument from silence' requires a change in what we are looking for

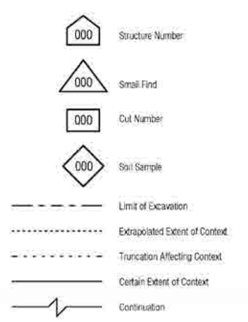
Making and remaking of site with scales of change and alteration
What are the dynamics of activities of the site?
Archaeology as intimately linked to the architecture of 'making'
The redrawing and what someone else has made in the past, their drawing being a creative process
The act of drawing is an interpretative practice.

<u>Process of Excavation</u>
Excavate in quadrants
Unexcavated walkways as Cross-section 'control baulks', also acting as visual and textural markers.
Vertical sections are vital in seeing the relation between deposits, cut and fills, recording traces of action they hold.
The vertical section holds time and the order of things differently to that of the plan.
Ground features are revealed through changes of soil colour, texture, composition and inclusions.
The act of finding human traces lies in reversing the naturally weather fill (soil erosion) and locating thresholds between deposits.
The trowel as a blade for probing changes in soil texture and compaction.
The trowel to score lines lightly in section to demarcate edges of cut and fill.
The trowel used like a pencil to draw.
1:50 Plans
1:10 Section
Areas of white in the drawing doesn't illustrate that nothing is there, rather that there is movement in the soil.
Depict course gravel inclusions, pitch, imbrication (overlapping of edges) because it articulates action.
Draw the dynamics of 'emptying out' rather than the material already in place.
Lines of movements depicted using heavy-handed dashed lines in blunt pencil, to show the process of weathering and silting (untouched by human activity). About slow rather than fast activity.

<u>Property of Time</u>
Archaeologists work in teams, the drawing become a culmination of various ideas
Hiatus (pause) between different movements of soil can be shown in the same drawing.
It is through the process of drawing and discussing ideas of how to draw, that one understands the site.
The drawing become the process for new/ ongoing discussions.
Capture elusive quantities through improvised drawing technique.
It is only during archaeology excavation where architectural and material space coexist at the same time (cut and fill occurring at the same time).
At some moment in time, people went through the process of making something out of nothing, digging trenches where none exists. The in-between nature of the hard line pencil to draw the ditch yields a temporal experience, the line lives between the 'no longer' and the 'not yet'.
The act of making drawings is for the future as much as it is about the past. Archaeological drawings are an on-going experience and invite redrawing of shifts.
Creative working from other disciplines come into play to extend learning.

<u>Acts of Redrawing</u>
There is tension between what we think is 'recordable' and things 'in the process of being formed'.
'Unknowable weight' - Are escapable qualities that cannot be pinned down. These unknowable weights allow archives to be revisited and new futures to be redrawn (Derrida 1998: 29).

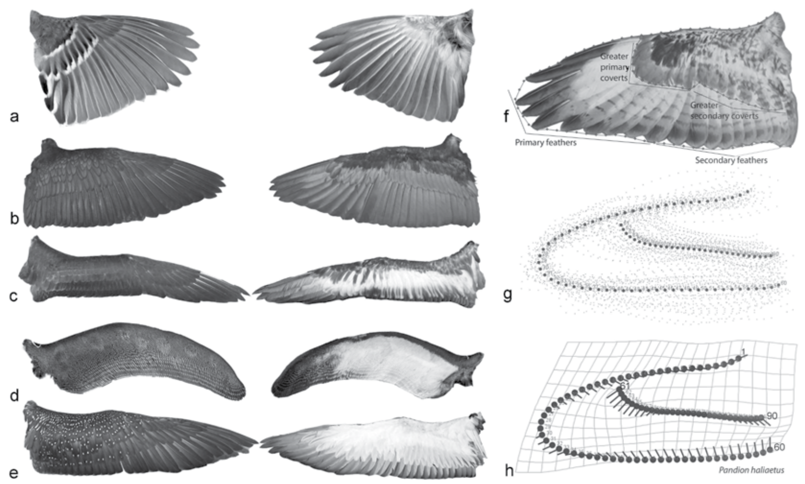




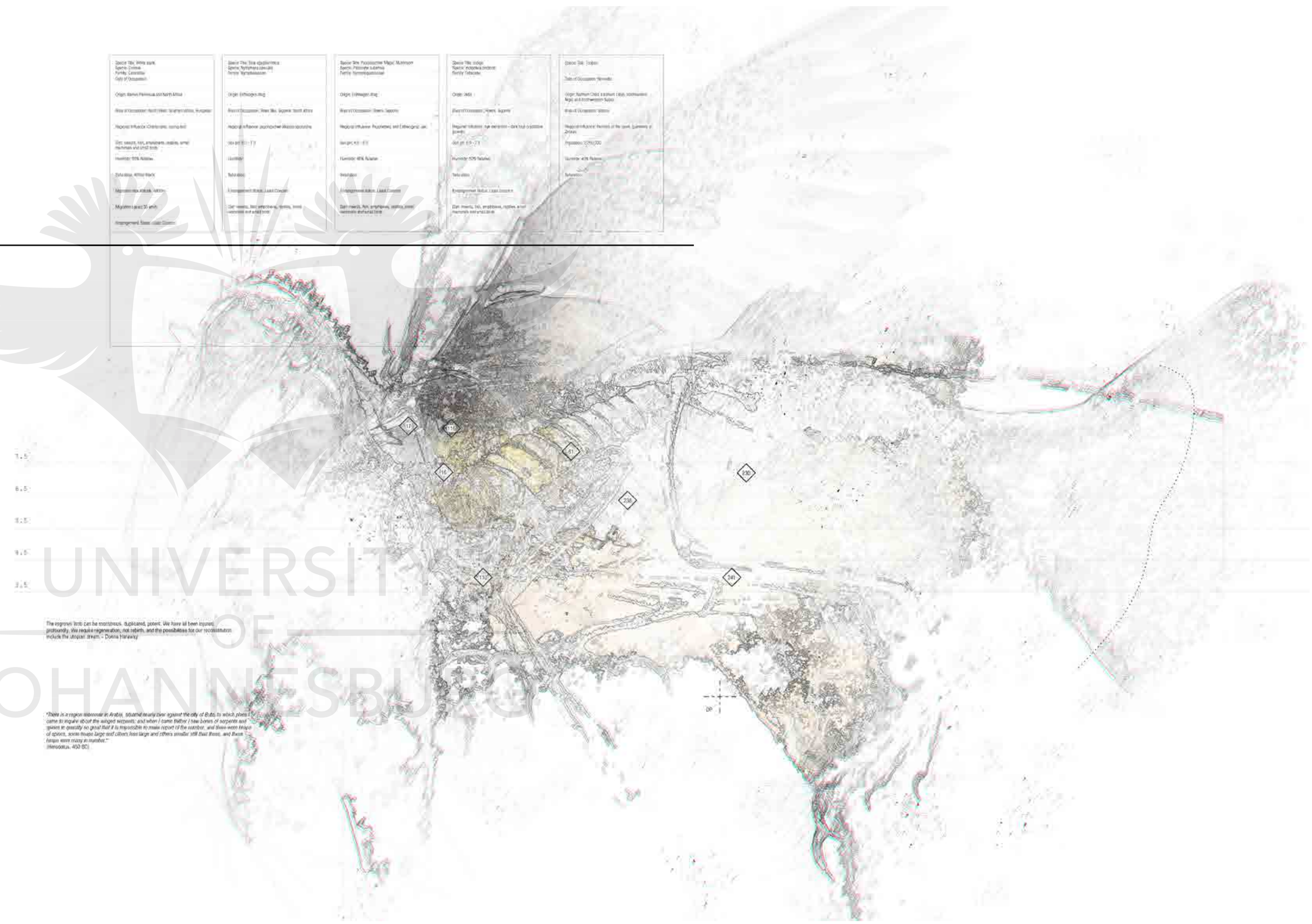
"The geologist takes up the history of the earth at the point where the archaeologist leaves it, and carries it further back into remote antiquity."
- Bal Gangadhar Tilak, The Arctic Home in the Vedas

Archaeologist Section - Guardian Excavation

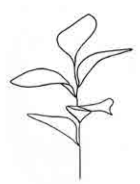
The unearthing of the mythical Zerzura guardian



Wing Types

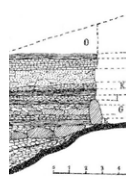


0 hrs



Botanist

2.5 hrs



Archaeologist

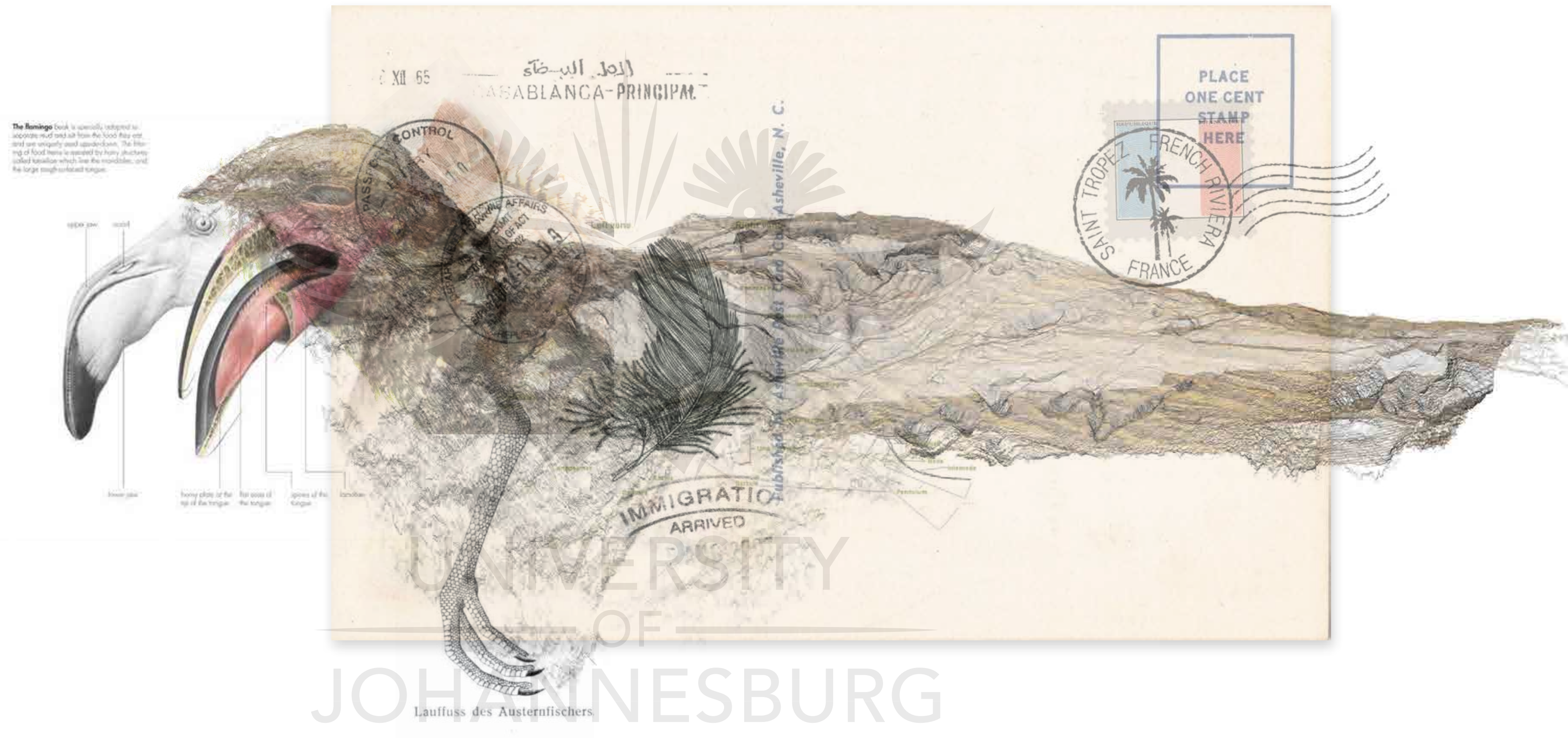
3 hrs

Zoologist

0 hrs

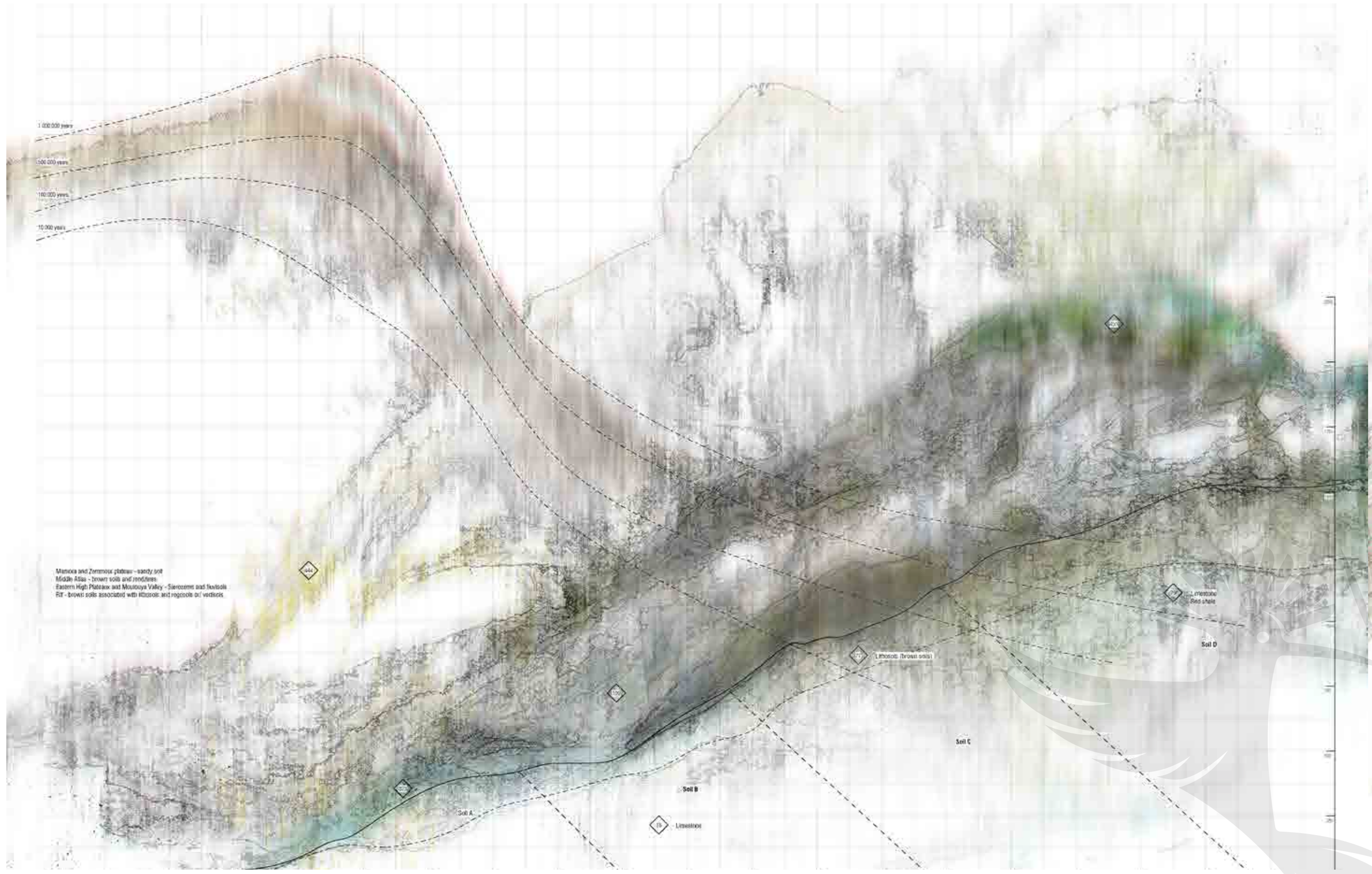
Scientist

Zoologist/ Archaeologist
Role
- How do global forces of climate change, migration, conflict affect the living conditions of roving species?

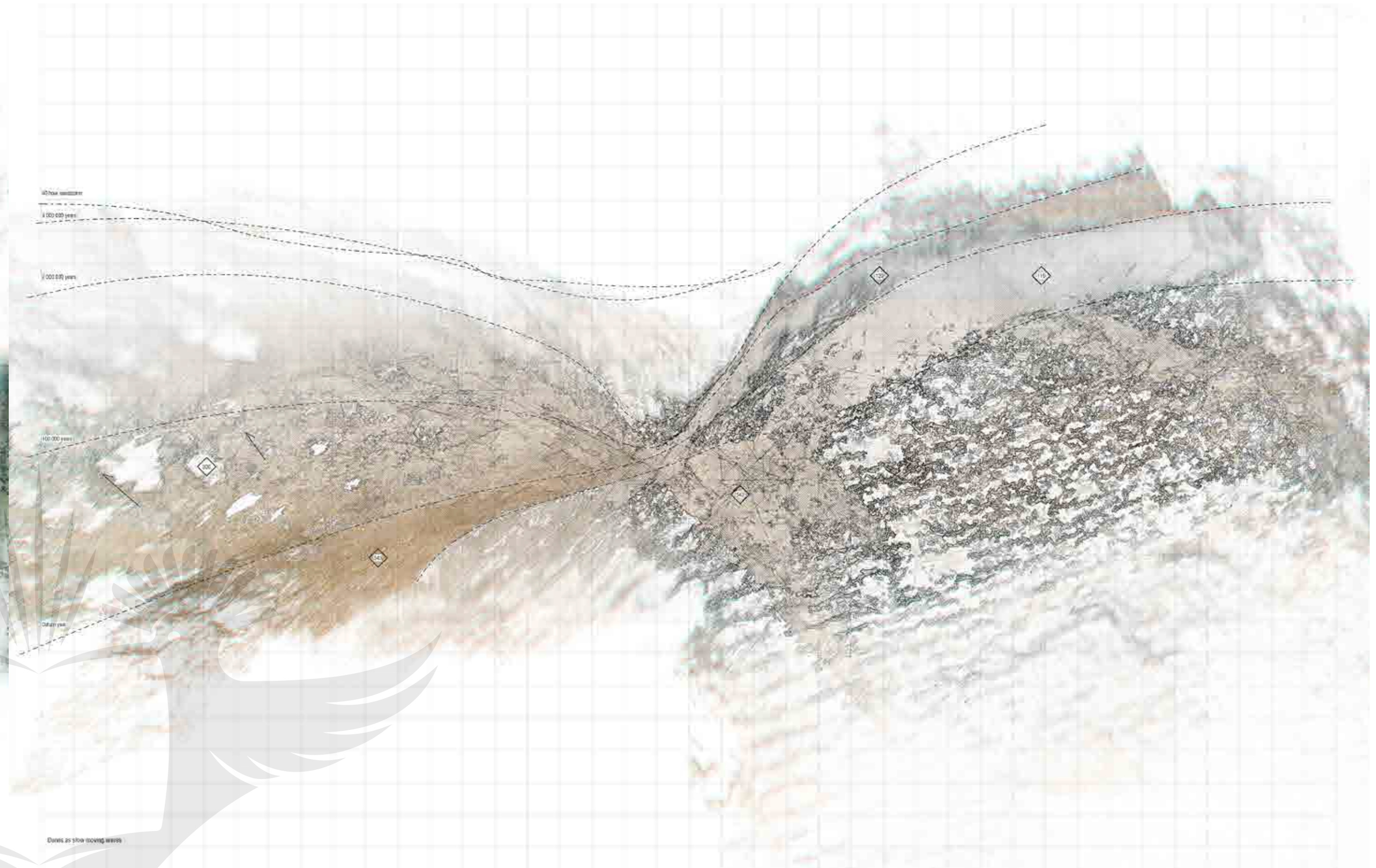


"I am so happy migrating birds and animals do not have visa issues and fences in the sky to halt their efforts to survive, but humans with their mindful consciousness do actually build walls around themselves."

- Rana Abdulfattah, Tiger and Clay: Syria Fragments

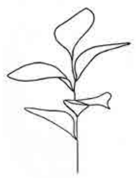


Atlas mountain erosion over time



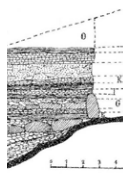
Dune tidal wave shifts over time

0.5 hrs



Botanist

1.5 hrs



Archaeologist

0.25 hrs

Zoologist

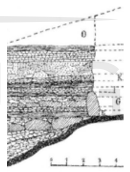
1 hrs

Scientist

1 hrs

Botanist

1 hrs



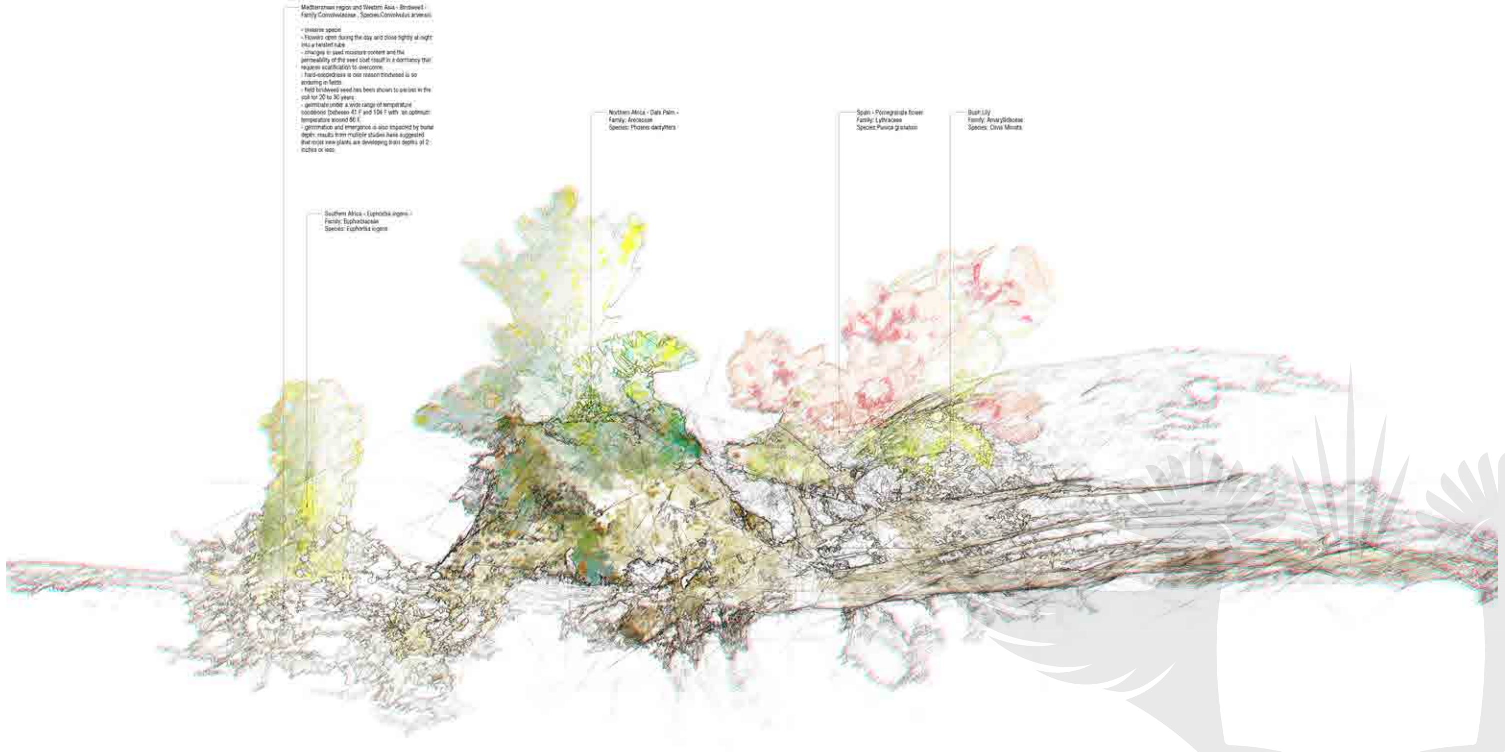
Archaeologist

1 hrs

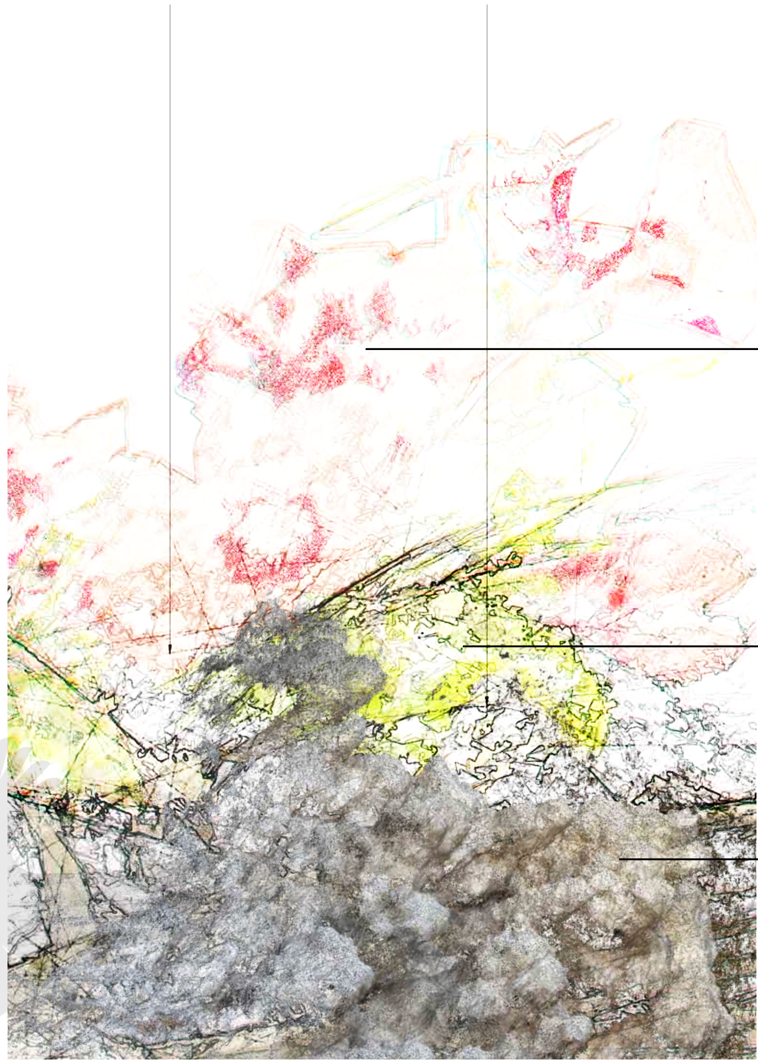
Zoologist

1 hrs

Scientist



Flora cross-pollination between Poland and Morocco

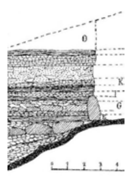


Cross pollination of continental flora into contested territory

1.5 hrs

Botanist

0.5 hrs



Archaeologist

0.5 hrs

Zoologist

2 hrs

Scientist

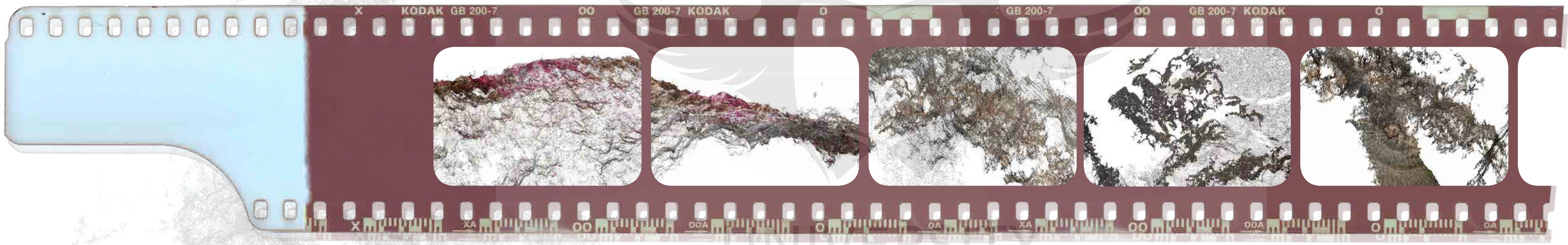
Cryptogenic - potentially native, unclear origin due to lack of evidence
Indigenous - arrived by natural means
Endemic - evolved to grow natural in a certain place
Exotic - introduced through artificial means
Invasive - exotic species which have become uncontrollable, threatening native specie

Botanist/ Taxonomy
Role
- Appropriation of the exotic and indigenous to create new narratives of identity
- Linnaeus' taxonomy order. We can determine the origin of species through their structure. Altering structure to give new origin

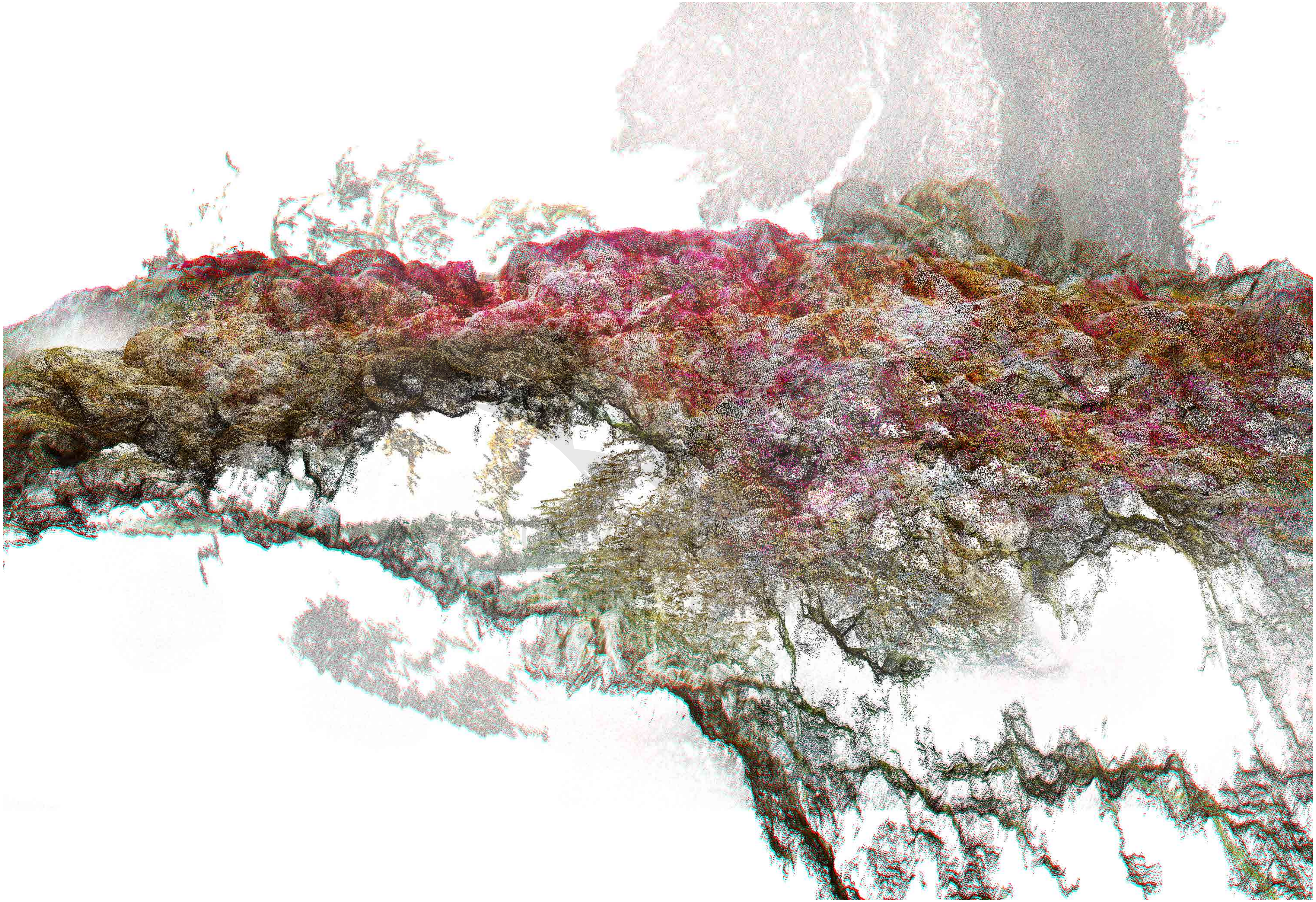
Ingredient Landscape

The Cold Scape

The making of up landscape through hybrid informants. A photogrammetric landscape is generated from glitched photographs of the existing migrants requirements of oxygen, humidity, alkalinity tolerances. This generated landscapes, informed by the migrant creates a symbiotic relationship with the specie i.e. they are informed and edited by each other. By using small interventions and at a micro-scale, it may become easier to understand this relationship process and to create long term 'knock-on' effects far into the future (20 000 years when the monsoon hit the Sahara).



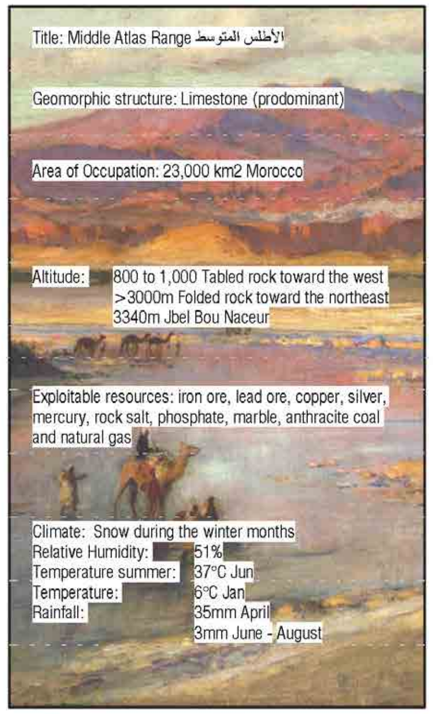
Play Media '003.mp4'

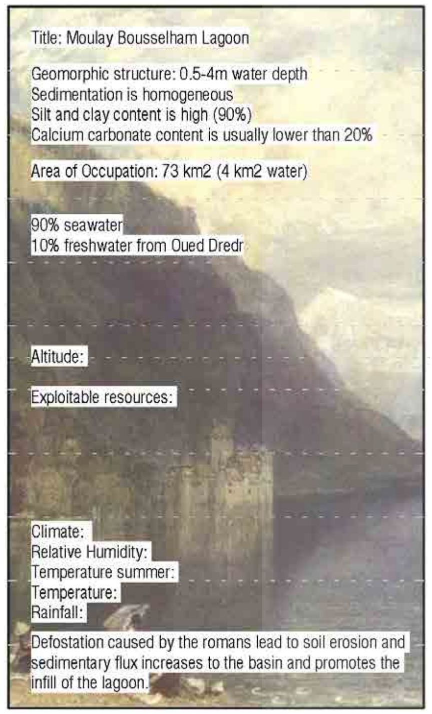


Generated landscape

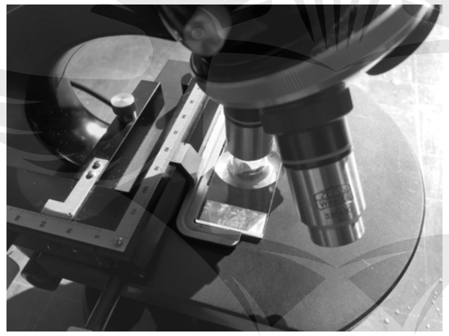
Chefchaouen

Parametered Landscape - Cave rock, limestone





Tools



- Microscope
10/0.25 magnification
40/0.65 magnification

pH Levels

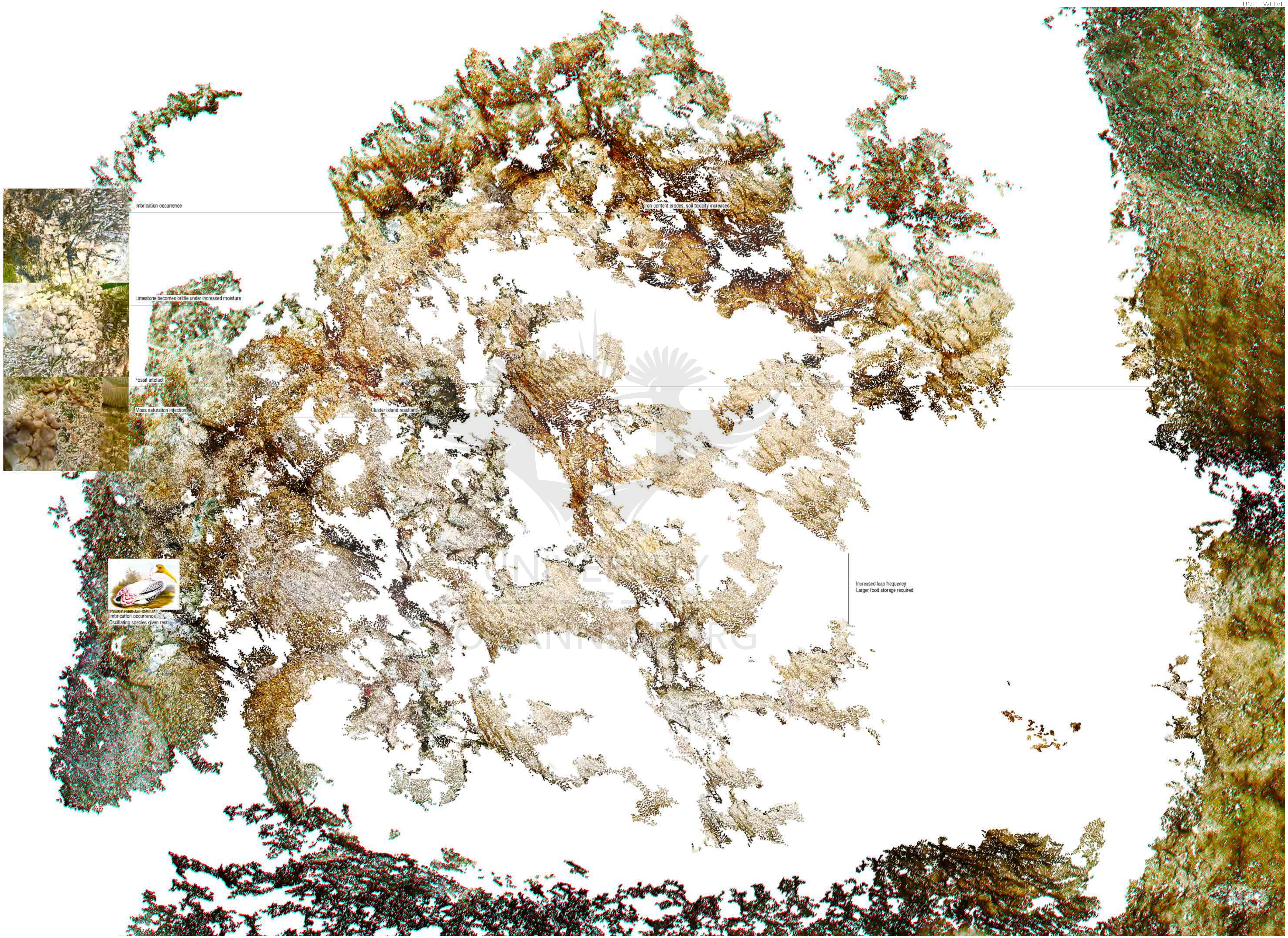
6.7

Temperature	10 - 23 °C
Altitude	660m
Humidity	55% rh
Soil	50% Sand 20% Clay 30% Loam

Sandy Soil
Sand is the largest particle in soil and does not hold nutrients well. The following plants are well-adapted to sandy soil

Clay Soil
Soil with a large amount of clay are heavy and do not drain well. The following plants are well-adapted to clay soil

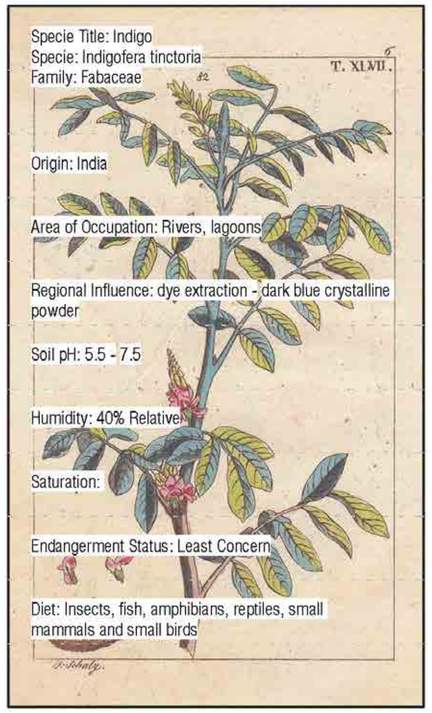
Silt Soil
Silty soil is powdery with high fertility. Unfortunately, soils that are high in silt can become waterlogged very easily. The following plants are well-adapted to silty soil

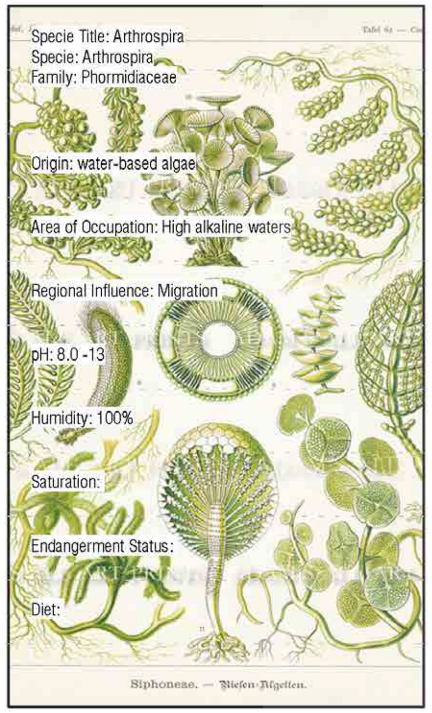


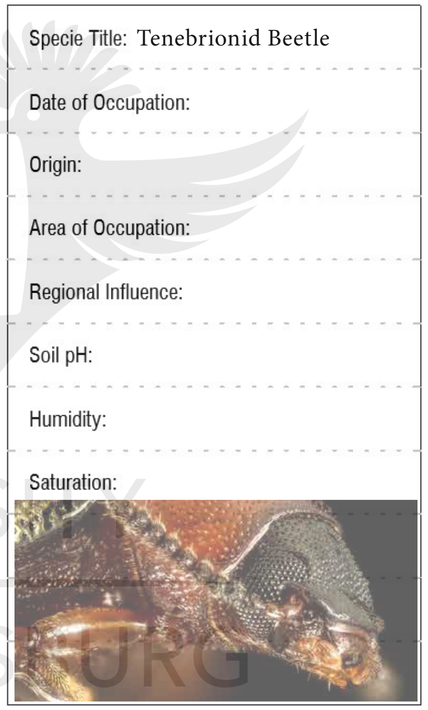
Generated landscape

Moulay Bousselham Lagoon

Parametered Landscape - Oued Massa Lagoon

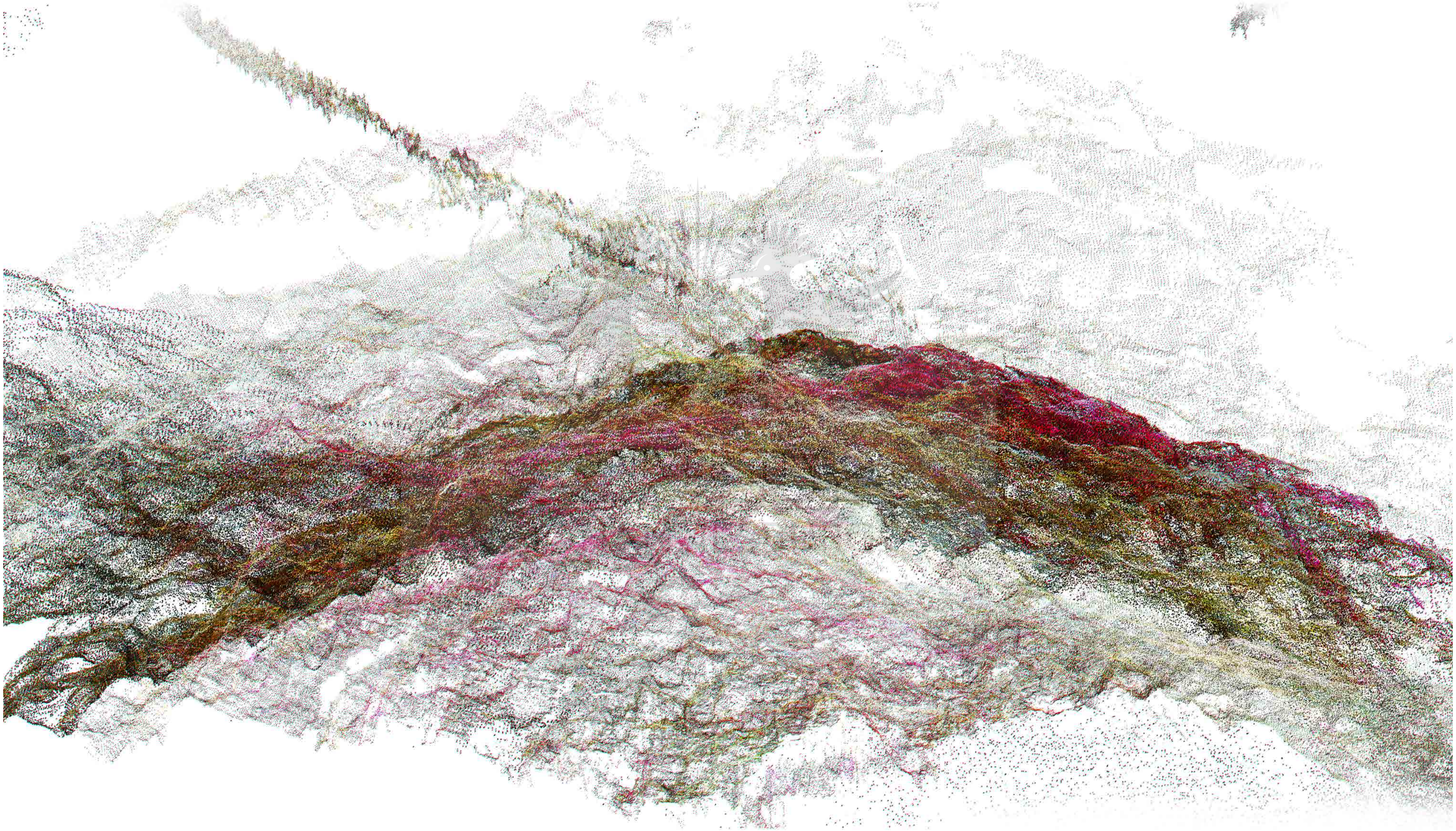






pH Levels

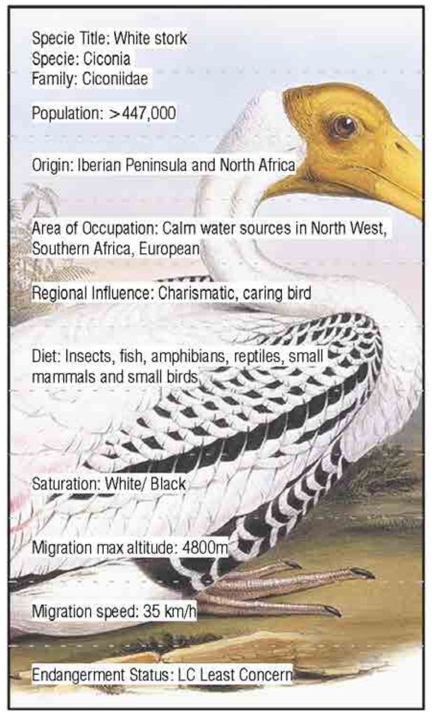
pH Levels	10.8
Temperature	10 - 27 °C
Altitude	660m
Humidity	70% rh
Soil	50% Sand 20% Clay 30% Loam



Generated landscape

Akchour

Parametered Landscape - Sparse resources

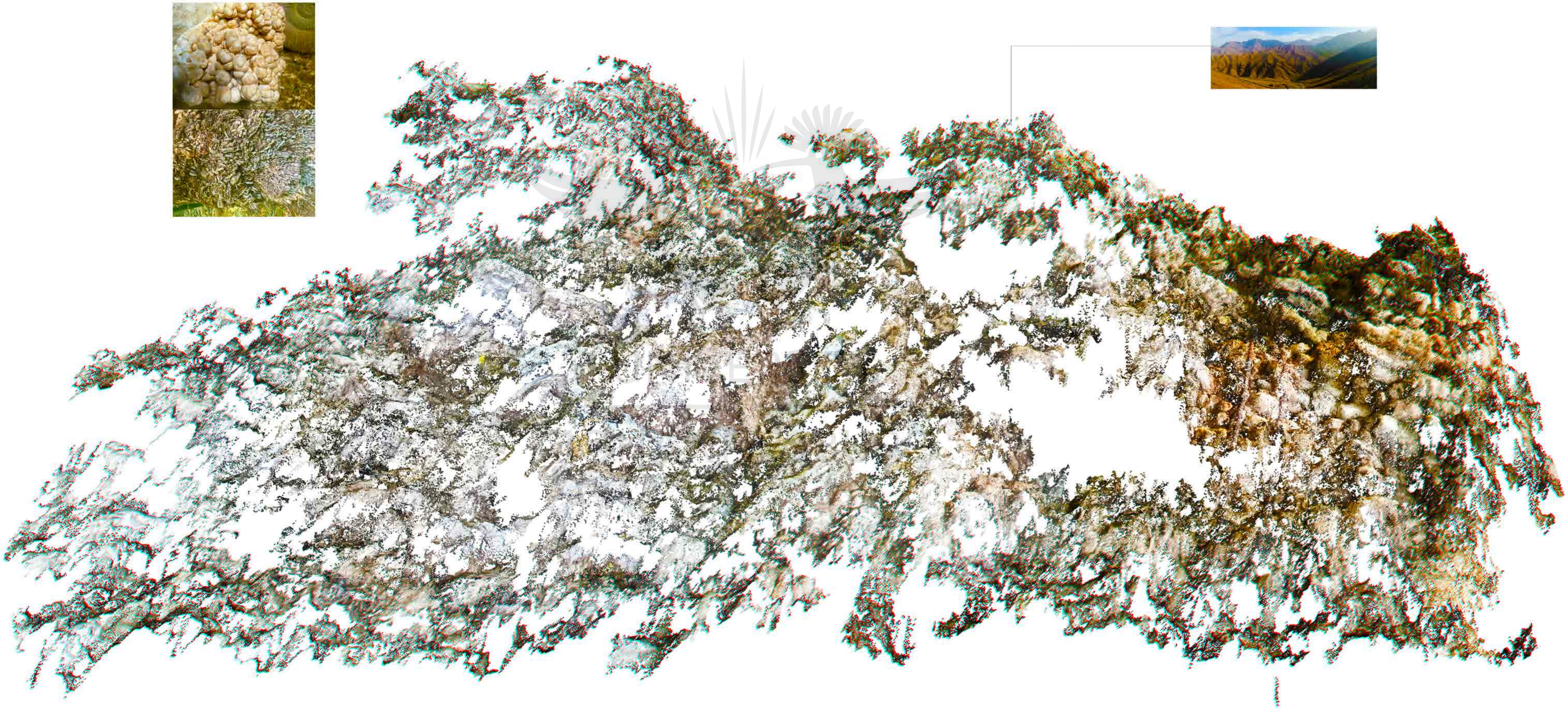


Atlas Mountain range

pH Levels

7.9

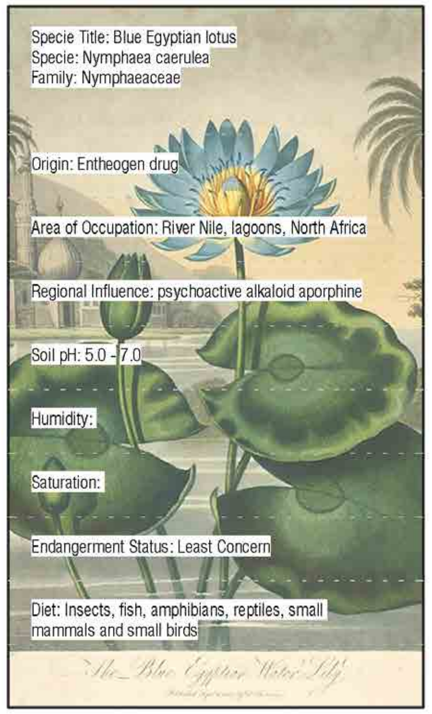
Temperature	5 - 20 °C
Altitude	3100m
Humidity	50% rh
Soil	50% Sand 20% Clay 30% Loam

