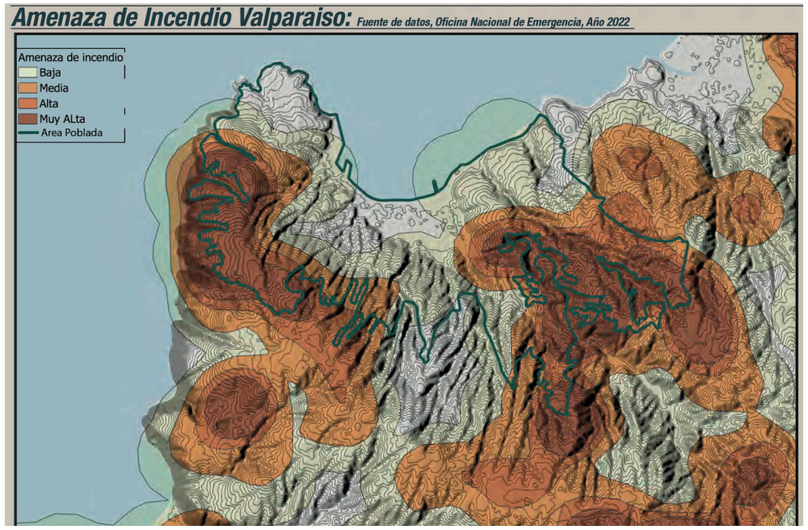
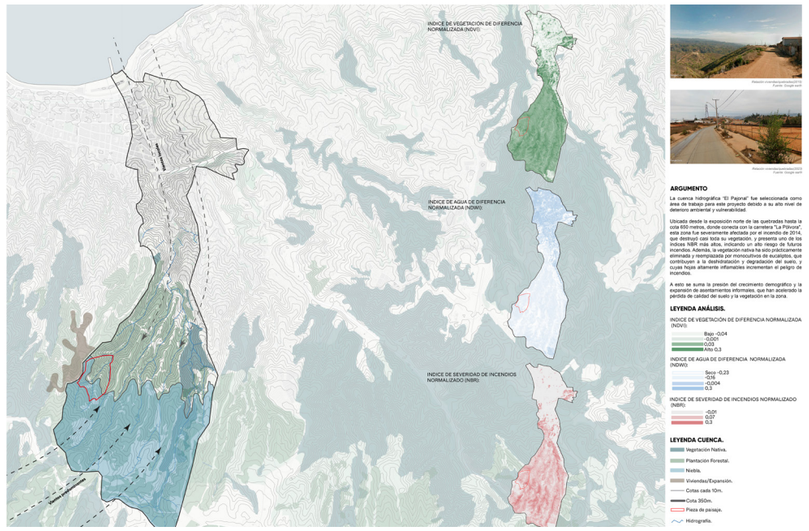
RAVINE SYSTEM AND WILDFIRES

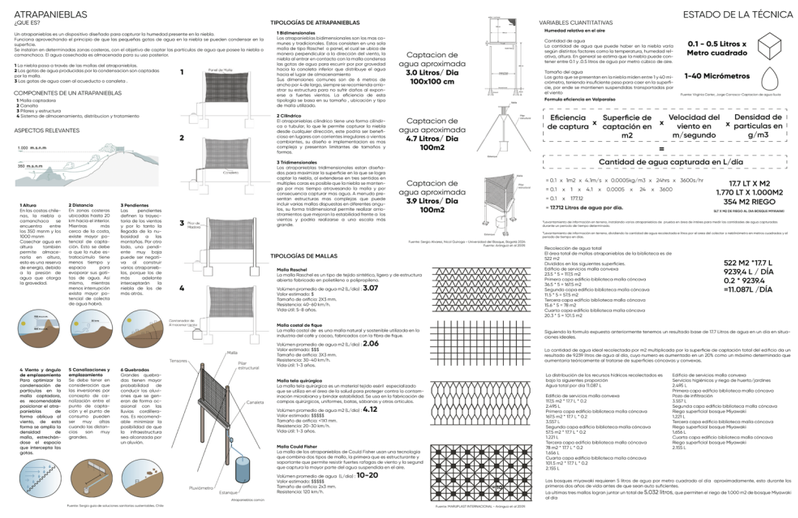


WATERSHED (=RAVINE) UNIT

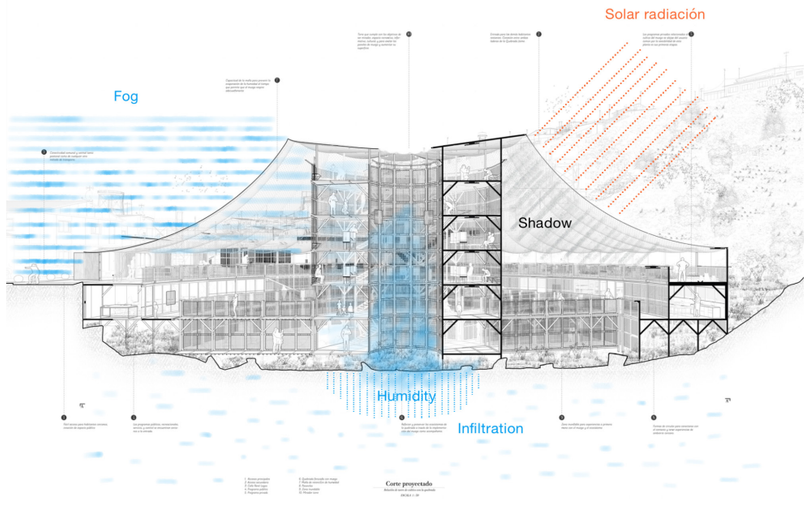


MASTERPLAN _LANDSCAPE UNIT

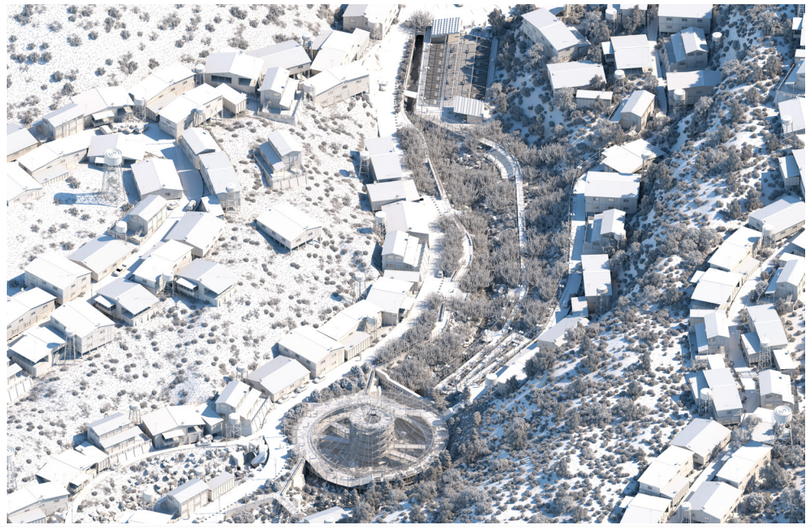
TECHNOLOGICAL UNIT



HYDROLOGICAL CYCLE



HYDRIC INFRASTRUCTURE



The Landscape Studio is dedicated to researching and developing climate change adaptation projects, specifically within the ravine systems (or watershed basins) of Valparaíso, Chile—an area that has experienced the deadliest wildfires in the country's history (2014, 2024). These fires are driven by water scarcity, prolonged droughts, and low humidity in the region. In response, the studio proposes water infrastructures designed to capture, store, manage, and infiltrate water into the subsoil. This approach enables ecological restoration at the landscape scale and creates phenomenologically rich public spaces at the local scale. Over a three-year cycle involving three student cohorts, the studio has developed and refined four adaptation strategies tailored to the climatic conditions and topography of Valparaíso. Special attention is given to the soil profile, which governs a hydrological behavior based on capillarity rather than traditional groundwater tables. These strategies, along with their hybridizations, are illustrated through five selected student projects that successfully meet all evaluation criteria: conceptual clarity, innovation in relation to the current state of the tecnique, coherent development across three scales (territorial, landscape, and architectural/hydric artifact), strong design quality, and effective representation.

Adaptation Strategies:

1. Architecturization of a physical phenomenon: Harnessing geo/thermal condensation.
2. Fog harvesting innovation: Evolving the planar fog catcher into a three-dimensional device (as a building or park).
3. Terracing systems: Controlling erosion and recycling greywater through integrated landscape design.
4. Biomaterial application: Using mosses and other organic materials as humidity retainers.

GEO-HELIX

Restoration and Conservation Park for Native Vegetation.
San Agustín Watershed.
Program: Plant nursery + public space.
Total water:
minimum: 1442 l/d
maximum: 3857 l/d
Restoration area: 2571 m²

Country/City	Santiago, Chile.
University / School	University Diego Portales / Architecture School UDP.
Academic year	2023 - 2024.
Title of the project	GEO-HELIX: Restoration and Conservation Park for Native Vegetation.
Authors	Flavio Santisteban Alarcón.

TECHNICAL DOSSIER

Title of the project	GEO-HELIX: Restoration and Conservation Park for Native Vegetation.
Authors	Flavio Santisteban Alarcón.
Title of the course	Hydric Infrastructure: Climate Change Adaptation projects in Micro-watersheds.
Academic year	2023 - 2024.
Teaching Staff	Prof. Claudio Magrini / Assistants Sofía Navarro + Ignacia Márquez.
Department / Section / Program of belonging	Landscape unit.
University / School	University Diego Portales / Architecture School UDP.

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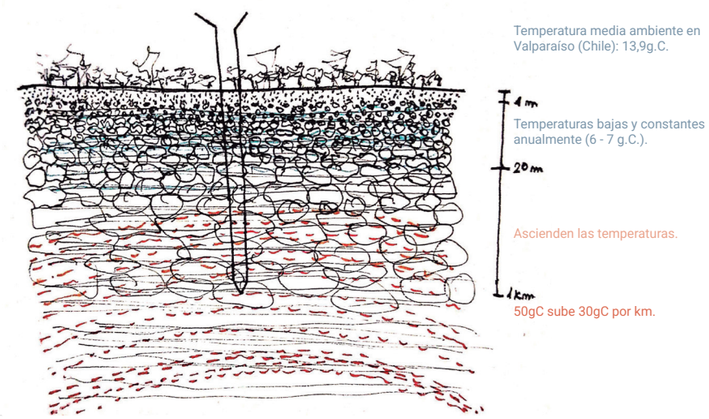
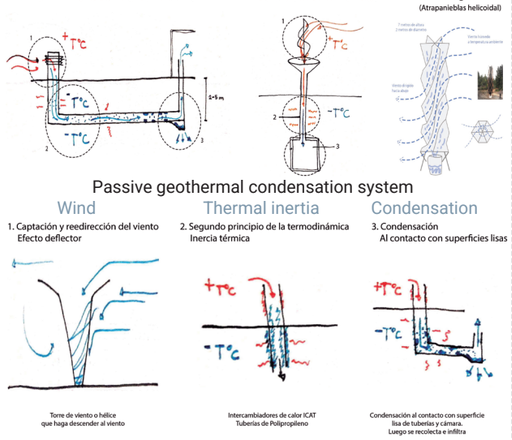
Geothermal energy: a renewable energy source that uses the Earth's heat to generate heating and cooling through air conditioning systems. Temperatures vary depending on geographical location. In Valparaíso (Chile), for example, it ranges between 6 and 7 °C Celsius and remains constant down to a depth of 20 meters. The subsoil is mainly composed of weathered granite (1 to 15 m).