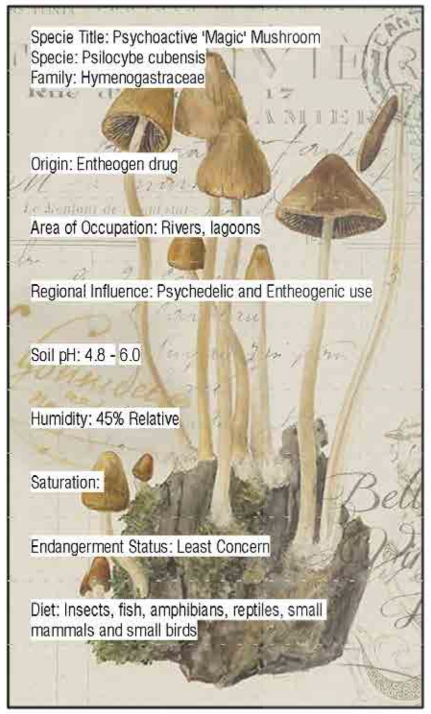


Generated landscape

Oued massa

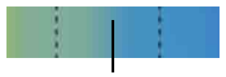
Parametered Landscape - Transfloral seeding





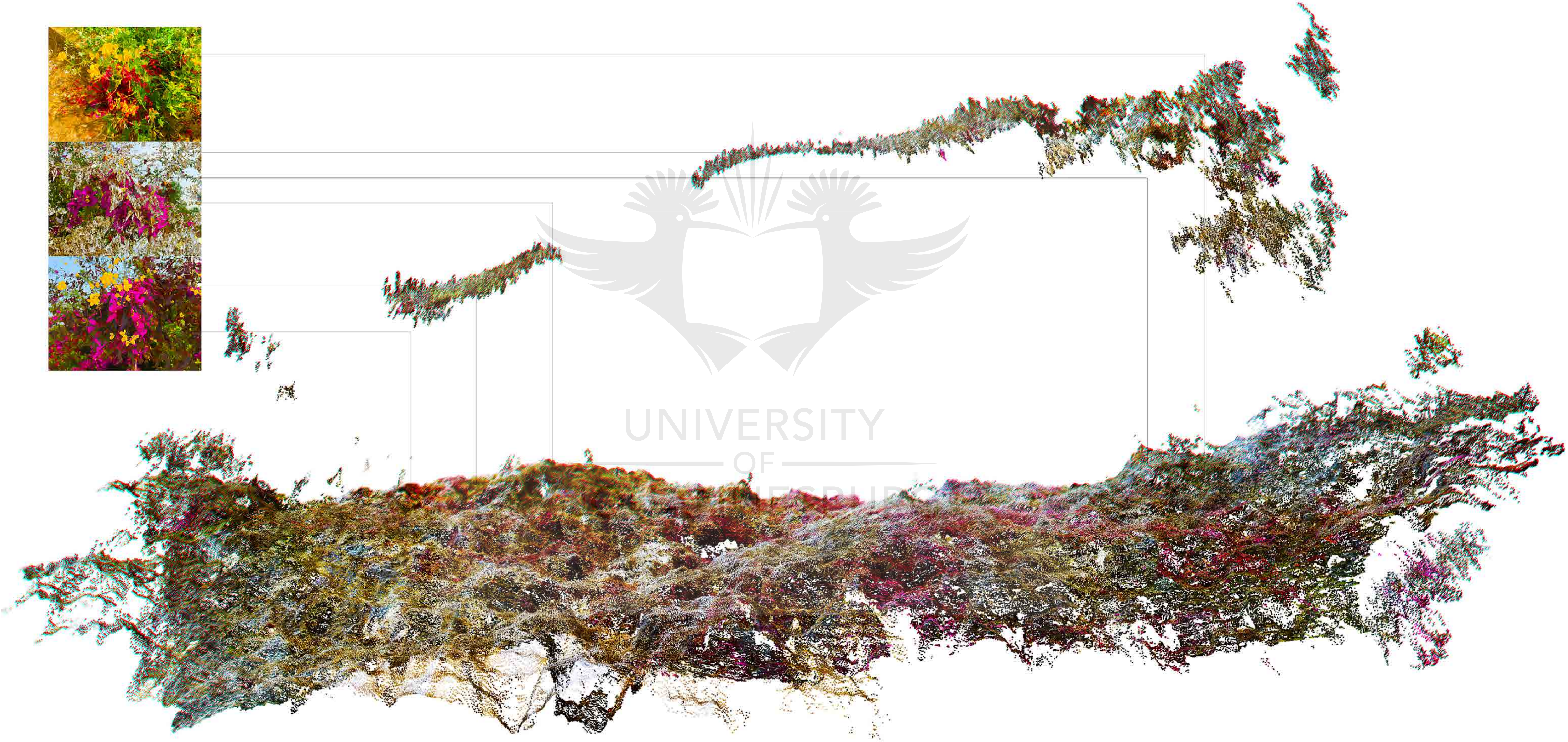
Lightweight soil-less planting medium ingredients:
1/2 cubic yard peat moss
1/2 cubic yard perlite
10 pounds bone meal
5 pounds blood meal
5 pounds limestone

pH Levels



9.5

Temperature	10 - 23 °C
Altitude	660m
Humidity	55% rh
Soil	10% Sand 70% Clay 20% Loam



Generated landscape

44

ALMANAC 3

Species Series - Adaption

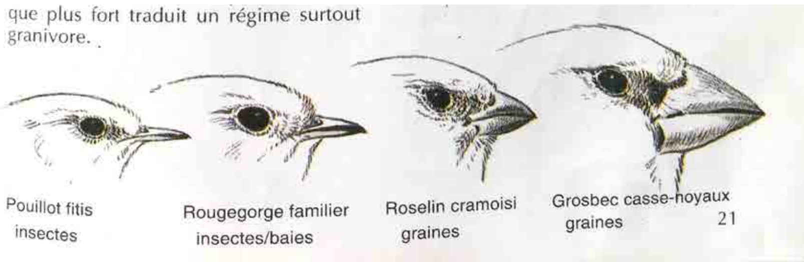
The Coldscape

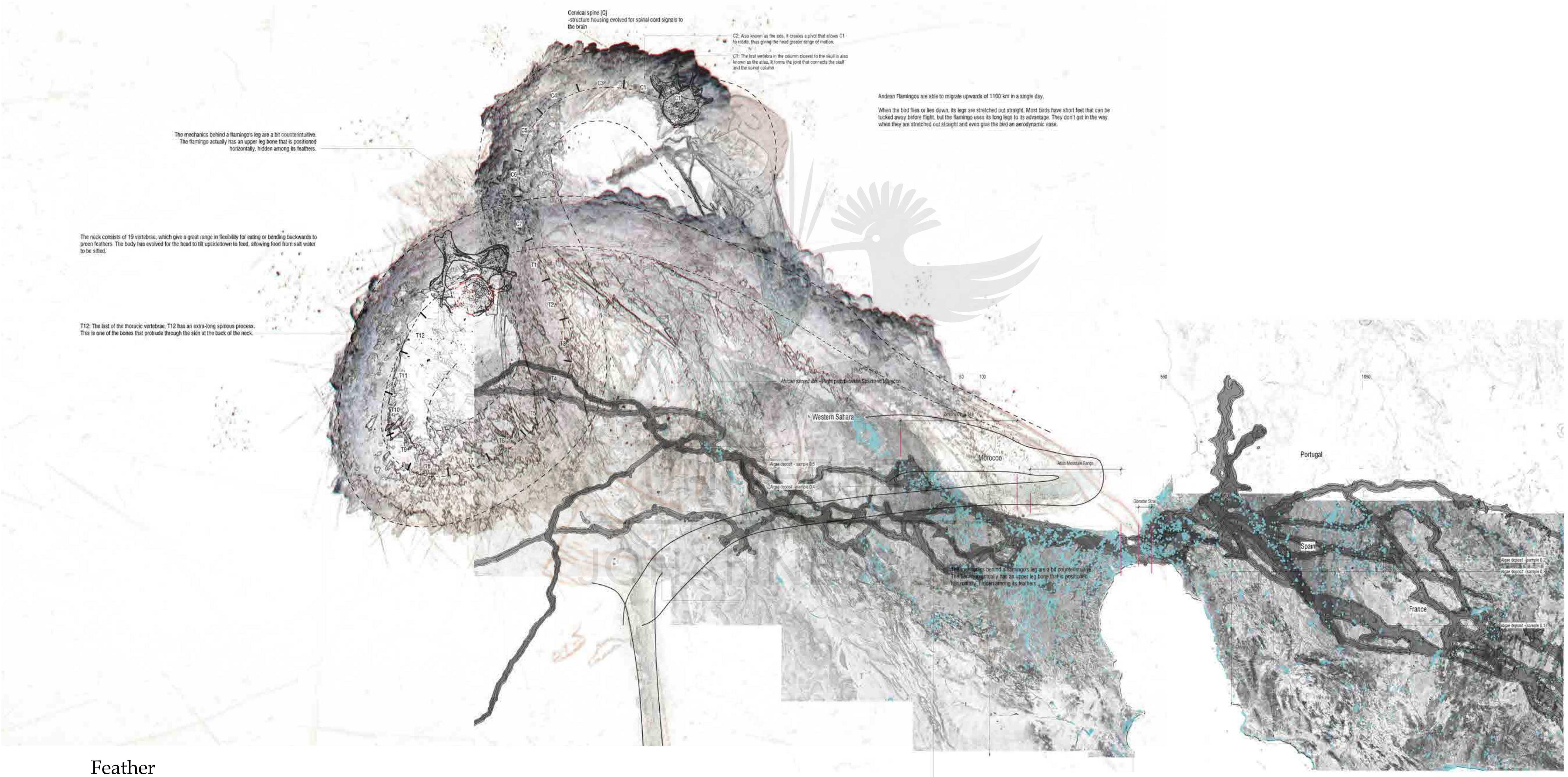
The altitude of the Atlas mountain as well of its cold temperatures poses a barrier to the migrant specie. Snow is not unusual for this region and average summer temperatures are only 25°C (Weather Forecast, Morocco. 2019).

By working as zoologist and scientist to better understand the flamingo's strategies for regulating its own heat, various environmental factors were identified. Factors of saturation, skin, bone structure, diet are all variables in controlling a flamingo's resilience in a coldscape. Through manipulating these landscape factors manually (e.g. introducing a exotic crustacean to a more alkaline water) would allow the flamingo to increases it's feather pigment and light energy absorption, increasing survivability. This almanac speculated these adaptation of the flamingo.

"There is a place in Arabia, situated near the city of Buto, to which I went, on hearing of some winged serpents; and when I arrived there, I saw bones and spines of serpents in such quantities as it would be impossible to describe. The form of the serpent is like that of the water snake; but he has wings without feathers, and as like as possible to the wings of a bat."

- Herodotus (5th century BC)





Feather

/ˈfɛðə/ - verb

- to smooth delicately.

Lesser Flamingo Heat Gain

The lesser flamingo found at the lagoon of Moulay Bousselham, tucks its head into lush feathers for warmth, pivoting on one foot to avoid cold waters. Over time, the birds genetics could be imagined to build resilience, taking on deeper feather pigment to trap solar heat, to grow longer feathers.

Contour feather

/ ˈkɒntʊə ˈfɛðə/ - noun

- any of the mainly small feathers which form the outline of an adult bird's plumage. It is made up of a central shaft and a vane.

Down feather

/ daʊn ˈfɛðə/ - noun

- insulative sub-layering feather to trap the creature's internal body heat.

Semiplume feather

/ ˈsɛmɪˌpluːm ˈfɛðə/ - noun

- and insulative feather also serving the purpose of increased buoyancy.

Bristle feather

/ ˈˈbrɪs(ə)l ˈfɛðə/ - noun

- modified contour feather with only a few barbs at the base. They occur around the eyes and mouth and serve the purpose of catching insects mid-flight (tyrant flycatchers & goatsuckers species)

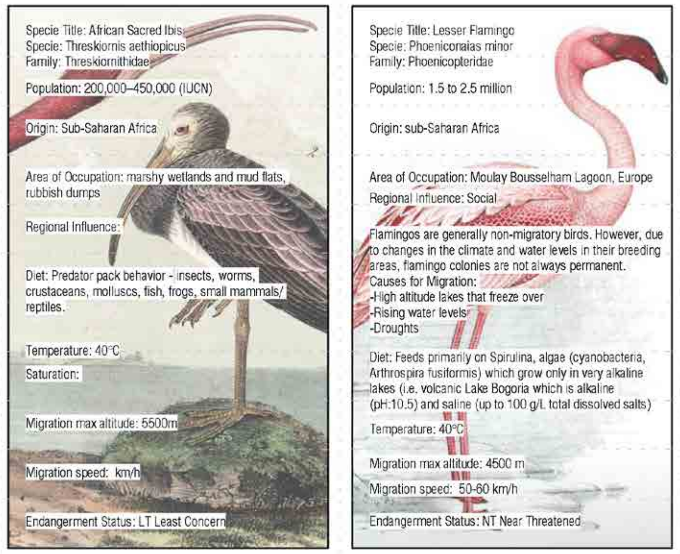
Semiplume feather

/ ˈsɛmɪˌpluːm ˈfɛðə/ - noun

- and insulative feather also serving the purpose of increased buoyancy.

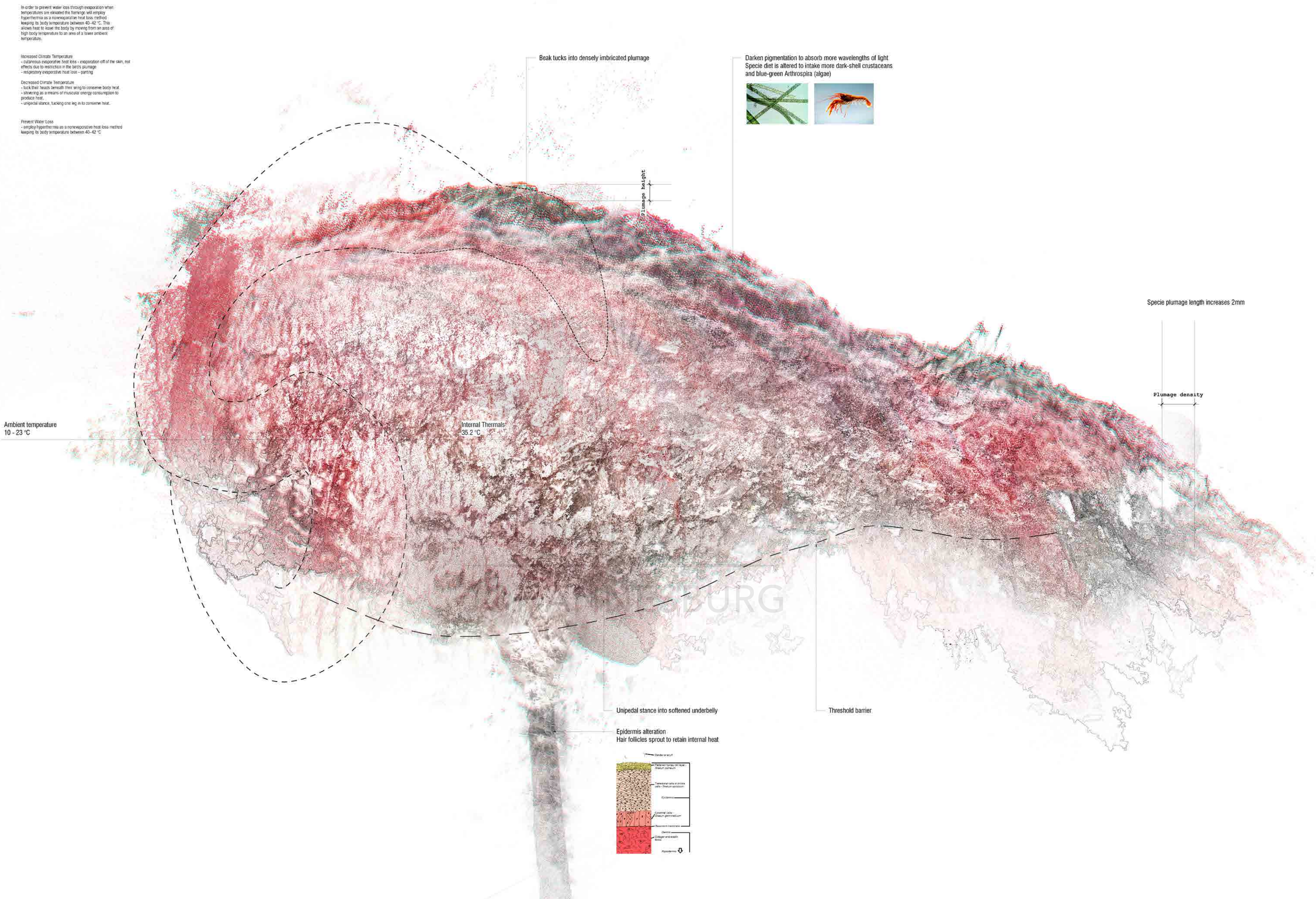
Healthy flamingo feather pigment

Peppered moth specie mutates to man-made ash



Usually, the brighter the color of the flamingo's feathers, the healthier the flamingo is and the higher likelihood that is will attract a mate. Pale or whitish flamingos are lacking nutrients in their diet.

Bioexpedition, (2015).

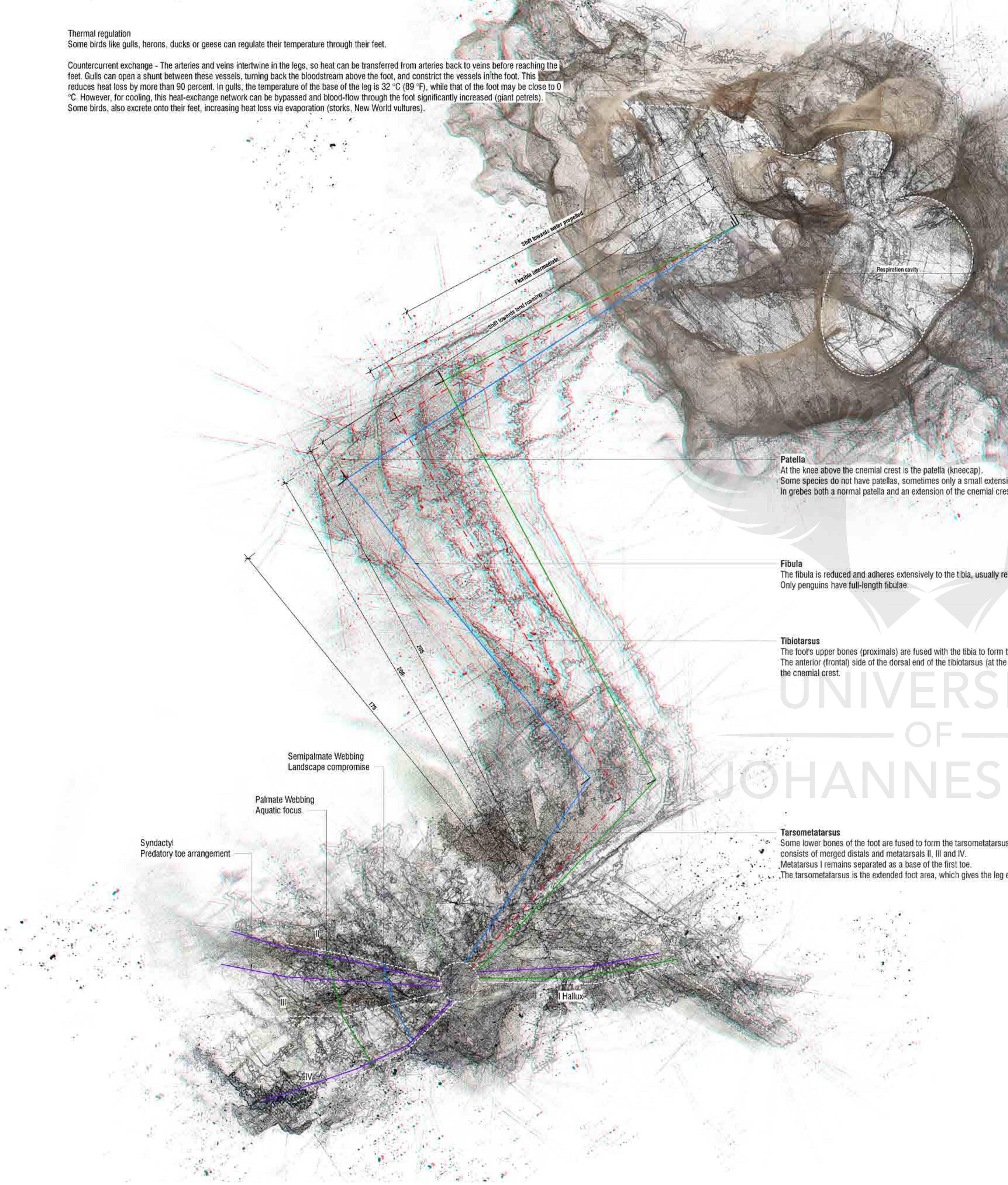


African flamingo's feathers saturates with increased consumption of European crustaceans

Adaptations of a Flight Vessel

Thermal regulation
Some birds like gulls, herons, ducks or geese can regulate their temperature through their feet.

Countercurrent exchange - The arteries and veins intertwine in the legs, so heat can be transferred from arteries back to veins before reaching the feet. Gulls can open a shunt between these vessels, turning back the bloodstream above the foot, and constrict the vessels in the foot. This reduces heat loss by more than 90 percent. In gulls, the temperature of the base of the leg is 32 °C (89 °F), while that of the foot may be close to 0 °C. However, for cooling, this heat-exchange network can be bypassed and blood-flow through the foot significantly increased (giant petrels). Some birds, also excrete onto their feet, increasing heat loss via evaporation (storks, New World vultures).



Patella
At the knee above the cnemial crest is the patella (kneecap).
Some species do not have patellas, sometimes only a small extension of the cnemial crest.
In grebes both a normal patella and an extension of the cnemial crest are found.

Fibula
The fibula is reduced and adheres extensively to the tibia, usually reaching two-thirds of its length.
Only penguins have full-length fibulae.

Tibiotarsus
The foot's upper bones (proximals) are fused with the tibia to form the tibiotarsus, while the centralia are absent. The anterior (frontal) side of the dorsal end of the tibiotarsus (at the knee) contains a protruding enlargement called the cnemial crest.

Tarsometatarsus
Some lower bones of the foot are fused to form the tarsometatarsus – a third segment of the leg specific to birds. It consists of merged distals and metatarsals II, III and IV.
Metatarsus I remains separated as a base of the first toe.
The tarsometatarsus is the extended foot area, which gives the leg extra lever length.

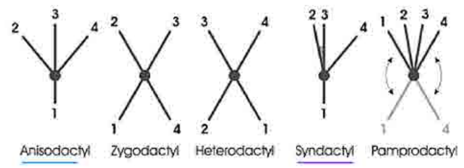
Balance
In theropods, the head and neck are greatly pneumatized, and the forearms are reduced. This would help reduce the mass further away from the center of balance. This adjustment to the center of mass would allow the animal to reduce its rotational inertia, thereby increasing its agility. The sacral pneumaticity would lower its center of mass to a more ventral position, allowing it more stabilization

Lightness
Pneumatised bones contain spaces of airpockets within the bone. These air sacks are connected to the repiratory system. Marrow replaced with air to reduce weight. Pneumatizing the vertebral column of sauropods (dinosaur) would reduce the weight of these organisms, and make it easier to support and move the massive neck

Density
Skeletal pneumaticity allows animals to redistribute the skeletal mass within their body. The skeletal mass of a bird (pneumatised) and a mammal (not pneumatized) with similar body size is roughly the same, yet the bones of birds were found to be denser than the bones of mammals. This suggests that pneumatization of bird bones does not affect the overall mass but allows for a better balance of weight within the body to allow for greater balance, agility and ease of flight.

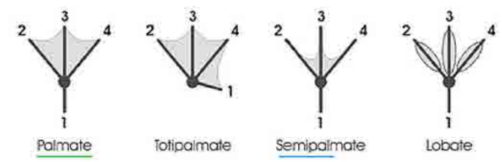
Water Propulsion
Plantigrade locomotion - Narrow pelvis is highly specialised for swimming. The attachment point of the femur to the rear, and their tibiotarsus is much longer than the femur. This shifts the feet (toes) behind the center of mass of the loon body, creating a motoboat-like propeller. Larger Loons cannot take off from land

- **Anisodactyl**: three toes in front (2, 3, 4), and one in back (1); in nearly all songbirds and most other perching birds.
- **Zygodactyl**: two toes in front (2, 3) and two in back (1, 4) – the outermost front toe (4) is reversed. The zygodactyl arrangement is a case of convergence, because it evolved in birds in different ways nine times.
- **Heterodactyl**: two toes in front (3, 4) and two in back (2, 1) – the inner front toe (2) is reversed; heterodactyl arrangement only exists in trogons.
- **Syndactyl**: three toes in front (2, 3, 4), one in back (1); the outer and middle (3,4) are joined for much of their length.[1] Common in Coraciiformes, including kingfishers and hornbills.
- **Pamprodactyl**: two inner toes in front (2, 3), the two outer (1, 4) can rotate freely forward and backward. In mousebirds and some swifts. Some swifts move all four digits forward to use them as hooks to hang.



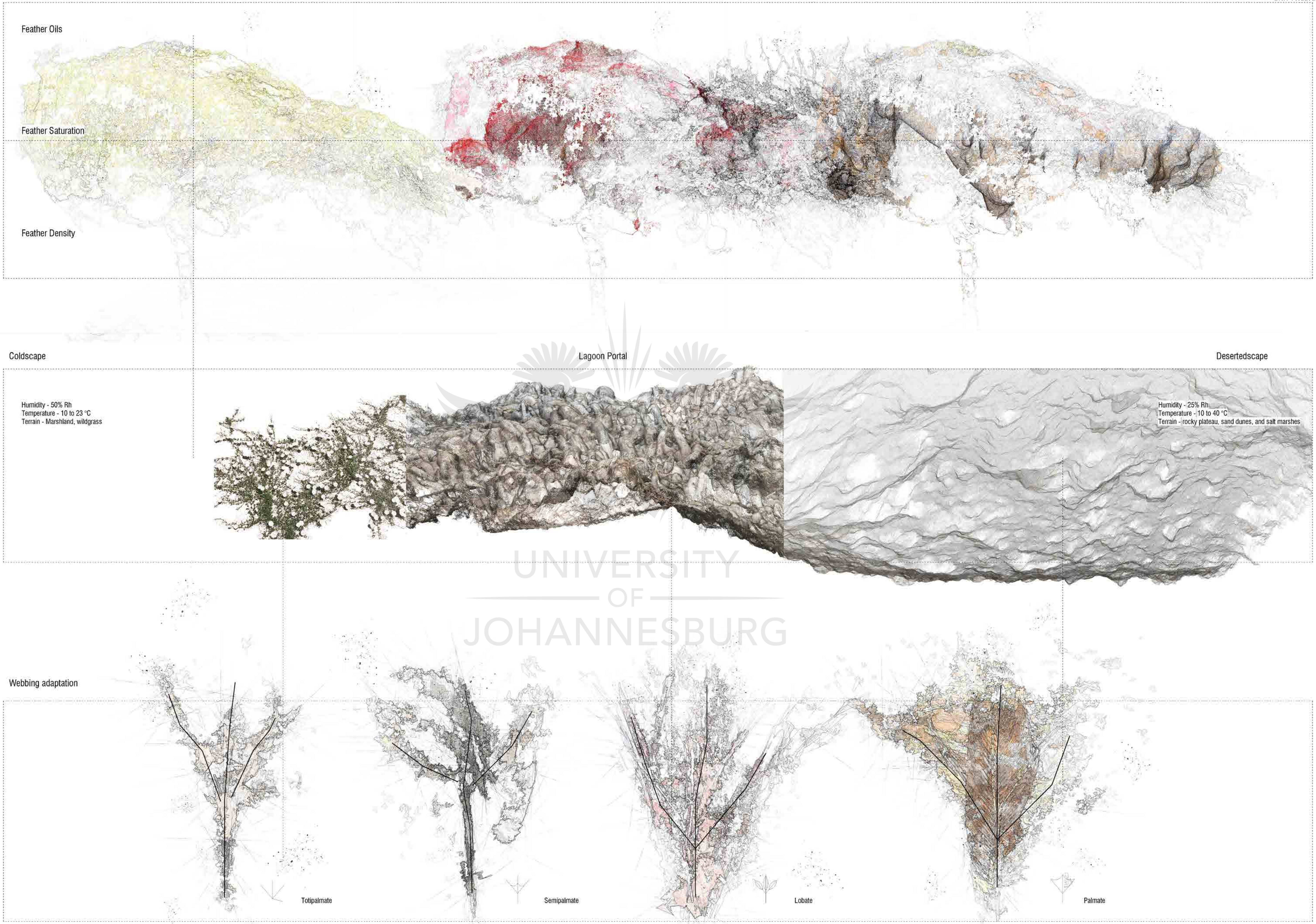
Right foot toe arrangement

- **Palmate**: only the anterior digits (2–4) are joined by webbing. Found in ducks, geese and swans, gulls and terns, and other aquatic birds (auks, flamingos, fulmars, jaegers, loons, petrels, shearwaters and skimmers). Diving ducks also have a lobed hind toe (1), and gulls, terns and allies have a reduced hind toe.
- **Totipalmate**: all four digits (1–4) are joined by webbing. Found in gannets and boobies, pelicans, cormorants, anhingas and frigatebirds. Some gannets have brightly colored feet used in display.
- **Semipalmate**: a small web between the anterior digits (2–4). Found in some plovers (Eurasian dotterels) and sandpipers (semipalmated sandpipers, stilt sandpipers, upland sandpipers, greater yellowlegs and willet), avocet, herons (only two toes), all grouse, and some domesticated breeds of chicken. Plovers and lapwings have a vestigial hind toe (1), and sandpipers and their allies have a reduced and raised hind toe barely touching the ground. The sanderling is the only sandpiper having 3 toes (tridactyl foot).
- **Lobate**: the anterior digits (2–4) are edged with lobes of skin. Lobes expand or contract when a bird swims. In grebes, coots, phalaropes, finfoots and some palmate-footed ducks on the hallux (1). Grebes have more webbing between the toes than coots and phalaropes.



Right foot webbing

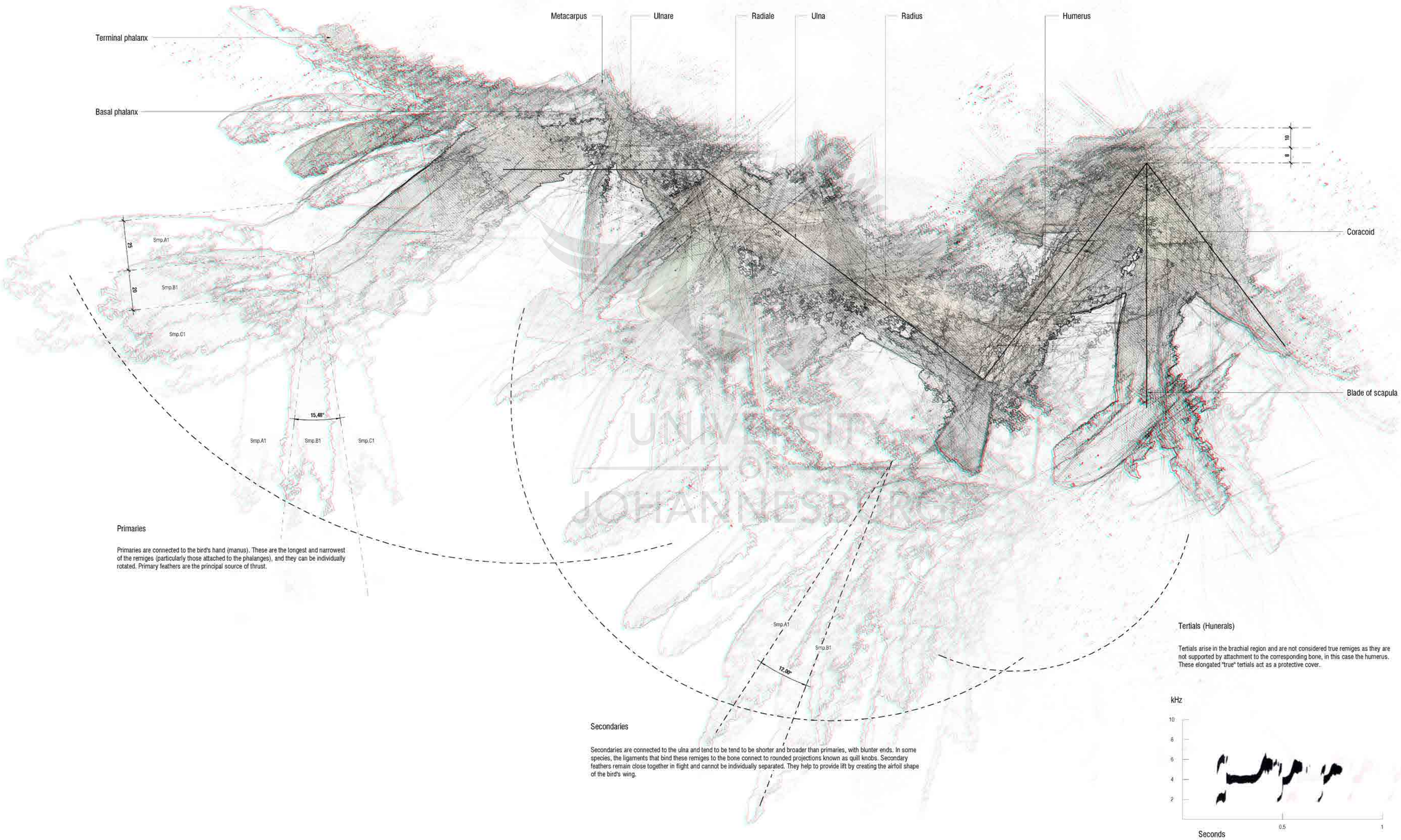
Flamingo foot structure adapts with environmental moisture content



Flamingo feet analysis

Lesser Flamingo Wing Adaptation

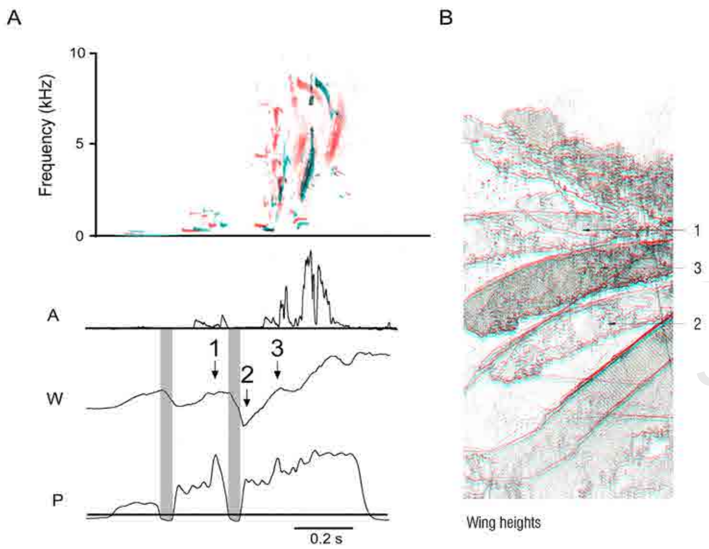
Bird species adapt themselves to different climate conditions through wing structure.
Migration at extreme altitudes require strength. Continental winds favour long-wingspan species, carrying them further.

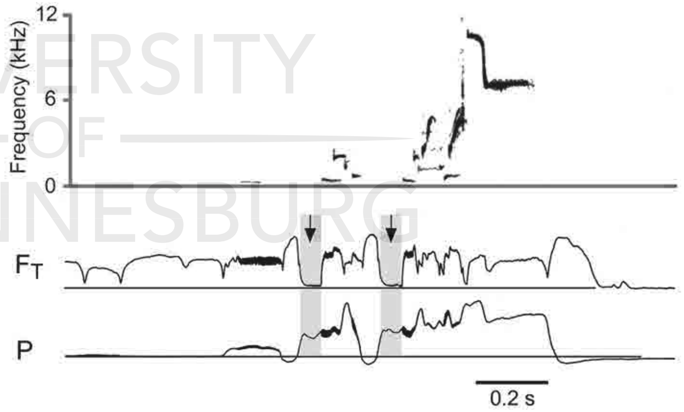


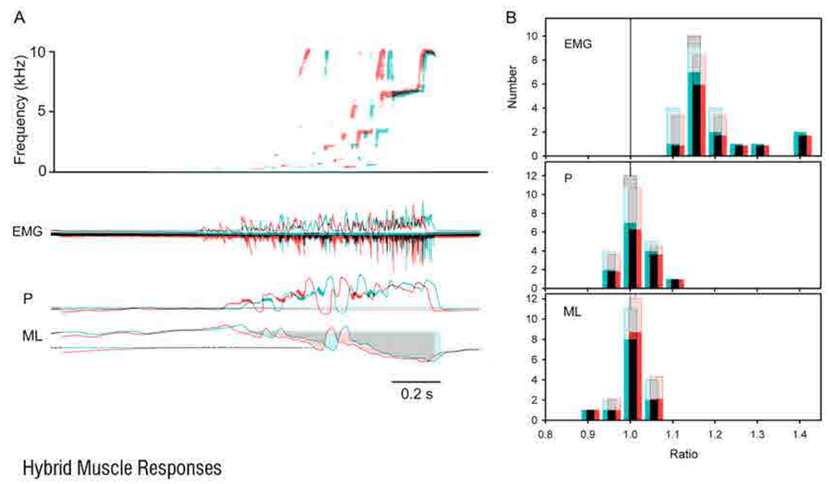
African Flamingo wing structure adapts with increased European-specie diet

"Butterflies have always had wings; people have always had legs. While history is marked by the hybridity of human societies & the desire for movement, the reality of most of migration today reveals the unequal relations between rich & poor, between North and South, between whiteness and its others."

- Harsha Walia, Undoing Border Imperialism







Wing Oscillation Timings

Flamingo wing oscillation
A - sound amplitude
P - subsyringeal air sac pressure
W - impedance changes associated with the wing display

The lowest wing position occurs shortly after inspiration. The numbers indicate the approximate occurrence of highest (1 and 3) and lowest (2)

Hybrid Oxygen Adaptations

Flamingo breathing pressure
P - subsyringeal air sac pressure
FT - tracheal airflow

During the beginning of the second and third expiratory pulses, the syrinx is kept closed even after air sac pressure reached levels adequate for phonation (gray bars marked by arrows; note zero airflow during these periods).

Hybrid Muscle Responses

Flamingo respiratory reading estimated between two wing span conditions
ML - Muscle Length
P - subsyringeal air sac pressure
EMG - electromyographic activity of expiratory muscles

Flamingo wing strength analysis with increased oxygen levels

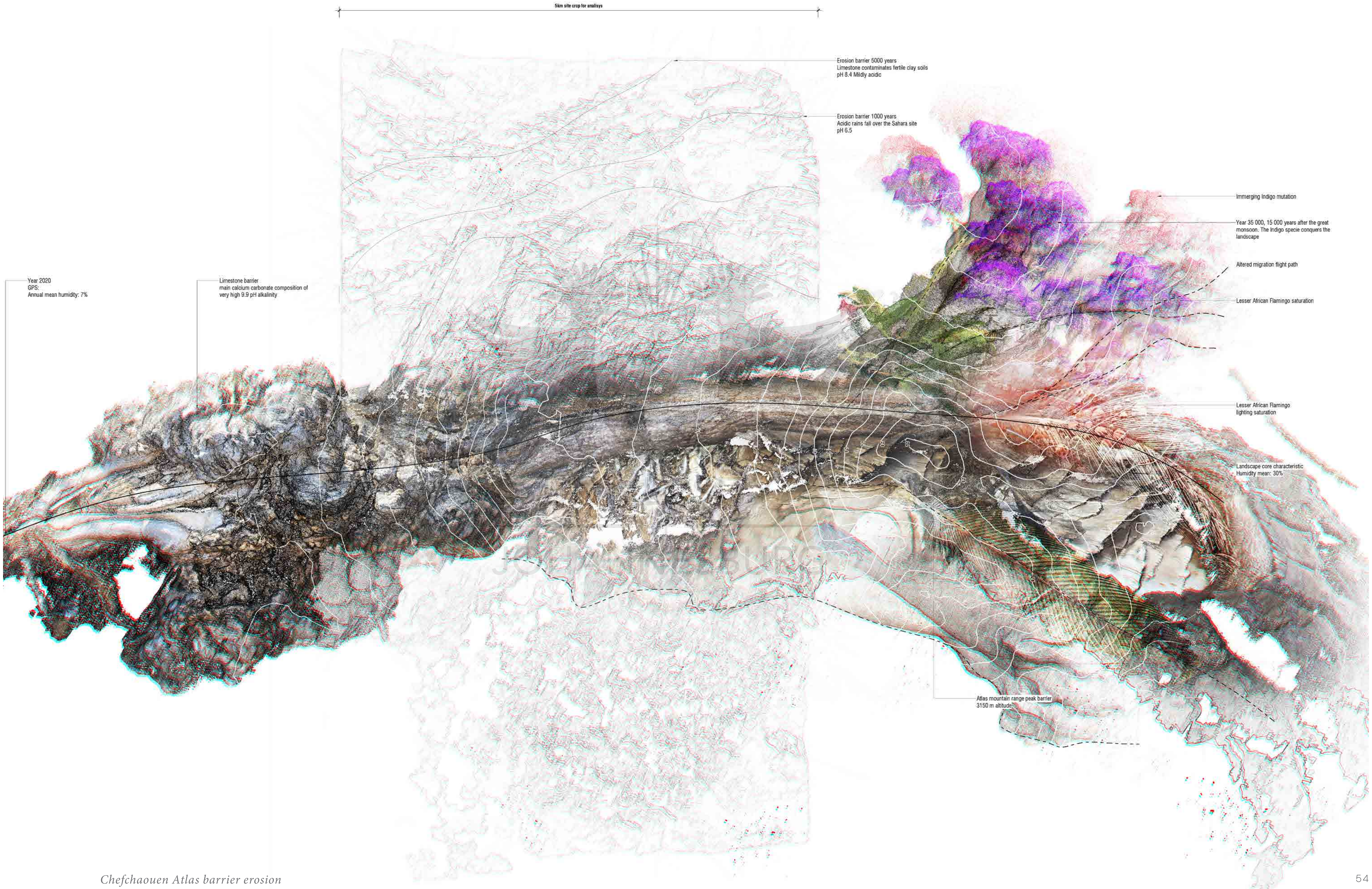
ALMANAC 4

Directionality of Alterations

Specie/ Landscape - Landscape/Specie

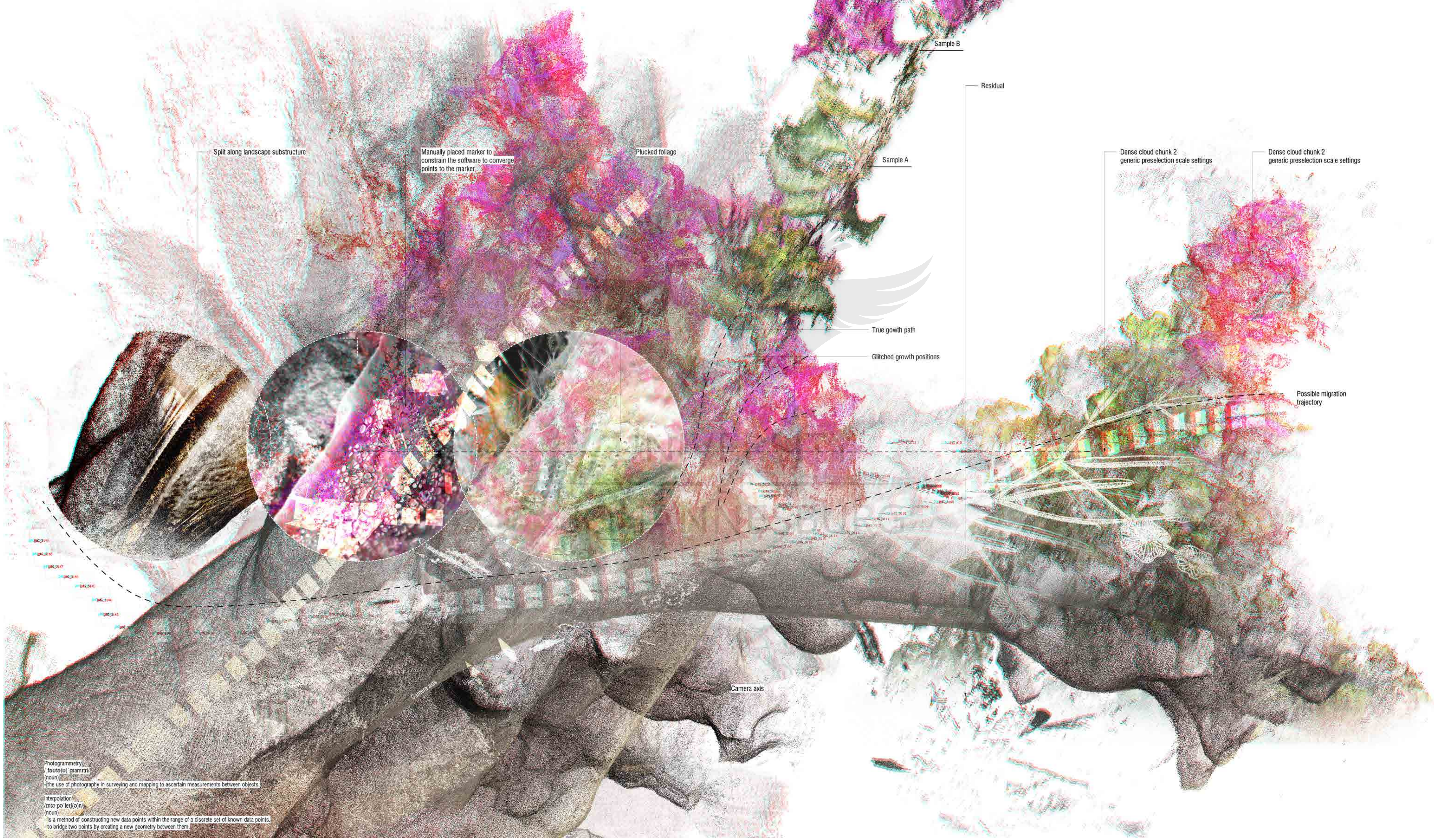
During the fourth almanac, I speculated further on new symbiotic relationships between landscape and migrant specie, with focus given to the radical climate shifts to the Sahara i.e. the monsoon. And how this shift in landscape condition could be instrumented to erode the barriers within the atlas site. The '*directionality of alterations*' drawing series sees these changes altering the hybrid to become more resilient and how it in turn alters the landscape.