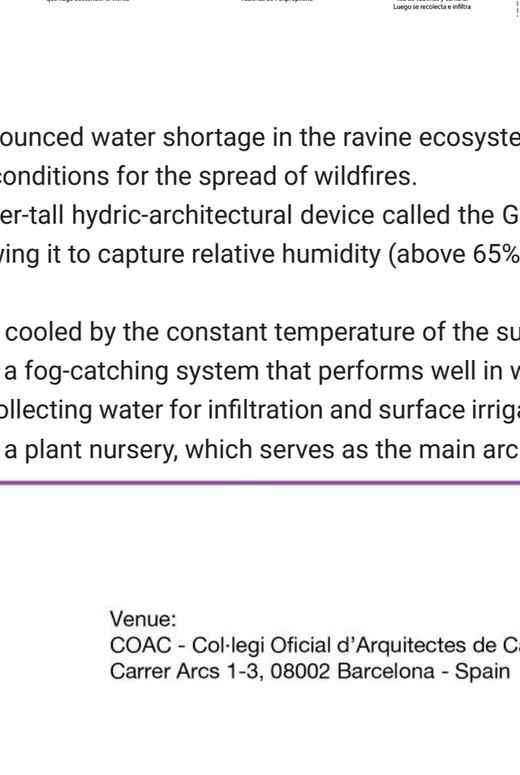
Geothermal climate control system and wind channeling

Horizontal | Vertical | Wind



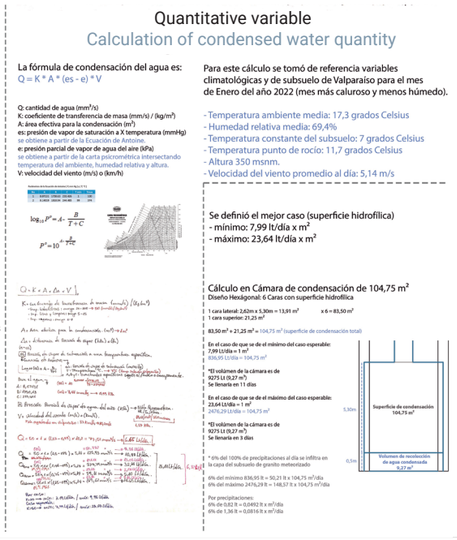
Passive geothermal condensation system

Wind | Thermal inertia | Condensation



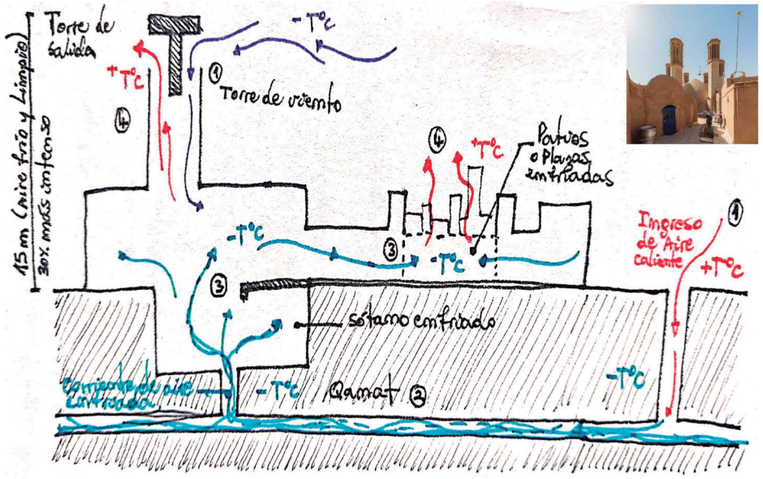
Quantitative variable

Calculation of condensed water quantity



Architectural form integrated into the physical phenomenon

Wind towers in Iran + Qanat



Strategy 1:

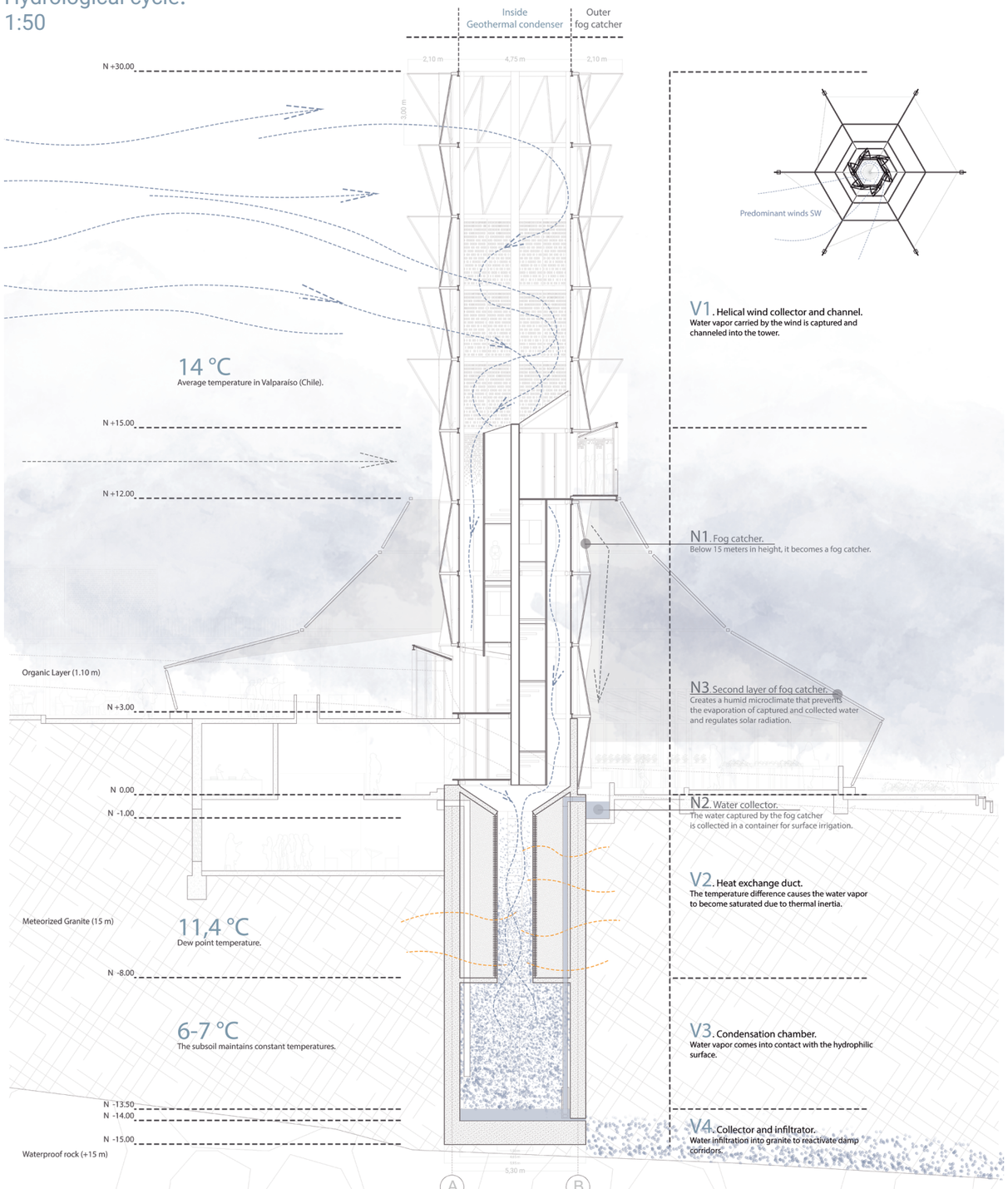
Climate change and human intervention have caused a pronounced water shortage in the ravine ecosystems of Valparaíso, leading to soil degradation and the loss of native vegetation. This has also resulted in a significant reduction in vegetative cover, creating optimal conditions for the spread of wildfires.

In response, the proposal consists of constructing a 30-meter-tall hydric-architectural device called the Geo-Helix, which primarily harnesses the physical phenomenon of geothermal condensation. The project is located at the summit of the San Agustín watershed, allowing it to capture relative humidity (above 65%) by intercepting and channeling the prevailing southwesterly winds, which maintain an average ambient temperature of 13.9 °C.

The helical form directs the airflow vertically into a chamber cooled by the constant temperature of the subsoil (between 6 and 7 °C), where water vapor condenses due to the temperature difference—especially during the summer months. The device is complemented by a fog-catching system that performs well in winter, when coastal fog tends to linger for longer periods.

This proposal is therefore capable of operating year-round, collecting water for infiltration and surface irrigation in order to keep critical points of the ravine hydrated through gravity, reactivate humid corridors, and support ecological restoration. This process originates from a plant nursery, which serves as the main architectural program of the project.

Hydrological cycle.
1:50



V1. Helical wind collector and channel.
Water vapor carried by the wind is captured and channeled into the tower.

N1. Fog catcher.
Below 15 meters in height, it becomes a fog catcher.

N3. Second layer of fog catcher.
Creates a humid microclimate that prevents the evaporation of captured and collected water and regulates solar radiation.

N2. Water collector.
The water captured by the fog catcher is collected in a container for surface irrigation.

V2. Heat exchange duct.
The temperature difference causes the water vapor to become saturated due to thermal inertia.

V3. Condensation chamber.
Water vapor comes into contact with the hydrophilic surface.

V4. Collector and infiltrator.
Water infiltration into granite to reactivate damp corridors.

Strategies and calculations

1. Infiltration.
Cámara de condensación de Hormigón armado con terminación lisa y aditivo hidrofílico

Resultado final con los m³ de la cámara de condensación (V3):

En 104,75 m² para un volúmen de recolección de 9275 lt o 9,27 m³
mínimo: 836,95 lt/día. Se llenaría en 11 días.
máximo: 2476,29 lt/día. Se llenaría en 3 días.

El 6% que se infiltra al granito meteorizado es:

mínimo: 50,21 lt/día
máximo: 148,57 lt/día

94% restante del agua condensada al día se bombea hacia el contenedor superficial para riego inmediato:

mínimo: 786,73 lt/día
máximo: 2327,71 lt/día

2. Harvest for immediate use (drip irrigation).
Atrapanieblas de malla de polietileno de alta densidad estabilizado contra UV y con cobertura del 30% de sombra

Resultado de un atrapanieblas común:
mínimo: 3 lt/día x m²
máximo: 7 lt/día x m²

Resultado final con los m² del atrapanieblas con forma helicoidal (N1):
En 218,57 m² se recolectan:
mínimo: 655,71 lt/día
máximo: 1529,99 lt/día

Total for surface irrigation (Geothermal condensation + fog catcher).

mínimo: 1442,44 lt/día
máximo: 3857,70 lt/día

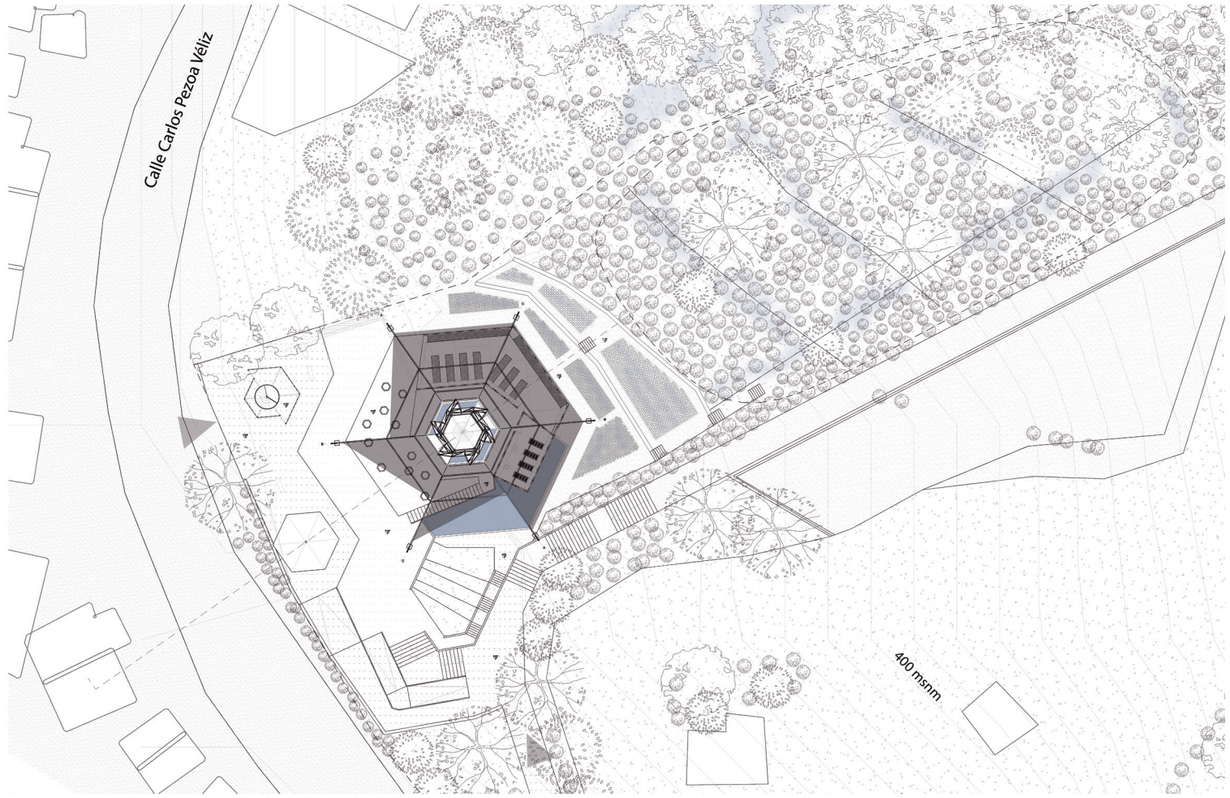
Rango de m² que debe tener el área de influencia a restaurar a partir del agua recolectada al día:

mínimo: 961,62 m²
máximo: 2571,80 m²

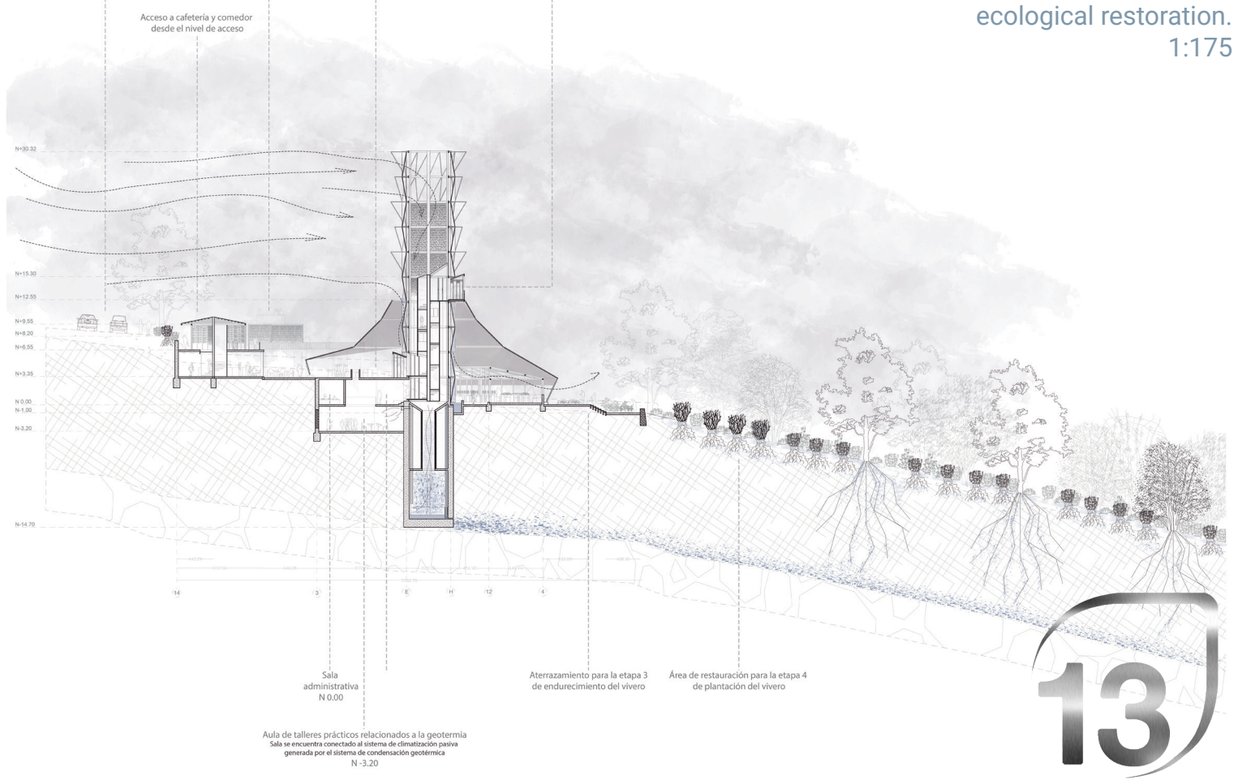
"El agua infiltrada es la que mantiene la vitalidad de las quebradas" (L.Álvarez, geógrafo y profesor PUCV, 29 de Septiembre de 2023).