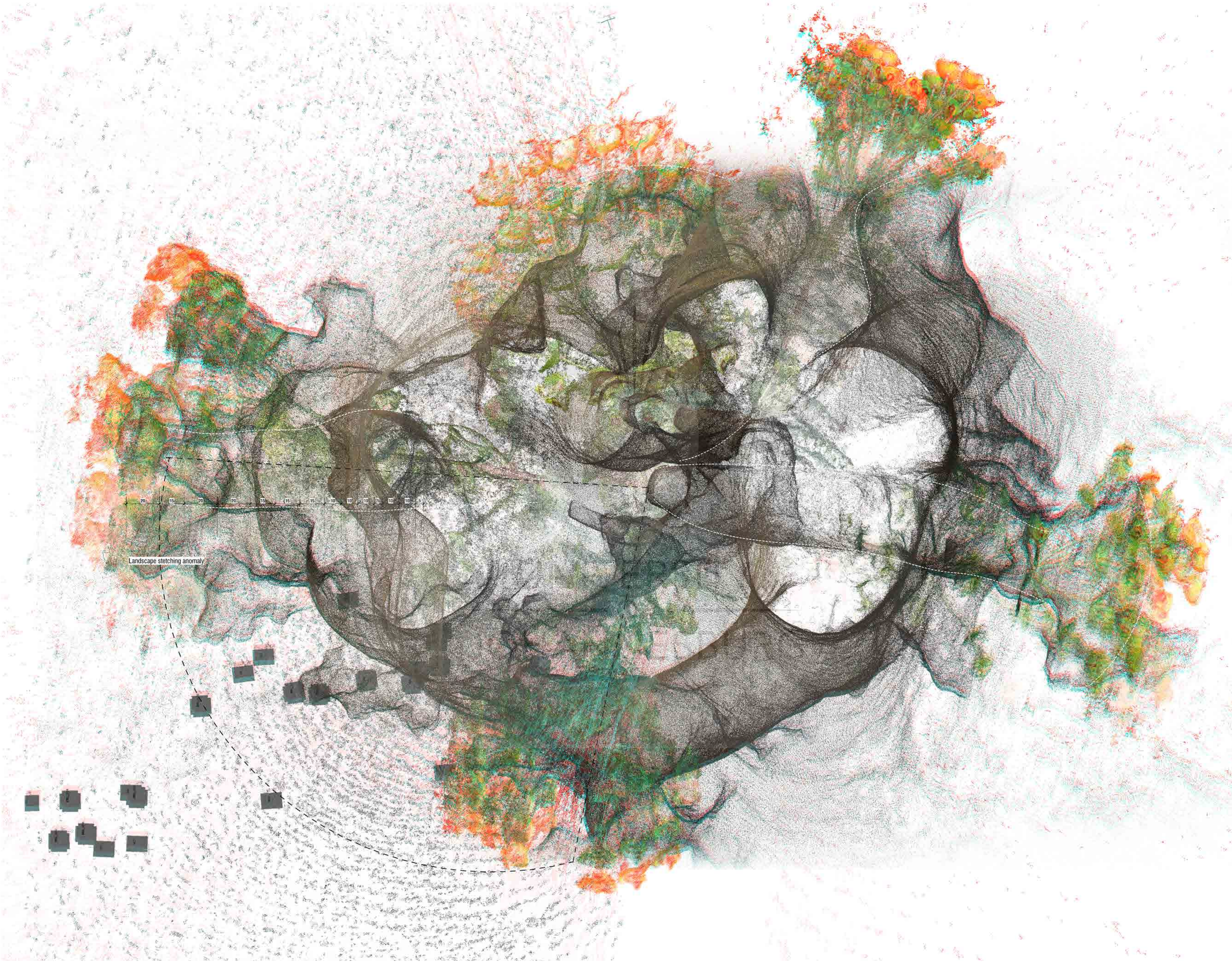
The Atlas site looked at how high altitude ecosystems are susceptible to displacement due to shifts in the climate condition outside of the ordinary. Research reveals warmer climates will result in lower altitude birds competing for resources with the established alpine species. Alpine bird species generally have slower birth rates with longer life spans, and are therefore more rigid in their ability to adapt.



Chefchaouen Atlas barrier erosion

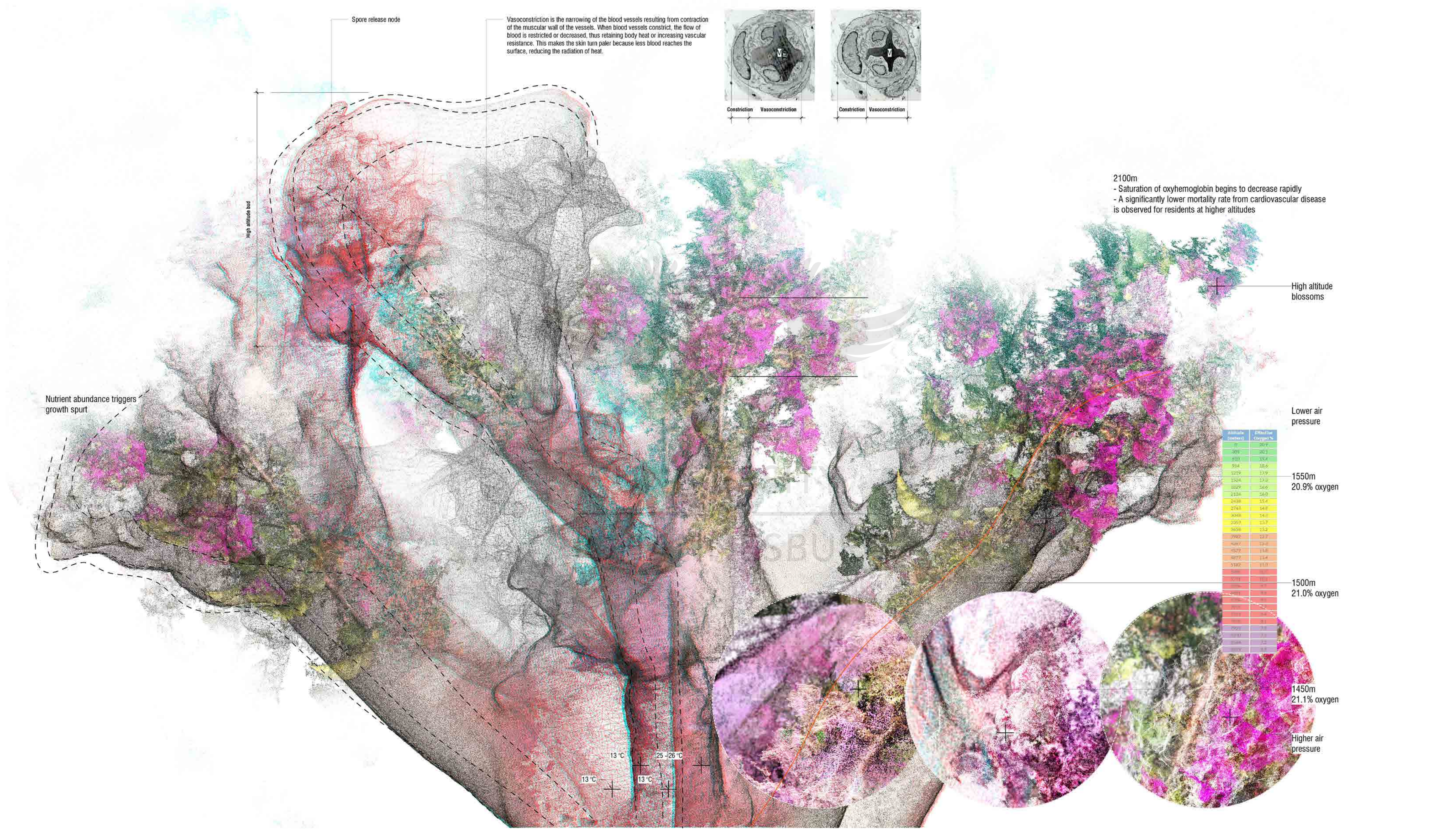
The lesser flamingo found at the lagoon of Moulay Bousselham, tucks its head into lush feathers for warmth, pivoting on one foot to avoid cold waters. Over time, the birds genetics could be imagined to build resilience, taking on deeper feather pigment to trap solar heat and to grow longer feathers.



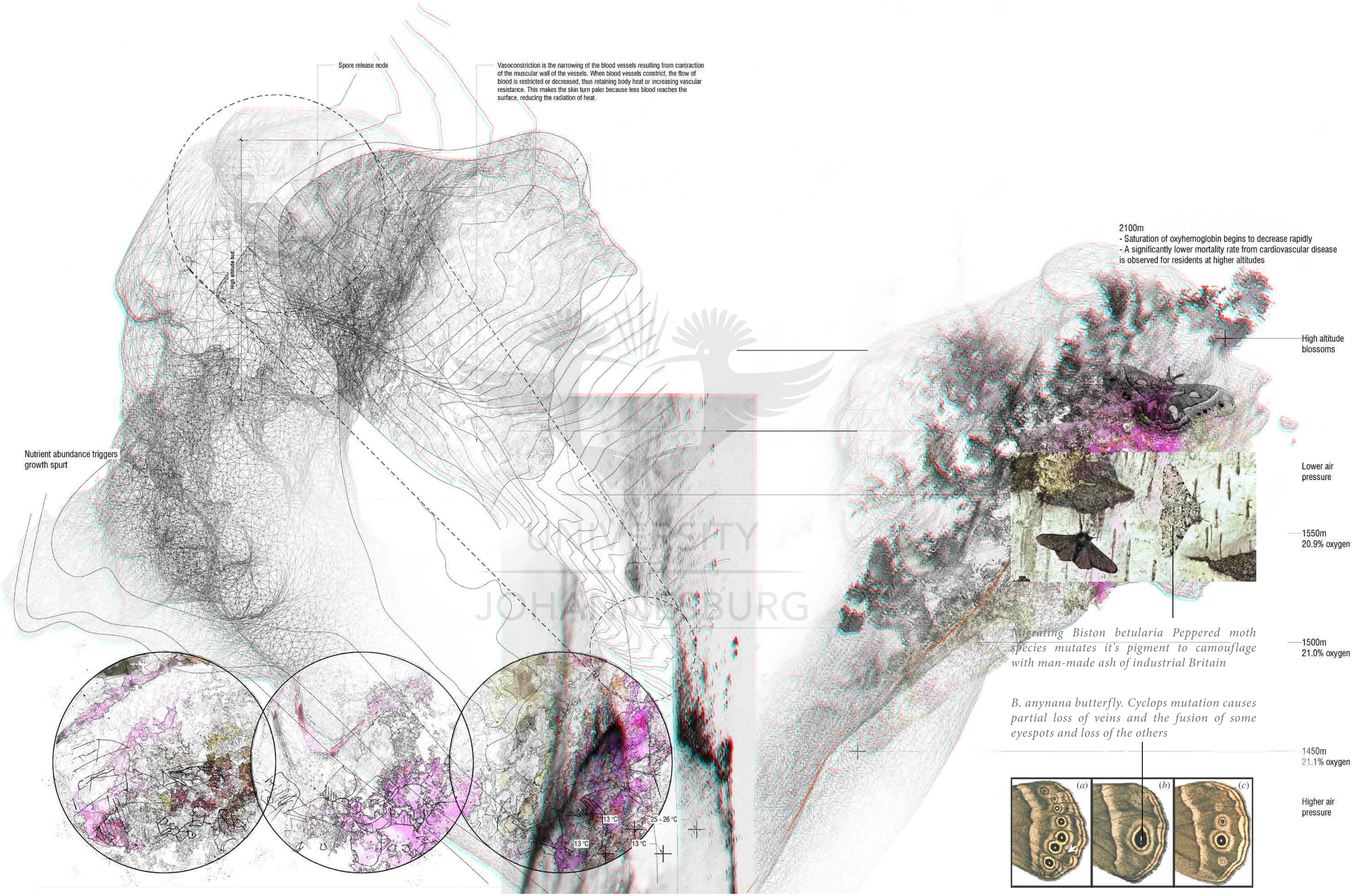


RAW photo inputs
Software calculates depth cues off glitched photographs with lack of information.

Geological structure generated



Oxygen levels - Eroded altitudes vs growth strength



Oxygen levels - Structural integrity analysis

ALMANAC 5

Global Forces

Story of the Monsoon - Science fiction of future alternatives

The arid landscape climate shifts in almanac five. A monsoon hits a once arid landscape condition, drowning indigenous species. The African date palm must be planted alongside its water-thirsty European counterpart. The introduction of the Spanish Pumpkin Ash (Fraxinus profunda) mitigates the gashing water force, its roots run deep to hold the soil. The graft of these two species creates a new resilient entity, the canopy of the date palm shades is now exposed

Water quality
- saline sea water kills off non-tolerant halophyte species. Plants are tolerant to a certain concentration of salt. New hybrids would become resilient to withstand their new environment.
- fresh water, Brackish water, Briny water

Fresh water
- Less than 500 parts per million (ppm) of dissolved salts

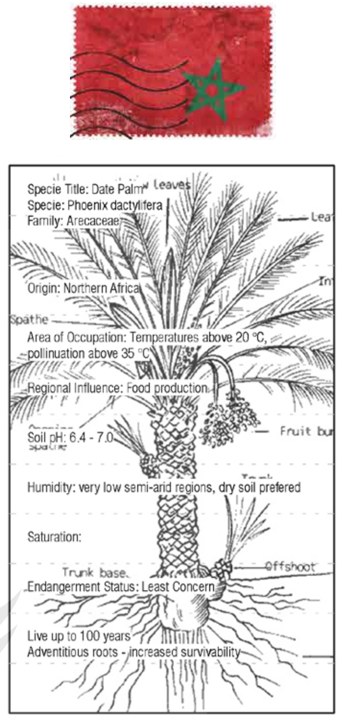
Brackish water
- is water having more salinity than freshwater, but not as much as seawater. 0.5 and 30 grams of salt per litre.

Seawater typically
- contains 40 grams per litre (g/l) of dissolved salts

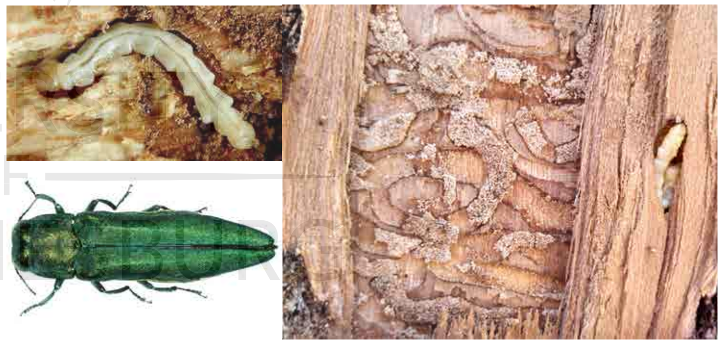
Briny water (brine)
- is a high-concentration solution of salt in water. 3.5% - 26% salt solution.


Salt concentrations in water

Pumpkin ash



Date palm

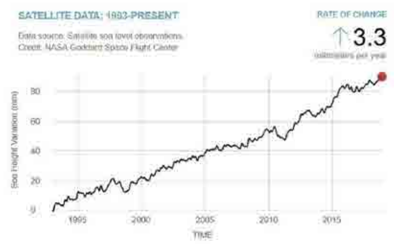


Emerald ash borer
Borrows in ash wood tree (including Pumpkin ash), slowly killing them

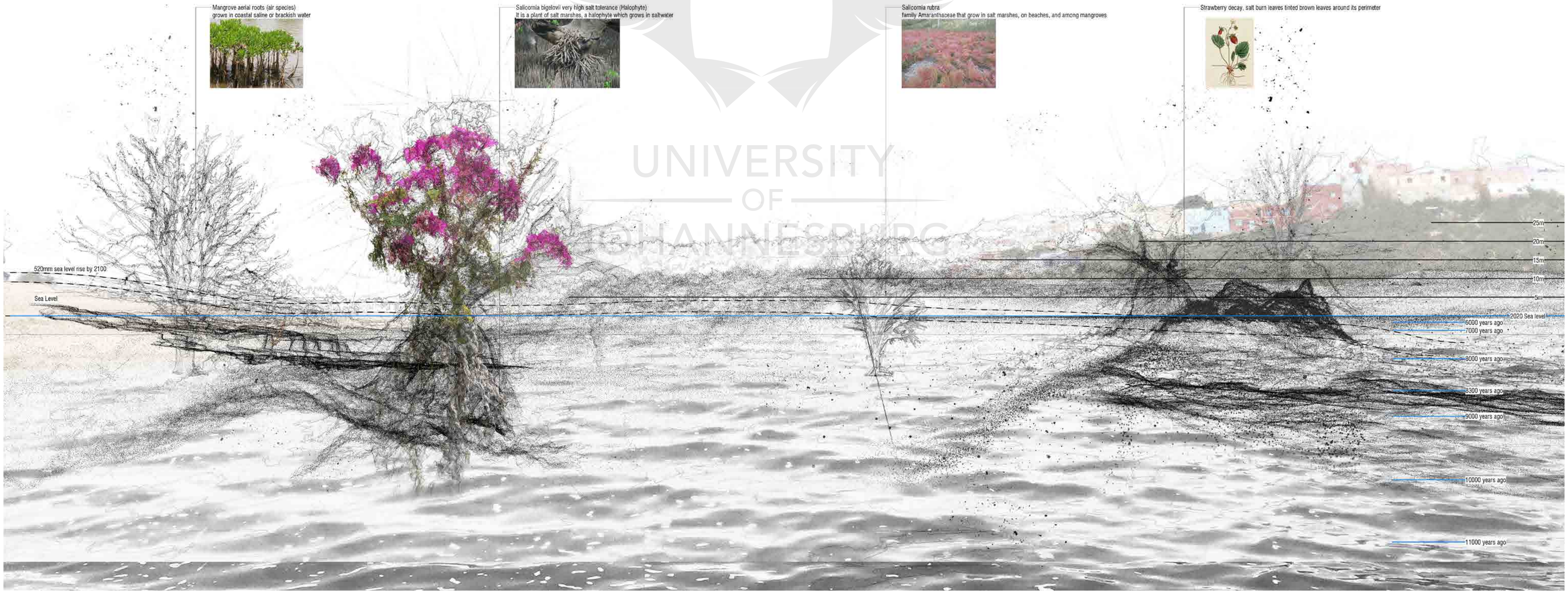
Water level rise, sea water contamination, drastic pH change

Water quality
- fresh water. Less than 500 parts per million (ppm) of dissolved salts
- Brackish water is water having more salinity than freshwater, but not as much as seawater. 0.5 and 30 grams of HYPERLINK "https://en.wikipedia.org/wiki/Salt"salt per litre.
- Seawater typically contains 40 grams per litre (g/l) of dissolved salts
- Briny water (brine) is a high-concentration solution of salt in water. 3.5% - 26% salt solution.

Salt Tolerant halophytes
Sea water typically contains 40 grams salt per litre
- Beans and rice can tolerate about 1–3 g/l, and are considered glycophytes (as are most crop plants)
- date palm (HYPERLINK "https://en.wikipedia.org/wiki/Phoenix_dactylifera"*Phoenix dactylifera*) can tolerate about 5 g/l. Considered marginal halophytes.
- Salicornia bigelovii (common name: dwarf glasswort) (Family: Amaranthaceae) can tolerate 70 g/l of dissolved solids



Annual sea level rise of 3.3mm



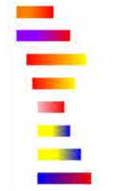
Moulay Bousselham lagoon

Story of the Monsoon

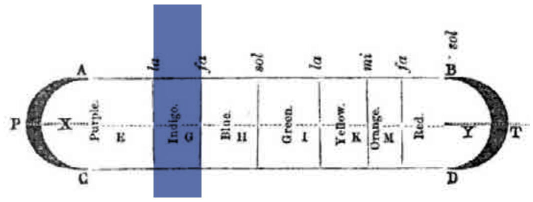
The landscape erodes over 3 million years, it's once jagged limestone rockface softens. Particles of light sand tint the soils, lightening them.

The hybrid root system of the Pumpkin/ Date palm tree combines the deep root strategies of the arid date palm, with the swamp root strategies of the Pumpkin Ash. The resilient wax coated leaves of leaves bare the harsh solar condition, as the extreme temperature of the Sahara still presents an obstacle for new hybrids to over-come. With the combination of shade bearing plants, ground creepers emerge, coating the terrain's skin with their vibrant colours.

Indigo



Hex triplet	*#3F00FF*
sRGBB	*(r, g, b) (63, 0, 255)*
CMYKH	*(c, m, y, k) (75, 100, 0, 0)*
HSV	*(h, s, v) (255°, 100%, 100%)*



Newton prismatic colours

Futures of the Exotic

The classification of what makes a species exotic/ indigenous/ cryptogenic/ endemic is fundamentally tied to the structure of the specie. Linnaeus discovered a strong correlation between the plant structures and evolutionary adaptations to specific climate conditions. These climate conditions help determine a plants origin of place. Species occurring outside of the natural biogeographic environment are considered exotic, even if their distribution is caused naturally (by ocean currents, wind or a bird transporting a seed).

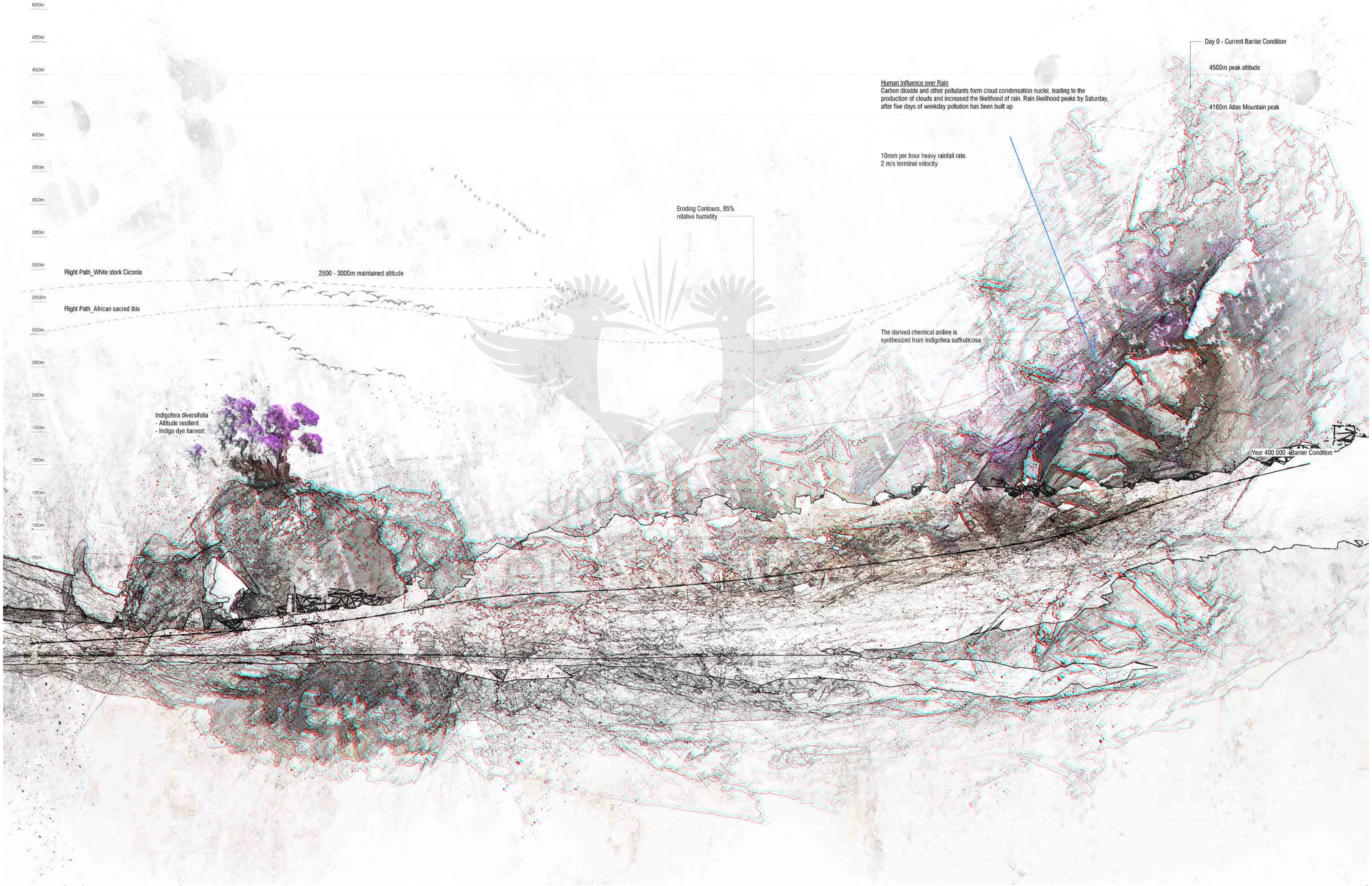
Exotic species could be allowed to persist for agricultural reasons, where anything that interferes with cultivation is deemed an invasive species. The erosion of my barrier sites addresses this question of classification. And taxonomy within itself is also a man-made construct. When the Sahara endures a cataclysmic monsoon in 41000 years' time, the indigenous desert plants have not evolved root systems to sustain flooding and would therefore drown. By allowing the 'exotic' Spanish Pumpkin Ash tree to propagate with the 'indigenous' African desert palm date for example, would imagine a new resilient hybrid specie to not only withstand but also thrive in a very different green desertscape.

Man-made global forces of climate change present new realms of barrier landscape for life. Across the Zerzura sites, these barrier conditions obstruct the movement of species between Africa and Europe.

D, Minchin. (2010)

Indigo symbology in Chefchaouen (شفشاون)
- The colour of Jews, used to demarcate territory. Along with the Ghomara tribes of the region, many Moriscos and Jews settled here after the Spanish Reconquista in medieval times.
- The deep blue indigo pigment is diluted down with limestone, acting as a natural colour wash.
- The light blue is likened to the colour of the sky and heaven and serve as a reminder to lead a spiritual life.

Indigo Sample

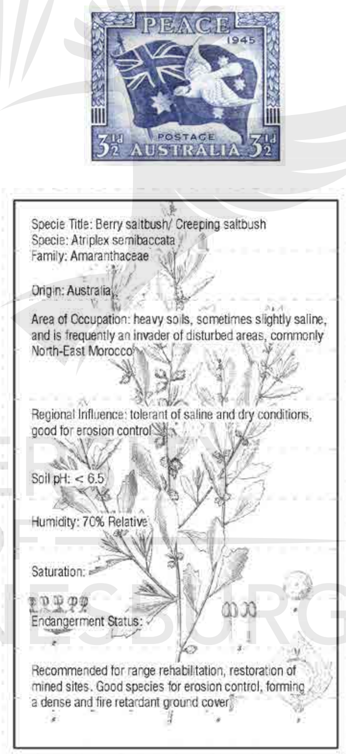


Atlas barrier erosion - The great monsoon

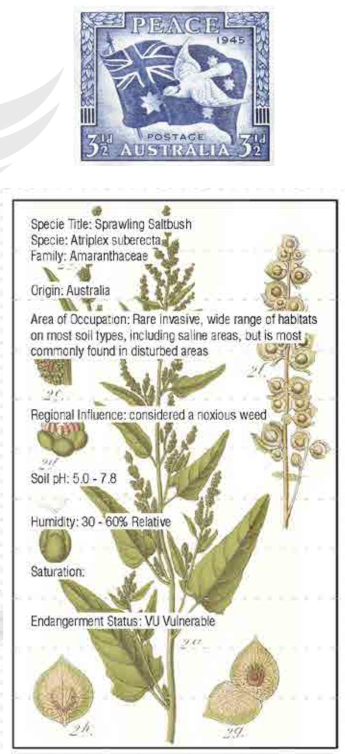
Arid plants won't migrate

Scientist have assumed plant species migrate to survive changes in climate, favouring more hospitable areas. Plants which are unable to migrate to new climate conditions can be compared with varieties of the same species which do adapt. The surviving adaptations are often overlooked by researches, who often find themselves focusing on the dying out variant. The surviving specie variants should be analysed further for what makes them so resilient, perhaps combining them with even hardened plants to secure their existence long into future climate fluctuations.

Professor Marcelo Sternberg believes species in arid climates, surrounding the Mediterranean and Sahara will be the least affect by climate change, at least in the short and medium term. Although short term is interpreted as 20-30 years from now. Drastic adaptations can be speculated for times frames thousands and even millions of years into the future.
Morjan CL, Rieseberg LH. (2004).



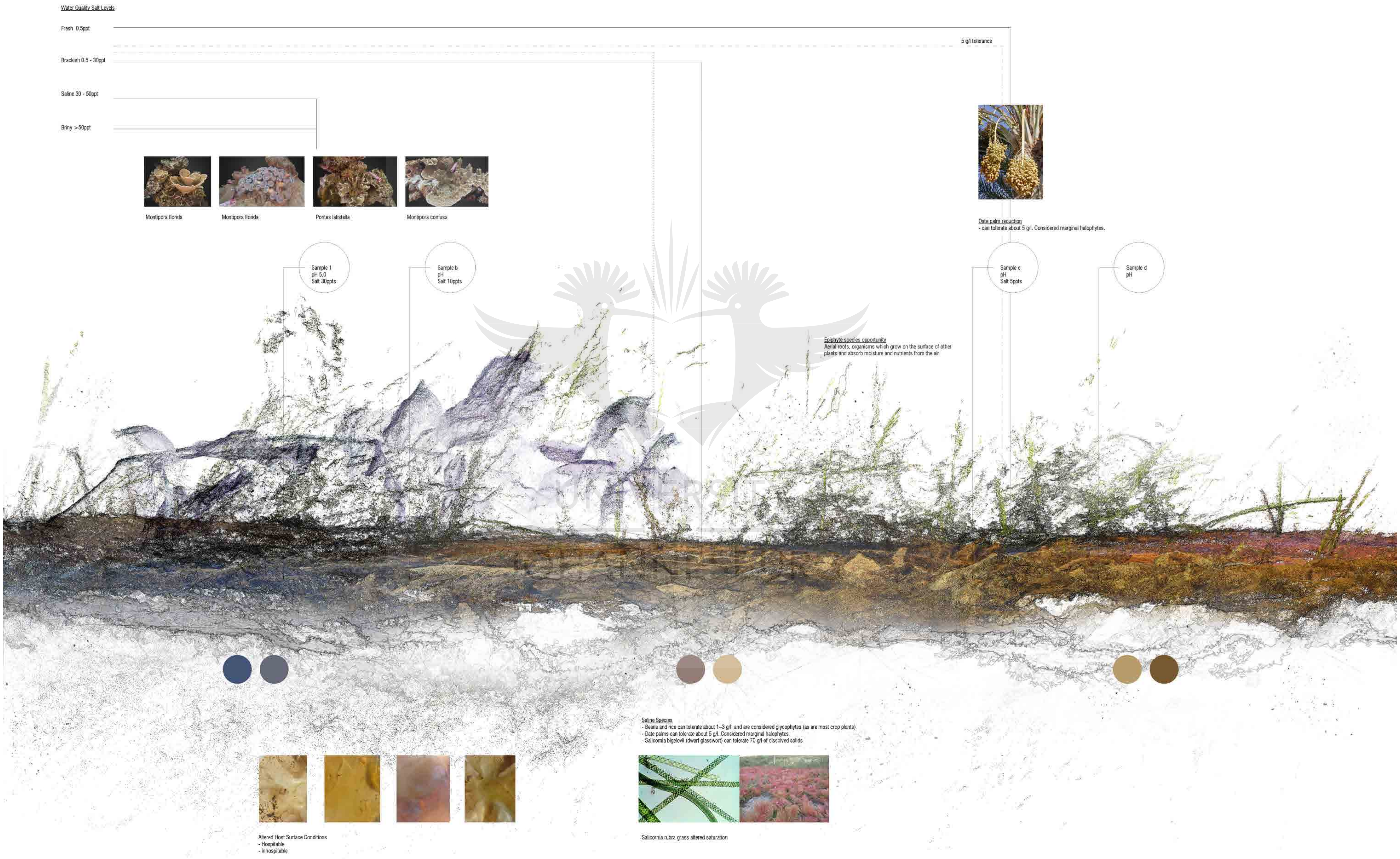
Berry saltbush



Sprawling Saltbush

Egyptian sea blite

Saline Species
- Beans and rice can tolerate about 1–3 g/l, and are considered glycophytes (as are most crop plants)
- Date palms can tolerate about 5 g/l. Considered marginal halophytes.
- Salicornia bigelovii (dwarf glasswort) can tolerate 70 g/l of dissolved solids

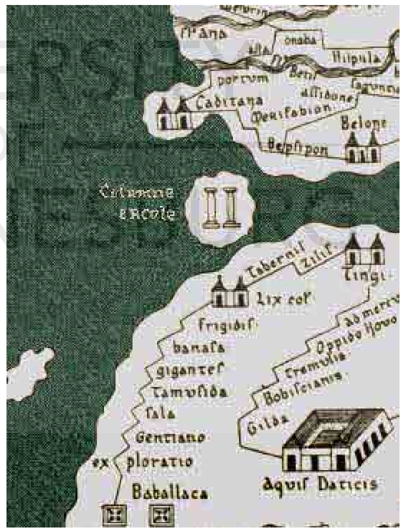


Lagoon water quality shift

Hercules and the Atlas Barrier (35.759547, -5.939152)

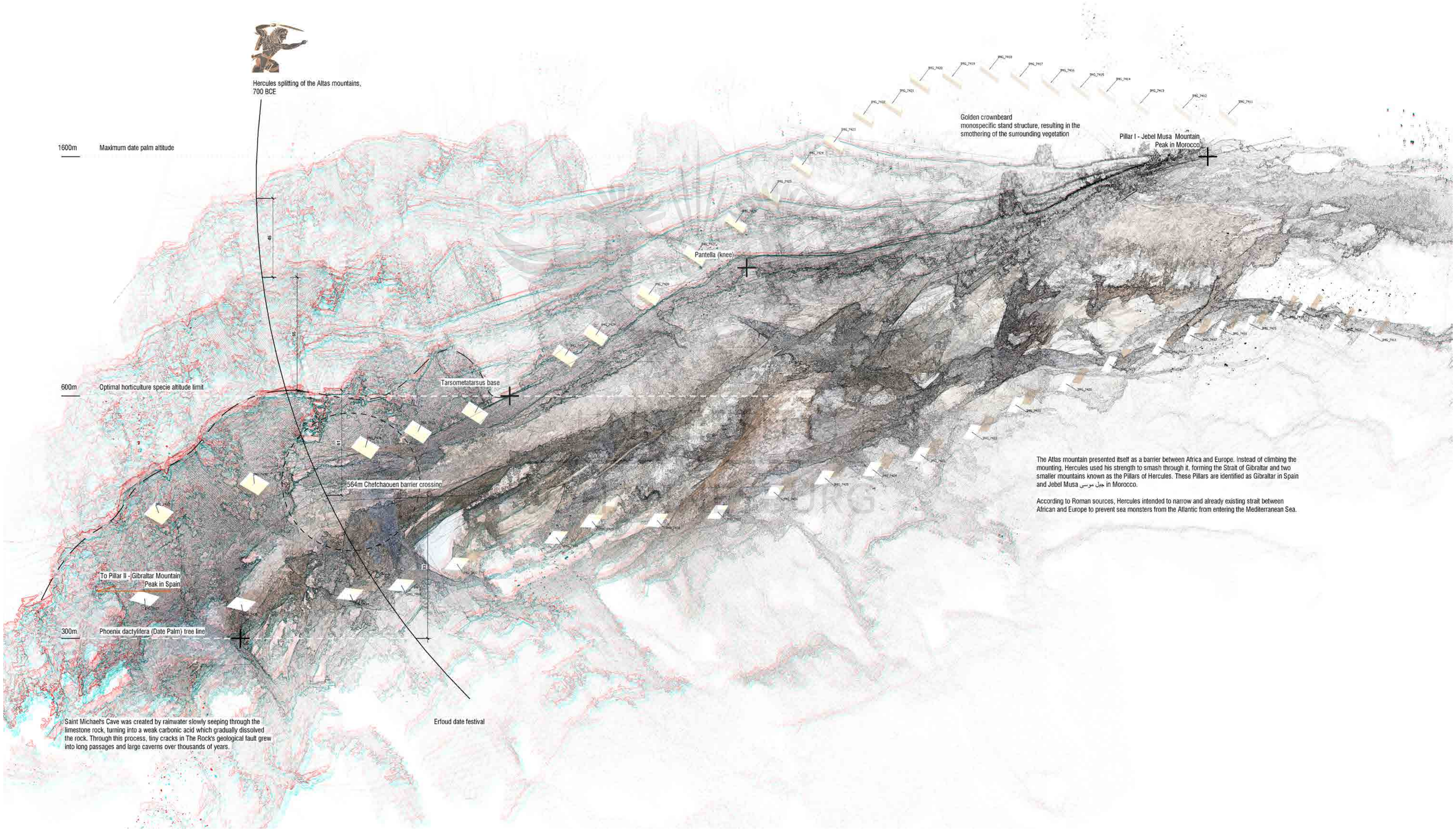
Around the year 700BCE, Hercules encountered the Atlas mountain along his travels to the garden of the Hesperides. The Atlas mountain presented itself as a barrier between Africa and Europe. Instead of climbing the mounting, he used his strength to smash through it, forming the Strait of Gibraltar and two smaller mountains known as the Pillars of Hercules. These Pillars are identified as Gibraltar in Spain and Jebel Musa جبل موسى in Morocco. According to Roman sources, Hercules intended to narrow and already existing strait between African and Europe to prevent sea monsters from the Atlantic from entering the Mediterranean Sea. And in other versions of the myth, Hercules instead built the two mountains to hold the sky away from the earth, liberating Atlas from his damnation.

Golden crownbeard
monospecific stand structure, resulting in the smothering of the surrounding vegetation



The barrier between of African and Europe has adopted a new political one, as well as physical. These barrier-scapes inhibit the movement and will require alternative subversion tactics.

Detail of Pillars of Hercules from Tabula Peutingeriana, 1-4th century CE



Atlas structure shift - Speculative scenarios

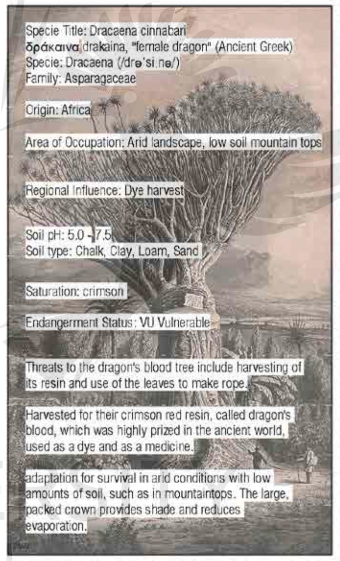
Ladon's Myth - Sentinel Dragon Tree

Ladon is fierce serpent-like dragon with a hundred heads, his role was to guard the golden apples from the Garden of Hesperides. The ancient Greeks describe his physical attributes to the likes of the dragon blood tree, its cluster of sword-like blue/green leaves which sprung from multiple branches or necks, with resin which bleeds red whenever cut. The dragon's bark feels like scales to the touch and in appearance.

Hercules engaged Ladon during his eleventh task of his '12 Labour of Hercules'. Hercules slayed Ladon, his blood flowed over the land, sprouting dragon trees. Ladon was laid to rest among the stars by the gods as the Constellation Draco according to Greek legend. The dragon trees continue to bleed the death of Ladon with a reddish sap whenever cut.

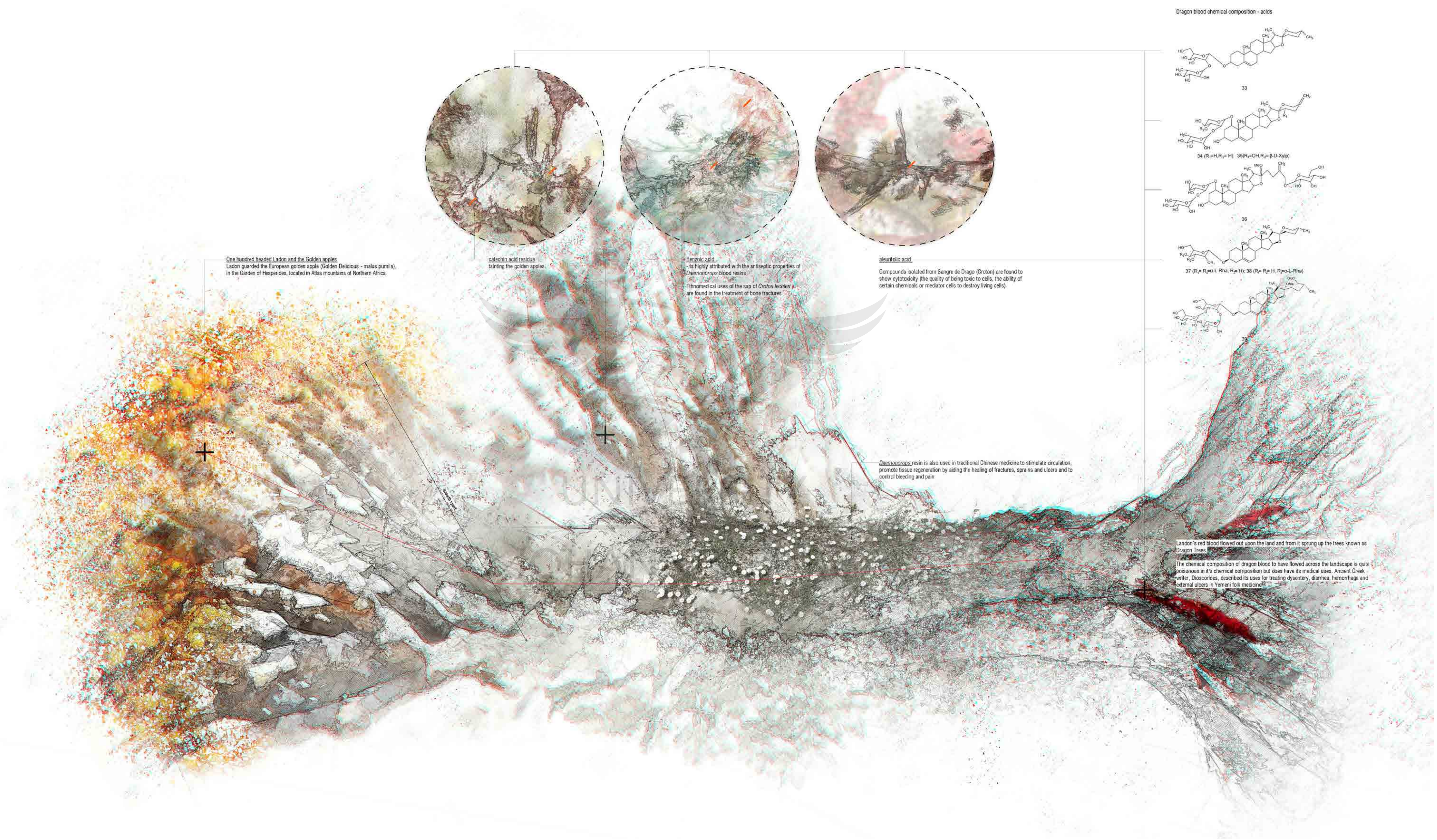
Multiple Dracaena cinnabari (dragons) have migrated from Yemen and into the harsh arid territories of the Sahara to guard treasures of the Zerzura. These perennial species stand for hundreds of years under optimal conditions. Their umbrella-like branches capture moisture from the air and transfer to its roots, as well as shade the soil above the roots. Fruits are blossom orange which are then carried by birds.

Specie actors

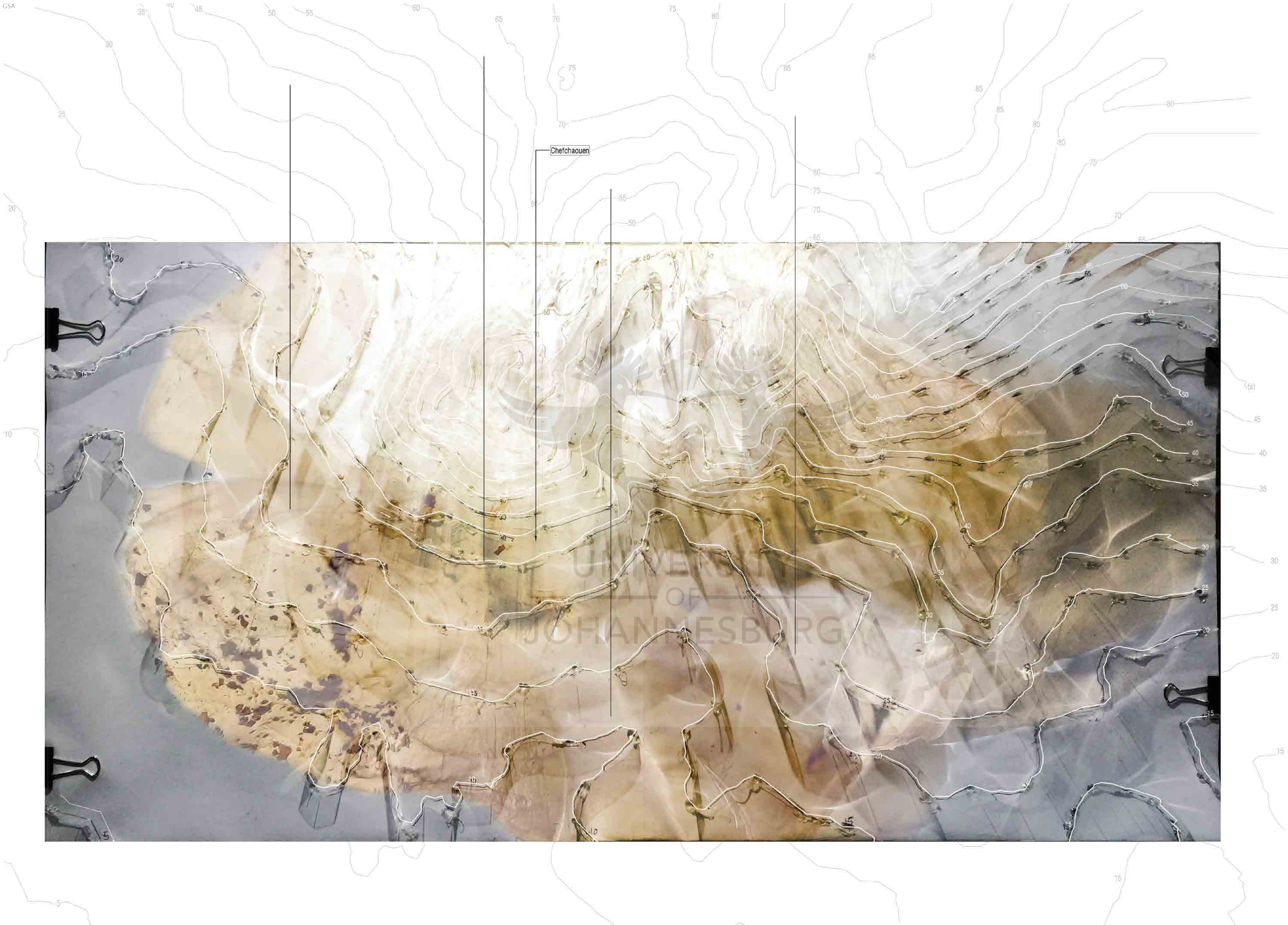


Dragon tree

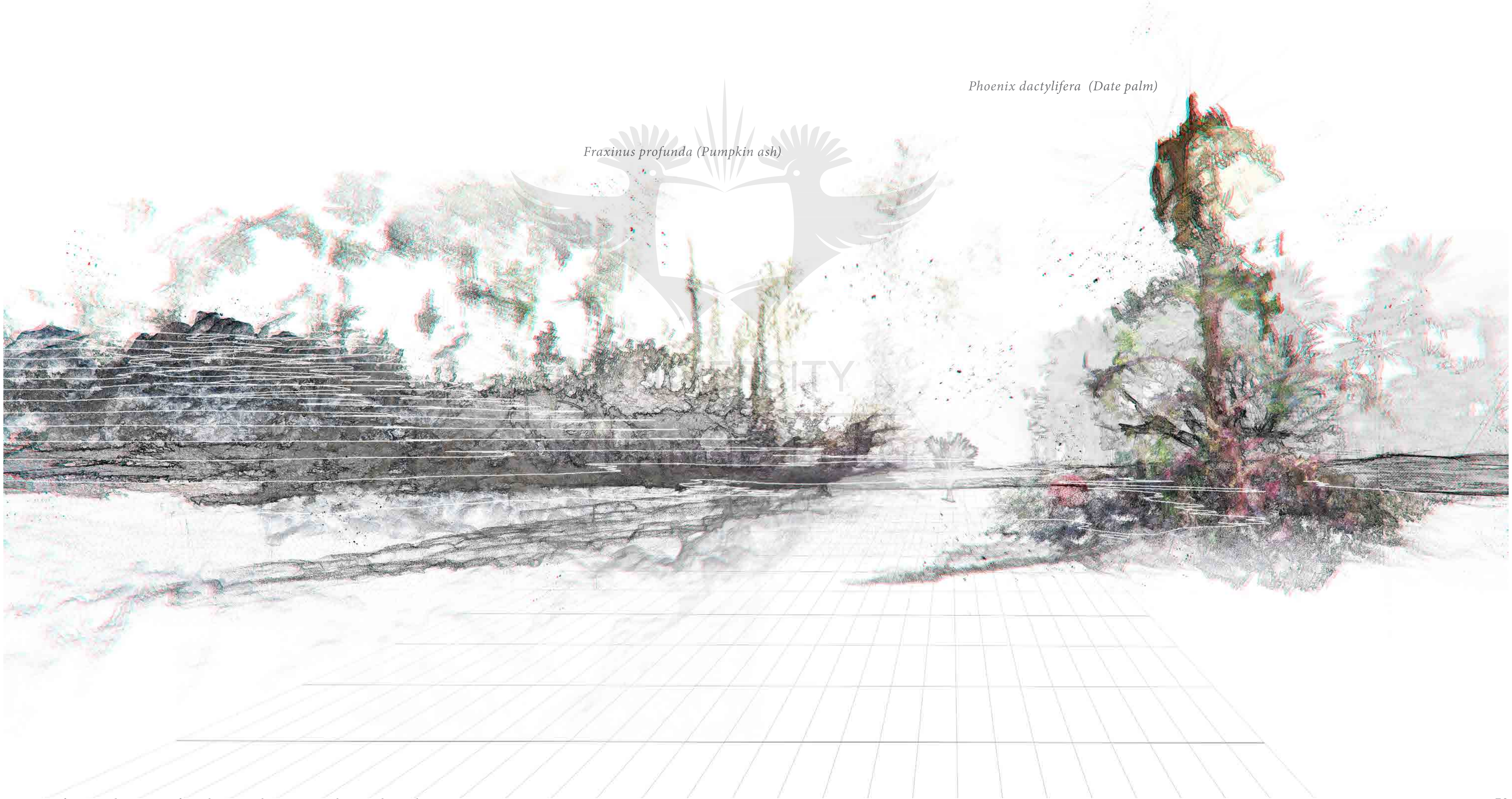
Ladon Dragon



Ladon dragon tree



Chefchaouen growth model 600 x 300mm



African palm tree graft with water-thirsty Spanish Pumpkin ash

Power of Water Resource - Controlled Landscapes

Desert oases ecosystems are often artificially and anthropogenic generated for agriculture. The dependency on water is vital. Whichever regime controls the water source, controls and dominates the society in the region.

French colonisation of Djerid, Tangier in the nineteenth century brought unprecedented innovations in water control that took the resource out of the hands of Djerid landowners. The colonial administration was not satisfied with the existing palm groves as it did not reflect the French conception of productive agriculture. Ingenious palm groves were organised in ways that were not very intuitive to the new rulers. French colonials began creating their own palm plantations in the desert: cultivating 'new land', drilling water wells, and implementing a new model of salaried labour that relied upon novel personnel and labour management. In doing so, the colonial rulers distanced themselves from the complex local politics surrounding the control of water, land and the workforce, the three essential elements of an oasis (Battesti, V. 2012).

"To give life to deserts, thanks to the presence of trees and greenery, to break up with the sorrowful monotony of a bare ground, to populate those mournful and silent sands, this could be the oeuvre of the artesian wells... Nothing resists our powerful tools, whilst a thick layer of stone is, for those indigenous well-diggers, an insurmountable barrier" (Tissandier 1867 :363)

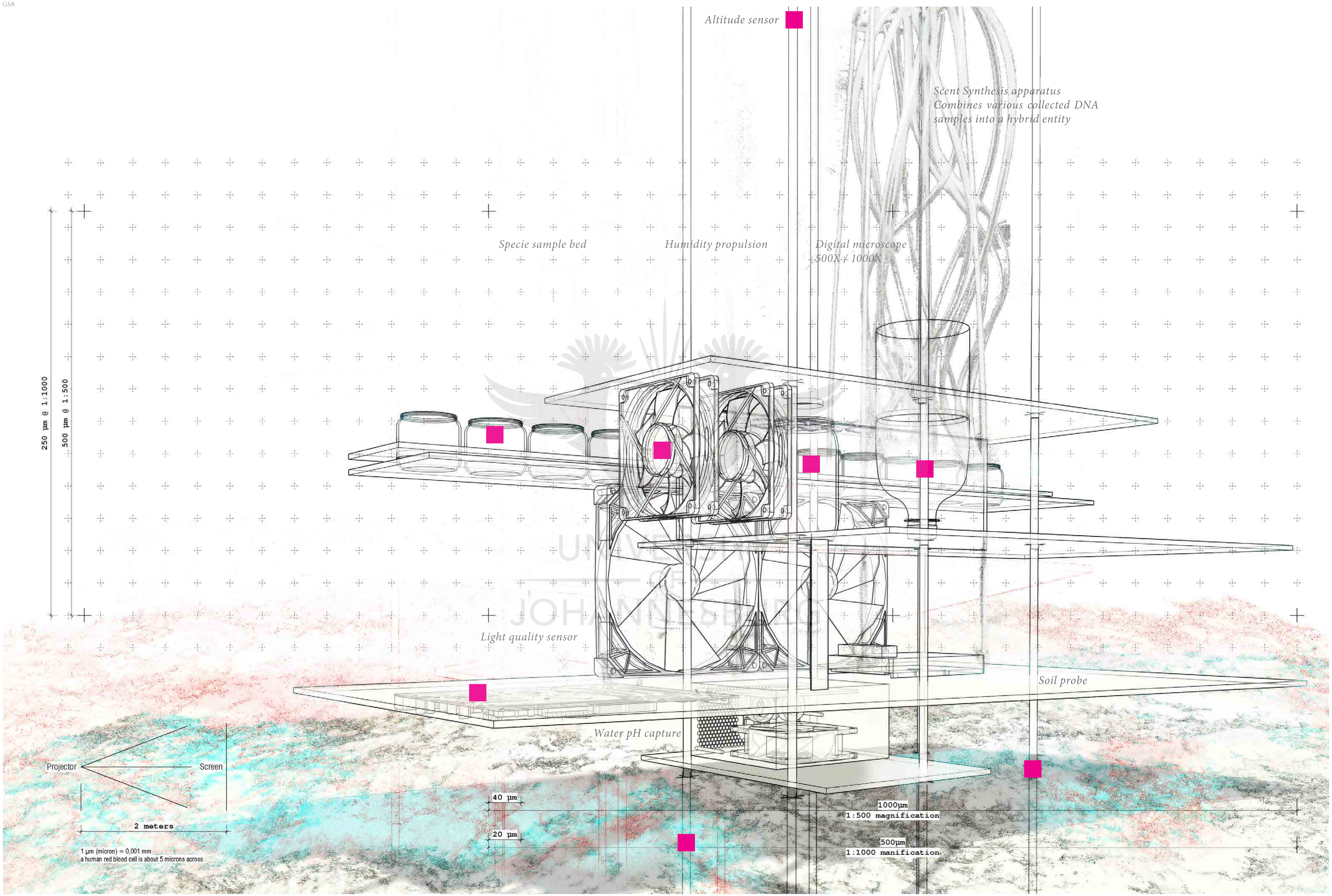
Lesser Flamingo

Arthrospira Algae

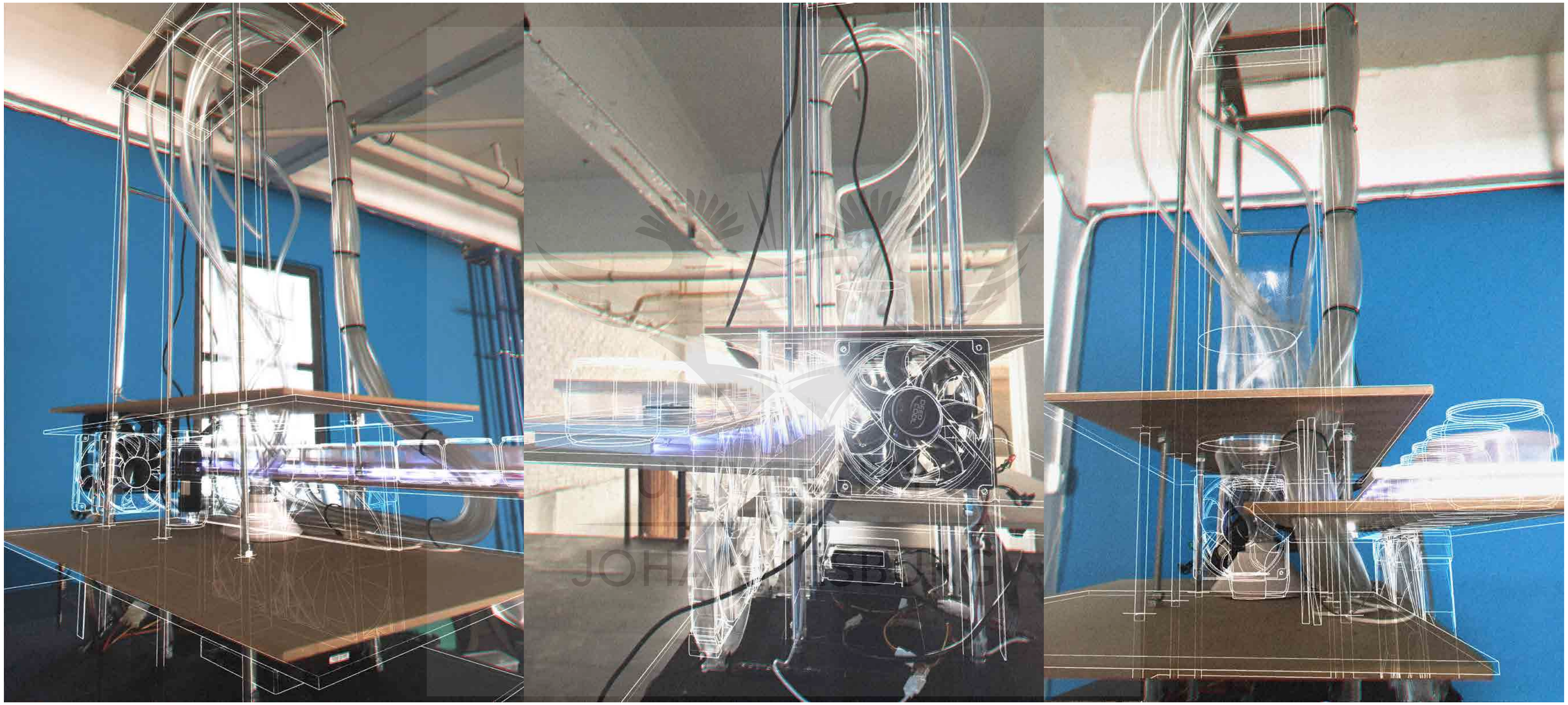
Scent Parcel 2

Scent Parcel 3

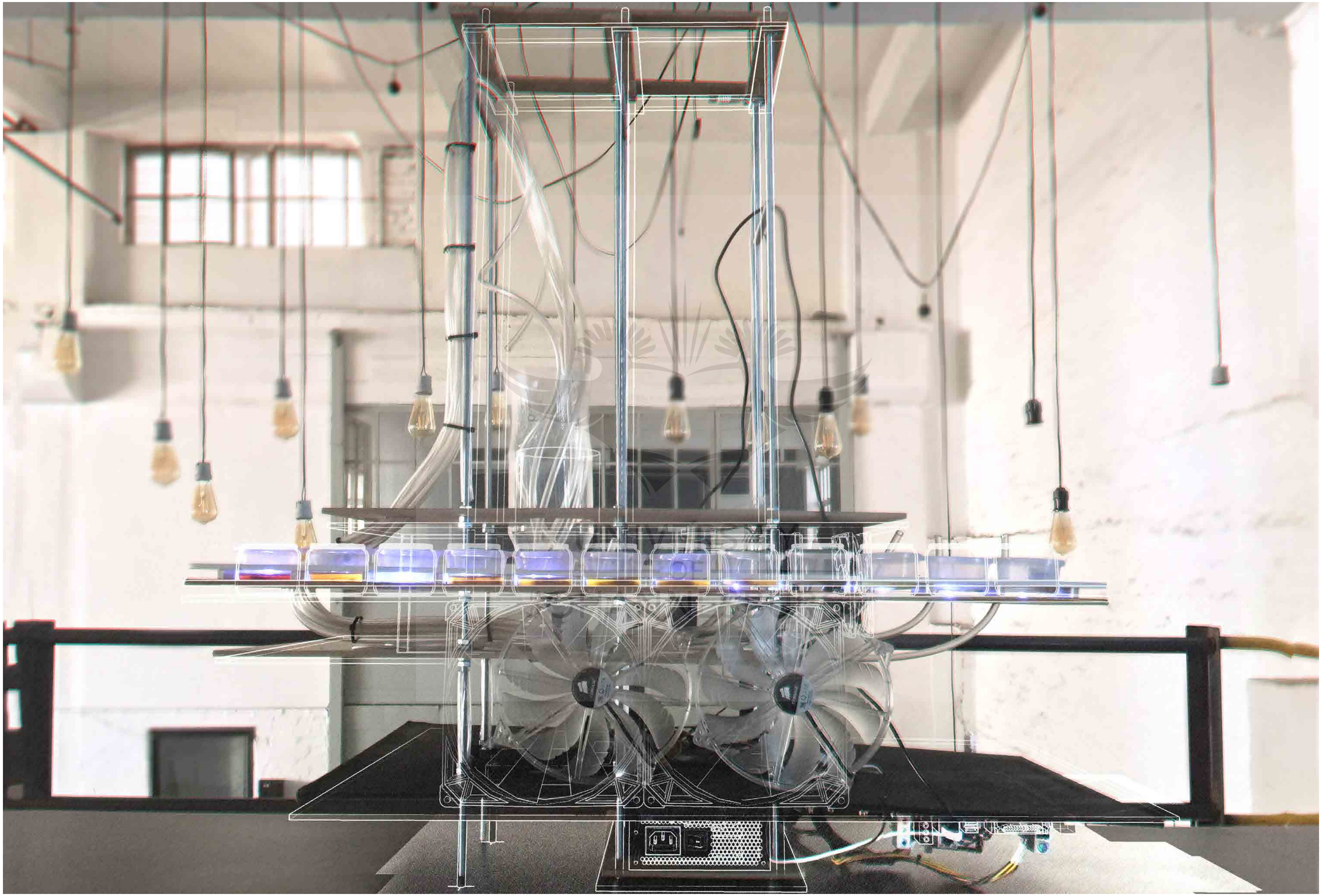
Scent Parcel 4



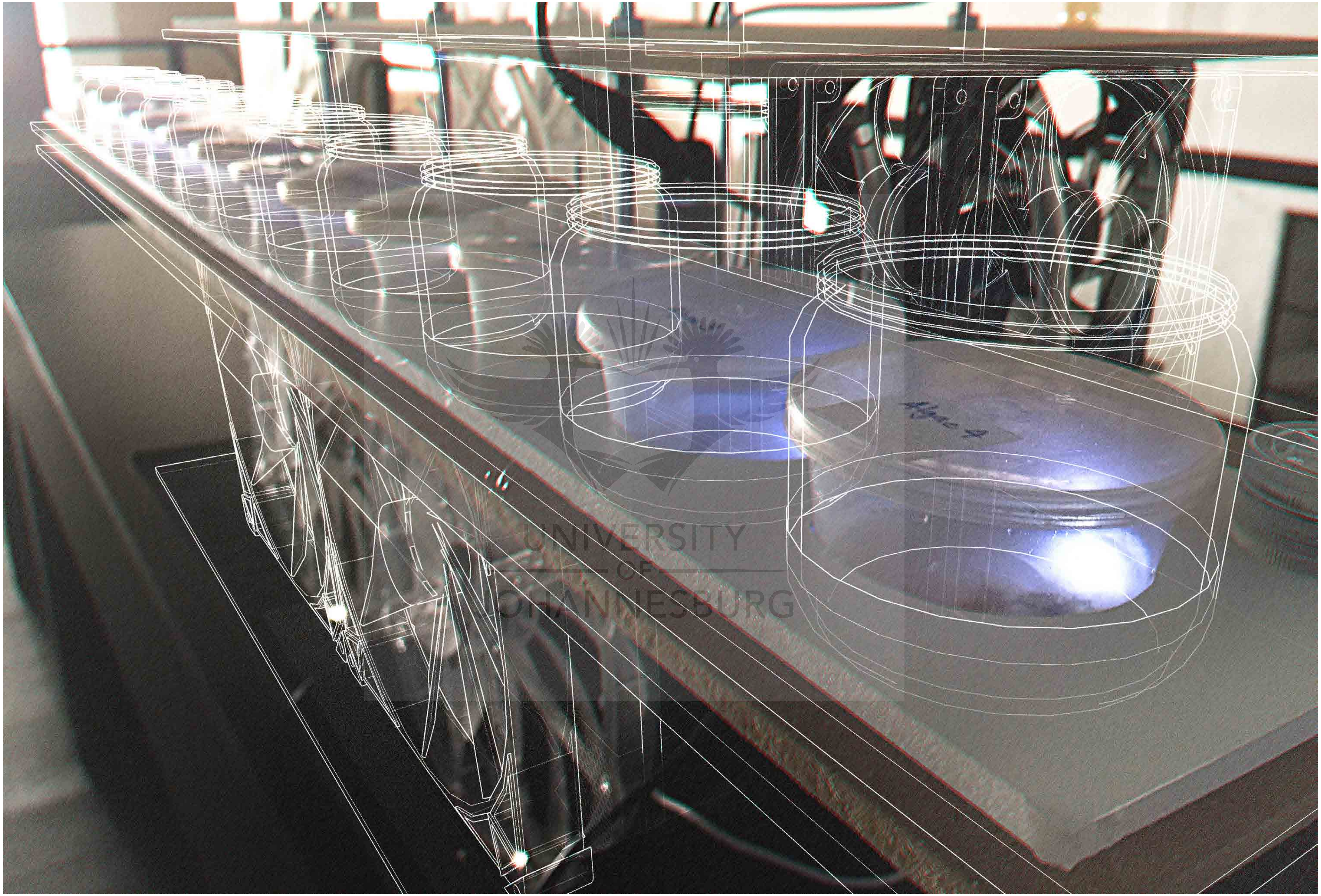
Geography sensory probe



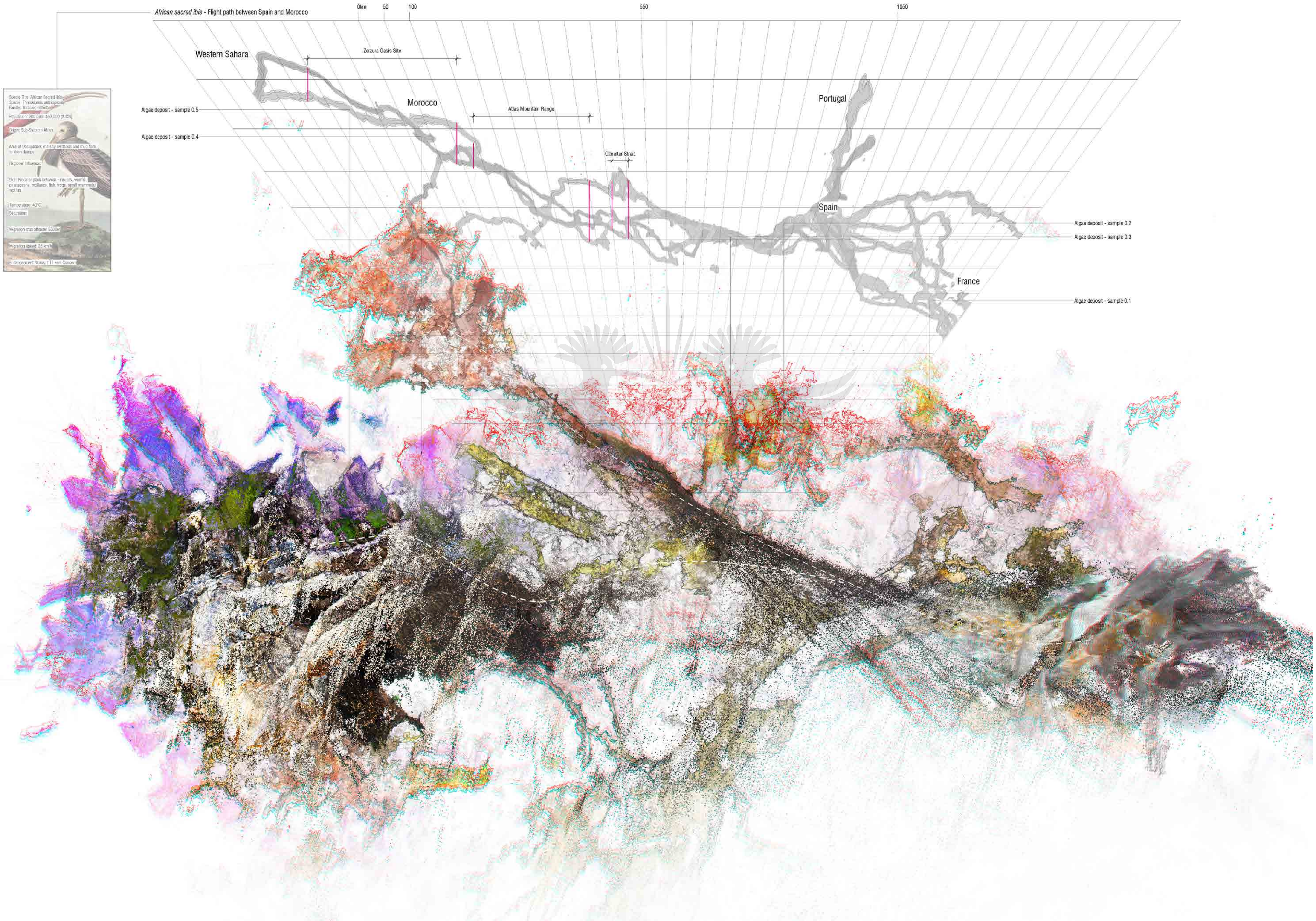
Primary Functions
- Synthesizing mobile probe inserted into the landscape to read/ understand its surroundings.
- Documents current algae on a water site, determining their specie origin, pH levels, humidity, salinity content.
- Mutation of the language note scent from the test bed samples, combining their DNA identities and releasing the hybrid note into the atmosphere around the site.
- Digital microscope probes new surfaces invisible to the naked eye, unpacking minute changes in species happening at the micro-scale.



Geography sensory probe



Test bed for collected samples



Water-migrant mutants - Analysing an exotics algae's path from Spain to Morocco

Salt Sample 1 - Control
Geo Location: 35.759547, -5.939152
Region: Sub-Sahara
Species: Argan Tree (Argania spinosa)

Salt Sample 2 - 3ppt for liter
Tolerant Species: Date palm, Barley (Hordeum vulgare)
Geo Location: 35.768312, -5.858033
Region: Sub-sahara

Salt Sample 3 - 10ppt for liter
Tolerant Species: Crowfoot Grass (Dactyloctenium aegyptium)
Geo Location: 35.753588, -5.897118
Region: Sub-Sahara, Mediterranean

Salt Sample 4 - 30ppt for liter
Tolerant Species: Eel Grass (Zostera marina
Geo Location: 35.790149, -5.929131
Region: Mediterranean

Salt Sample 5 - 60ppt for liter
Tolerant Species: Palmer Saltgrass (Distichlis palmeri)
Geo Location: 35.778034, -5.929902
Region: Mediterranean

Salt Sample 6 - 100ppt for liter
Tolerant Species: Saltwort (Batis maritima)
Geo Location: 35.785164, -5.798253
Region: Mediterranean, North Pacific

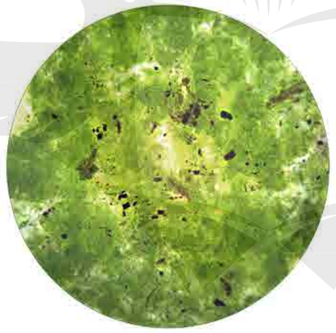
Salt Sample 7 - 200ppt for liter
Tolerant Species: Toxic to Halophytes
Geo Location: 35.774684, -5.847262
Region: Sub-sahara
Species: North Pacific

Salt Sample 8 - 300ppt for liter
Tolerant Species: Unknown/ unstable
Geo Location: 35.791742, -5.814431
Region: Sub-Sahara
Species: Mediterranean, North Pacific

Algae Sample 1 - Control
Geo Location: 35.768312, -5.858033
Region: Mediterranean, Oases

Algae Sample 2 - Growth 1
Geo Location: 35.753588, -5.897118
Region: Oases

Algae Sample 3 - Growth
Geo Location: 35.759547, -5.939152
Region: Mediterranean, Oases



Algae Sample 4 - Growth
Geo Location: 35.774684, -5.847262
Region: Mediterranean

Algae Sample 5 - Growth
Geo Location: 35.790149, -5.929131
Region: Mediterranean

Algae Sample 6 - Growth
Geo Location: 35.791742, -5.814431
Region: Mediterranean

Algae Sample 7 - Growth
Geo Location: 35.774684, -5.847262
Region: Mediterranean

Algae Sample 8 - Growth
Geo Location: 35.785164, -5.798253
Region: Mediterranean

Mineral Sample 1 - Control
Geo Location: 35.774684, -5.847262
Region: Atlas, Sub-Sahara, Mediterranean

Mineral Sample 2
Geo Location: 35.791742, -5.814431
Region: Atlas, Sub-Sahara

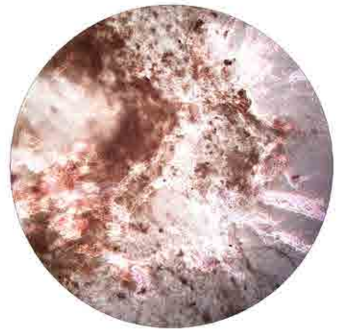
Mineral Sample 3
Geo Location: 35.759547, -5.939152
Region: Atlas, Sub-Sahara

Mineral Sample 4
Geo Location: 35.759547, -5.939152
Region: Atlas, Sub-Sahara

Mineral Sample 5
Geo Location: 35.790149, -5.929131
Region: Atlas

Mineral Sample 6
Geo Location: 35.753588, -5.897118
Region: Sub-Sahara

Mineral Sample 7
Geo Location: 35.753588, -5.897118
Region: Atlas, Sub-Sahara



Mineral Sample 8
Geo Location: 35.774684, -5.847262
Region: Atlas, Sub-Sahara

Growth language scent notes. Hybridising bacteria with an exotic algae specie, Salt stress and Limestone alkalinity factors

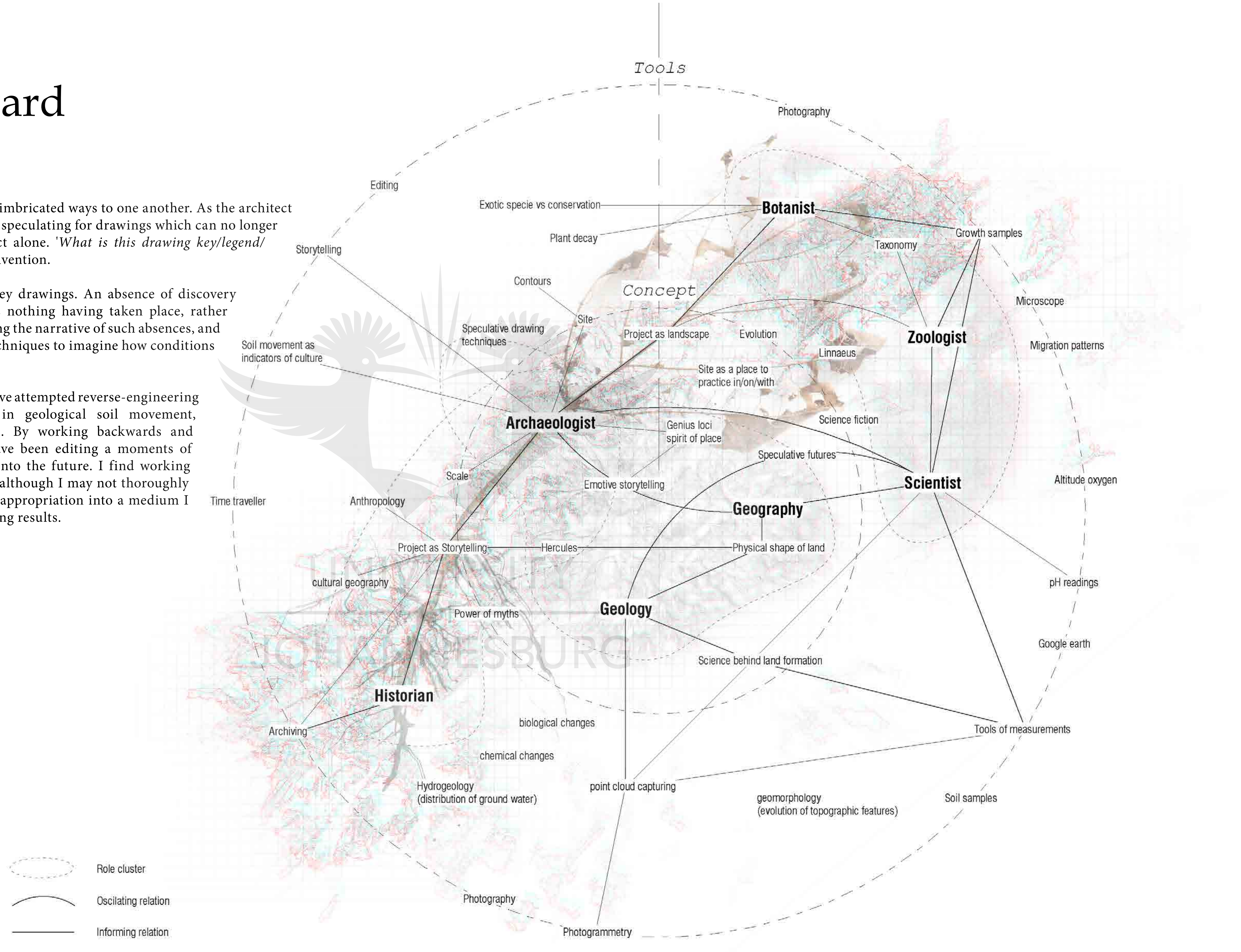
Moving Forward

Role of the Architect

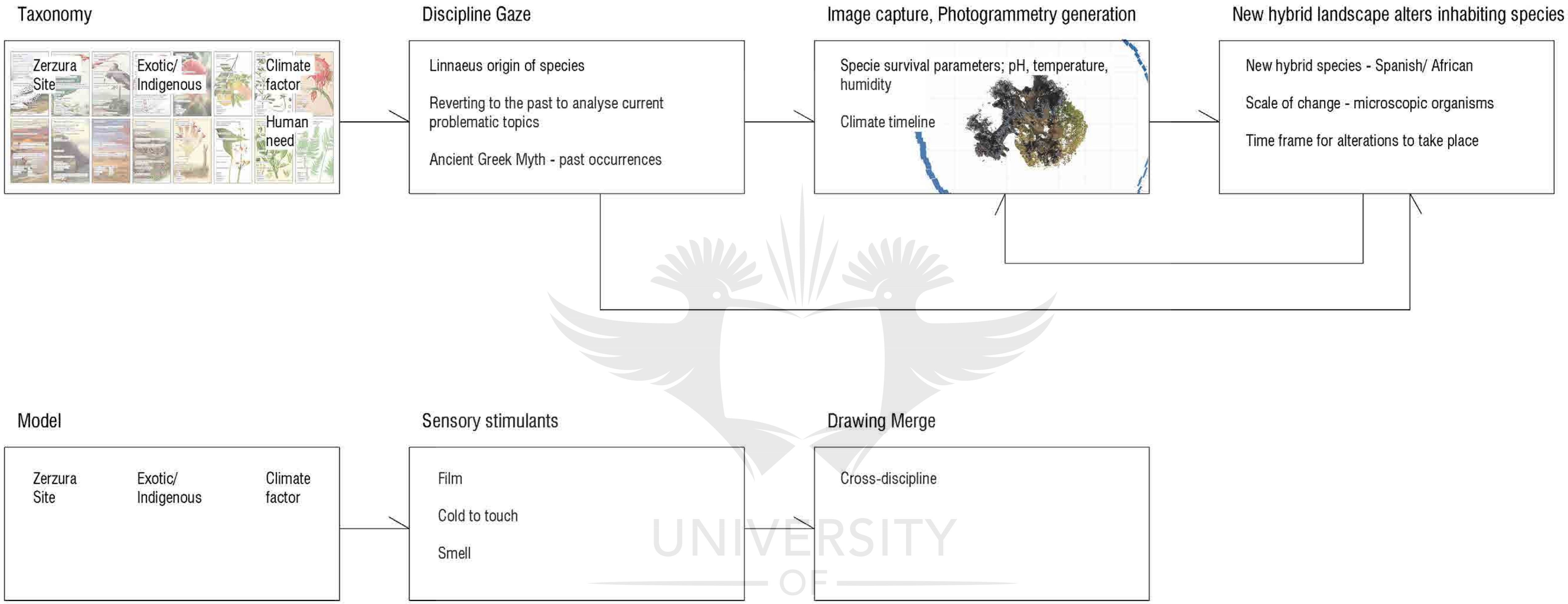
Various roles conceptualise in unique and imbricated ways to one another. As the architect in this project, I am exploring new ways of speculating for drawings which can no longer rely on conventional tools of the architect alone. '*What is this drawing key/legend/ language?*' becomes a question requiring invention.

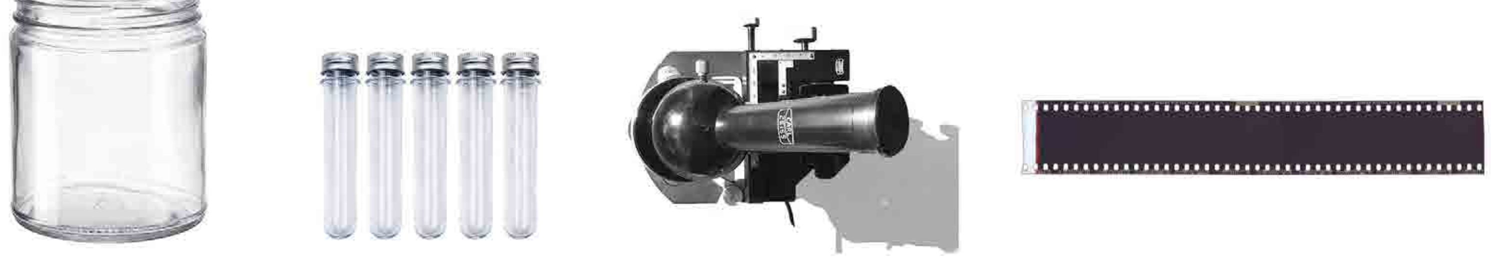
I am inspired by the way archaeologist key drawings. An absence of discovery when digging a ditch should not seen as nothing having taken place, rather archaeologists work speculatively in retelling the narrative of such absences, and by working inventively in their drawing techniques to imagine how conditions occurred.

By working as a speculative archaeologist, I've attempted reverse-engineering the process behind 'keying' contrasts in geological soil movement, discolouration, texture and composition. By working backwards and placing the 'keys' of landscape first, I have been editing a moments of geography to unfold and tell a story far into the future. I find working with the other disciplines fascinating and although I may not thoroughly understand their tools of working, a level appropriation into a medium I do understand can certainly yield interesting results.



Mechanisms of Alteration





Design process schematic using the various roles

End Part 1 - Thank you

ZERZURA CLUB

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MASTERS YEAR 1

Appendix A - Previous Works

Linnaeus and the Garden of Earthly Delights

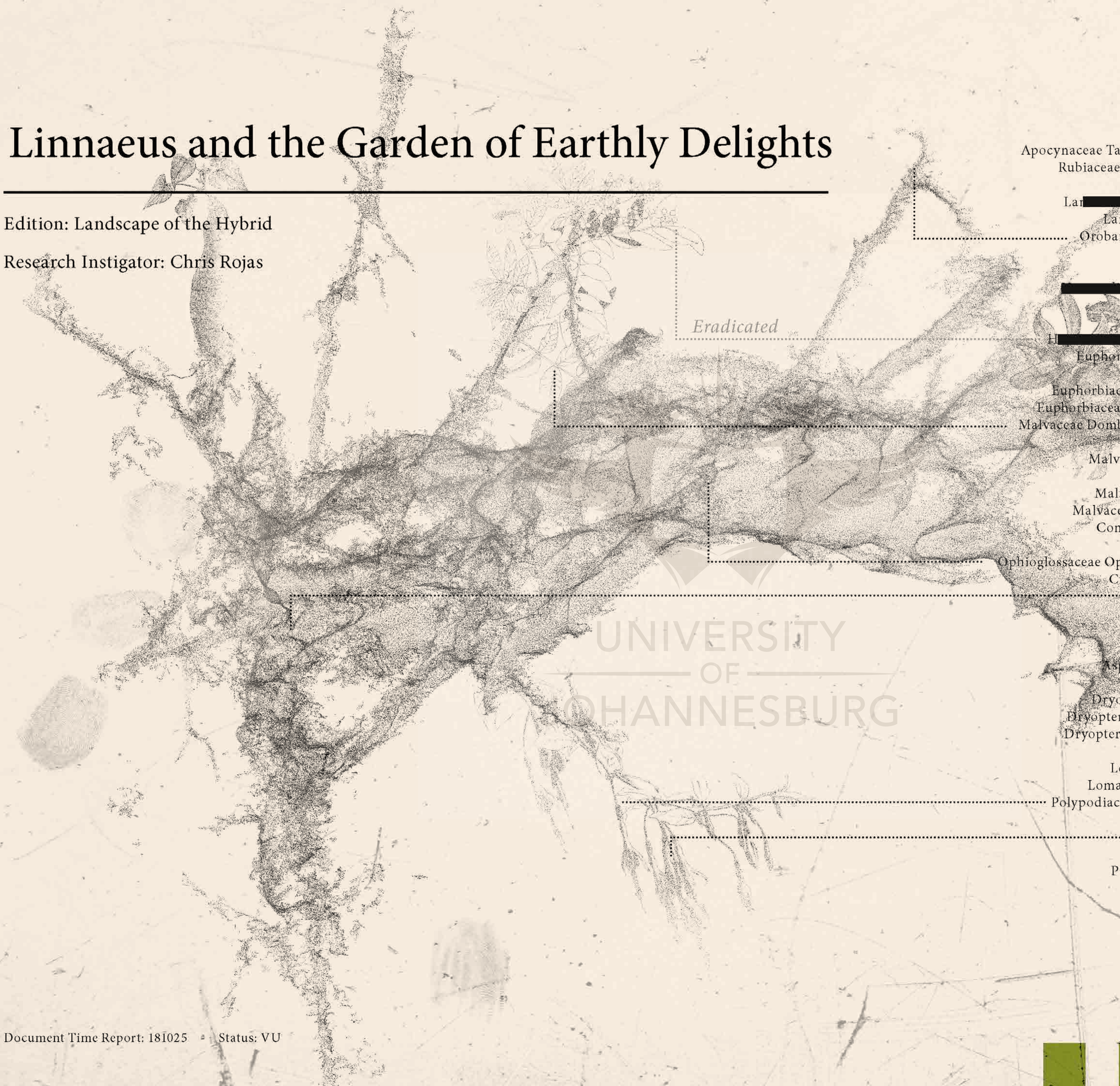
An island presents us with several unique conditions where the word 'nature' can be closely observed, almost as if to be under a microscope. Literature is full of examples where an island stands in for the world-as-a-whole, a microcosm of life as we know it, enclosed in a finite, bounded entity. If I were to ask you to draw an island, chances are that you would draw a piece of land in a more-or-less circular shape, without much detail. The reality of islands is, of course, far more complicated.

Réunion Island is one such place that is full of contradictions and surprises. As you have no doubt heard, it is both part of mainland France and yet it is not. Its citizens carry European passports, yet their ancestries extend far beyond Europe's borders. It is part of Africa and yet it is not. Whilst these political and cultural contradictions are interesting, I have chosen to focus on the landscape, flora and fauna of Réunion as a way of investigating the architectural and spatial potential of the nature/culture dichotomy.

Linnaeus and the Garden of Earthly Delights

Edition: Landscape of the Hybrid

Research Instigator: Chris Rojas



Apocynaceae Carissa spinarum L. Bois amer CR
Apocynaceae Tabernaemontana persicariifolia Jacq. Bois de lait M CR
Rubiaceae Pyrostria commersonii J.F. Gmel. Bois mussard R CR
Rubiaceae Spermacoce flagelliformis Poir. M CR
La[redacted] CR
Lamiaceae Lepechina chamaedryoides (Balb.) Epling CR
Orobanchaceae Nesogenes orerensis (Cordem.) Marais R CR
Plantaginaceae Bacopa monnieri (L.) Pennell CR
Scrophulariaceae Buddleja indica Lam. CR
[redacted] Kubitzki CR
Huperziaceae Huperzia obtusifolia (Sw.) Rothm. CR
Huperziaceae Huperzia phlegmaria (L.) Rothm. CR
H[redacted]t. CR
Euphorbiaceae Chamaesyce goliana (Lam.) comb. ined. R CR
Euphorbiaceae Claoxylon setosum Coode R CR
Euphorbiaceae Croton mauritianus Lam. Ti bois de senteur R CR
Euphorbiaceae Stillingia lineata (Lam.) Müll.Arg. Tanguin pays CR
Malvaceae Dombeya populnea (Cav.) Baker Bois de senteur bleu M CR
Malvaceae Heritiera littoralis Aiton CR
Malvaceae Hibiscus columnaris Cav. Mahot rempart M CR
Malvaceae Hibiscus ovalifolius (Forssk.) Vahl CR
Malvaceae Ruizia cordata Cav. Bois de senteur blanc R CR
Malvaceae Thespesia populneoides (Roxb.) Kostel. Porché CR
Combretaceae Terminalia bentzoë (L.) L. f. Benjoin M CR
Onagraceae Ludwigia jussiaeoides Desr. CR
Ophioglossaceae Ophioglossum reticulatum L. Herbe paille-en-queue CR
Cyperaceae Bulbostylis barbata (Rottb.) C.B. Clarke CR
Cyperaceae Cyperus expansus Poir. R CR
Cyperaceae Eleocharis minuta Boeck. CR
Poaceae Sporobolus virginicus (L.) Kunth CR
Aspleniaceae Asplenium lividum Mett. ex Kuhn CR
Aspleniaceae Asplenium petiolulatum Mett. ex Kuhn CR
Dennstaedtiaceae Hypolepis goetzei Reimers CR
Dryopteridaceae Dryopteris pentheri (Krasser) C. Chr. CR
Dryopteridaceae Hypodematium crenatum (Forssk.) Kuhn CR
Dryopteridaceae Polystichum luctuosum (Kunze) T. Moore CR
Dryopteridaceae Polystichum wilsonii H. Christ CR
Lomariopsidaceae Bolbitis auriculata (Lam.) Alston CR
Lomariopsidaceae Lomariopsis mauritientis Lorence M CR
Polypodiaceae Terpsichore cultrata (Bory ex Willd.) A.R. Sm. CR
Pteridaceae Pteris croesus Bory CR
Pteridaceae Pteris nevillei Baker R CR
Pteridaceae Pteris pseudolonchitis Bory ex Willd. CR
Pteridaceae Vittaria scolopendrina (Bory) Thwaites CR
Pteridaceae Vittaria zosterifolia Willd. CR

Document Time Report: 181025 Status: VU

Process & Methodology

Réunion is a territory with vast amounts of energy given to its protection and conservation. One fascinating statistic about Réunion , and one which forms an underlying theme throughout this project is that Réunion has the 72% of its land under environmental protection, the highest in the world. With such emphasis placed on conservation, I asked the mundane question; what is the island being protected against?

I began investigating how the landscape treats its hosts i.e. the conditions and limitations place on flora based purely off their taxonomy. French authority denies territory and even actively exterminates species based purely off a classification system of the structures of plants. The ultimate French vision for the landscape is to purge it of anything of otherness, the invasive, the alien.

I believe this system is of classification is flawed and narrow-sighted in its representation of migrating life. Throughout my project, I am challenging the boundaries of classification, creating blurred indexes of the hybrid. And through manipulation of landscape conditions, be it soil pH levels, humidity, colour pigment or light qualities, create a sensory experience to address questions of classification.

The International Union for the Conservation of Nature (IUCN) has established a national park covering 42% of the island's surface area with no tolerance for non-native species. There are 1730 known flora species inhabiting the island with dire implications imposed upon the 49% of plants unfortunate enough to be categorised as exotic.

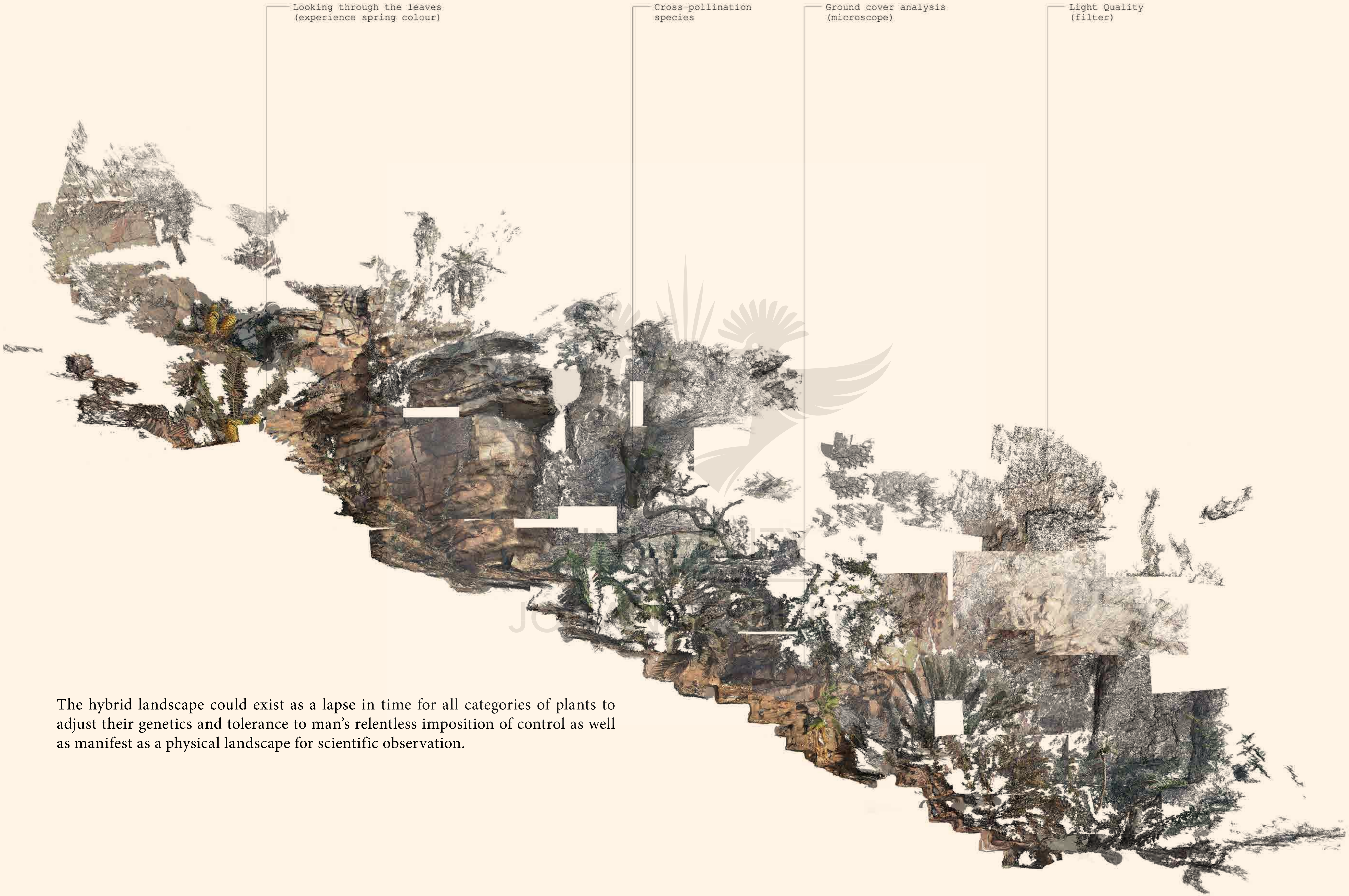
One particularly important concept in the development of my project has been the way in which plants and natural species are classified by botanists into the following categories:

- Native/ Indigenous – arrived naturally to the island
- Endemic – evolved to grow natural in a certain place
- Exotic – species from other countries introduces through artificial means
- Cryptogenic – potentially native, unclear origin due to lack of evidence
- Invasive – exotic species which have become uncontrollable and threatening

Collared Dove Turtur risorius

The classification of flora appears precise with the careful documentation of specie structures to determine not only their evolutionary ancestors, but origin of place. In the grand-scale of time, Réunion's physical manifestation from the ocean depths was sudden, offering a landing fabric for life to attach to. Plant immigrants were handed citizenship by the volcanic rock. No apologies were needed during this inauguration.

And now the landscape is classified to be under threat. A list of endangered species has been created and carefully observed by the creator. There is limited resource, limited space, and perhaps limited tolerance as new species make their way onto the island by deliberate or accidental means. Réunion is a hybrid landscape of alien where human classification is determining which of these invaders are given amnesty, given protection. It should be protested through a lens of hybridity to expose the observer to questions of certainty. Not all territories are bordered, nor will systematic observation make it knowable.



The hybrid landscape could exist as a lapse in time for all categories of plants to adjust their genetics and tolerance to man's relentless imposition of control as well as manifest as a physical landscape for scientific observation.

Trail Section
SCale 1:20 @ A1

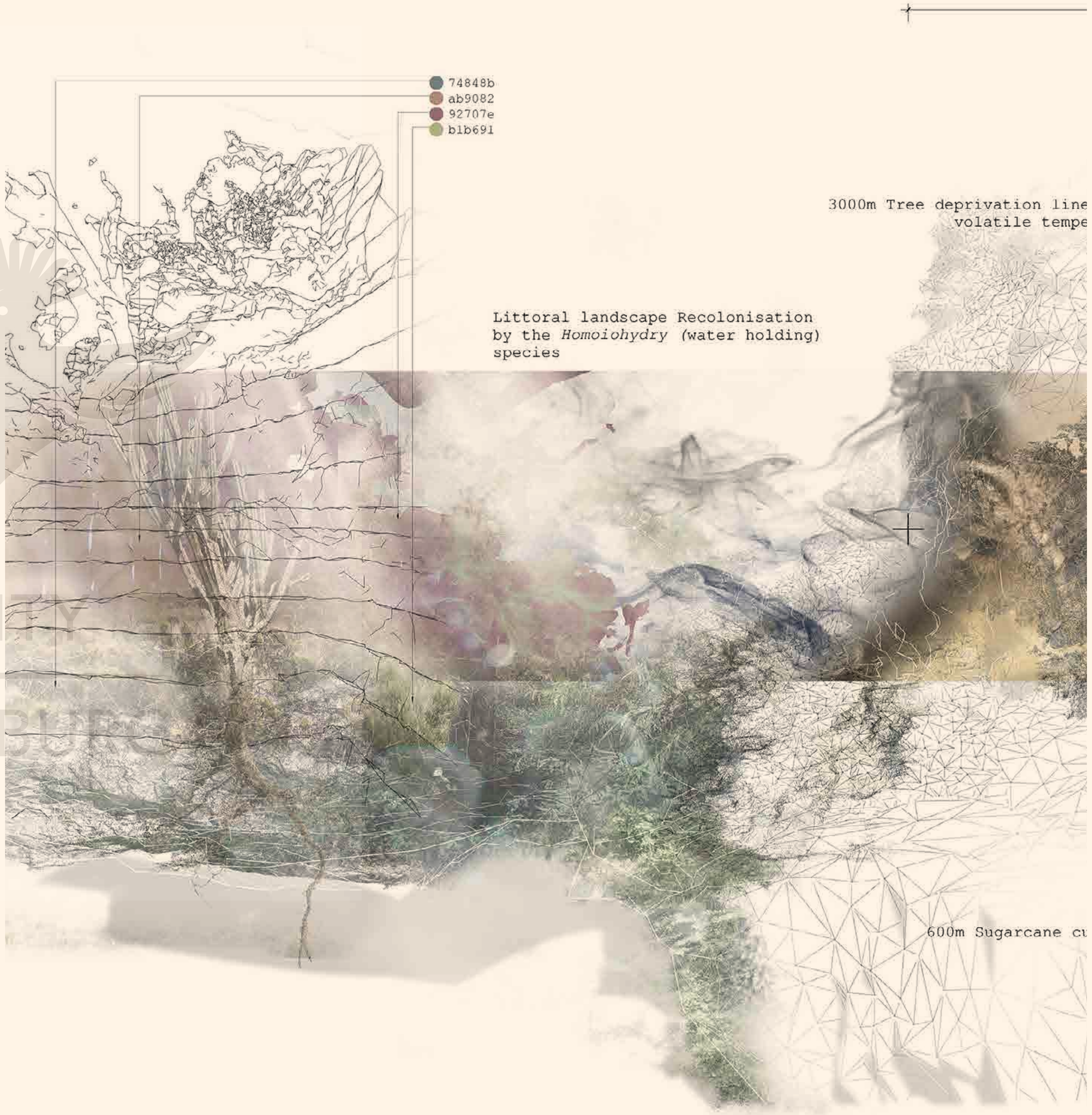
Throughout history, man has always viewed the concepts of 'nature' and 'culture' as diametrically opposed. Nature is defined as "the phenomena of the physical world collectively, including plants, animals, the landscape, and other features and products of the earth, as opposed to humans or human creations." Culture is defined as "the ideas, customs, and social behaviour of a particular people or society", typically as invented by humans.