Aula Paisaje / Flavio Santisteban Alarcón

Architectural project plan + area of influence for ecological restoration.
1:200

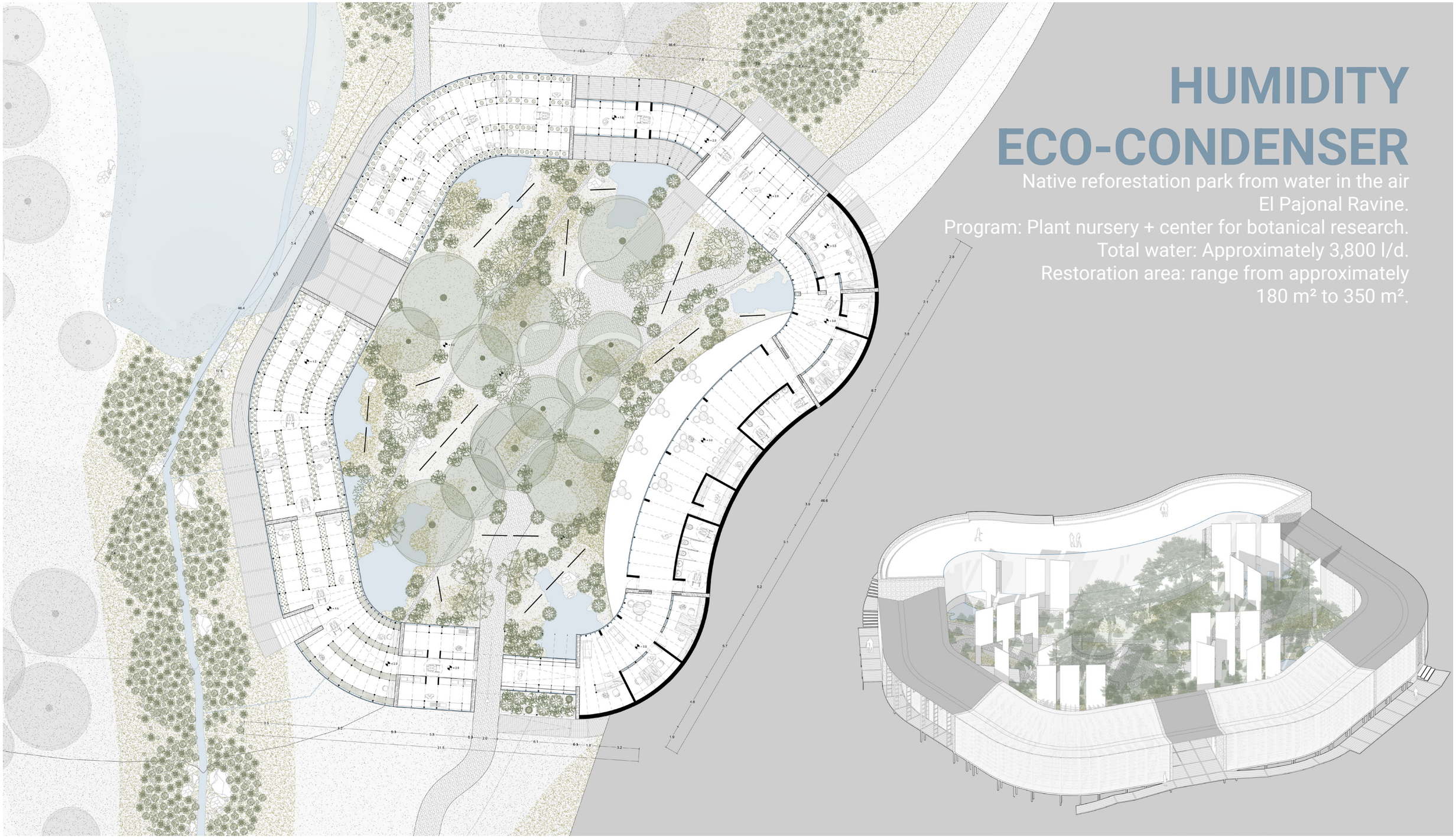


Architectural project section + area of influence for ecological restoration.
1:175



HUMIDITY ECO-CONDENSER

Native reforestation park from water in the air
El Pajonal Ravine.
Program: Plant nursery + center for botanical research.
Total water: Approximately 3,800 l/d.
Restoration area: range from approximately
180 m² to 350 m².



Country/City	Santiago, Chile.
University / School	University Diego Portales / Architecture School UDP
Academic year	2023 - 2024.
Title of the project	HUMIDITY ECO-CONDENSER: Case Study of El Pajonal Ravine, Valparaíso.
Authors	Joaquín Reveco García-Huidobro.

TECHNICAL DOSSIER

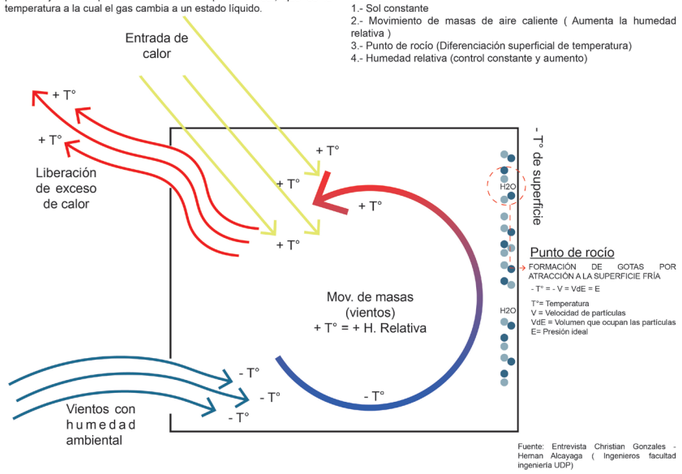
13

Title of the project	HUMIDITY ECO-CONDENSER: Case Study of El Pajonal Ravine, Valparaíso.
Authors	Joaquín Reveco García-Huidobro.
Title of the course	Hydric Infrastructure: Climate Change Adaptation projects in Micro-watersheds.
Academic year	2023 - 2024
Teaching Staff	Prof. Claudio Magrini / Assistant Sofia Navarro + Ignacia Márquez
Department / Section / Program of belonging	Landscape unit
University / School	University Diego Portales / Architecture School UDP

Condensation by temperature:
CONDENSACIÓN POR TEMPERATURA:

Este fenómeno se produce cuando la temperatura de un gas disminuye por debajo de su punto de rocío a una presión ideal, que es la temperatura a la cual el gas cambia a un estado líquido.

Factores importantes para producir la condensación constante y artificial:
1.- Sol constante
2.- Movimiento de masas de aire caliente (Aumenta la humedad relativa)
3.- Punto de rocío (Diferenciación superficial de temperatura)
4.- Humedad relativa (control constante y aumento)



Fuente: Entrevista Christian Gonzales - Hernan Alcayaga (Ingenieros facultad ingeniería UDP)

Important factors for the dew point:
FACTORES IMPORTANTES PARA EL PUNTO DE ROCÍO

- ***HUMEDAD RELATIVA***: es una medida que indica cuánto vapor de agua hay en el aire en comparación a con la cantidad máxima que podría haber a una temperatura y presión determinadas, es decir, es cuan cerca está el aire de estar totalmente saturado de humedad.