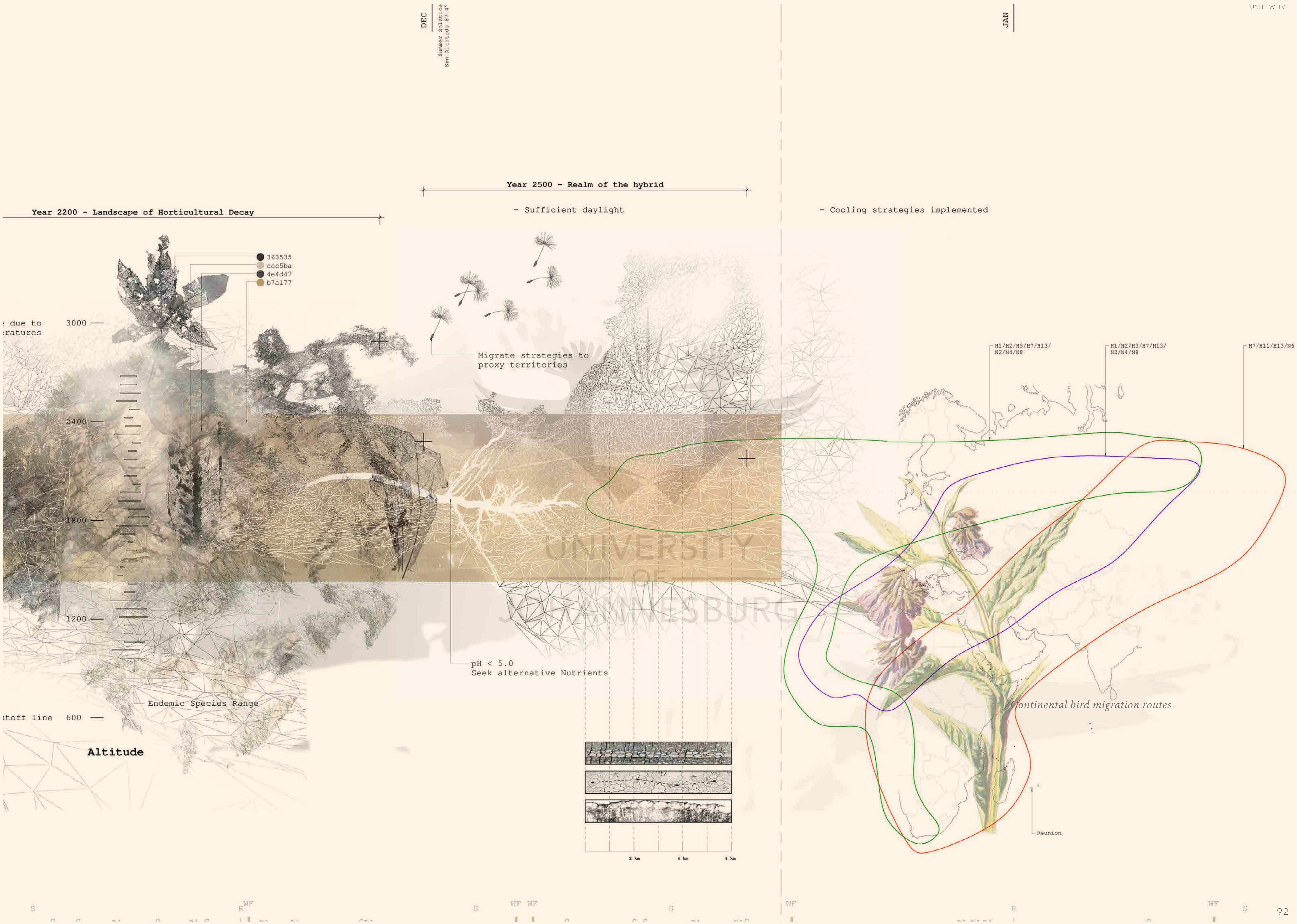
Artificial landscape membrane


Winter
Structural adaptation
Bridge Territories
Dying light
90886e
84474c
697f8a
82c7bd
EXTINCT IN WILD (EW)
ENDANGERED (EN)
REGIONALLY EXTINCT (RE)
VULNERABLE (VU)
CRITICALLY ENDANGERED (CR)
7300 Land-invading Species Documented
Sample A
Sample B
pH
pH
pH


Coldest Mon
Sun Altit
885d69
545374
e378a5
e378a5
Lowest Relative Humid
Year 2050 - Colony Strives for Water
Stages of wilting
Range of deterioration
Soil Dehydration
Abiotic stress from spike in pH levels
Tolerated pH when slowly induced over-time
Unaffected Sample
4.5 5.0 5.5 5.75 6.0 6.25 6.5 6.75 7.0 7.25 7.5 8.0 8.5 9.0
very acidic
acidic
balanced
too alkaline

Atmosphere dust sample collector




DEC
Summer Solstice
Sun Altitude 87.4°
JAN
Year 2500 - Realm of the hybrid
Year 2200 - Landscape of Horticultural Decay
- Sufficient daylight
- Cooling strategies implemented
363535
ccc5ba
4e4d47
b7a177
e due to
eratures
3000
2400
1800
1200
600
Migrate strategies to
proxy territories
pH < 5.0
Seek alternative Nutrients
Endemic Species Range
utoff line
Altitude
H1/H2/H3/H7/H13/
N2/N4/N8
H1/H2/H3/H7/H13/
N2/N4/N8
H7/H11/H13/N6
Continental bird migration routes
Reunion
2 km
4 km
6 km
UNIVERSITY
OF
JOHANNESBURG

My major design project is driven by an interest in an increasingly blurred boundary between nature and culture. Science fiction is often used as a political mechanism, using the future as a medium to discuss past events and revolutionary societal futures. Designed as a series of new, science-fictional insertions into the landscape, the landscape takes on cyborgian forms – breaching dualisms of different species, of nature and machine.

Grafted hybrid species

Reflective Statement

'Linnaeus and the Garden of Early Delights' presented a great opportunity for me to explore and create new ways of talking about migration and French assimilation of people on Réunion through the use of plants. As living organisms, I was fascinated in the idea of the hybrid, a champion species to bridge binary definitions of what we are told by science to be alien and indigenous.

The toolkit through the course of the project investigates the survival requirements of plants, their intolerances to high altitudes, soil pH strategies as well as their anthropomorphic behavior for taking and holding territory, or strategies for living in cohesion with others in communities.

Discovering the unexpected brought delight and further into the physical manifestation of territories and its inhabitants. It was only by crossing into other disciplines of the botanist, the historian, the biologist to name a few, was I able to talk to the boundaries and limitation of classification. This 3rd landscape of the hybrid sits in between the realm of the fantastical and the known.

Linnaeus and the Garden of Earthly Delights

A shift in focus away from traditional categories of invasiveness could imagine a new landscape of the endemic for the coherence of both plant life and culture on the island.

Contents

Endangered Species

EXTINCT (EX)

Fabaceae Mucuna pallida Cordem. Cadoque blanche R EX
Rubiaceae Fernelia pedunculata C.F. Gaertn. Bois de buis R EX
Euphorbiaceae Claoxylon grandifolium (Poir.) Müll.Arg. M EX

EXTINCT IN WILD (EW)

Campanulaceae Lobelia parva Badré et Cadet R EW
Pteridaceae Pteris dentata Forssk. EW

REGIONALLY EXTINCT (RE)

Ruppiaceae Ruppia maritima L. RE
Orchidaceae Nervilia simplex (Thouars) Schltr. M RE
Orchidaceae Aeranthes caudata Rolfe RE
Orchidaceae Angraecum palmiforme Thouars M RE
Orchidaceae Disperis discifera H. Perrier RE
Orchidaceae Nervilia bicarinata (Blume) Schltr. RE
Asteraceae Adenostemma mauritianum DC. RE
Asteraceae Launaea sarmentosa (Willd.) Schultz RE
Goodeniaceae Scaevola plumieri (L.) Vahl Manioc marron du bord RE
Caryophyllaceae Cerastium indicum Wight et Arn. RE
Myrsinaceae Badula crassa A. DC. M RE
Fabaceae Alysicarpus vaginalis (L.) DC. RE
Fabaceae Clitoria heterophylla Lam. RE
Fabaceae Desmodium salicifolium (Poir.) DC. RE
Fabaceae Mucuna gigantea (Willd.) DC. RE
Hymenophyllaceae Hymenophyllum balfourii Baker M RE
Phyllanthaceae Sauropus bacciformis (L.) Airy Shaw RE
Malvaceae Hibiscus liliiflorus Cav. Fleur de St Louis M RE
Malvaceae Urena sinuata L. Hérisson rouge RE
Ophioglossaceae Ophioglossum convexum J.E. Burrows RE
Ophioglossaceae Ophioglossum lancifolium C. Presl RE
Cyperaceae Mariscus sumatrensis (Retz.) J. Raynal RE
Poaceae Pseudolasiacis leptolomoides (A. Camus) A. Camus RE
Aspleniaceae Asplenium bipartitum Bory ex Willd. RE
Aspleniaceae Asplenium gemmiferum Schrad. RE
Aspleniaceae Asplenium inaequilaterale Willd. RE
Aspleniaceae Asplenium sandersonii Hook. RE
Blechnaceae Stenochlaena tenuifolia (Desv.) Moore RE
Dennstaedtiaceae Dennstaedtia anthriscifolia (Bory ex Willd.) T. Moore RE
Dennstaedtiaceae Hypolepis sparsisora (Schrad.) Kuhn RE
Dennstaedtiaceae Microlepia speluncae (L.) T. Moore RE
Dryopteridaceae Megalastrum lanuginosum (Willd. ex Kaulf.) Holttum RE
Lindsaeaceae Lindsaea heterophylla Dryand. RE
Lindsaeaceae Lindsaea repens (Bory) Thwaites RE
Lomariopsidaceae Lomariopsis cordata (Bonap.) Alston RE
Lomariopsidaceae Lomariopsis variabilis (Willd.) Fée M RE
Oleandraceae Nephrolepis acutifolia (Desv.) H. Christ RE
Polypodiaceae Grammitis pygmaea (Mett. Ex Kuhn) Copel. RE
Polypodiaceae Microgramma lycopodioides (L.) Copel. RE
Thelypteridaceae Amauropelta oppositiformis (C. Chr.) Holttum RE
Thelypteridaceae Pseudocyclosorus pulcher (Bory ex Willd.) Holttum RE
Rhamnaceae Gouania tiliifolia Lam. M RE
Marsileaceae Marsilea sp.1 RE
Meliaceae Turraea rutilans (Sm.) Bosser M RE

CRITICALLY ENDANGERED (CR)

Fabaceae Indigofera diversifolia DC. CR
Fabaceae Stylosanthes fruticosa (Retz.) Alston CR
Fabaceae Tephrosia pumila (Lam.) Pers. CR
Apocynaceae Camptocarpus mauritianus (Lam.) Decne. Liane café CR
Apocynaceae Carissa spinarum L. Bois amer CR
Apocynaceae Tabernaemontana persicariifolia Jacq. Bois de lait M CR
Rubiaceae Pyrostria commersonii J.F. Gmel. Bois mussard R CR
Rubiaceae Spermacoce flagelliformis Poir. M CR
Lamiaceae Clerodendrum heterophyllum (Poir.) R. Br. Bois CR
Lamiaceae Lepechina chamaedryoides (Balb.) Epling CR
Orobanchaceae Nesogenes orerensis (Cordem.) Marais R CR
Plantaginaceae Bacopa monnieri (L.) Pennell CR
Scrophulariaceae Buddleja indica Lam. CR
Hernandiaceae Hernandia mascarenensis (Meisn.) Kubitzki CR
Huperziaceae Huperzia obtusifolia (Sw.) Rothm. CR
Huperziaceae Huperzia phlegmaria (L.) Rothm. CR
Huperziaceae Huperzia selago (L.) Bernh. ex Schrank et Mart. CR
Euphorbiaceae Chamaesyce goliana (Lam.) comb. ined. R CR
Euphorbiaceae Claoxylon setosum Coode R CR
Euphorbiaceae Croton mauritianus Lam. Ti bois de senteur R CR
Euphorbiaceae Stillingia lineata (Lam.) Müll.Arg. Tanguin pays CR
Malvaceae Dombeya populnea (Cav.) Baker Bois de senteur bleu M CR
Malvaceae Heritiera littoralis Aiton CR
Malvaceae Hibiscus columnaris Cav. Mahot rempart M CR
Malvaceae Hibiscus ovalifolius (Forssk.) Vahl CR
Malvaceae Ruizia cordata Cav. Bois de senteur blanc R CR
Malvaceae Thespesia populneoides (Roxb.) Kostel. Porché CR
Combretaceae Terminalia bentzoë (L.) L. f. Benjoin M CR
Onagraceae Ludwigia jussiaeoides Desr. CR
Ophioglossaceae Ophioglossum reticulatum L. Herbe paille-en-queue CR
Cyperaceae Bulbostylis barbata (Rottb.) C.B. Clarke CR
Cyperaceae Cyperus expansus Poir. R CR
Cyperaceae Eleocharis minuta Boeck. CR
Poaceae Sporobolus virginicus (L.) Kunth CR
Aspleniaceae Asplenium lividum Mett. ex Kuhn CR
Aspleniaceae Asplenium petiolulatum Mett. ex Kuhn CR
Dennstaedtiaceae Hypolepis goetzei Reimers CR
Dryopteridaceae Dryopteris pentheri (Krasser) C. Chr. CR
Dryopteridaceae Hypodematium crenatum (Forssk.) Kuhn CR
Dryopteridaceae Polystichum luctuosum (Kunze) T. Moore CR
Dryopteridaceae Polystichum wilsonii H. Christ CR
Lomariopsidaceae Bolbitis auriculata (Lam.) Alston CR
Lomariopsidaceae Lomariopsis mauritientis Lorence M CR
Polypodiaceae Terpsichore cultrata (Bory ex Willd.) A.R. Sm. CR
Pteridaceae Pteris croesus Bory CR
Pteridaceae Pteris nevillei Baker R CR
Pteridaceae Pteris pseudolonchitis Bory ex Willd. CR
Pteridaceae Vittaria scolopendrina (Bory) Thwaites CR
Pteridaceae Vittaria zosterifolia Willd. CR
Tectariaceae Tectaria pica (L. f.) C. Chr. CR
Thelypteridaceae Amauropelta tomentosa (Thouars) Holttum M CR
Thelypteridaceae Christella gueinziana (Mett.) Holttum CR
Thelypteridaceae Pseudophegopteris aubertii (Desv.) Holttum CR
Rhamnaceae Gouania mauritiana Lam. Liane savon CR
Anacardiaceae Poupartia borbonica J.F. Gmel. Bois blanc rouge M CR
Meliaceae Turraea oppositifolia (Cav.) Harms Bois café M CR
Convolvulaceae Ipomoea littoralis Blume CR
Convolvulaceae Stictocardia tiliifolia (Desr.) Hallier f. CR
Vitaceae Cissus anulata Desc. M CR

ENDANGERED (EN)

Araceae Typhonodorum lindleyanum Schott Via EN
Hydrocharitaceae Hydrilla verticillata (L. f.) Royle EN
Potamogetonaceae Zannichellia palustris L. EN
Araliaceae Hydrocotyle grossularioides A. Rich. R EN
Araliaceae Polyscias borbonica Marais R EN
Araliaceae Polyscias sessiliflora Marais R EN
Asphodelaceae Aloe macra Haw. Mazambron marron R EN
Iridaceae Gladiolus luteus Lam. EN
Orchidaceae Aeranthes adenopoda H. Perrier EN
Orchidaceae Angraecum germinyanum Hook. f. EN
Orchidaceae Angraecum tenuifolium Frapp. ex Cordem. R EN
Orchidaceae Bathiorchis rosea (H.Perrier) Bosser & P.J.Cribb R EN
Orchidaceae Eulophia versicolor Frapp. ex Cordem. R EN
Orchidaceae Habenaria undulata Frapp. ex Cordem. R EN
Orchidaceae Liparis bernieri Frapp. ex Cordem. R EN
Orchidaceae Liparis punctilabris Frapp. ex Cordem. R EN
Orchidaceae Microcoelia aphylla (Thouars) Summerh. EN
Asteraceae Psiadia rivalsii A.J. Scott R EN
Campanulaceae Heterochaenia borbonica Badré et Cadet R EN
Boraginaceae Tournefortia acuminata DC. Bois de Laurent-Martin R EN
Brassicaceae Cardamine africana L. Cresson marron EN
Gisekiaceae Gisekia pharnaceoides L. EN
Sapotaceae Sideroxylon majus (C.F. Gaertn.) Baehni Bois de fer R EN
Fabaceae Macrotyloma axillare (E. Mey.) Verdc. EN
Fabaceae Sophora denudata Bory Petit tamarin des hauts R EN
Fabaceae Zornia gibbosa Span. EN
Rubiaceae Coptosperma borbonica (Hend. et A.A. Hend.) EN
Rubiaceae Fernelia buxifolia Lam. Bois de balai M EN
Rubiaceae Pyrostria orbicularis A. Rich. ex DC. Bois mussard R EN
Gleicheniaceae Gleichenia polypodioides (L.) Sm. EN
Hymenophyllaceae Crepidomanes frappieri (Cordem.) J. P. Roux EN
Plantaginaceae Bryodes micrantha Benth. EN
Huperziaceae Huperzia dentata (Herter) Holub EN
Huperziaceae Huperzia saururus (Lam.) Trevis. EN
Euphorbiaceae Acalypha reticulata (Poir.) Müll.Arg. EN
Euphorbiaceae Chamaesyce viridula (Cordem. ex Radcl.-Sm.) Soják R EN
Euphorbiaceae Claoxylon racemiflorum A. Juss. ex Baill. EN
Linaceae Hugonia serrata Lam. Liane de clef M EN
Putranjivaceae Drypetes caustica (Frapp. ex Cordem.) EN
Salicaceae Scolopia heterophylla (Lam.) Sleumer Bois de prune M EN
Malvaceae Abutilon exstipulare (Cav.) G. Don R EN
Malvaceae Dombeya blattiolens Frapp. ex Cordem. Mahot blanc R EN
Malvaceae Dombeya umbellata Cav. Mahot noir R EN
Malvaceae Hibiscus tiliaceus L. Mova EN
Malvaceae Sida cordifolia L. Herbe dure EN
Lythraceae Nesaea triflora (L. f.) Kunth EN
Myrtaceae Syzygium borbonicum J. Guého et A.J. Scott Bois EN
Ophioglossaceae Cheiroglossa malgassica (C. Chr.) Pic.Serm. EN
Osmundaceae Osmunda regalis L. Osmonde EN

Cyperaceae Cyperus stoloniferus Retz. EN
Cyperaceae Fimbristylis sieberiana Kunth EN
Poaceae Helictotrichon sp.1 R EN
Poaceae Phragmites mauritianus Kunth Roseau EN
Aspleniaceae Asplenium auritum Sw. EN
Aspleniaceae Asplenium nidus L. Nid d'oiseau EN
Aspleniaceae Asplenium rutifolium (Berg.) Kunze EN
Aspleniaceae Ceterach cordatum (Thunb.) Desv. EN
Dryopteridaceae Dryopteris antarctica (Baker) C. Chr. EN
Dryopteridaceae Dryopteris wallichiana (Spreng.) Hyl. EN
Dryopteridaceae Megalastrum canacae (Holttum) Holttum M EN
Lindsaeaceae Lindsaea ensifolia Sw. EN
Polypodiaceae Grammitis poolii (Baker) Copel. EN
Polypodiaceae Microsorum punctatum (L.) Copel. EN
Pteridaceae Acrostichum aureum L. EN
Pteridaceae Adiantum hirsutum Bory EN
Pteridaceae Antrophyum immersum (Bory ex Willd.) Mett. EN
Pteridaceae Ceratopteris cornuta (P. Beauv.) Lepr. EN
Pteridaceae Doryopteris pedatoides (Desv.) Kuhn EN
Pteridaceae Pellaea angulosa (Bory ex Willd.) Baker EN
Pteridaceae Pteris cretica L. EN
Pteridaceae Pteris linearis Poir. EN
Tectariaceae Tectaria puberula (Desv.) C. Chr. EN
Thelypteridaceae Christella parasitica (L.) H.Lév. EN
Urticaceae Droguetia gaudichaudiana Marais R EN
Urticaceae Obetia ficifolia (Poir.) Gaudich. Bois d'ortie M EN
Urticaceae Pilea cadetii Marais R EN
Meliaceae Turraea monticola Bosser R EN
Rutaceae Melicope segregis (Cordem.) T.G. Hartley Bois de catafaye R EN
Rutaceae Zanthoxylum heterophyllum (Lam.) Sm. Bois de poivre M EN
Schizaeaceae Schizaea dichotoma (L.) Sm. EN

VULNERABLE (VU)

Araliaceae Polyscias coriacea Marais R VU
Arecaceae Acanthophoenix crinita (Bory) H. Wendl. Palmiste rouge VU
Orchidaceae Aerangis punctata J. Stewart VU
Orchidaceae Aeranthes tenella Bosser VU
Orchidaceae Angraecum calceolus Thouars VU
Orchidaceae Angraecum hermannii (Cordem.) Schltr. R VU
Orchidaceae Angraecum liliodorum Frapp. ex Cordem. R VU
Orchidaceae Angraecum pingue Frapp. ex Cordem. M VU
Orchidaceae Bulbophyllum macrocarpum Frapp. ex Cordem. R VU
Orchidaceae Calanthe candida Bosser M VU
Orchidaceae Corymborkis corymbis Thouars VU
Orchidaceae Cynorkis discolor (Frapp. ex Cordem.) R VU
Orchidaceae Disperis tripetaloides (Thouars) Lindl. VU
Orchidaceae Gastrodia similis Bosser R VU
Orchidaceae Jumellea divaricata (Frapp. ex Cordem.) Schltr. R VU
Orchidaceae Jumellea recurva (Thouars) Schltr. M VU
Orchidaceae Jumellea stenophylla (Frapp. ex Cordem.) Schltr. R VU
Orchidaceae Oeceoclades monophylla (A. Rich.) Garay et P. Taylor M VU
Orchidaceae Oeoniella polystachys (Thouars) Schltr. VU
Orchidaceae Physoceras boryanum (A. Rich.) Bosser M VU
Asteraceae Eriotrix commersonii Cadet R VU
Asteraceae Faujasia cadetiana C. Jeffrey R VU
Asteraceae Faujasia squamosa (Bory) C. Jeffrey R VU
Asteraceae Monarrhenus pinifolius Cass. Bois de chenilles R VU
Asteraceae Parafaujasia fontinalis (Cordem.) C. Jeffrey R VU
Asteraceae Psiadia retusa (Lam.) DC. La salière R VU
Asteraceae Psiadia salaziana Cordem. R VU
Asteraceae Psiadia sericea Cordem. R VU
Campanulaceae Berenice arguta Tul. R VU
Campanulaceae Lobelia serpens Lam. VU
Boraginaceae Cynoglossum borbonicum Bory R VU
Boraginaceae Cynoglossum cernum Baker VU
Icacinaceae Apodytes dimidiata E. Mey. ex Arn. Peau gris VU
Aizoaceae Zaleya pentandra (L.) C. Jeffrey Pourpier rouge VU
Amaranthaceae Alternanthera sessilis (L.) R. Br. ex DC. Brède VU
Ebenaceae Diospyros borbonica I. Richardson Bois noir des hauts R VU
Myrsinaceae Badula decumbens (Cordem.) Coode R VU
Myrsinaceae Embelia micrantha (A. DC.) A. DC. M VU
Fabaceae Caesalpinia bonduc (L.) Roxb. Bonduc VU
Fabaceae Strongylodon lucidus (G. Forst.) Seem. Cadoque blanche VU
Apocynaceae Ochrosia borbonica J.F. Gmel. Bois jaune M VU
Apocynaceae Secamone volubilis (Lam.) Marais Liane d'olive M VU
Apocynaceae Trichosandra borbonica Decne. Liane noire R VU
Gleicheniaceae Dicranopteris cadetii Tardieu VU
Gleicheniaceae Gleichenia boryi Kunze VU
Hymenophyllaceae Crepidomanes bonapartei (C.Chr.) J.P.Roux VU
Hymenophyllaceae Crepidomanes fallax (H. Christ) Ebihara VU
Hymenophyllaceae Vandenboschia gigantea (Bory ex Willd.) VU
Lamiaceae Premna serratifolia L. Lingue blanc VU
Oleaceae Chionanthus broomeana (Horne ex Oliv.) A.J. VU
Plantaginaceae Lindernia rotundifolia (L.) Alston VU
Monimiaceae Tambourissa crassa Lorence Bois de bombarde R VU
Huperziaceae Huperzia squarrosa (G. Forst.) Trevis. VU
Lycopodiaceae Lycopodiella caroliniana (L.) Pic.Serm. VU
Erythroxylaceae Erythroxylum hypericifolium Lam. Bois d'huile M VU
Erythroxylaceae Erythroxylum sideroxyloides Lam. Bois de ronde M VU
Euphorbiaceae Chamaesyce reconciliationis (Radcl.-Sm.) Soják R VU
Euphorbiaceae Claoxylon dolichostachyum Cordem. R VU
Phyllanthaceae Phyllanthus consanguineus Müll.Arg. VU

Malvaceae Dombeya acutangula Cav. Mahot tantan M V
Malvaceae Dombeya delislei Arènes Mahot bleu R V
Marattiaceae Angiopteris madagascariensis de Vriese V
Lythraceae Pemphis acidula J.R. Forst. et G. Forst. Bois matelot V
Memecylaceae Memecylon cordatum Lam. Bois de balai M V
Myrtaceae Eugenia mespiloides Lam. Bois de nèfles à grandes feuilles V
Onagraceae Ludwigia stolonifera (Guill. et Perr.) Raven V
Ophioglossaceae Ophioderma pendula (L.) C. Presl V
Ophioglossaceae Ophioglossum vulgatum L. Herbe paille-en-queue V
Piperaceae Peperomia pedunculata C. DC. R V
Cyperaceae Cyperus articulatus L. V
Cyperaceae Eleocharis sp.1 R V
Cyperaceae Fimbristylis complanata (Retz.) Link V
Poaceae Festuca abyssinica A. Rich. V
Poaceae Lepturus repens (G. Forst.) R. Br. V
Poaceae Setaria geminata (Forssk.) Veldkamp Herbe de riz V
Poaceae Streblochaete longiaristata (A. Rich.) Pilg. V
Poaceae Zoysia matrella (L.) Merr. Gazon bord de mer V
Aspleniaceae Asplenium erectum Bory ex Willd. V
Aspleniaceae Asplenium monanthes L. V
Aspleniaceae Asplenium protensum Schrad. V
Aspleniaceae Asplenium theciferum (Kunth) Mett. V
Davalliaceae Humata repens (L. f.) Diels V
Dryopteridaceae Nothoperanema squamisetum (Hook.) Ching V
Lomariopsidaceae Lomariopsis pollicina Willemet ex Kuhn V
Oleandraceae Arthropteris monocarpa (Cordem.) C. Chr. V
Oleandraceae Nephrolepis undulata (K. Afzel. ex Sw.) J. Sm. V
Polypodiaceae Ctenopteris torulosa (Baker) Tardieu V
Polypodiaceae Grammitis cryptophlebia (Baker) Copel. V
Polypodiaceae Lellingeria myosuroides (Sw.) A.R. Sm. et Moran V
Pteridaceae Adiantum thalictroides Willd. ex Schltdl. Capillaire des V
Pteridaceae Cheilanthes hirta Sw. V
Pteridaceae Pellaea calomelanos (Sw.) Link V
Pteridaceae Pellaea quadripinnata (Forssk.) Prantl V
Pteridaceae Pityrogramma argentea (Willd.) Domin V
Thelypteridaceae Sphaerostephanos arbuscula (Willd.) Holttum V
Woodsiaceae Cystopteris diaphana (Bory) Blasdell V
Urticaceae Parietaria debilis G. Forst. V
Urticaceae Pilea borbonica Marais R V
Olacaceae Olax psittacorum (Lam.) Vahl Bois d'effort M V
Meliaceae Turraea cadetii A.J. Scott R V
Meliaceae Turraea ovata (Cav.) Harms Petit quivi M V
Rutaceae Vepris lanceolata (Lam.) G. Don Patte poule V
Convolvulaceae Dichondra repens J.R. Forst. et G. Forst. V
Solanaceae Lycium mascarenense A.M. Venter et A.J. Scott V

Specie Classifications

Plant Taxonomy

The native flora of Réunion has been introduced to new species of agriculture, medicinal and ornamental plants, In some cases, this induction has driven indigenous species to extinction. According to the International Union for Conservation of Nature (IUCN), 256 species are catergorised as endangered.

Native Species

Lycopodiaceae

Lacistemataceae

Asteraceae

Malvaceae

Lacistemataceae

Polypodium

The Early Land Invaders - The Cryptogenic

Cryptogenic species are potentially native, but have an unclear origin due to lacking evidence.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The Early Land Invaders - The Endemic

Endemic species are species that have evolved into a new species, growing naturally only in a certain place

The Early Land Invaders - The Exotic

Exotic species have been introduced by man, coming from other countries

Relations in Tensions

Top Trump Species

The card game pits species of flora against each other. In a military style game, the one with the strongest stats wins, or in this case, the plant with the highest altitude, pH tolerance, or number of its family to be endangered wins.

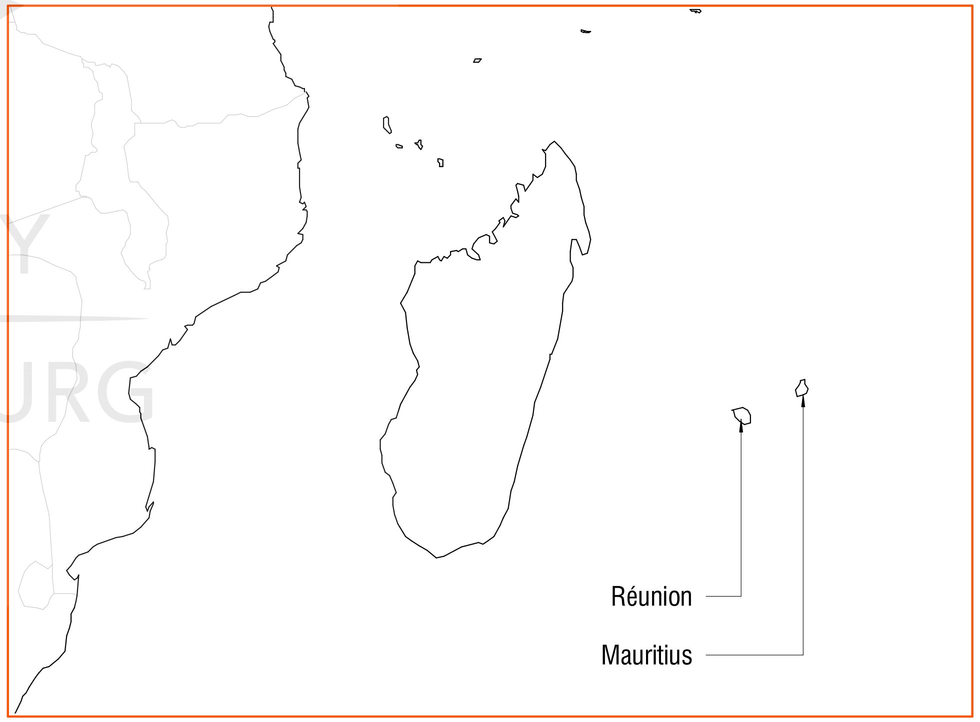
How to Play:
- Shuffle the deck and deal each player a card with it facing down
- Pick up your card not to reveal it to the other players.
- The player to the dealer's left reads out the value of one of characteristics of their card.
- Other players then compare that value with their own and the player with the highest value wins and collects all cards trumped card played during that round.
- In the event of a tie, the player who started the round must choose another characteristic.
- The person will all the cards at the end is declared the winner

Categorised Invasive Species

Cyperaceae	44	20	71	8	3
Cystopteridaceae	1	0	1	1	0
Davalliaceae	2	0	2	1	0
Dennstaedtiaceae	8	0	8	1	0
Dilleniaceae	0	1	1	0	0
Dioscoreaceae	0	2	2	0	0
Dombeyaceae	0	0	0	0	0
Drynariaceae	0	0	0	0	0
Dryopteridaceae	34	2	36	8	0
Ebenaceae	1	3	4	1	1
ehretioideae	0	0	0	0	0
Elaeocarpaceae	0	1	1	0	0
Elaphoglossaceae	0	0	0	0	0
Equisetaceae	1	0	1	0	0
Ericaceae	5	1	6	0	0
Eriocaulaceae	1	0	1	0	0
Erythroxylaceae	3	0	3	2	0
escalloniaceae	1	0	1	0	0
Euphorbiaceae	16	38	55	9	0
Fabaceae	23	189	217	11	13

Réunion - The sovereign proxy

Réunion is situated in a seemingly isolate territory in the Southern Indian Ocean. This 2500km² piece of volcanic land is located 9000km from Mainland France, yet despite the great distance, the island is administered by French Laws, Culture and Language. La Réunion consists of a diverse population living under French administration. With only 5% of all inhabitants being Z'oreilles (white French), the vast majority of people living here find themselves on a slice of Europe in the southern hemisphere. To the Creole islanders, there is a misalignment with their identity of ancestral belonging and their current administered citizenship.



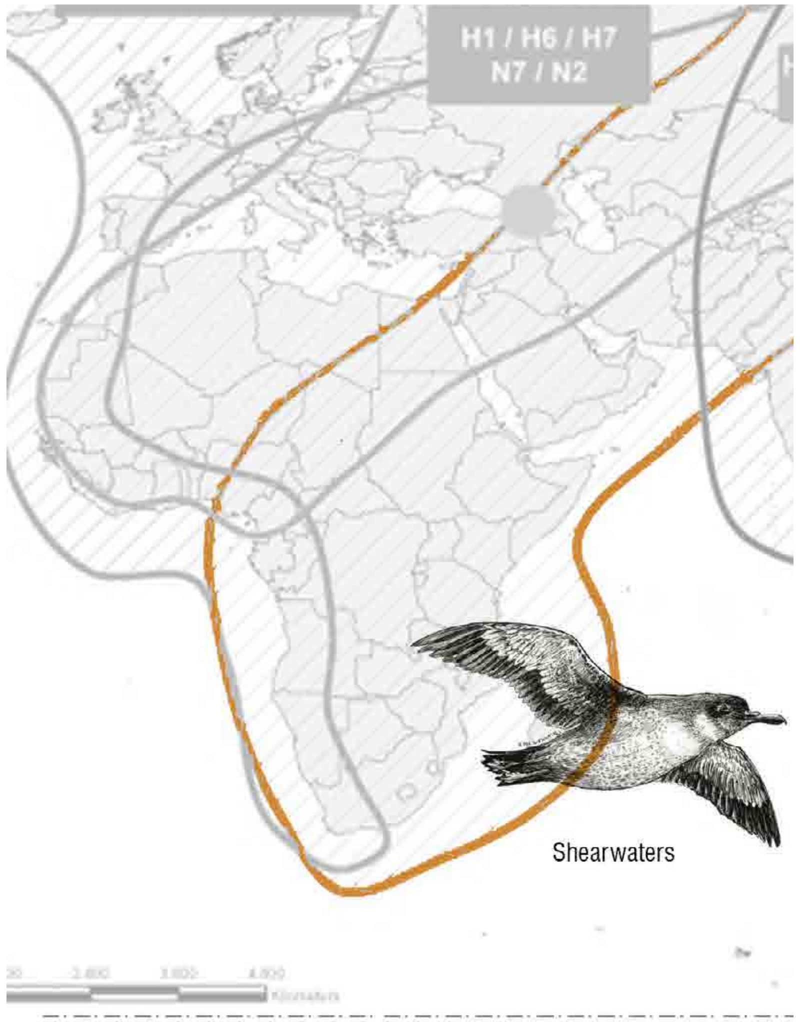
Sovereign cartographies

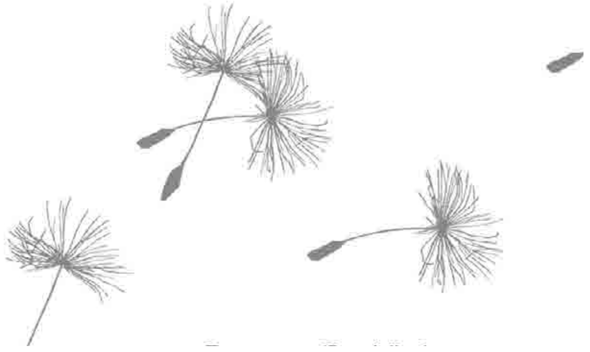
Specie Migrants

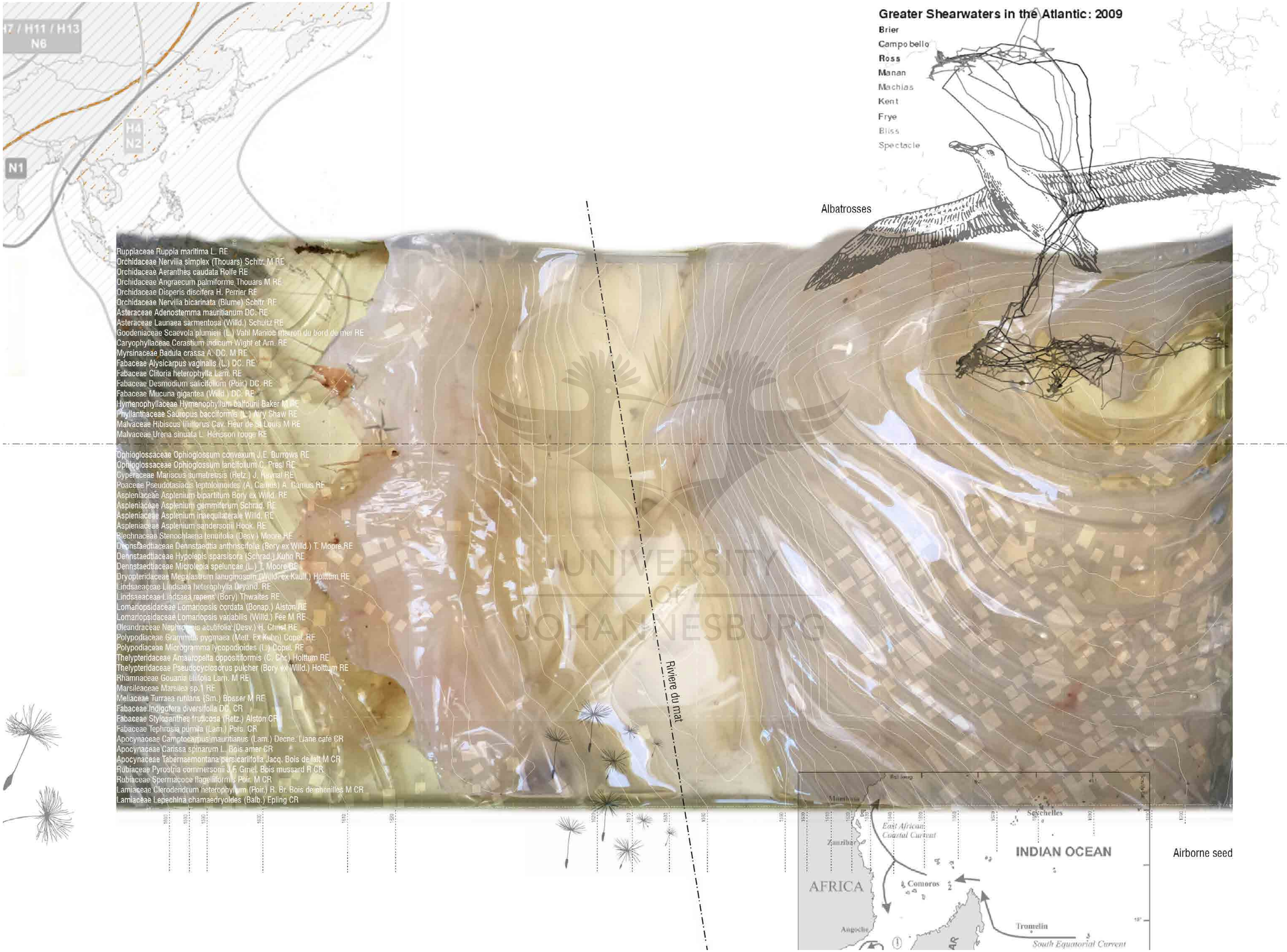
Seed Colonisation

"Man begets, but land does not beget.."
- Cecil Rhodes

Through natural means of travel by air or ocean current, to man's artificial implementation, flora seeds have made their way onto the island altering it.



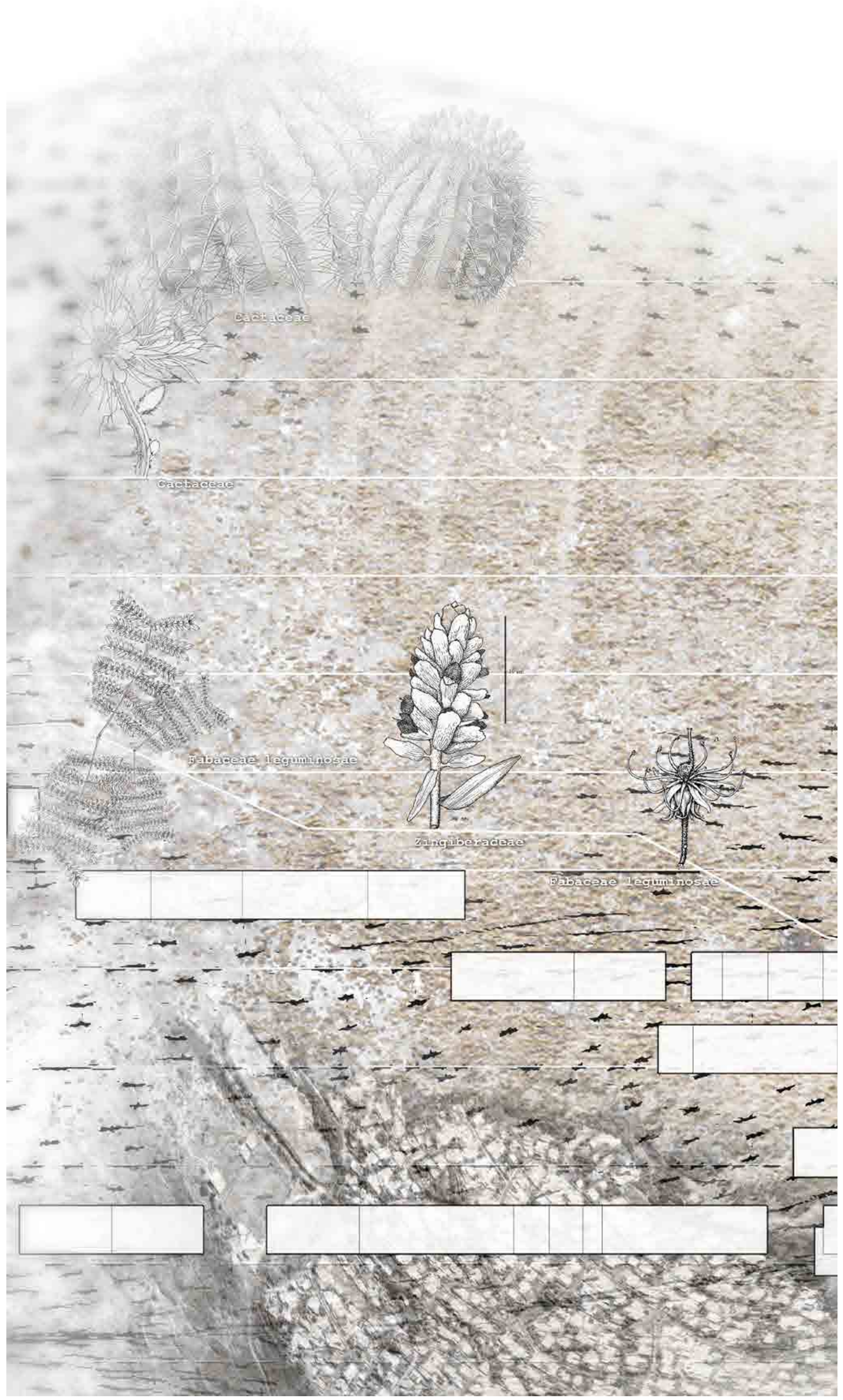


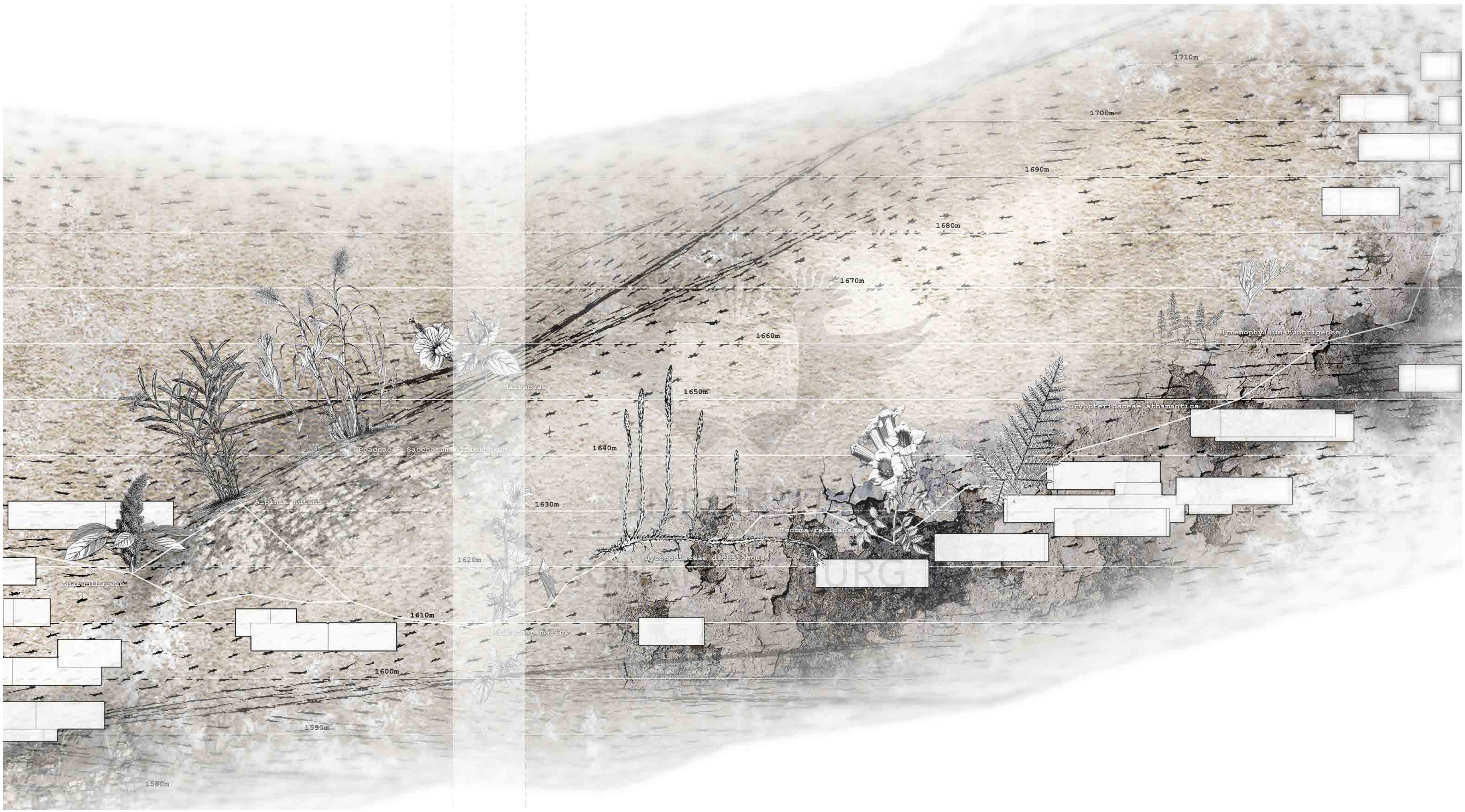


H7 / H11 / H13
N6
H4
N2
N1
Greater Shearwaters in the Atlantic: 2009
Brier
Campo bello
Ross
Manan
Machias
Kent
Frye
Bliss
Spectacle
Albatrosses
Ruppiaceae Ruppia maritima L. RE
Orchidaceae Nervilia simplex (Thouars) Schltr. M RE
Orchidaceae Aeranthes caudata Rolfe RE
Orchidaceae Angraecum palmiforme Thouars M RE
Orchidaceae Disperis discifera H. Perrier RE
Orchidaceae Nervilia bicarinata (Blume) Schltr. RE
Asteraceae Adenostemma mauritianum DC. RE
Asteraceae Launaea sarmentosa (Willd.) Schultz RE
Goodeniaceae Scaevola plumieri (L.) Vahl Manioc marron du bord de mer RE
Caryophyllaceae Cerastium indicum Wight et Arn. RE
Myrsinaceae Badula crassa A. DC. M RE
Fabaceae Alysicarpus vaginalis (L.) DC. RE
Fabaceae Clitoria heterophylla Lam. RE
Fabaceae Desmodium salicifolium (Poir.) DC. RE
Fabaceae Mucuna gigantea (Willd.) DC. RE
Hymenophyllaceae Hymenophyllum balfourii Baker M RE
Phyllanthaceae Sauropus bacciformis (L.) Airy Shaw RE
Malvaceae Hibiscus liliiflorus Cav. Fleur de St Louis M RE
Malvaceae Urena sinuata L. Hérisson rouge RE
Ophioglossaceae Ophioglossum convexum J.E. Burrows RE
Ophioglossaceae Ophioglossum lancifolium C. Presl RE
Cyperaceae Mariscus sumatrensis (Retz.) J. Raynal RE
Poaceae Pseudolasiacis leptolomoides (A. Camus) A. Camus RE
Aspleniaceae Asplenium bipartitum Bory ex Willd. RE
Aspleniaceae Asplenium gemmiferum Schrad. RE
Aspleniaceae Asplenium inaequilaterale Willd. RE
Aspleniaceae Asplenium sandersonii Hook. RE
Blechnaceae Stenochlaena tenuifolia (Desv.) Moore RE
Dennstaedtiaceae Dennstaedtia anthriscifolia (Bory ex Willd.) T. Moore RE
Dennstaedtiaceae Hypolepis sparsisora (Schrad.) Kuhn RE
Dennstaedtiaceae Microlepia speluncae (L.) T. Moore RE
Dryopteridaceae Megalastrum lanuginosum (Willd. ex Kaulf.) Holttum RE
Lindsaeaceae Lindsaea heterophylla Dryand. RE
Lindsaeaceae Lindsaea repens (Bory) Thwaites RE
Lomariopsidaceae Lomariopsis cordata (Bonap.) Alston RE
Lomariopsidaceae Lomariopsis variabilis (Willd.) Fée M RE
Oleandraceae Nephrolepis acutifolia (Desv.) H. Christ RE
Polypodiaceae Grammitis pygmaea (Mett. Ex Kuhn) Copel. RE
Polypodiaceae Microgramma lycopodioides (L.) Copel. RE
Thelypteridaceae Amauropelta oppositiformis (C. Chr.) Holttum RE
Thelypteridaceae Pseudocyclosorus pulcher (Bory ex Willd.) Holttum RE
Rhamnaceae Gouania tiliifolia Lam. M RE
Marsileaceae Marsilea sp.1 RE
Meliaceae Turraea rutilans (Sm.) Bosser M RE
Fabaceae Indigofera diversifolia DC. CR
Fabaceae Stylosanthes fruticosa (Retz.) Alston CR
Fabaceae Tephrosia pumila (Lam.) Pers. CR
Apocynaceae Camptocarpus mauritianus (Lam.) Decne. Liane café CR
Apocynaceae Carissa spinarum L. Bois amer CR
Apocynaceae Tabernaemontana persicariifolia Jacq. Bois de lait M CR
Rubiaceae Pyrostria commersonii J.F. Gmel. Bois mussard R CR
Rubiaceae Spermacoce flagelliformis Poir. M CR
Lamiaceae Clerodendrum heterophyllum (Poir.) R. Br. Bois de chenilles M CR
Lamiaceae Lepechina chamaedryoides (Balb.) Epling CR
Riviere du mat
Seychelles
East African Coastal Current
Zanzibar
INDIAN OCEAN
AFRICA
Comoros
Angoche
Tromelin
South Equatorial Current
Airborne seed

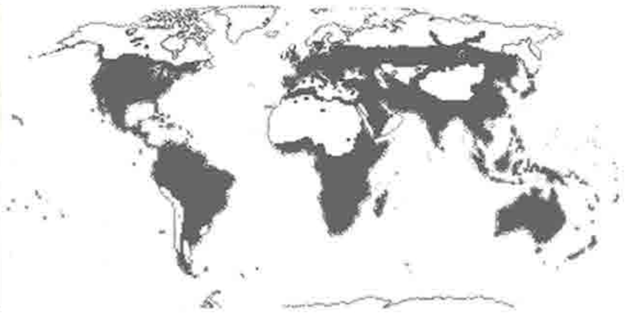
The early specie settlers - Hell-bourg, Salazie

Section through Hell-bourg investigating the invasive take over from 'colonising' cultivation species. The natural flora consists of highly-guarded 'endemic' species to be given sanction in this region from the 'invasives'.



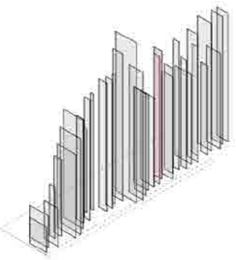


1710m
1700m
1690m
1680m
1670m
Hymenophyllum tunbrigense 2
1660m
Malvaceae
1650m
Dryopteridaceae athamantica
Poaceae - Saccharum officinarum
1640m
Alpinia nutans
1630m
Tecoma radicans
1620m
Lycopodiaceae dichotomous
Amaranthaceae
1610m
mallow
1600m
1590m
1580m



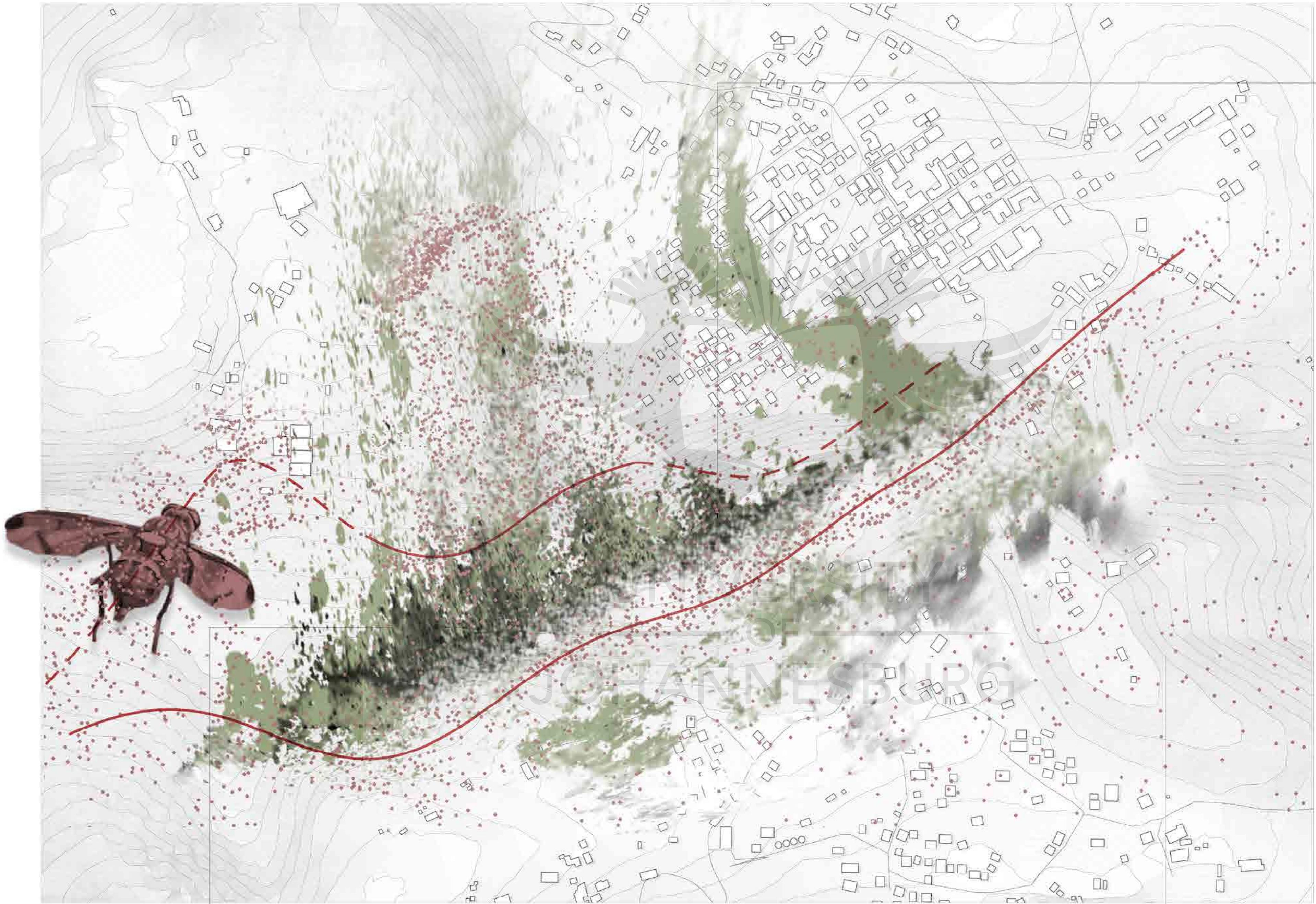
Invasive alien bird, the red-whiskered bulbul Pycnonotus jocosus introduced to Reunion Island

History of Spread
L. robustum subsp. walkeri was introduced to Mauritius in the late 1800s through botanical exchanges between Peradeniya Botanical Garden, Sri Lanka and Curepipe Botanical Garden, Mauritius. It was planted as a hedge in 1895 (Rouillard and Guého, 1990) and was actually propagated in native forests by P. Koenig, the Director of Forests and Gardens, in order to outcompete another invasive species Rubus alciefolius (Anon., 1903; Brouard, 1963). It was also promoted as an excellent plant for establishing in the plantations and gardens of the island (Gleadow, 1904) and for firewood (Sale, 1935).



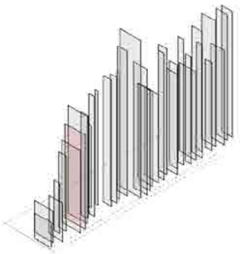
Anacardiaceae-Schinus terebinthifolius

Competes with and has the potential to replace indigenous species. Poisonous and irritant. Indigenous birds could neglect the dispersal of indigenous plants as a consequence of their preference for the fruits of this alien species

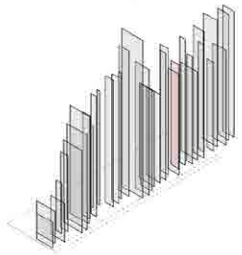


Degrees of Invasion
-Natural
-Unnatural

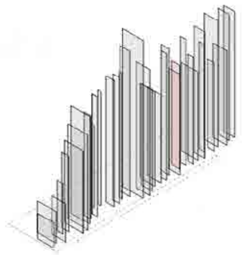
The most threatening plant invaders are the trees Psidium cattleianum and Ligustrum robustwn, the bramble Rubus alceifolius, the shrubs Fuchsia magellanica and Lantana camara, and the herbaceous Hedychium gardnerianum, Boehmeria macrophylla, and Boehmeria penduliflora.



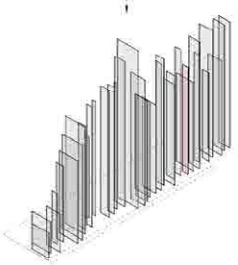
Myrtaceae-Psidium Guajava



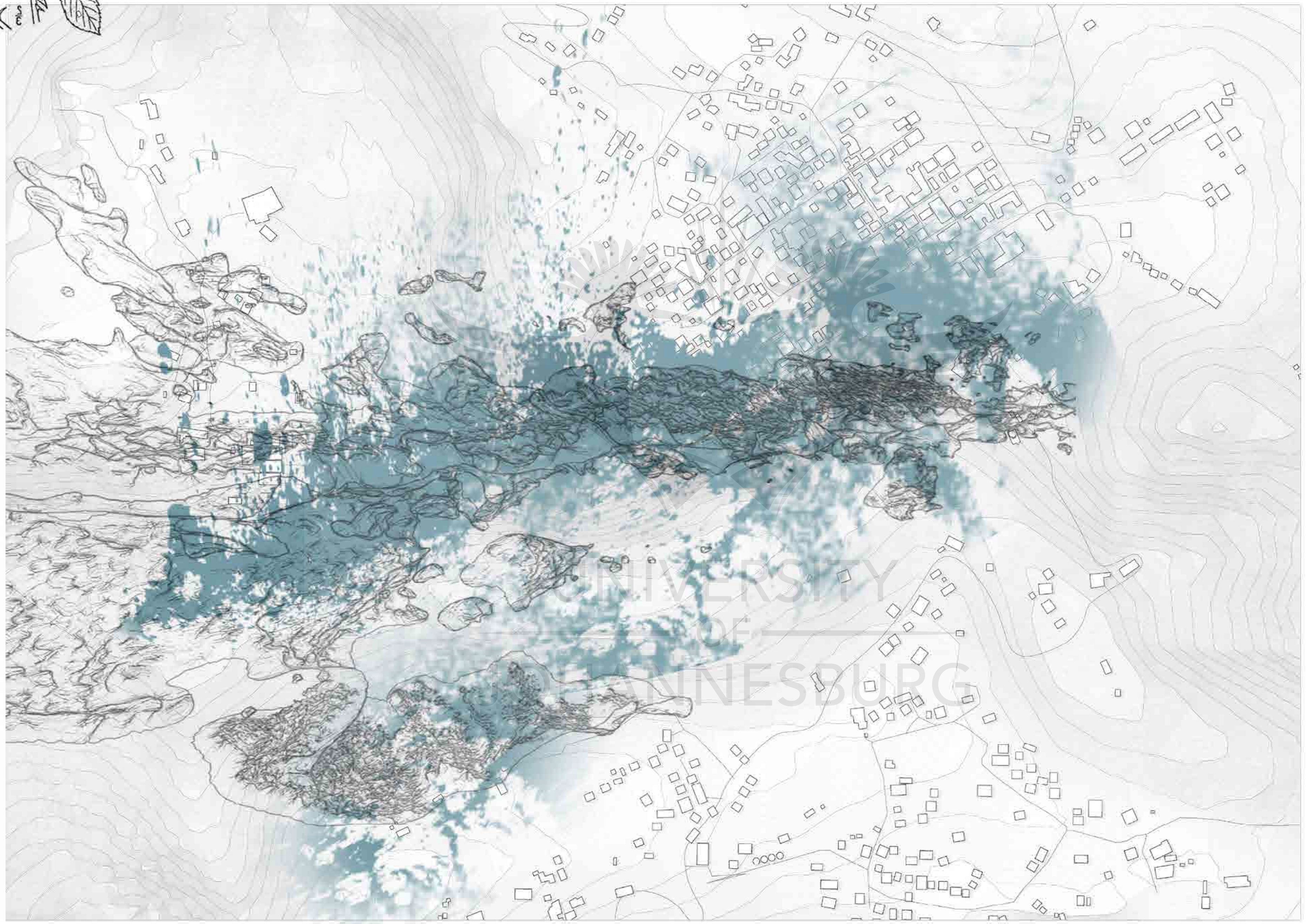
Oleaceae-Ligustrum robustum

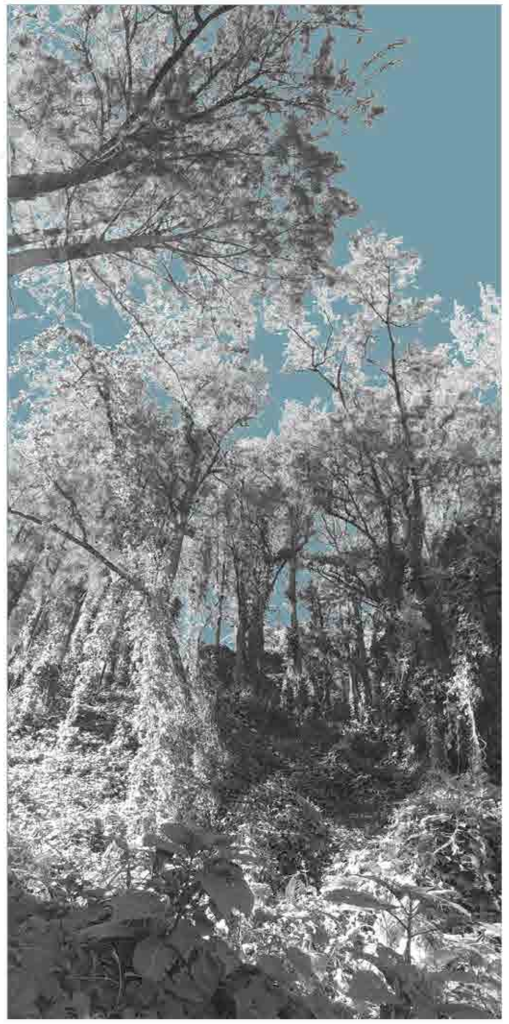


Onagracea-Fuchsia magellanica



Zingiberaceae-Hedychium gardnerianum

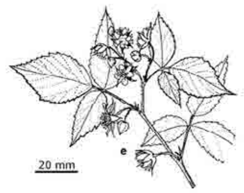


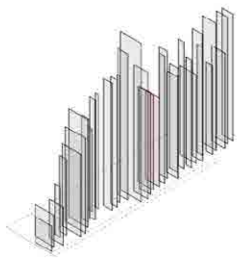


Forest Canopy as a Factor

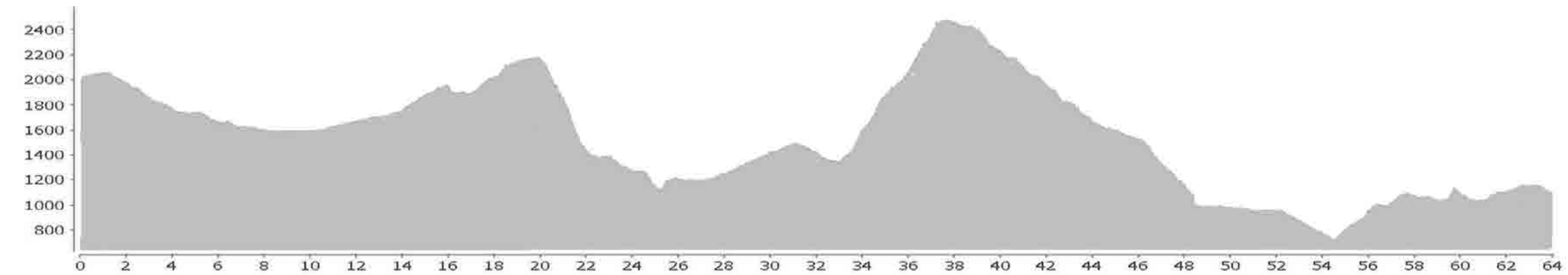
In the 12 000-m2 study area, alien plants occupied 24.9% of the area of gaps, which represented 5.62% of the forest area, but only 0.8% of the understorey area. The most abundant invasive species was Rubus alceifolius, which formed dense, monospecific stands in the largest gaps (> 25 m2). Although plants could persist in the shade, a germination experiment revealed that canopy openings were essential for seedling establishment. A cyclone that struck the study area in 2002 caused a temporary thinning of the canopy, increasing light levels to above the threshold needed for germination of R. alceifolius and also stimulating the growth of established plants. We conclude that the ability of this and other alien species to colonize intact lowland tropical rain forest is strongly influenced by the prevailing gap dynamics.

Various Colonising Species on Site

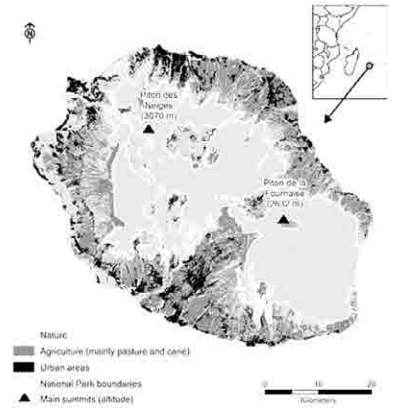


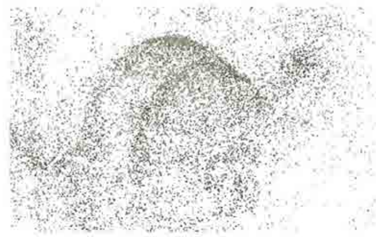


Rosaceae
Rubus alceifolius



70 Future Projections



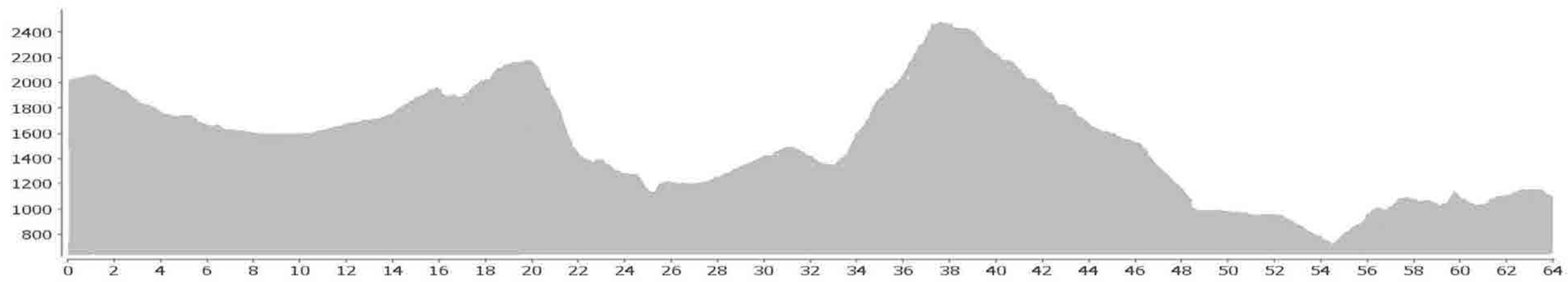



Sugar Water

Master Control

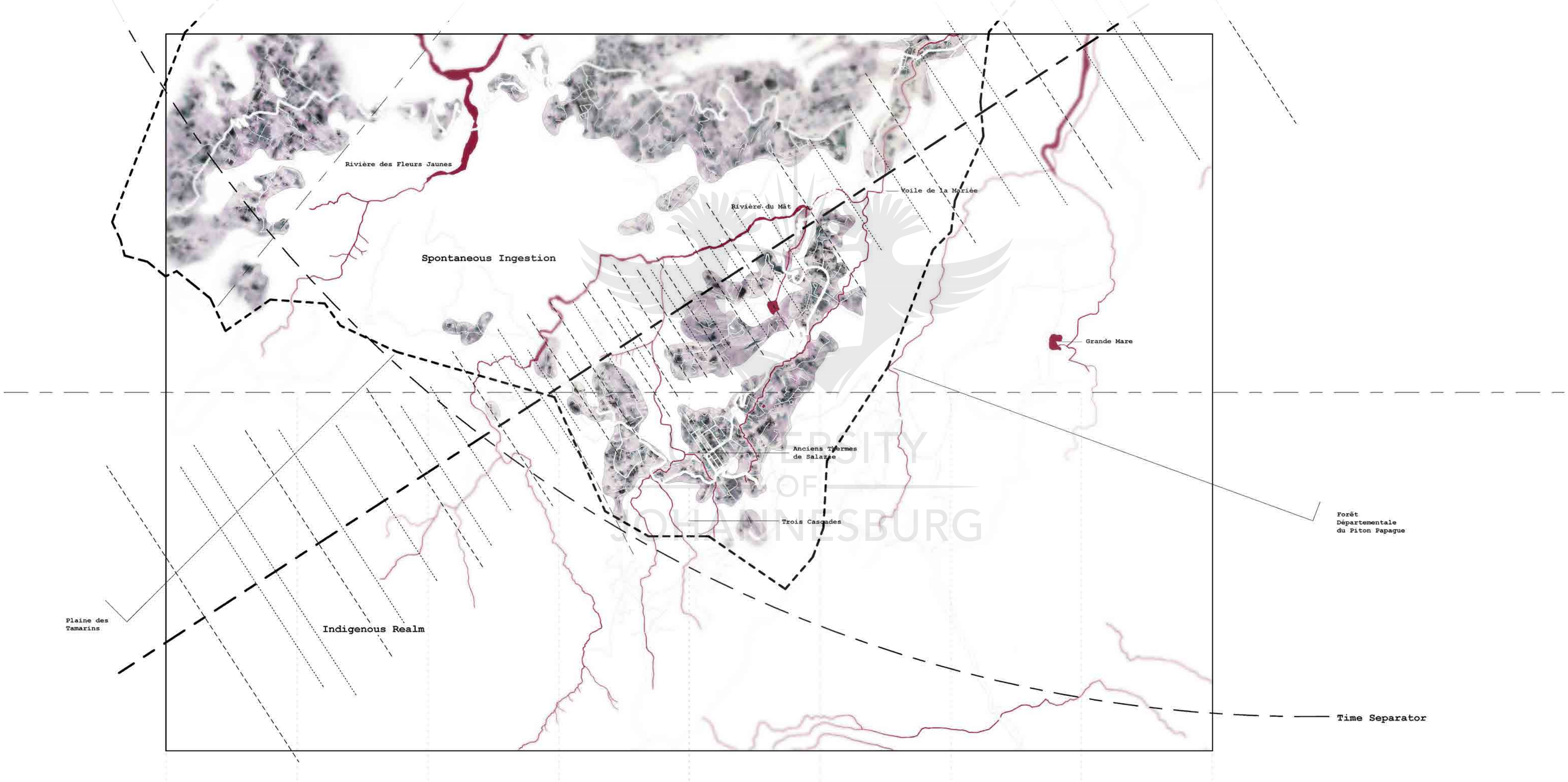

Alkaline Additive


Water Control



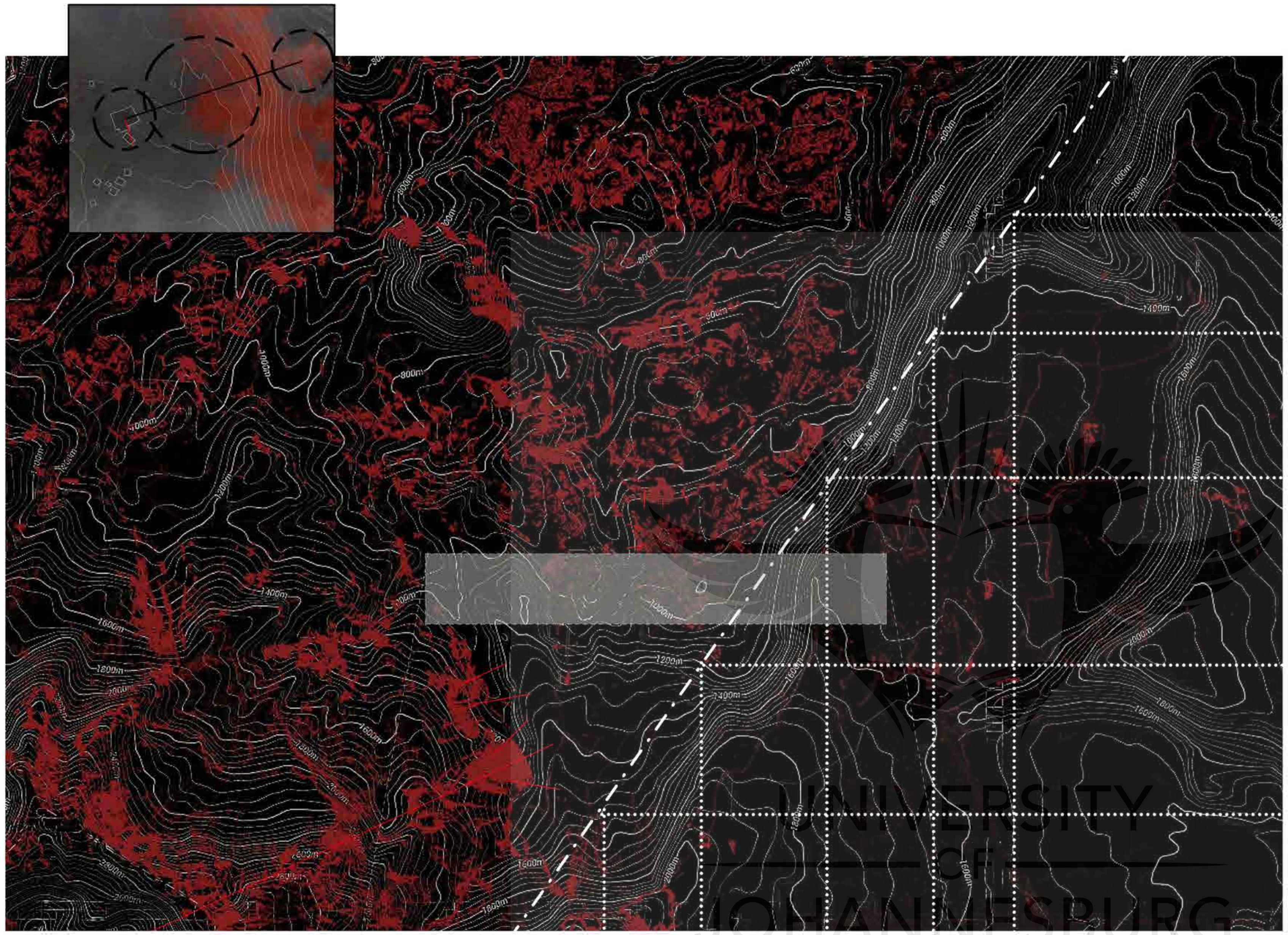
Future Projections

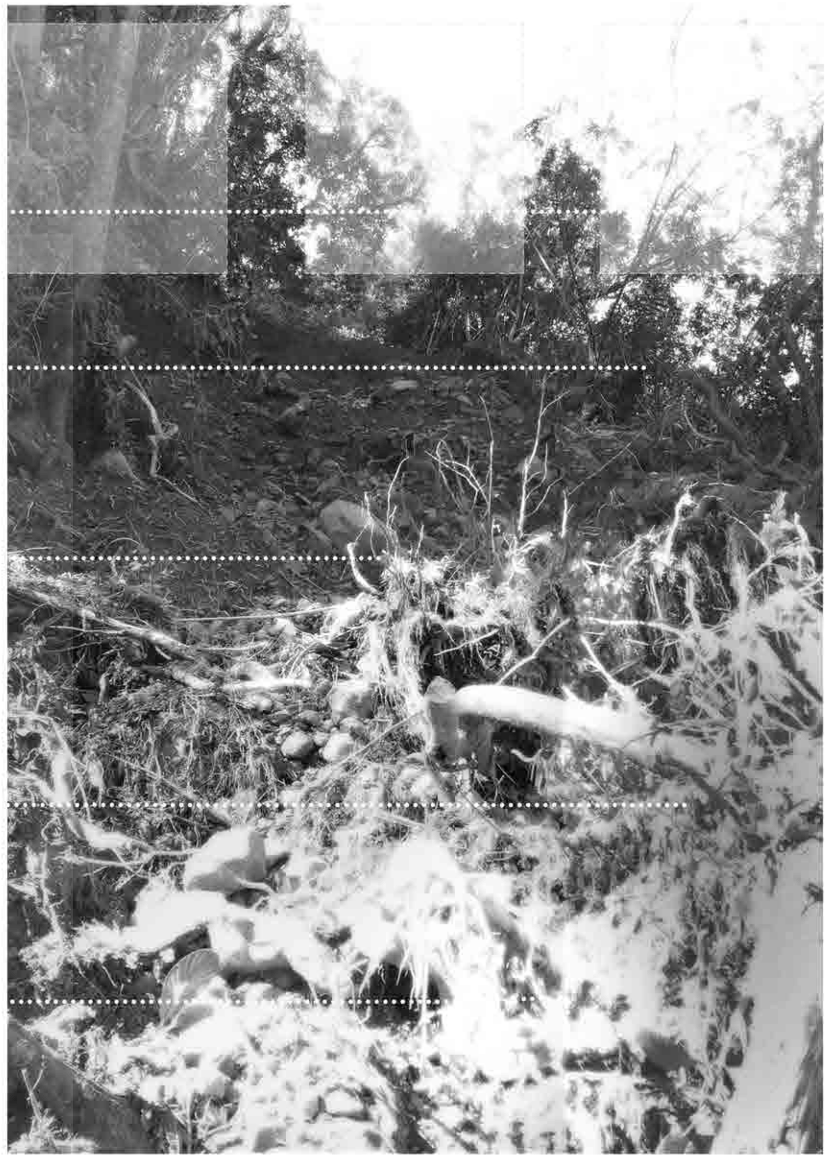
Sovereign Horticulture Impacts

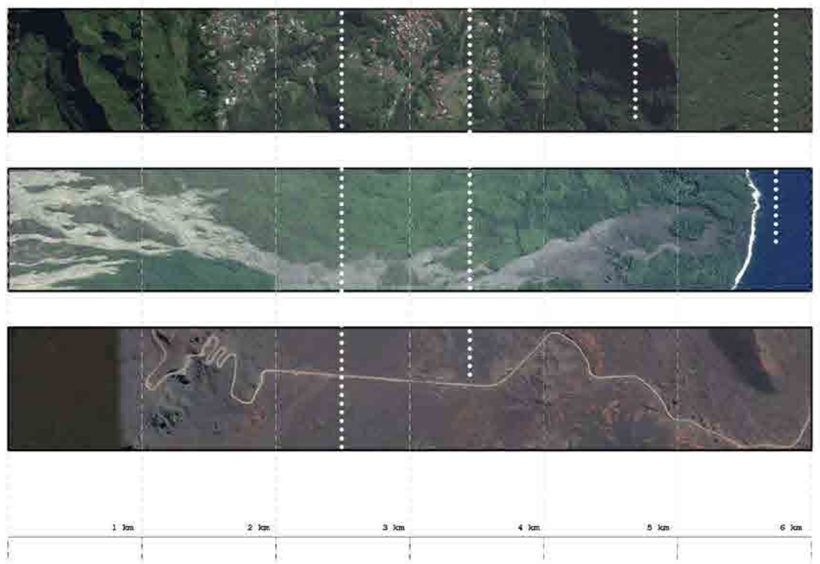


Site Ingestion

Réunion is a region which is completely hybrid – in its geology and topography, in its seasonal shifts and cycles, and in its fauna and flora habitats and inhabitants.

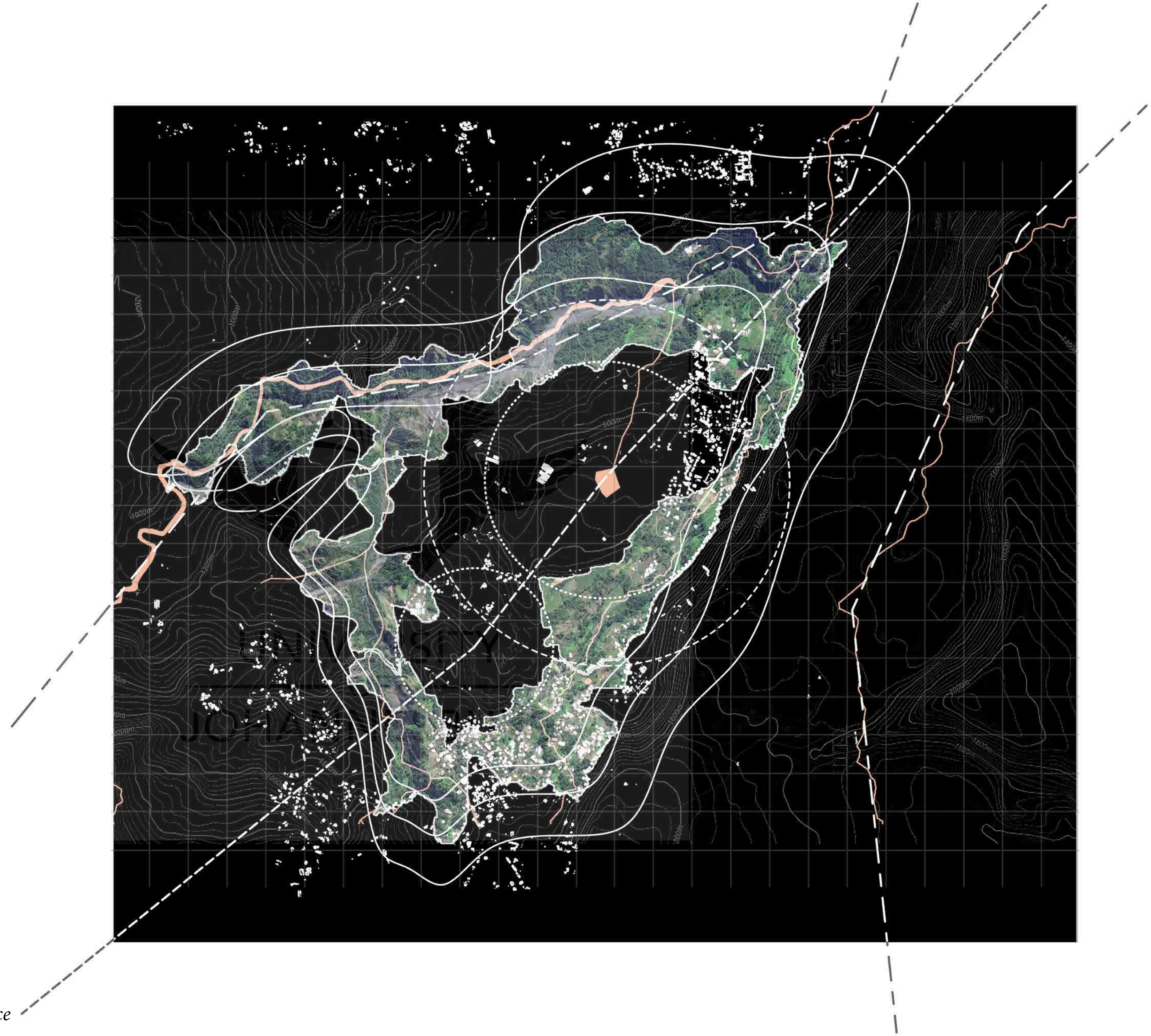






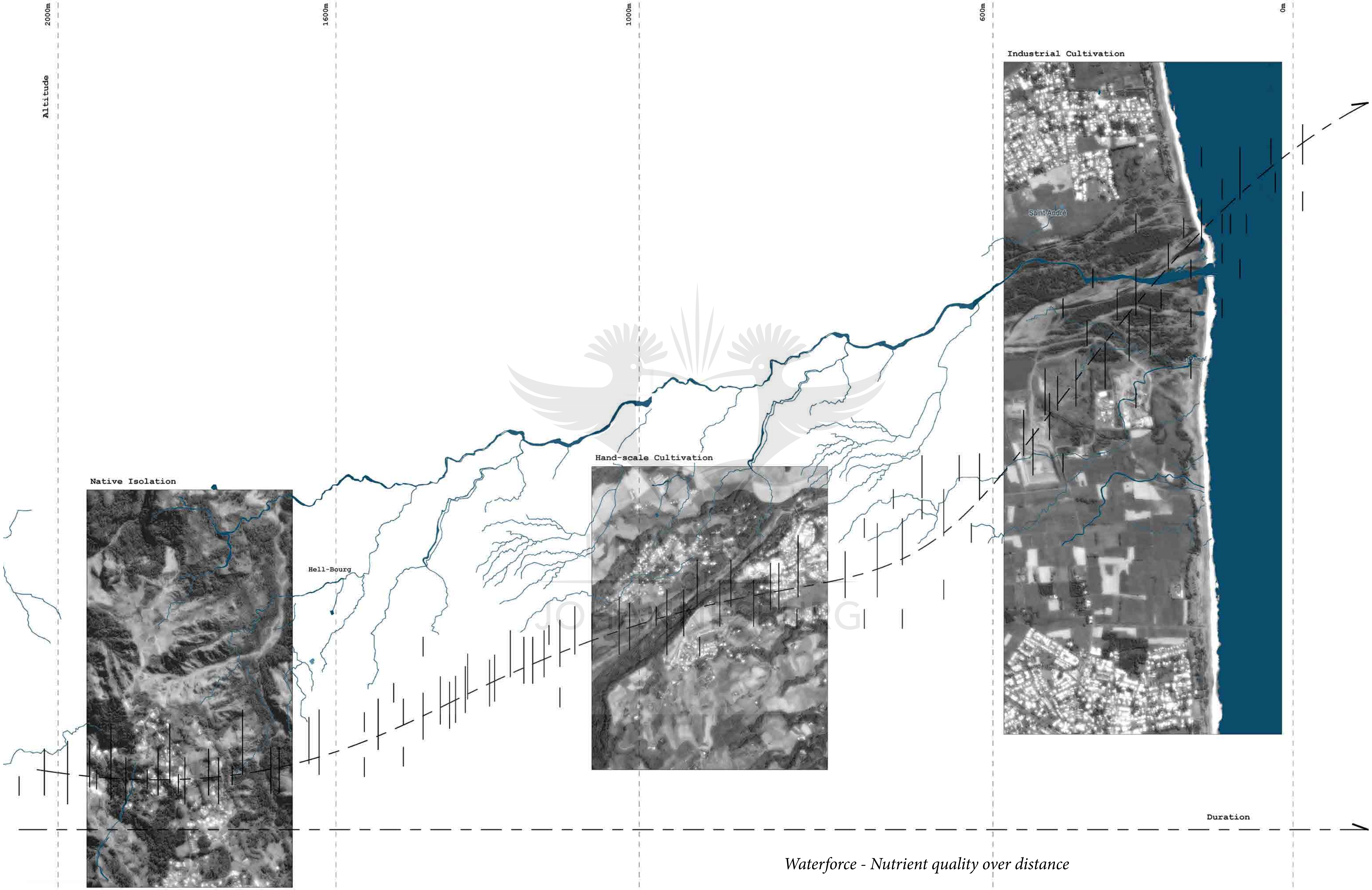
Erosion -Vulnerable Landscapes

Eroding soil condition analysis investigates the relations of cultivation to areas of vulnerability.



Interior Horticulture - Circle of convenience

Salazie's area of cultivation influence forms around a naturally formed crater, resulting in a radial behavior.

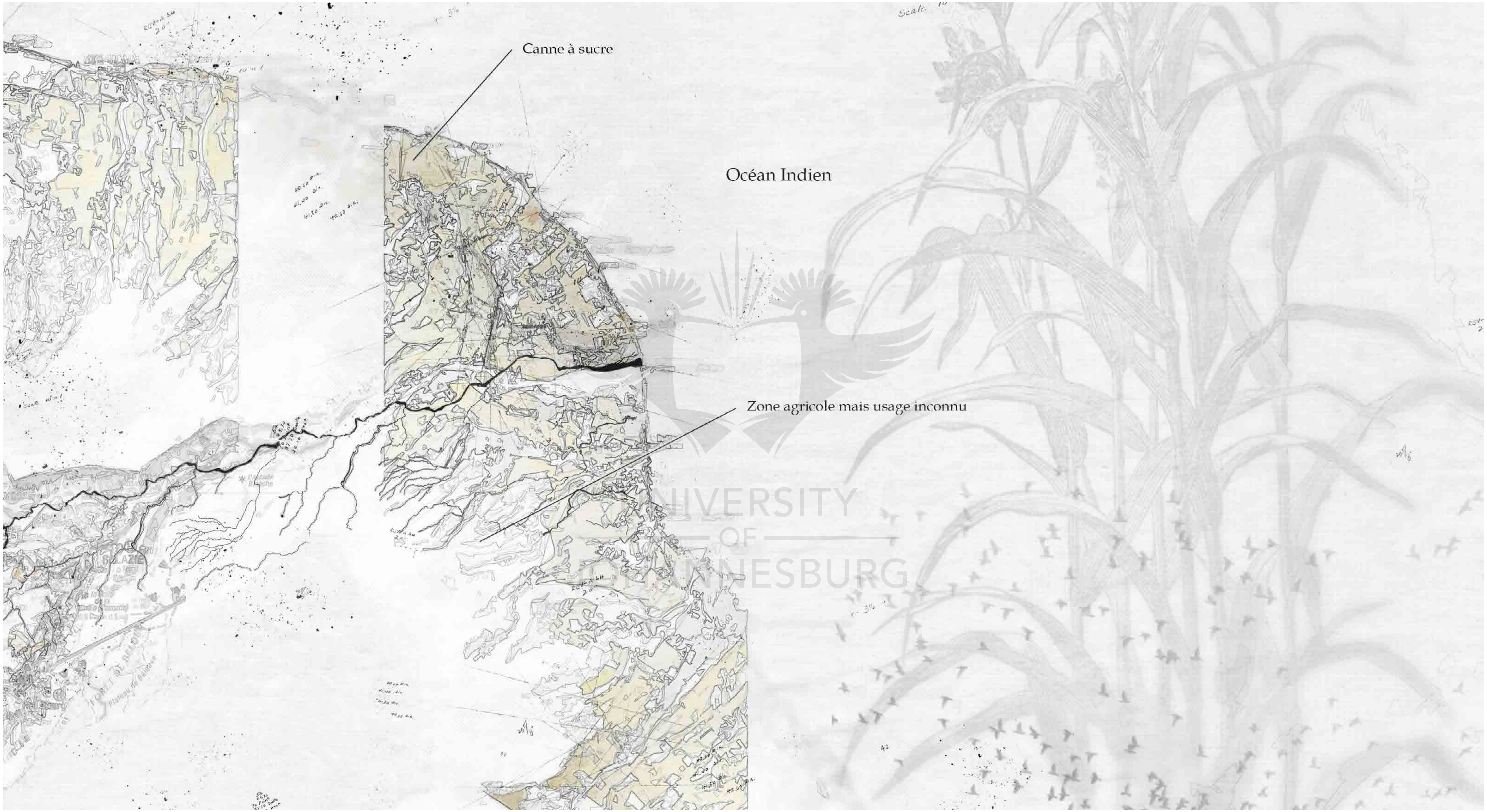


Waterforce - Nutrient quality over distance

Maturity of 'Rivière du Mât' from it's source in Salazie towards the East side of the island.

Terrain

Réunion is a volcanic island formed 6 million years ago. The terrain consists mostly rugged and mountainous with fertile lowlands along the coast line. An active volcano on the Southern part of the Island poses a threat to the road infrastructure.


Canne à sucre
Océan Indien
Zone agricole mais usage inconnu

Hosting the Gatekeeper

Requirements for water-based land invaders

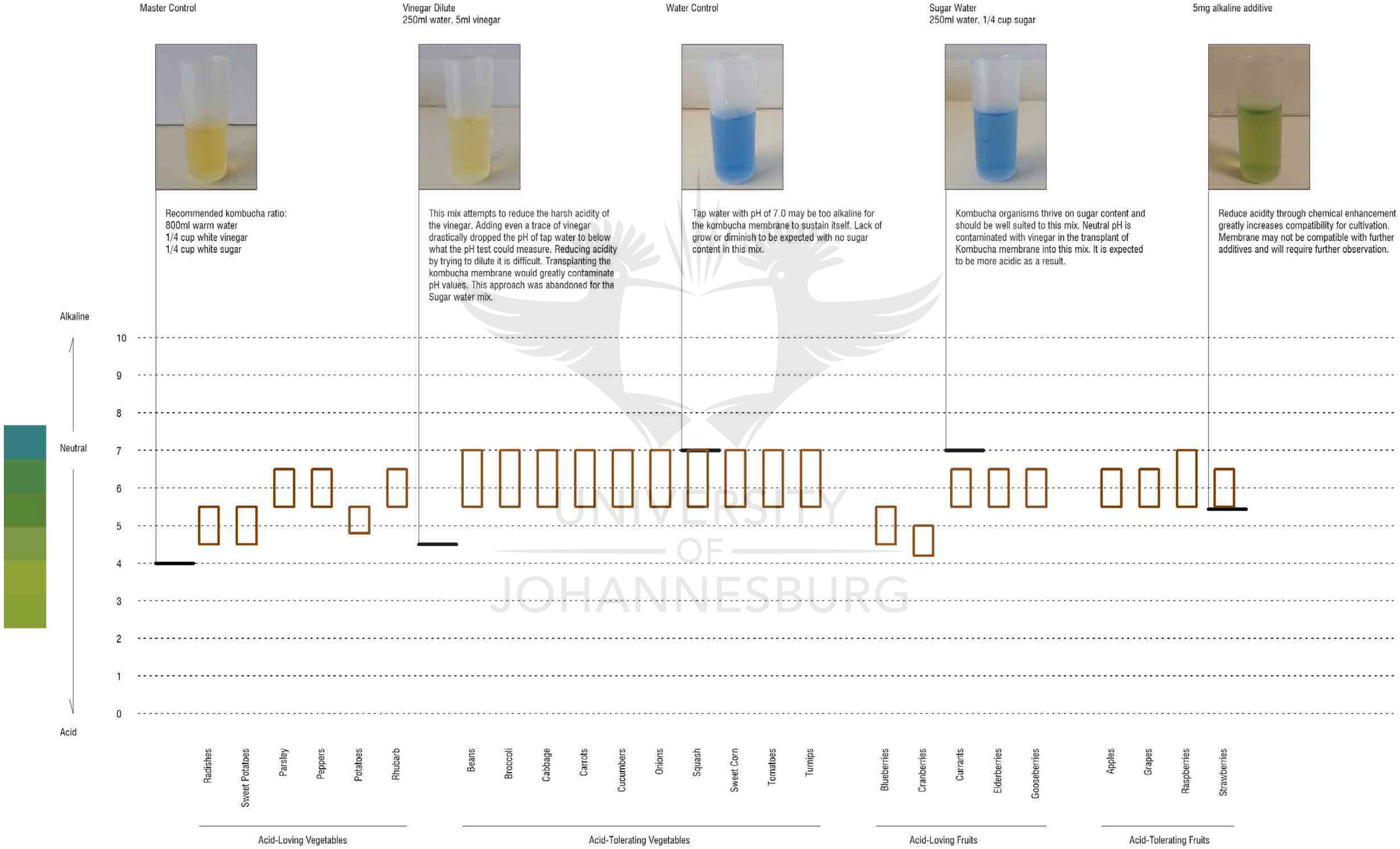
The first successful land invading plants had to tolerate an array of abiotic stresses i.e. soils devoid of life as well as high fluctuations of temperature, radiation, and desiccation (extreme dryness). These early land invading plants used algae as a common ancestor to bridge the water differences of marine and fresh water. From the perspective of plants transitioning from ocean onto land, water played a vital transitional resource but also limited the territories of plants dependent purely on water strategies.

Réunion island presents an optimal environment for the early land invaders with a tropical climate and annual rainfall average of 170mm with January being the wettest month with 379mm of rain (World Climate Guide. 2018). Geographically, the landscape peaks at 3069 meters above sea level catching cloud cover and providing a constant supply of condensation over the island.