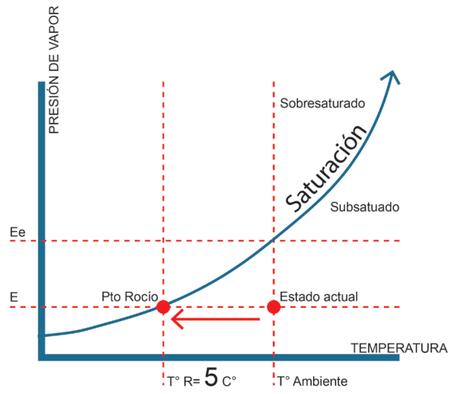
- ***PUNTO DE ROCÍO***: es la temperatura la cual se enfría el vapor de agua produciendo condensación en forma de agua. En este momento en el que el aire está tan saturado que no puede retener más, el agua comienza a aparecer en superficies frías.

- ***SATURADO***: El vapor de agua alcanza un punto donde no puede contener más partículas de agua.

E = Presión de vapor balanceado (ley de gases ideales)

Ee= Presión de vapor esperado

T° R = temperatura de rocío

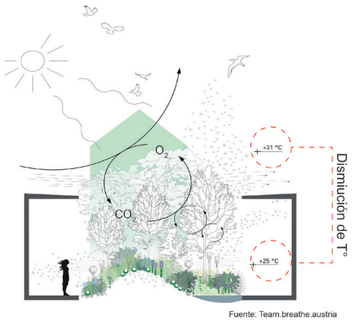


Fuente: Fuente: Entrevista Christian Gonzales - Hernan Alcayaga (Ingenieros facultad ingeniería UDP) / Artículo de investigación de Enrique Martines

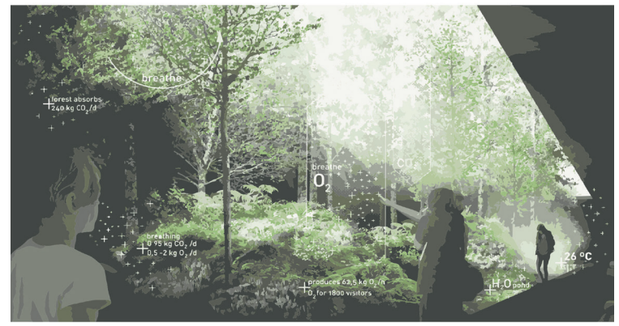
Natural decrease in temperature:
DISMINUCIÓN DE TEMPERATURA:

SISTEMA - EXPO MILÁN 2015

Este pabellón cuenta con diferentes estratos vegetales, desde el musgo hasta árboles, los cuales permiten una refrigeración natural producida por la evapotranspiración, es decir, que el ambiente baja su temperatura por la evaporación que generan las plantas. Este sistema de vegetación logra bajar la temperatura entre 5 a 7 grados Celsius.



Fuente: Team.breathe.austria



Written statement, short description of the project in English, no more than 250 words

Strategy 1:

This strategy addresses the loss of humidity and increased erosion—factors that contribute to the high incidence of wildfires in various areas of Valparaíso. These conditions also lead to a diminished capacity for coexistence and disrupt the biological cycles of native species that inhabit the territory.

In response, the proposal involves the architecturization of the condensation phenomenon caused by temperature differentials, which enables water extraction from the air with a delta as small as 5°C. This temperature gradient is achieved by placing a humid core in tension with surfaces of high thermal conductivity. The harvested water is used to increase ambient humidity and support the reforestation of degraded areas. The quantity and placement of these hydric-architectural devices are regulated by a Master Plan, aimed at restoring and revitalizing a hillside in the “El Pajonal” watershed using native vegetation.

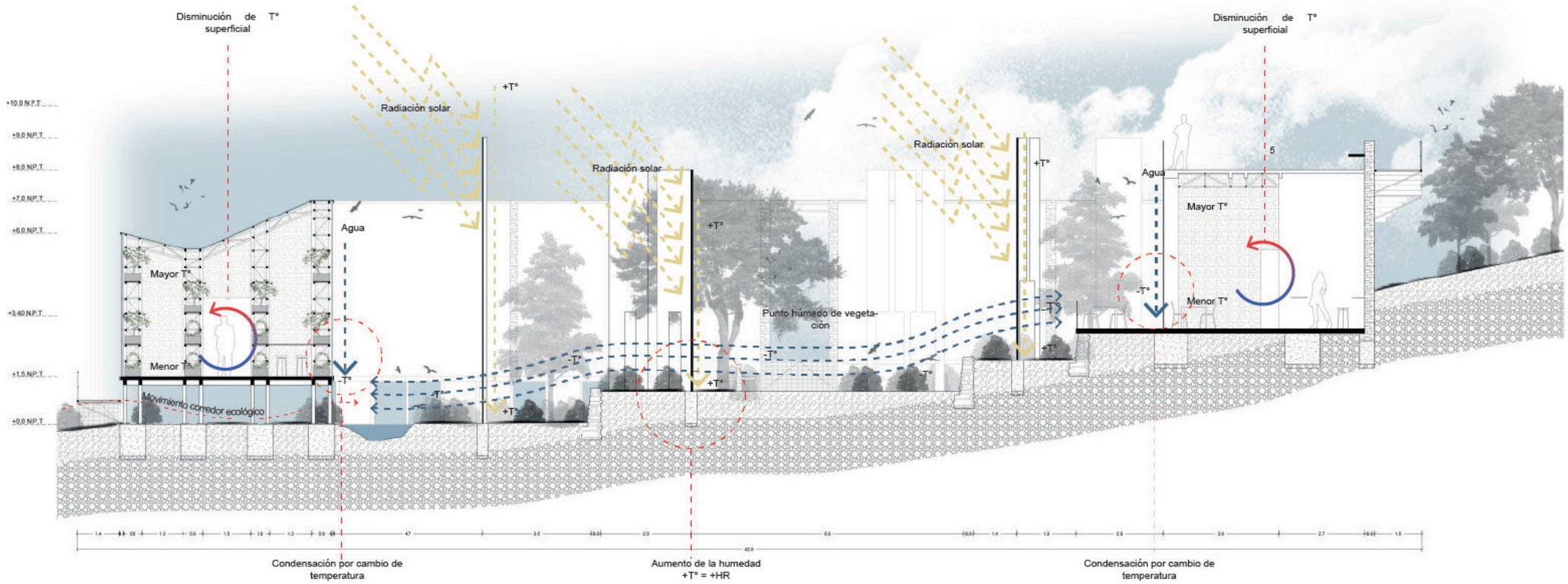
The building is designed as a closed “ring” that, within its inner courtyard, articulates a humid core through Miyawaki forests, which interact with north-facing windows and metal sheets that absorb solar radiation. This configuration induces daytime condensation through temperature differentials, while nighttime condensation occurs naturally through dew point processes.