Requirements - Soil pH as a gatekeeper to migrants

'pH' is measurement of Proton and Hydrogen ions in soil and is predominantly used to manage soil fertility for optimal plant productivity (Marschner. 1995). The pH of soil also has a notable effect on the physical structure, biological and chemical attributes of soil. The optimal pH level for plants is within the range of 6-7.5, however human activities and other environmental factors can alter the range of pH levels considerably. Soil pH is important in the way it alters the solubility of nutrients originating from organic and inorganic materials. Soils are an immediate source of plant nutrients, and while a fraction of these nutrients are offered in liquid form, the soil's texture, water content, structure and pH affects the behaviour of nutrients.

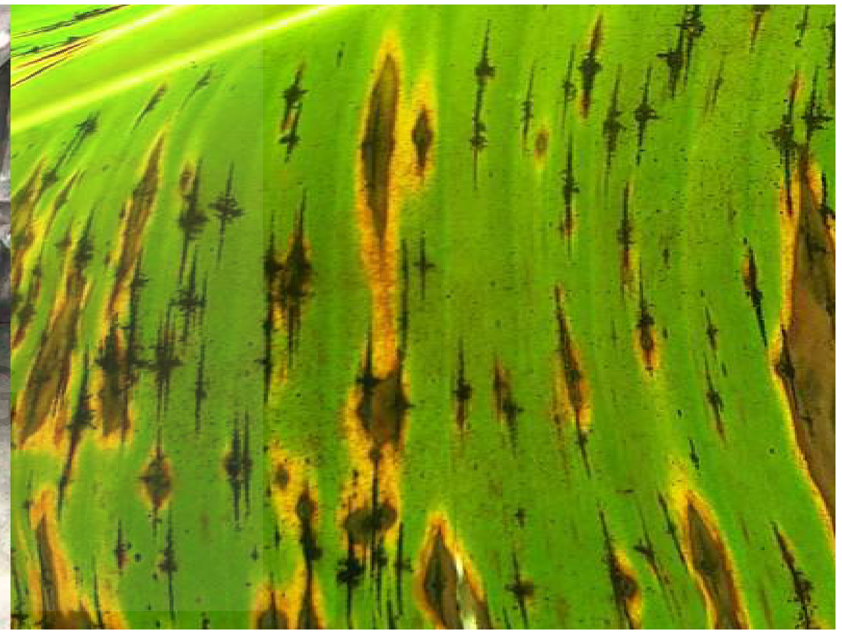
Landscape pH Status

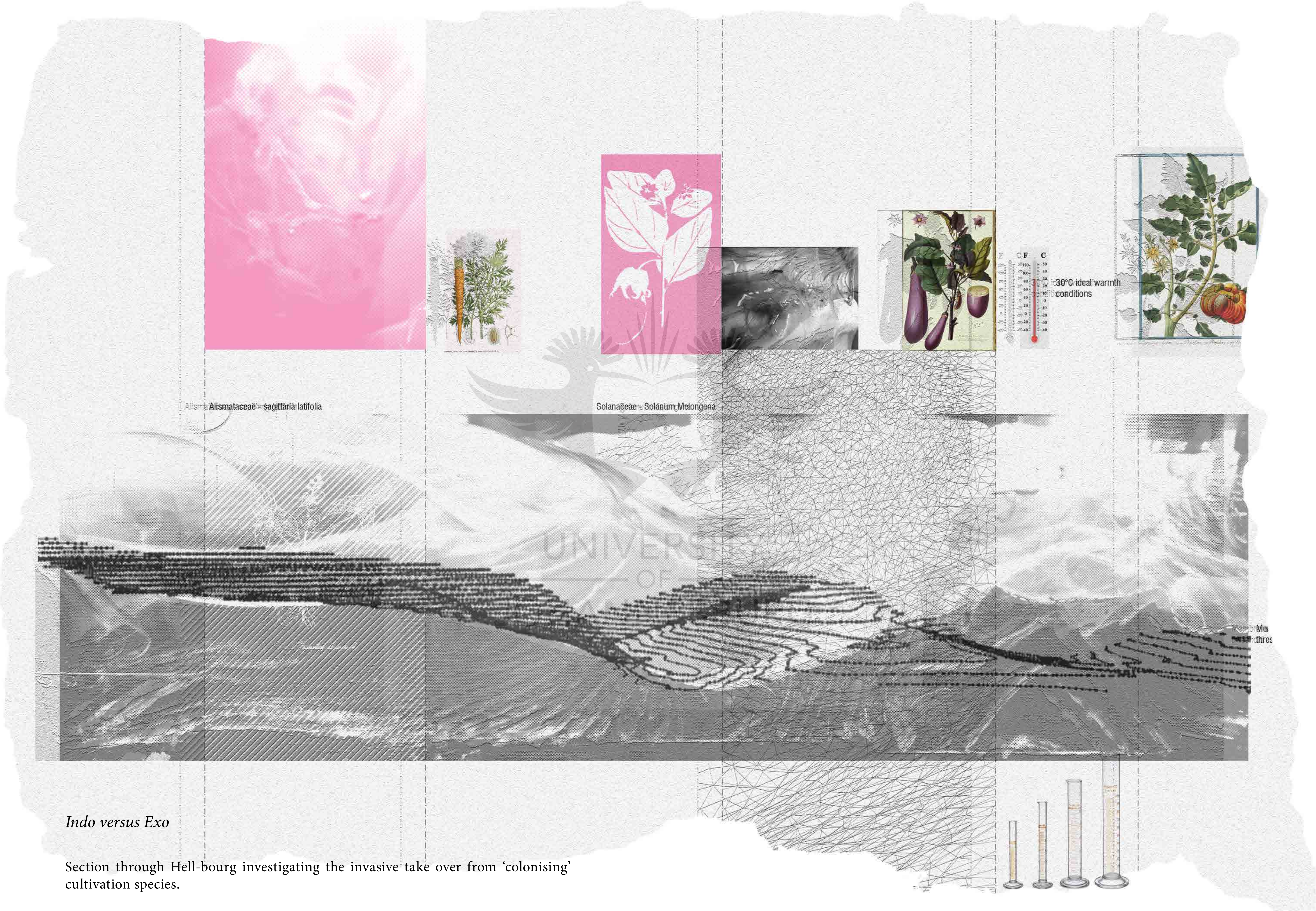


Requirements - Role of Iron for the arriving specie

The primary function of iron for plants is for photosynthesis. Even though iron is a minute resource for plants, species growing soils devoid of iron can suffer chlorosis (discolouration of the leaves) and stunted growth. High concentrations of iron become toxic and plants may secrete acids from their roots to lower the pH of the soil. Some symptoms plants exert when under stress from high iron concentration are stripping and bronzing of their leaves. According to researcher Molly Allman (2018) Tomatoes and basil are especially vulnerable to the toxicities of iron, and these species do not tolerate soils more acidic than a pH value of 5.8.





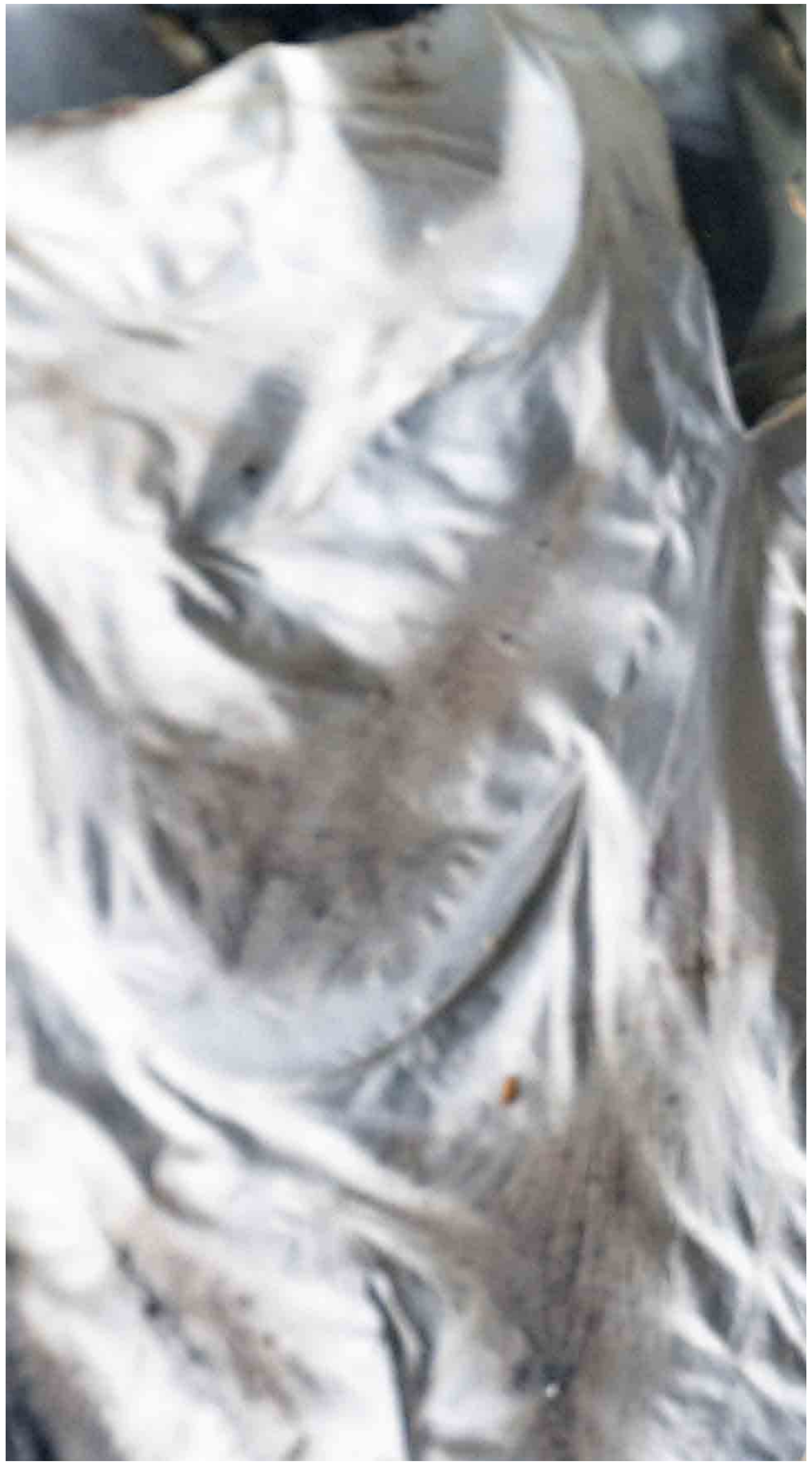


Indo versus Exo

Section through Hell-bourg investigating the invasive take over from 'colonising' cultivation species.

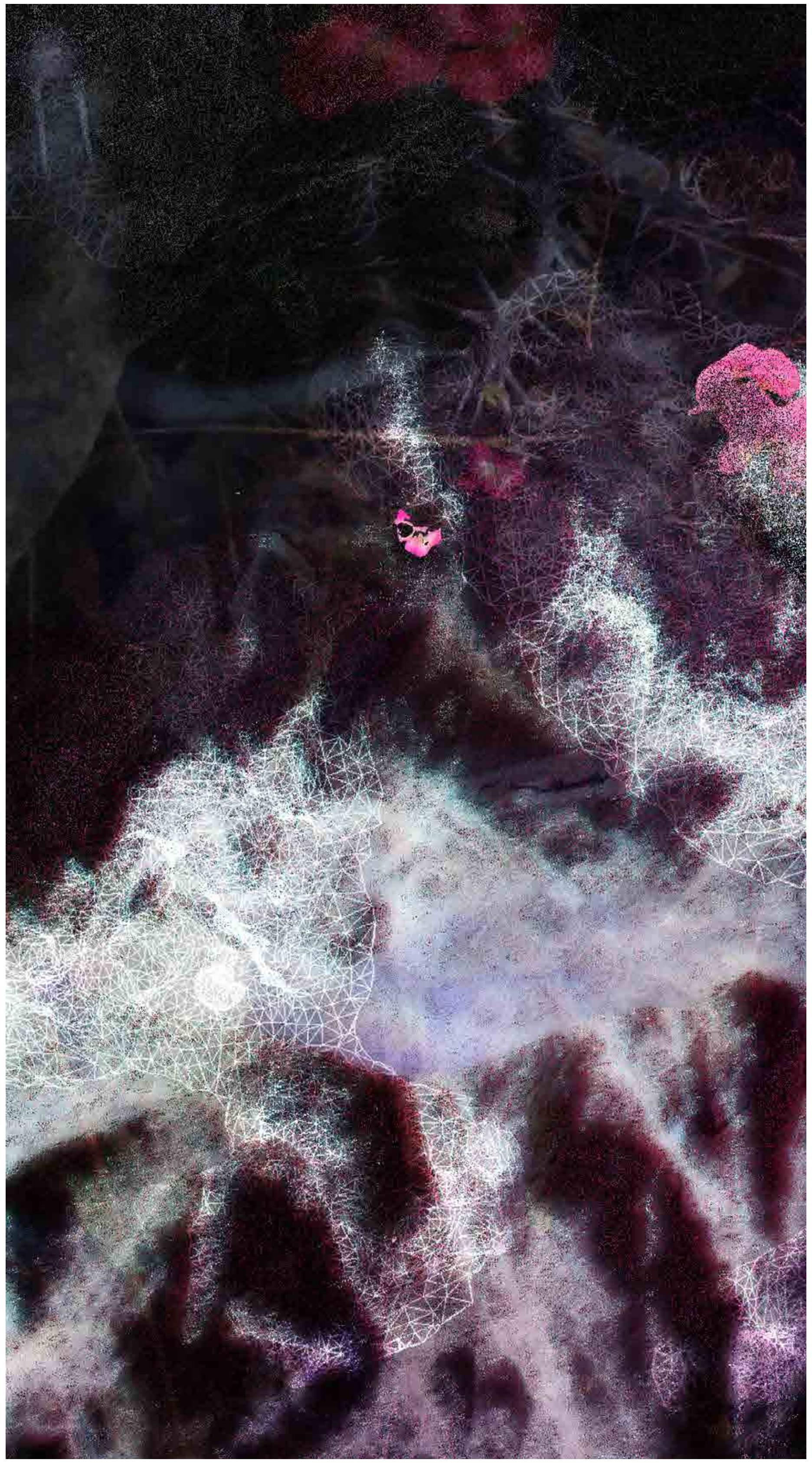
Salt Stress

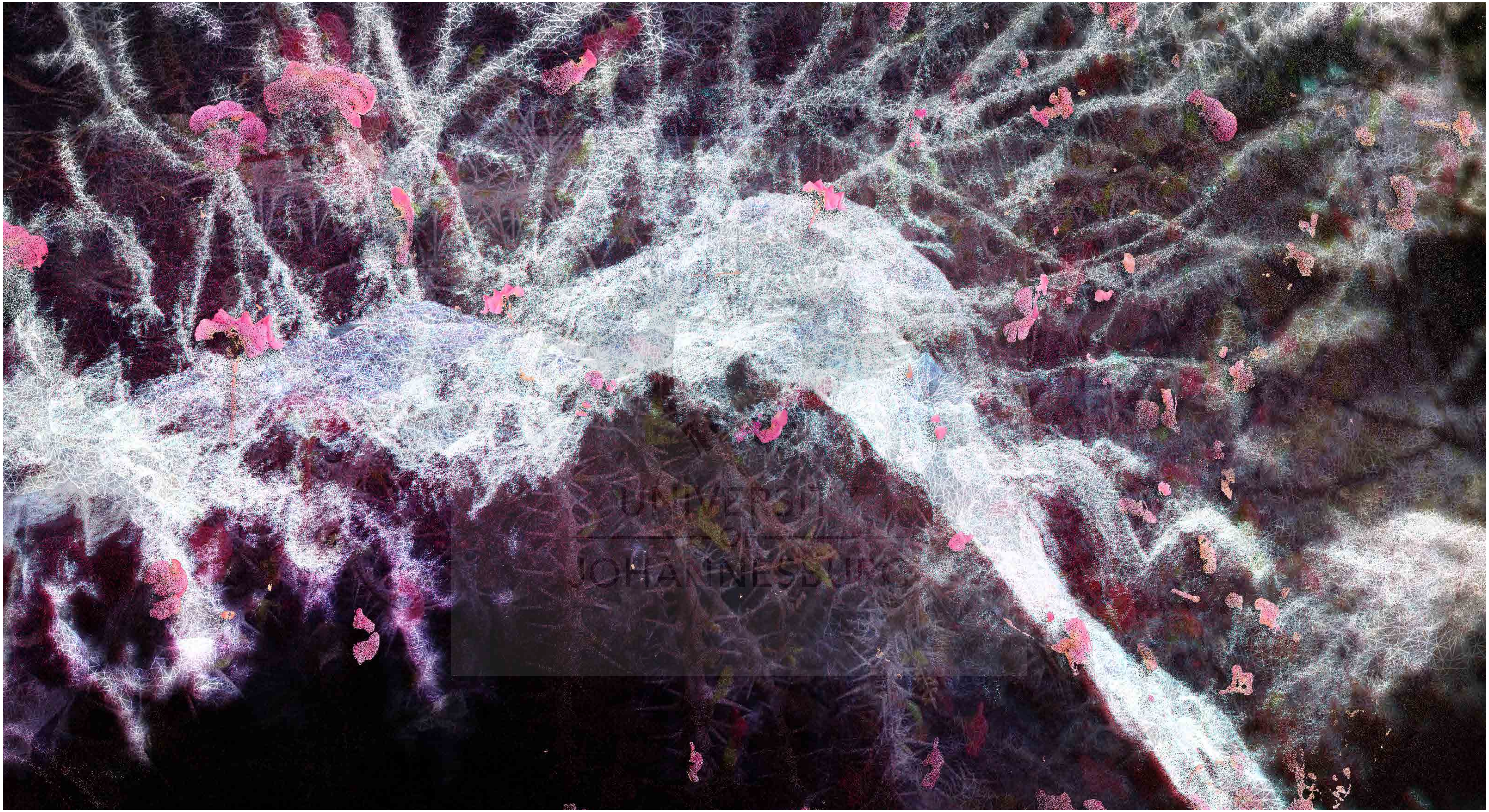
Plants can be categorised to be native or not in saline environments. Saline Natives are ‘halophytes’ while non-native are ‘glycophytes’ and use their distinct cellular processes to tolerate salty environments (Adams et al., 1998; Tester & Davenport, 2003). Horticultural species such as wheat and tomatoes share ancestry with glycophyte relatives putting them at a natural disadvantage to salt tolerance.



Herbicides

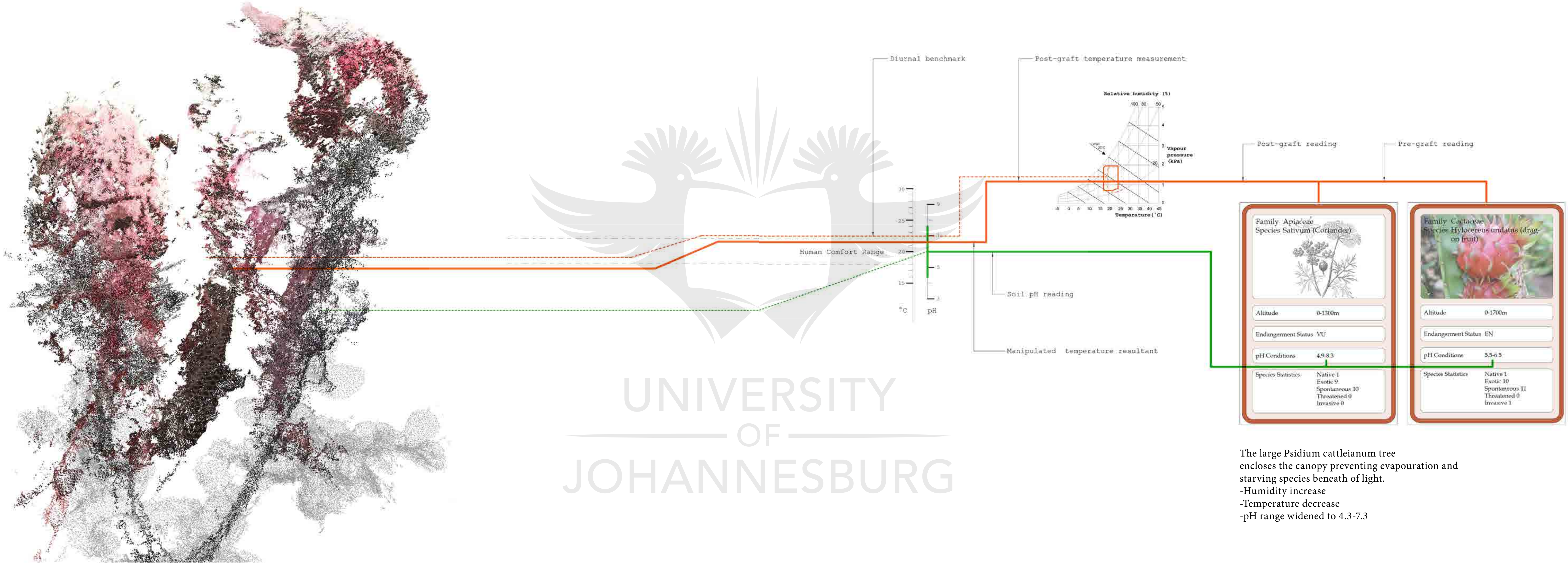
Herbicides are a deliberate stress imposed onto plants by humans. This is done using chemicals to eliminate 'unwanted' plants species within the ecosystem. Herbicides were initially discovered through the greenhouse screening of mass synthesised chemicals for the use of toxicity against plants. These chemicals were 'off-the-shelve' available to the public and allowed experimenting with chemicals targeting specific species. Weeds were therefore targeted through a trial and error approach (Mack et al., 2000).



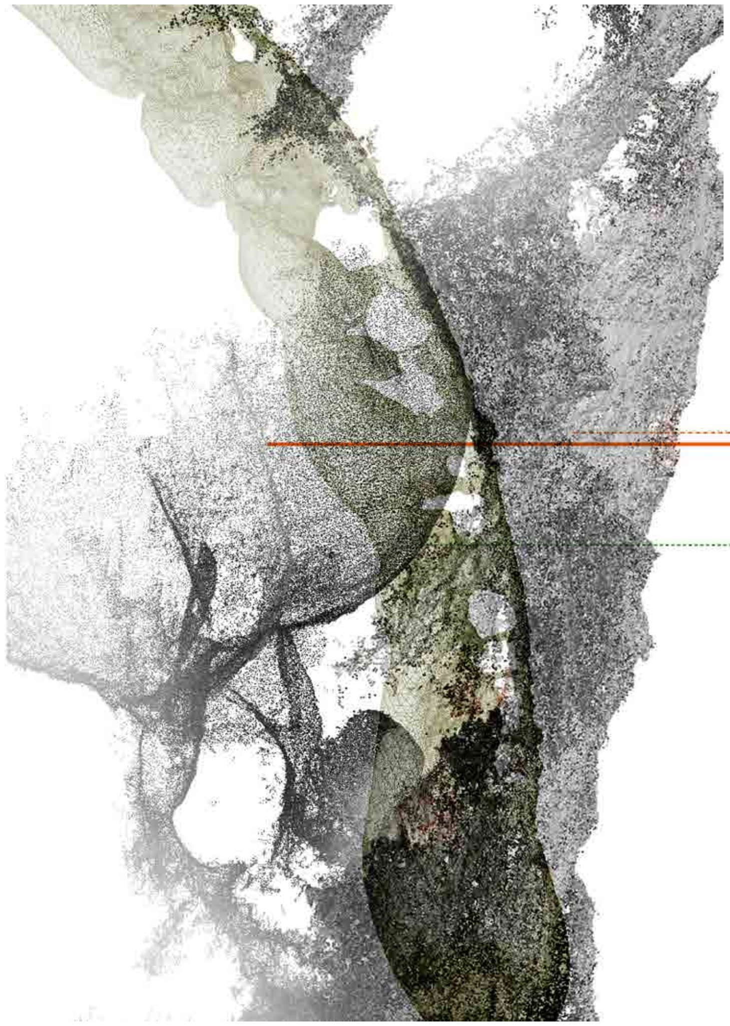


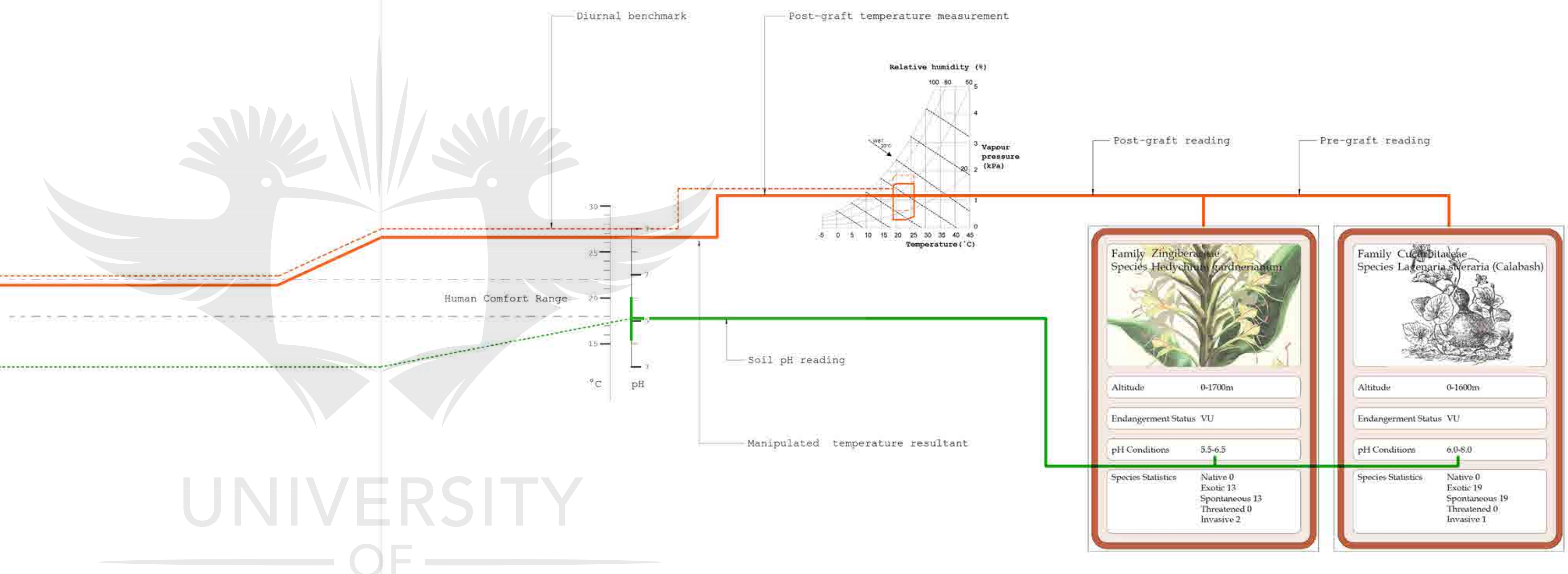
ALMANAC 3

Grafting Hybrid Species

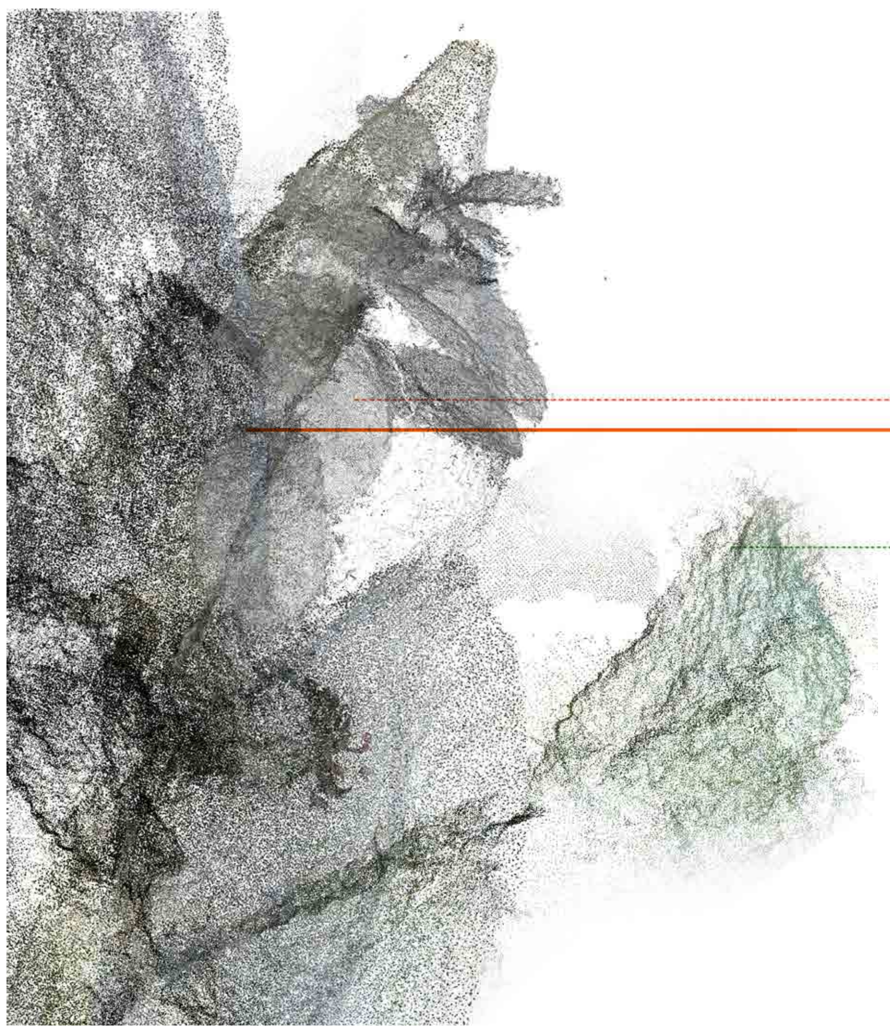


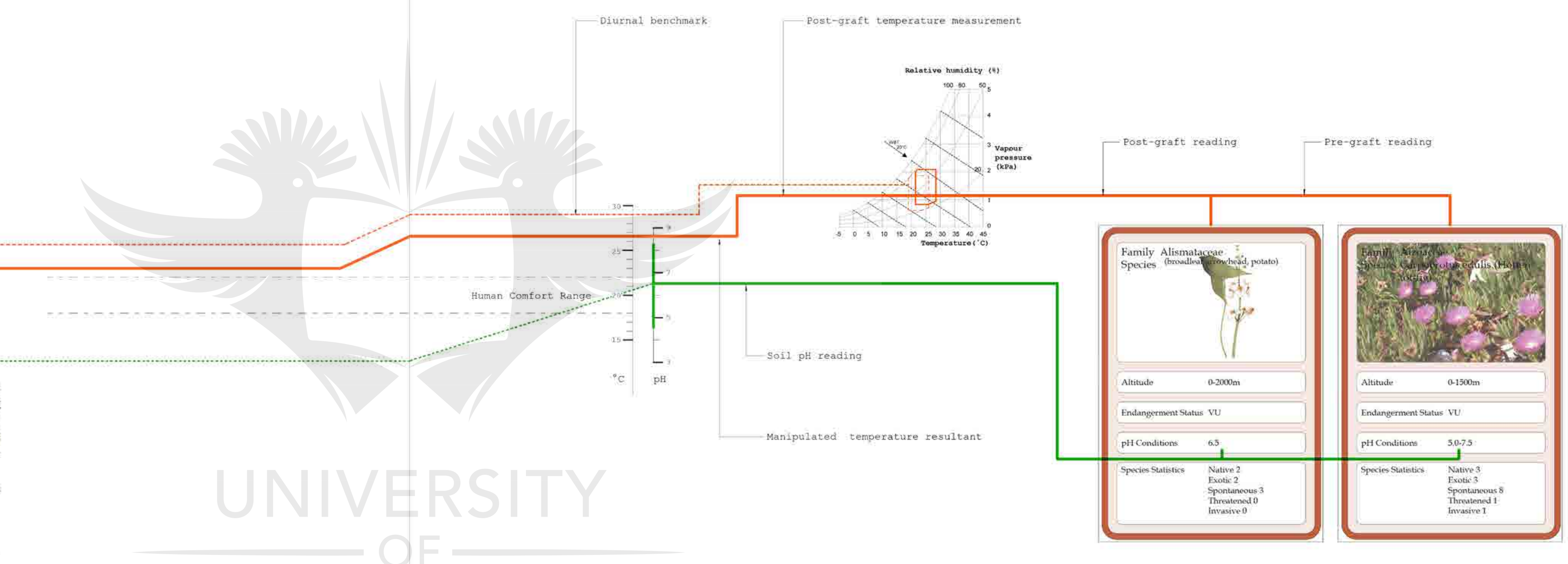
The large Psidium cattleianum tree encloses the canopy preventing evapouration and starving species beneath of light.
-Humidity increase
-Temperature decrease
-pH range widened to 4.3-7.3



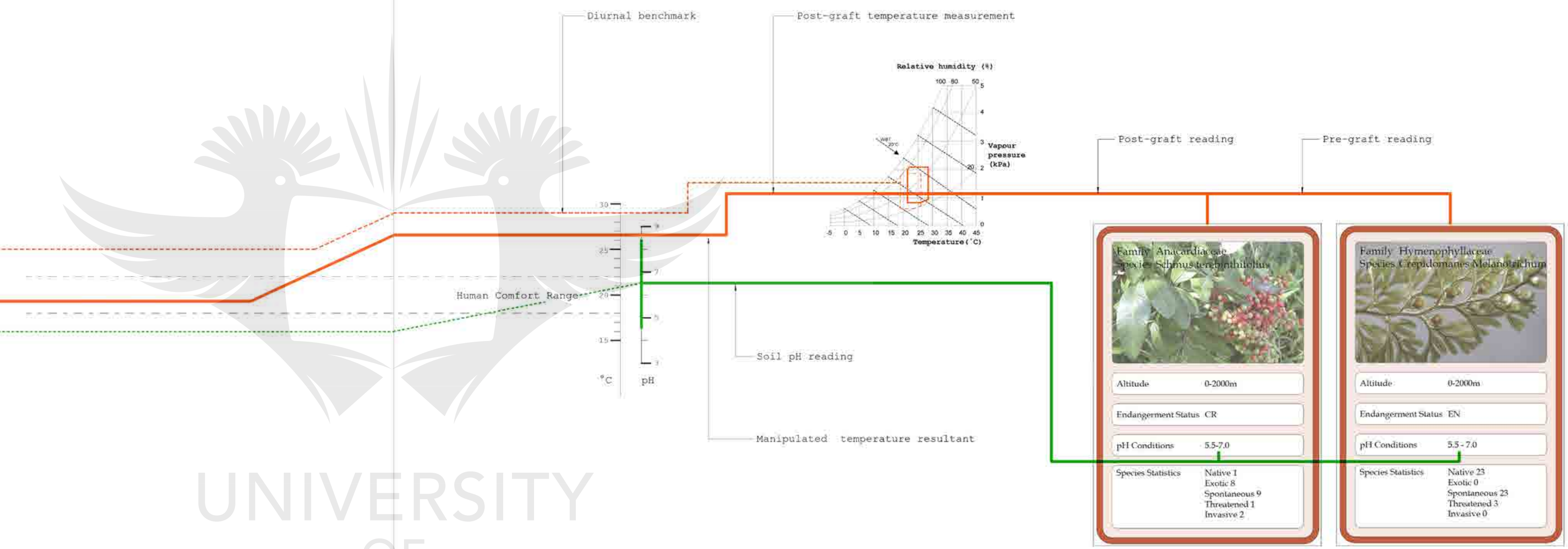


Highly invasive Boehmeria macrophylla tree dominates water resource and acidifies soil conditions making it difficult for other species to thrive.
-Humidity decrease
-Temperature unchanged
-pH 4.3-6.0



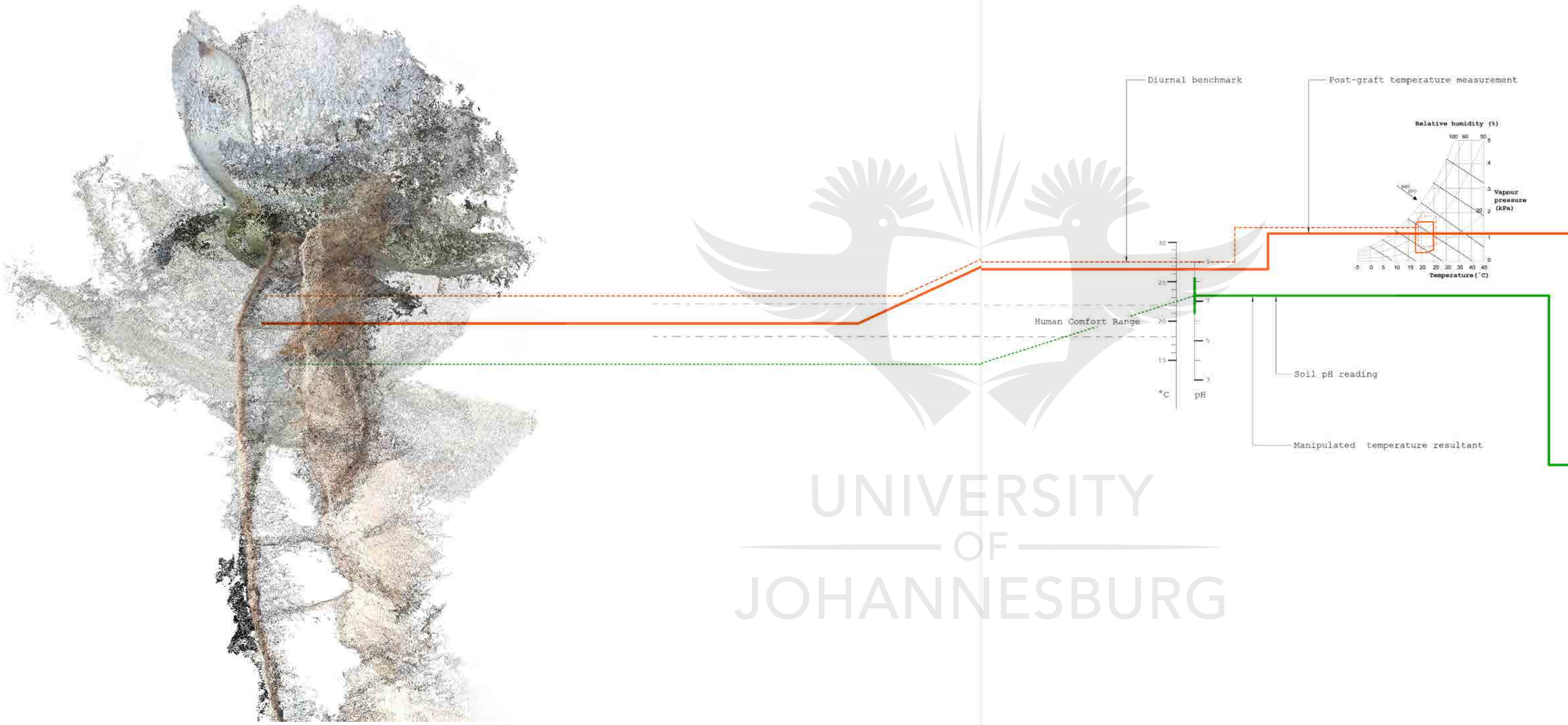


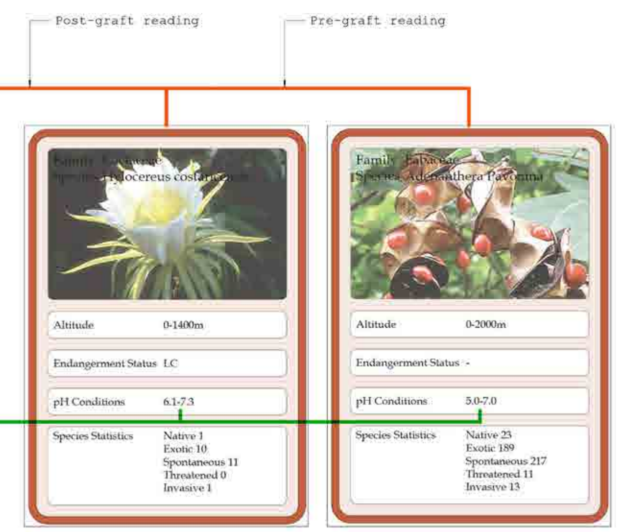
Psidium Guajava is a common invasive shrub from the Southern Americas. The larger leave surface area of the Clidemia hirta retains larger amounts of rainfall leaving the area more humid.
-Humidity increases
-Temperature increase
-pH range widened to 4.5-8.2



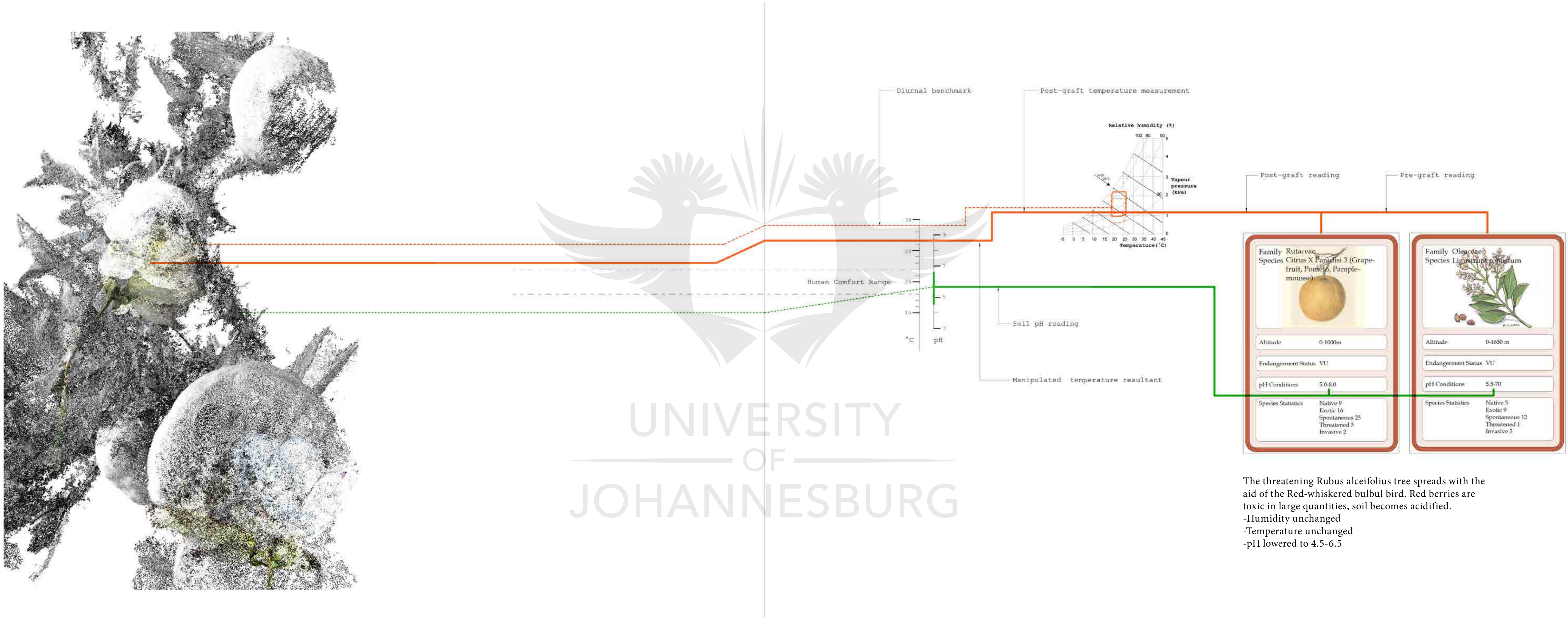
The Santalum-Haleakalae adapts itself to dry climates through the use of hard capsulated stems. This structure combined with the larger leaves of the Psidium Guajava makes the plant more resilient than competing species in this area.
-Humidity decrease
-Temperature increases
-pH increases to 6.0-7.5

GSA

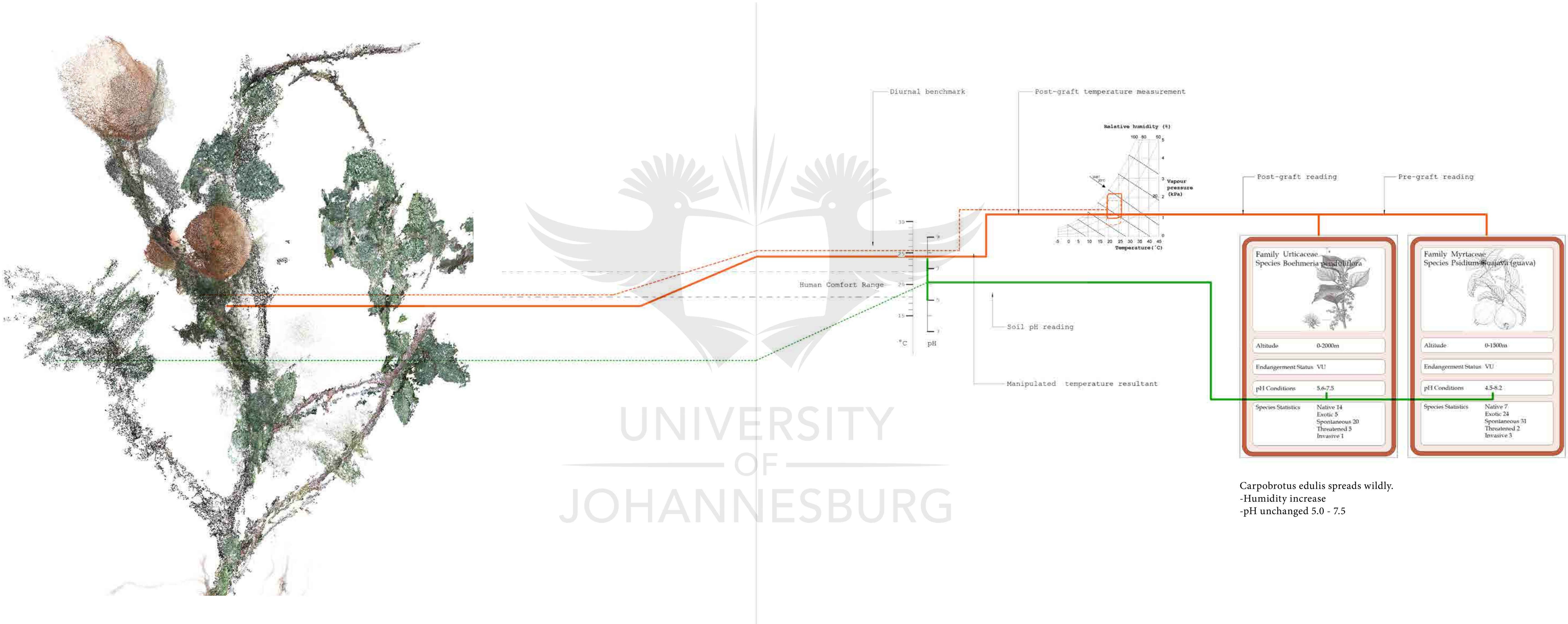




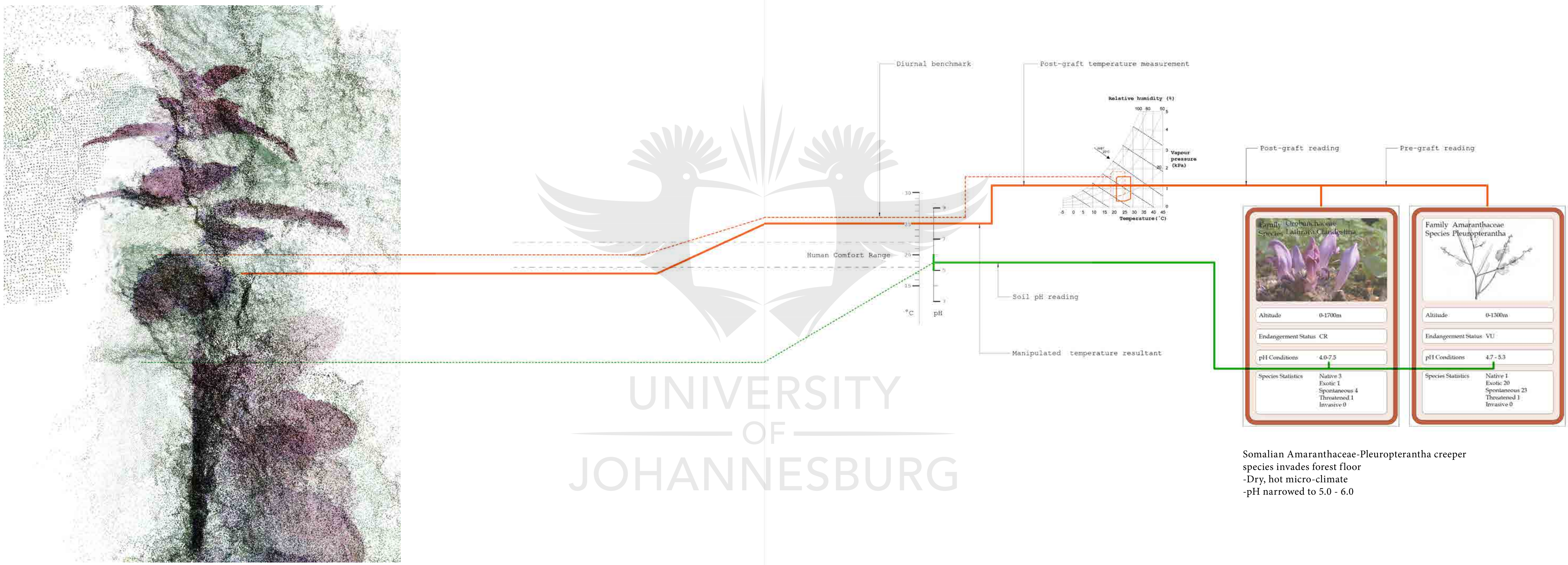
Carpobrotus edulis Southern African invasive rapidity saps water resource.
-Humidity decrease
-Temperature decrease
-pH alkaline increase 6.5-8.2



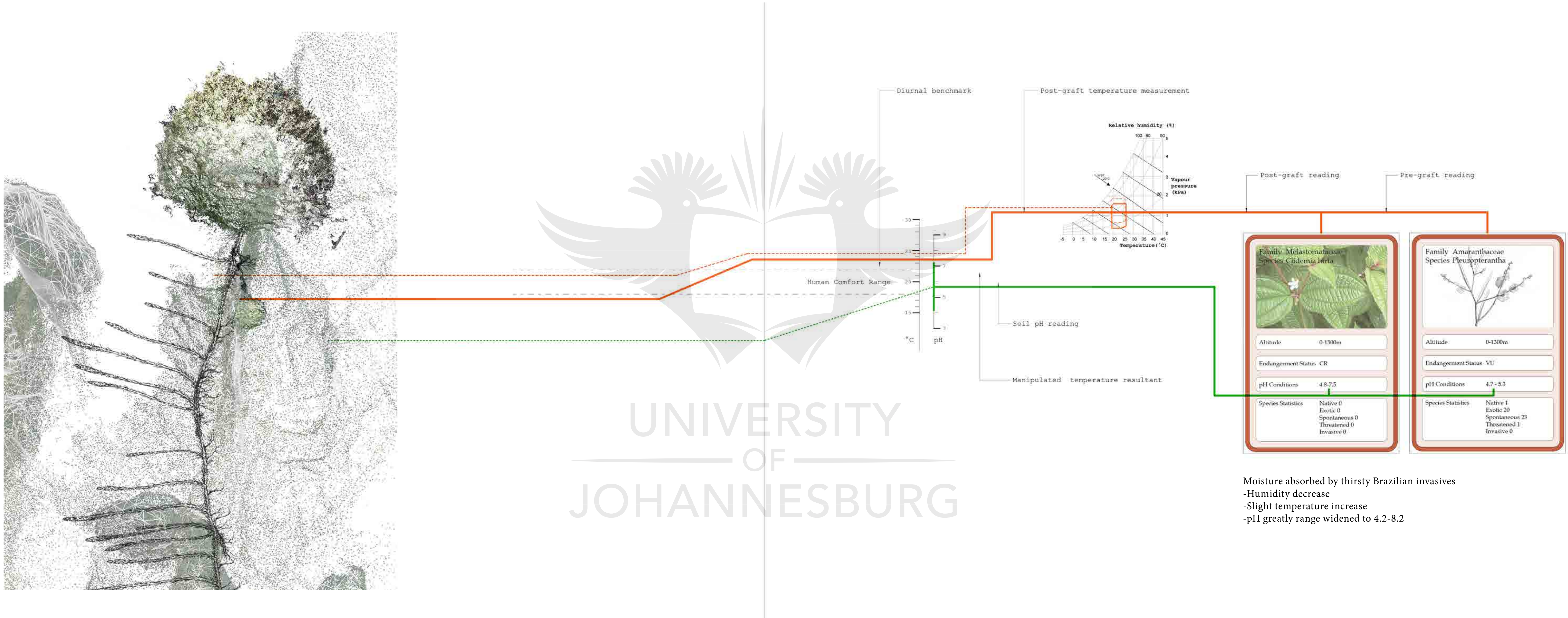
The threatening Rubus alceifolius tree spreads with the aid of the Red-whiskered bulbul bird. Red berries are toxic in large quantities, soil becomes acidified.
-Humidity unchanged
-Temperature unchanged
-pH lowered to 4.5-6.5



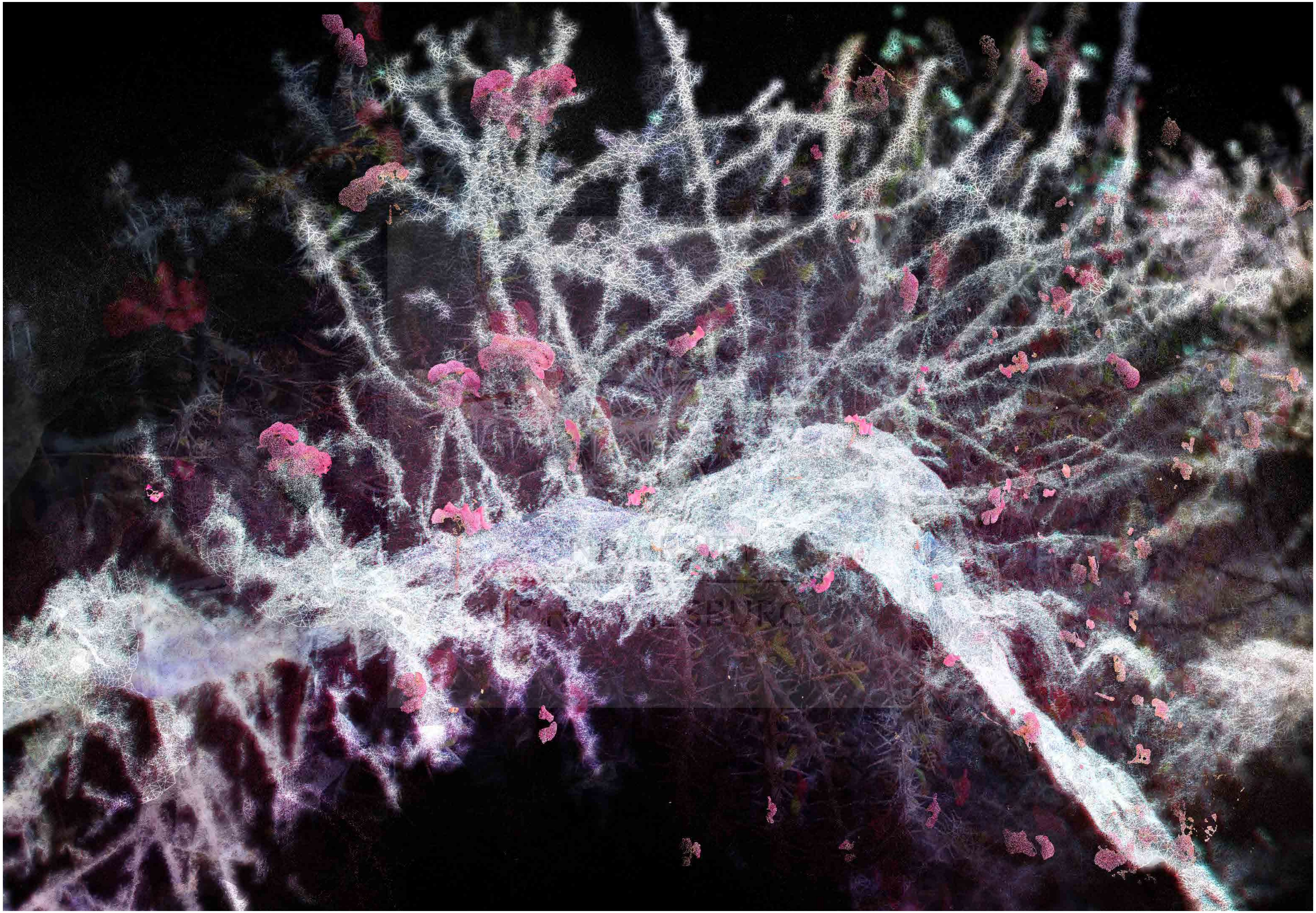
Carpobrotus edulis spreads wildly.
-Humidity increase
-pH unchanged 5.0 - 7.5

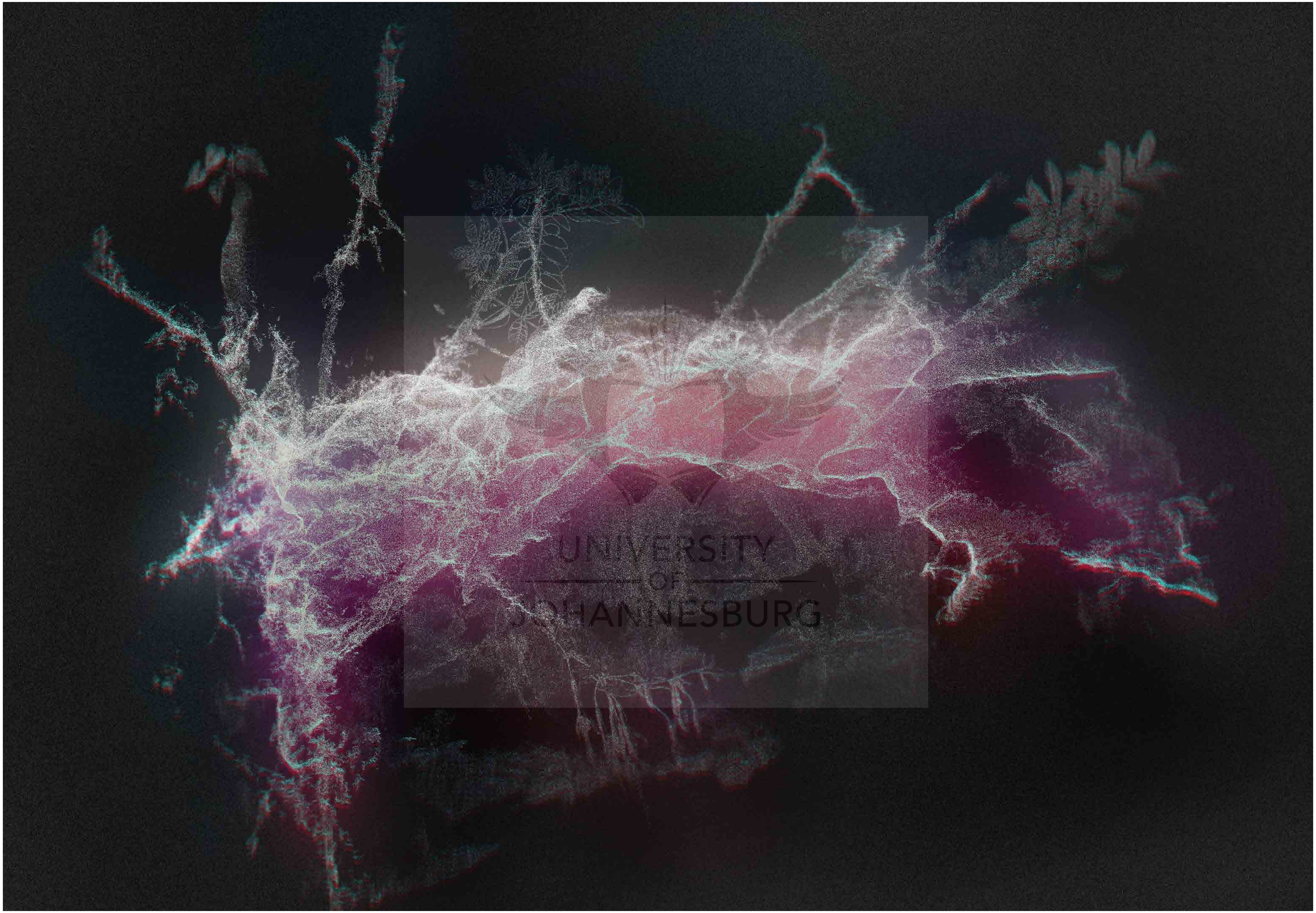


Somalian Amaranthaceae-Pleuropterantha creeper
species invades forest floor
-Dry, hot micro-climate
-pH narrowed to 5.0 - 6.0



Moisture absorbed by thirsty Brazilian invasives
-Humidity decrease
-Slight temperature increase
-pH greatly range widened to 4.2-8.2

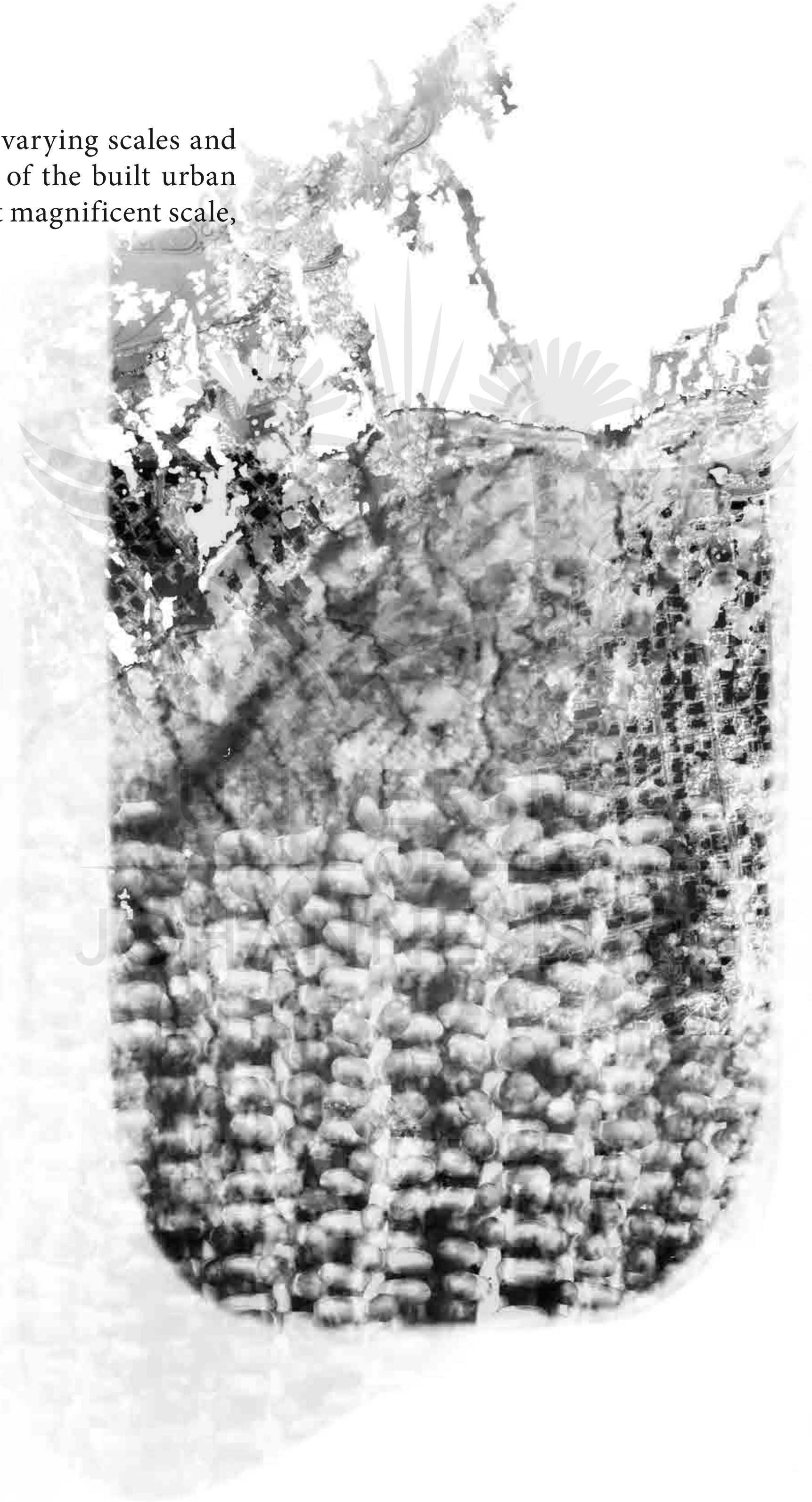


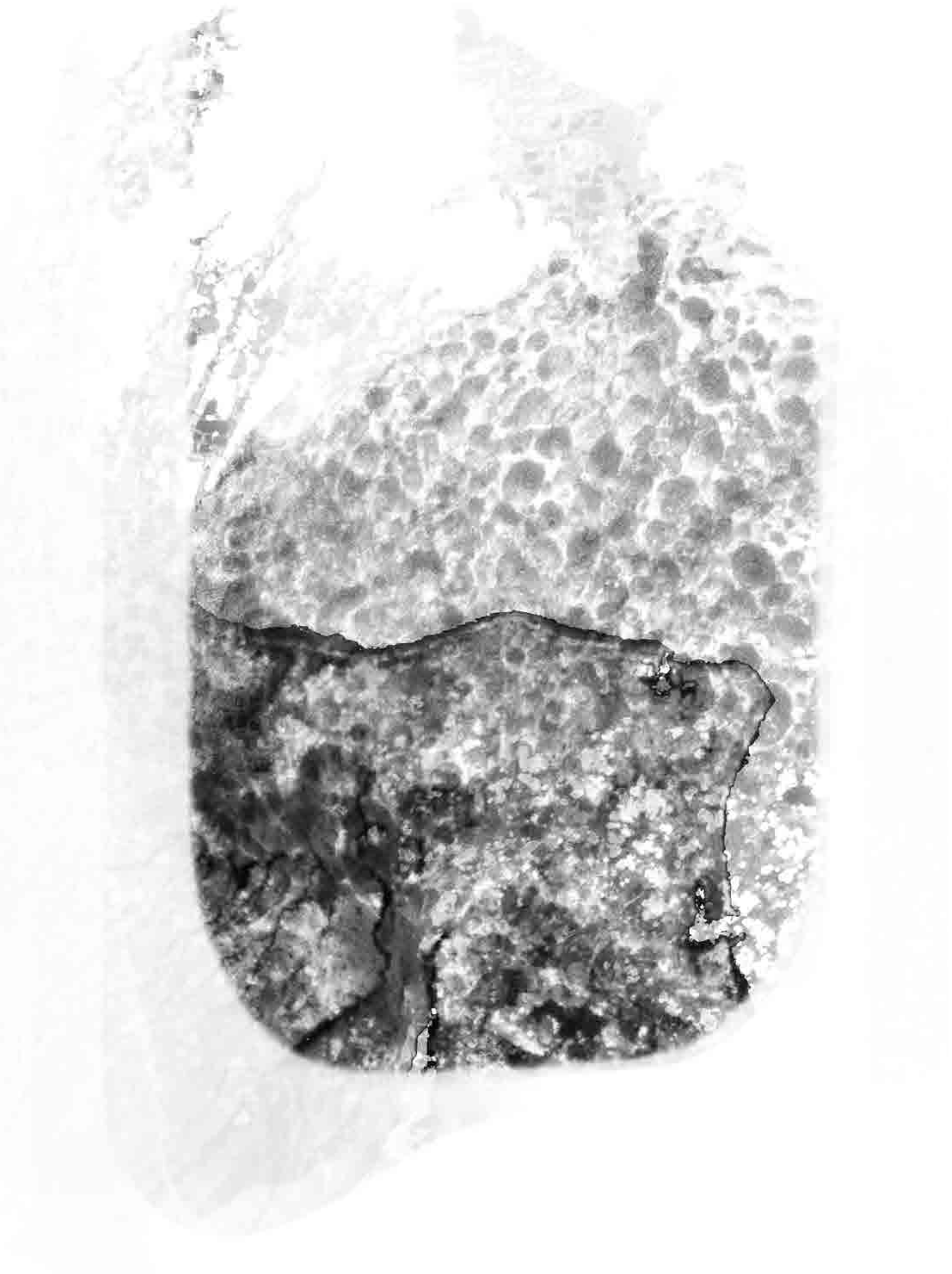


Editing Site

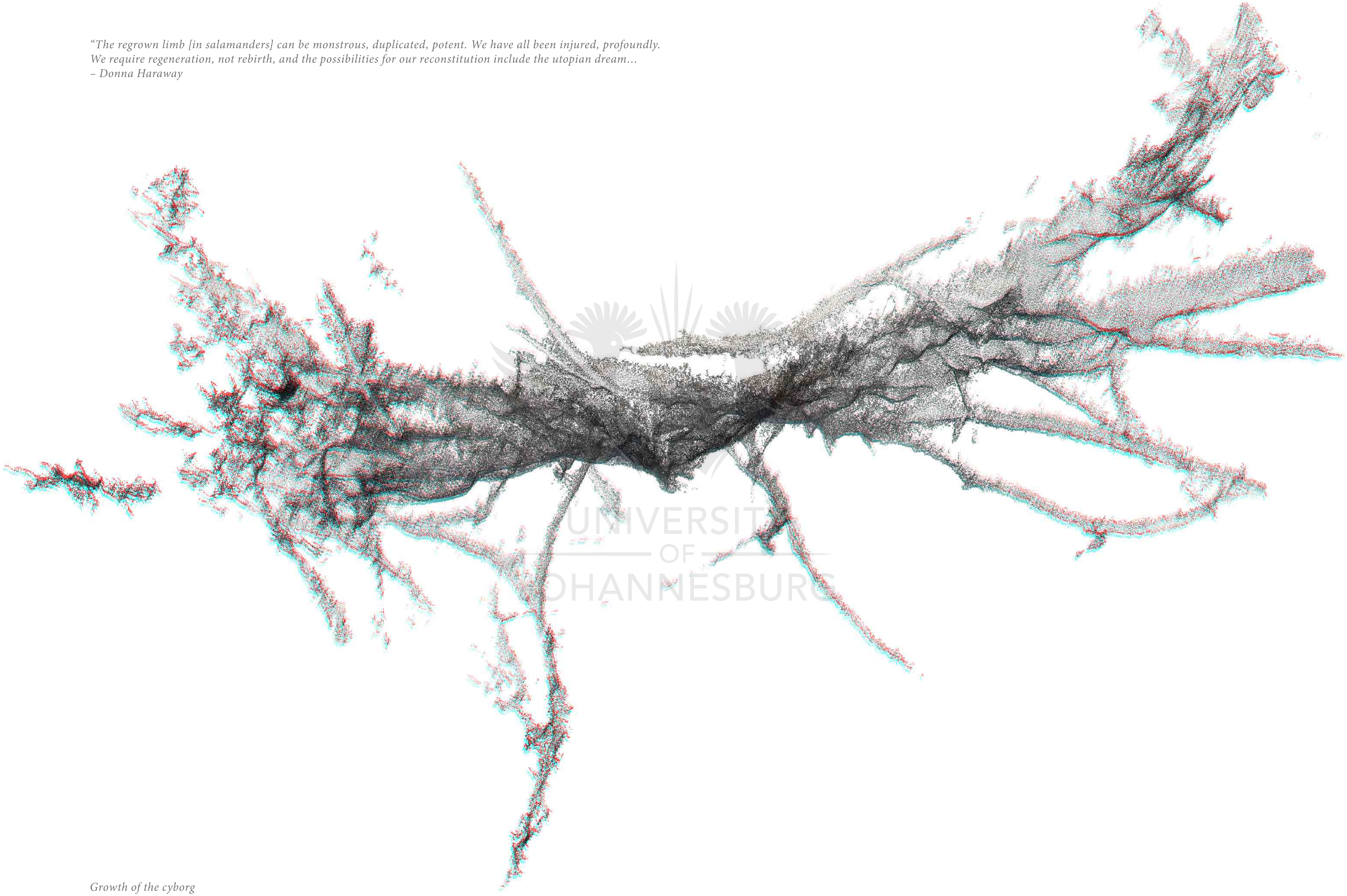
Test Tube Mapping

The littoral region of Réunion island is placed into test tubes of varying scales and shaken. The resultant landscape concoction imagines the blend of the built urban with the inner horticultural fields. Vegetables reveal themselves at magnificent scale, taking over built infrastructure





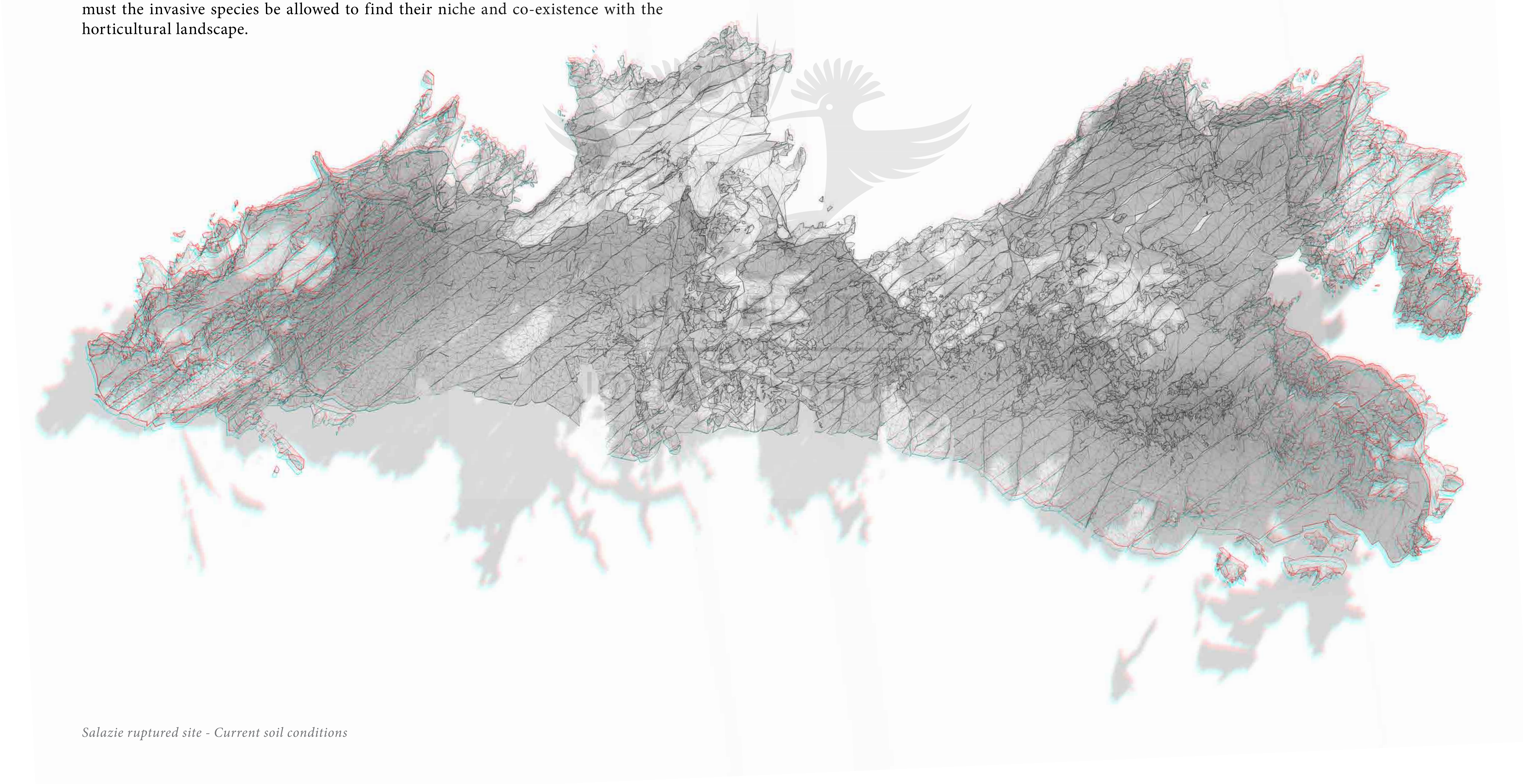
"The regrown limb [in salamanders] can be monstrous, duplicated, potent. We have all been injured, profoundly. We require regeneration, not rebirth, and the possibilities for our reconstitution include the utopian dream...
– Donna Haraway



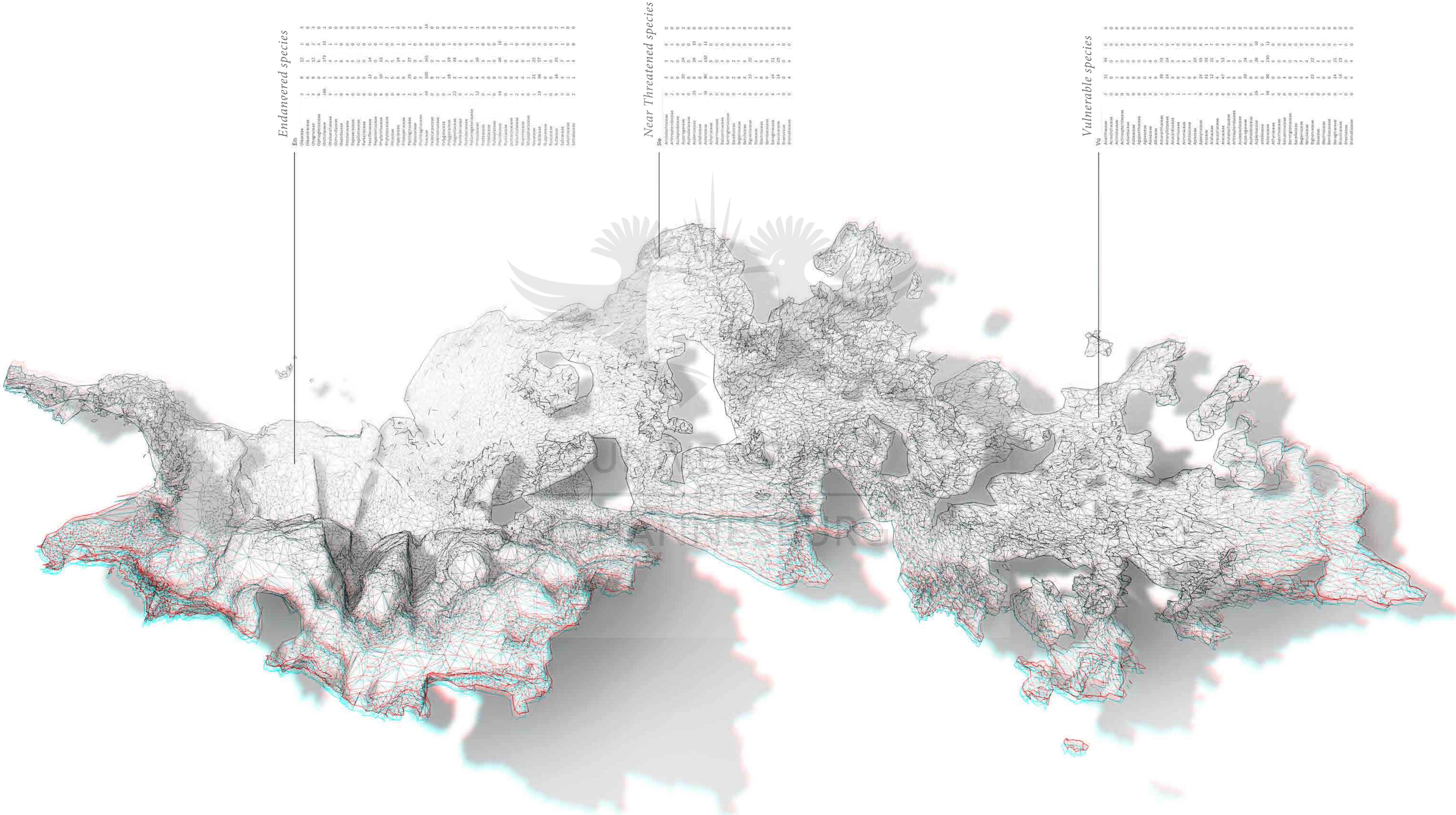
Growth of the cyborg

Hybrid Object Landscape

There is a third way in the form of a hybridity to allow invasive species to make a transition towards an endemic stasis. In much the same way the first land invaders were water-centric specialists during occupation of terrestrial territories, so too must the invasive species be allowed to find their niche and co-existence with the horticultural landscape.



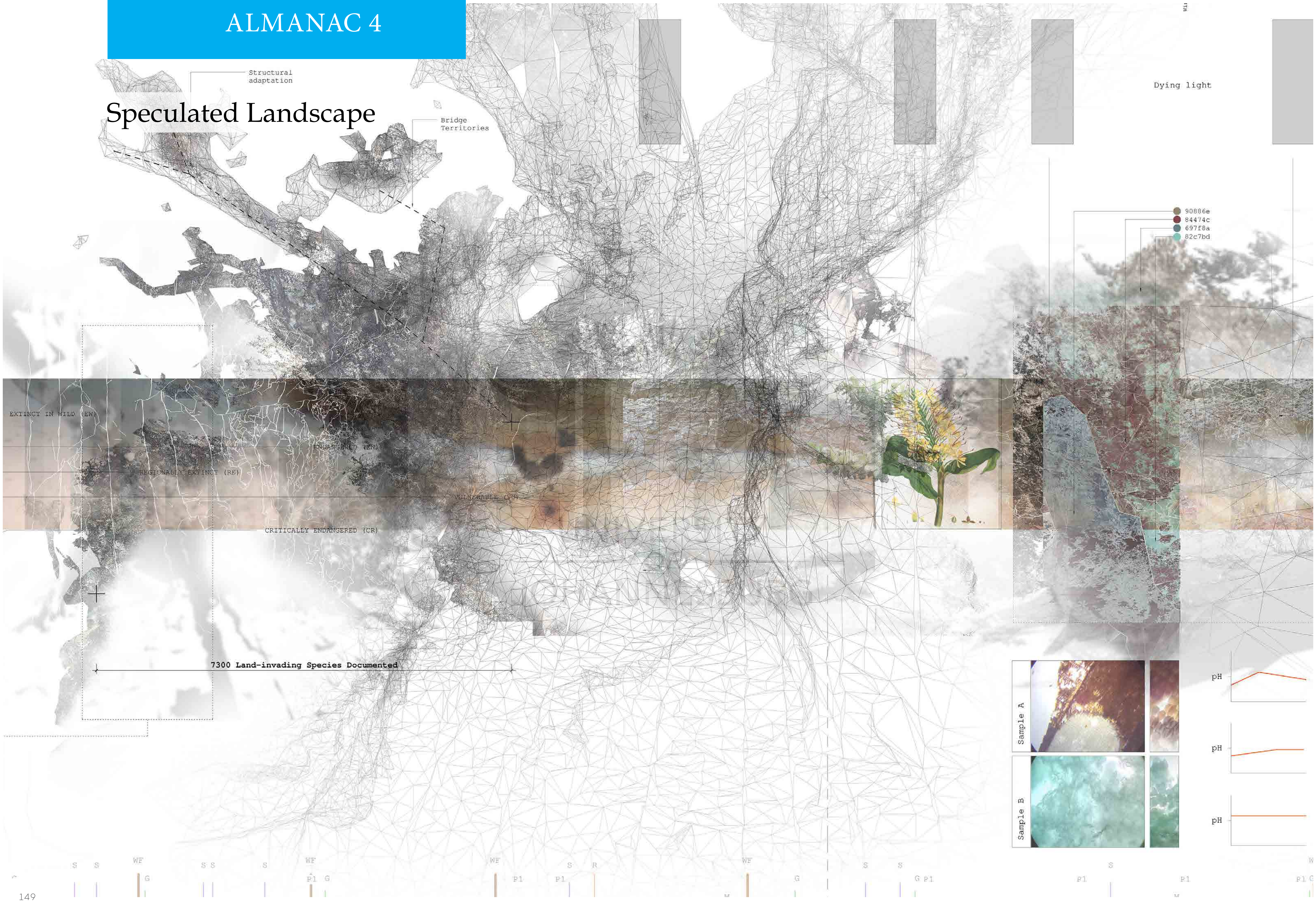
Salazie ruptured site - Current soil conditions

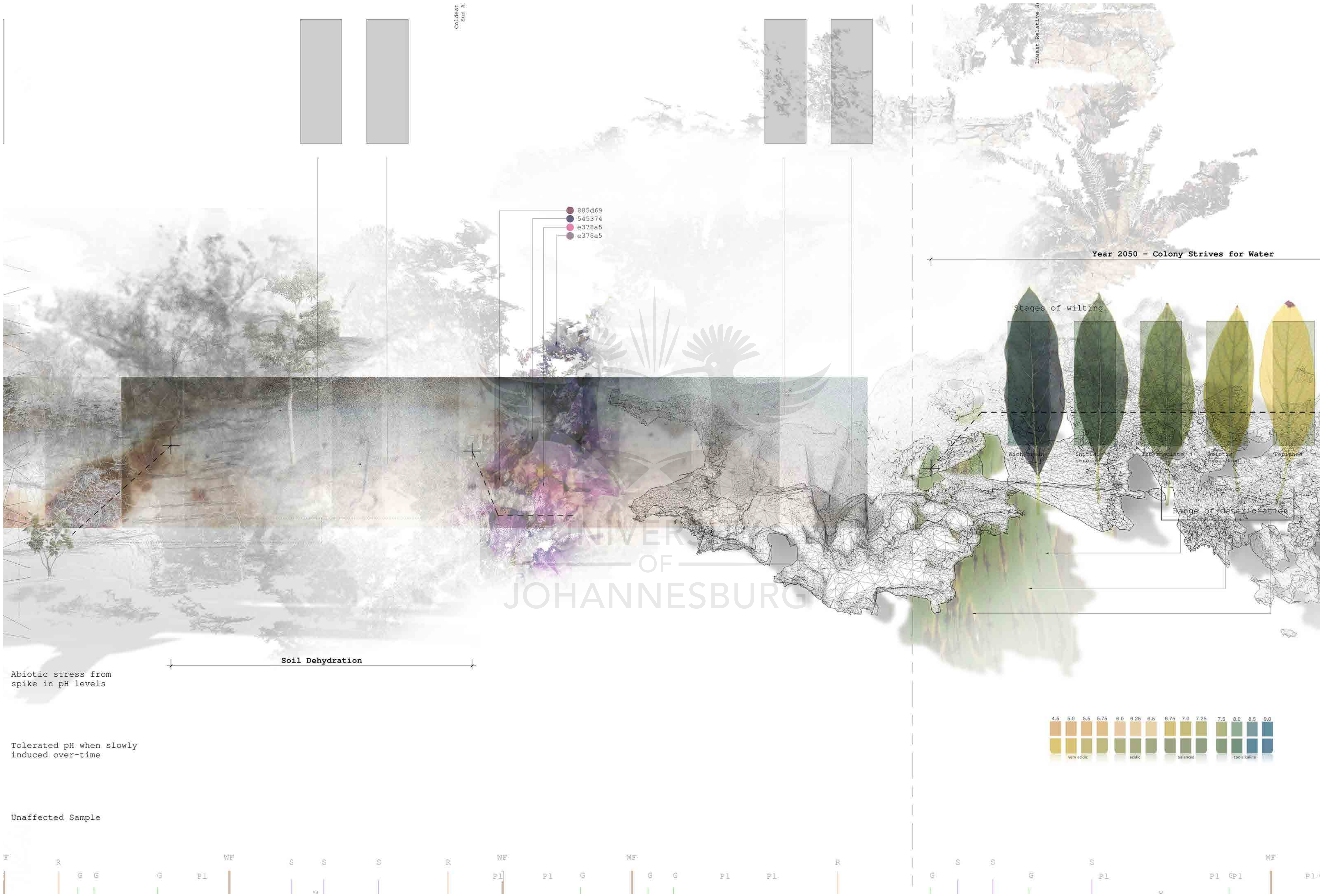


Volcanic mountain site - Host for invasive species

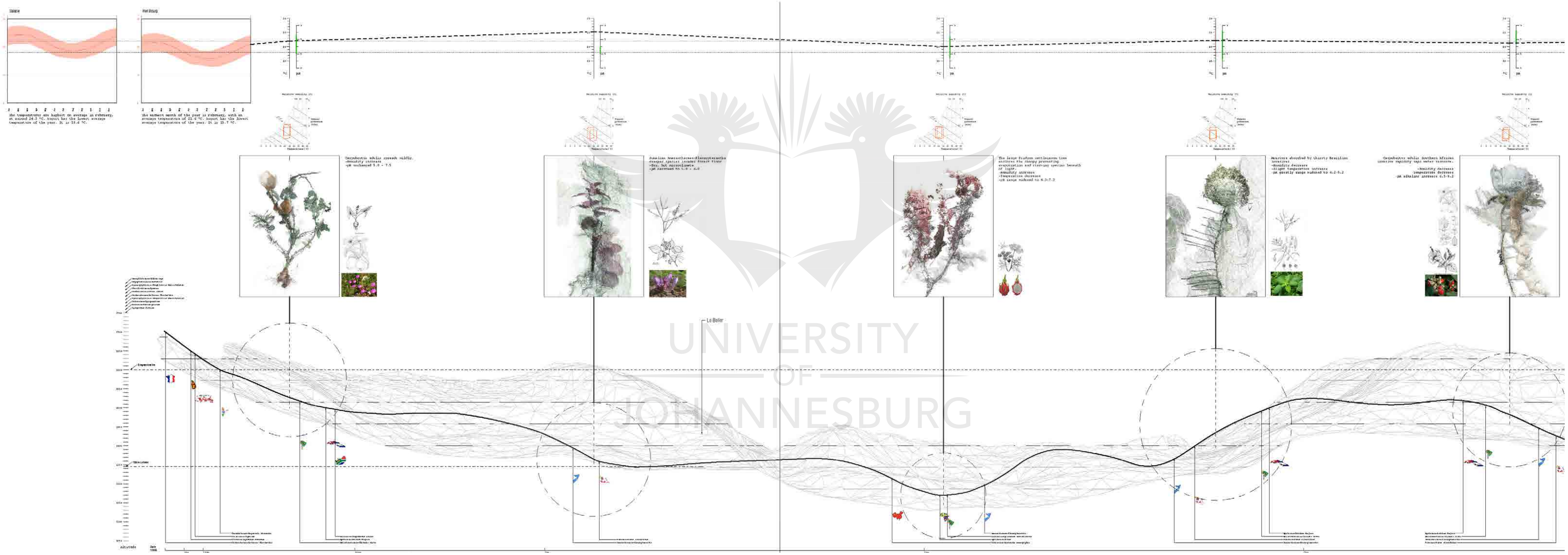
ALMANAC 4

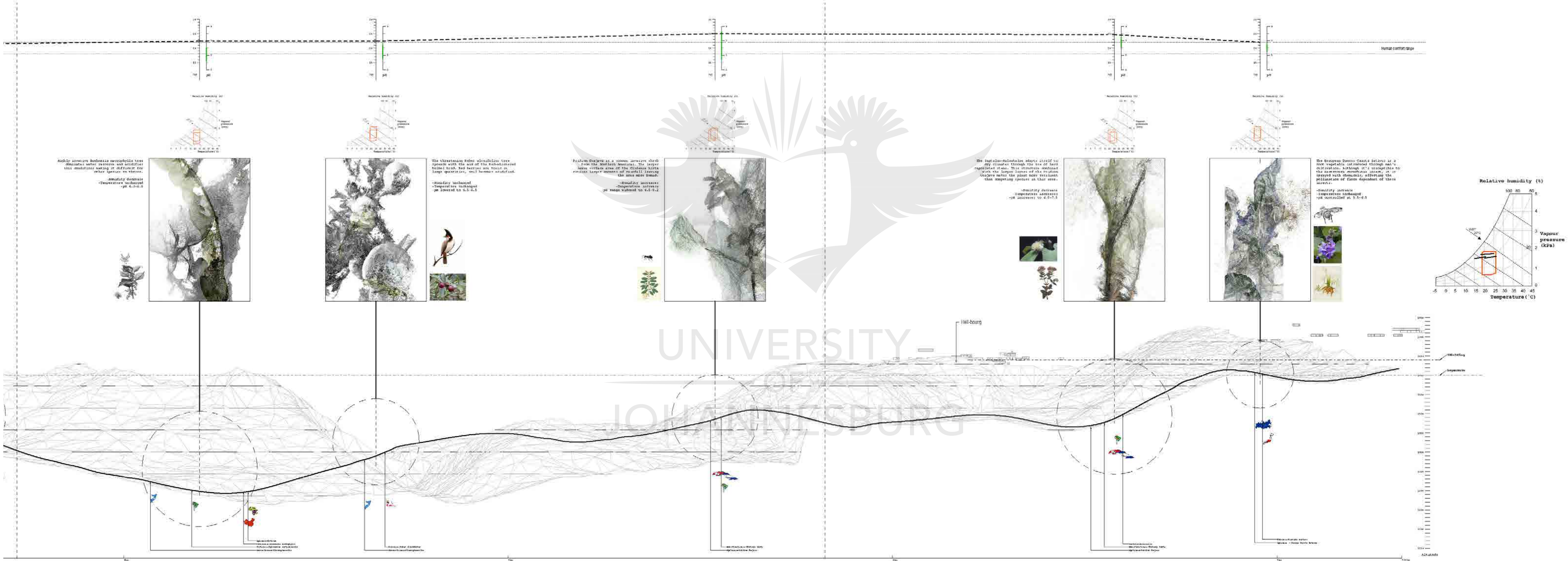
Speculated Landscape




885d69
545374
e378a5
e378a5
Year 2050 - Colony Strives for Water
Stages of wilting
Range of deterioration
Soil Dehydration
Abiotic stress from spike in pH levels
Tolerated pH when slowly induced over-time
Unaffected Sample
4.5 5.0 5.5 5.75 6.0 6.25 6.5 6.75 7.0 7.25 7.5 8.0 8.5 9.0
very acidic
acidic
balanced
too alkaline

Hiking Trail

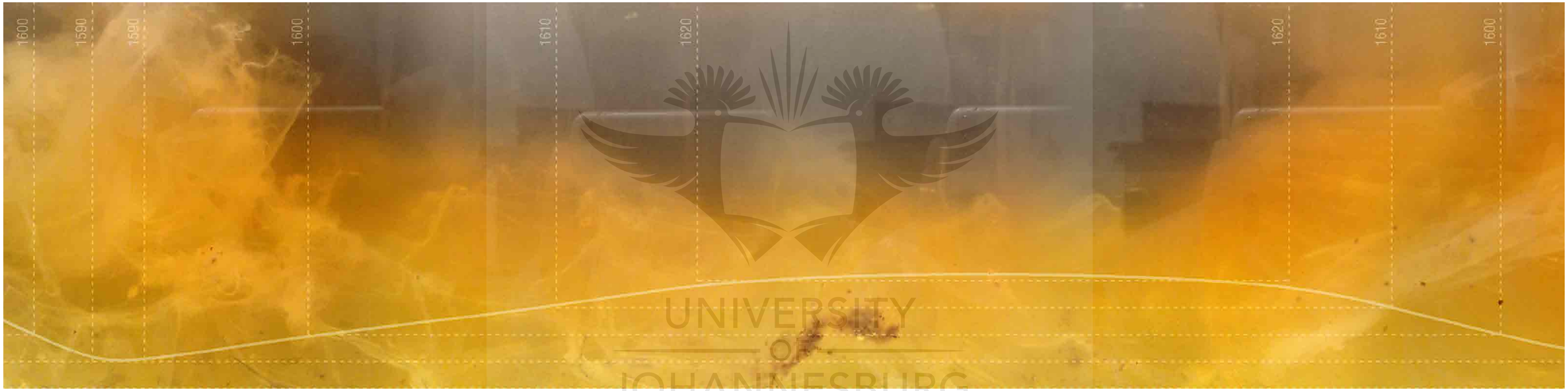


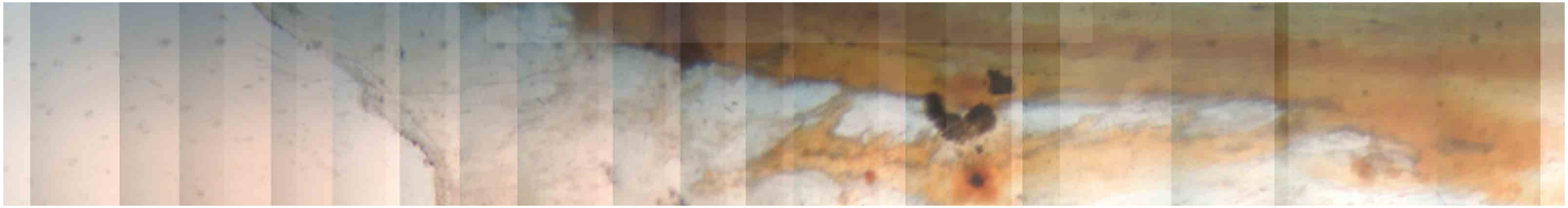


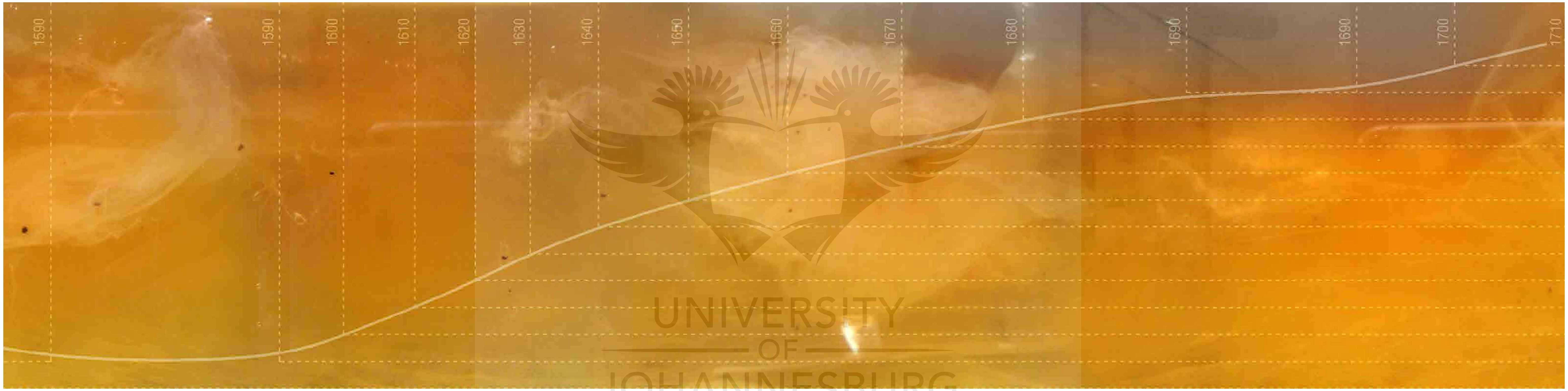
Relative humidity (%)
Vapour pressure (kPa)
Temperature (°C)

Scales of Time

The third landscape could exist as a lapse in time for plants for make adjustments within their genetics and tolerance, as well as becoming a physical territory for scientific observation.






1590
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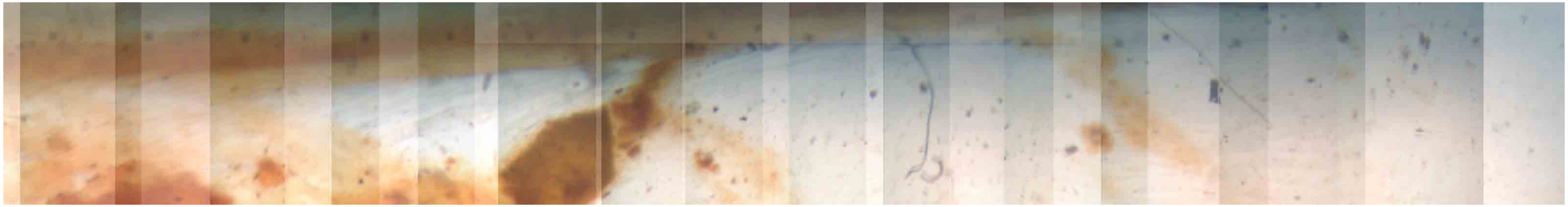

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End Part 2 - Thank you