The water generated serves multiple purposes: it is used in a plant nursery, supports reforestation areas, and is infiltrated into the subsoil to benefit the entire watershed downstream.

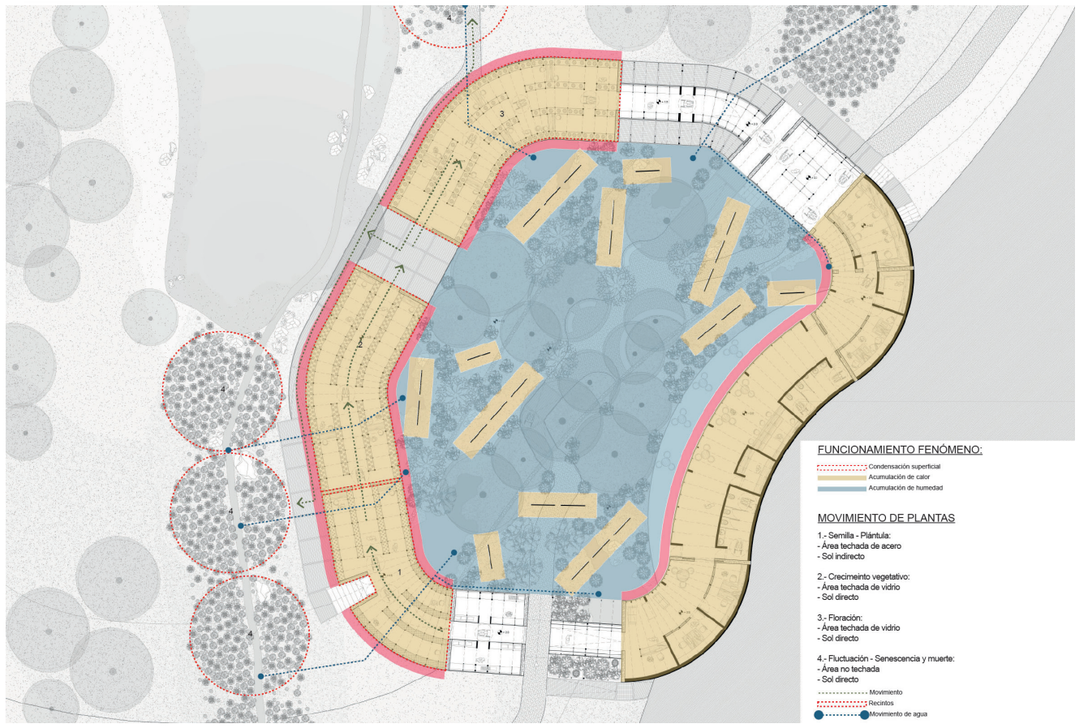
Contact via email:
biennaladm@coac.net

Venue:
COAC - Col·legi Oficial d’Arquitectes de Catalunya
Carrer Arcs 1-3, 08002 Barcelona - Spain

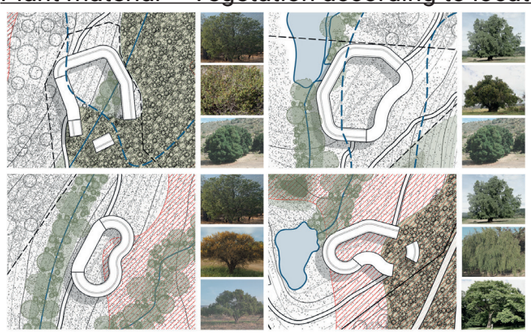
Section Diagram Explaining Operation:



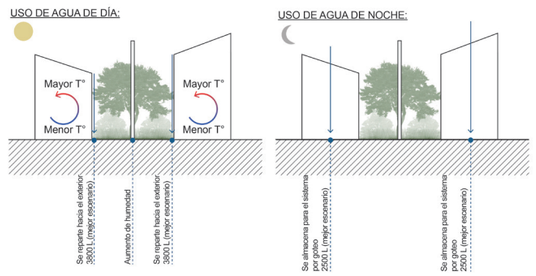
Level 1 Plan – Water Distribution:

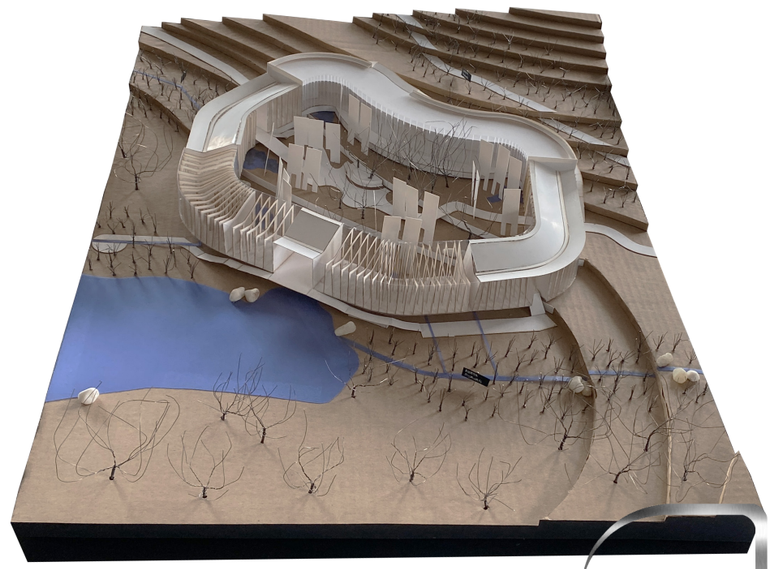


Plant material – Vegetation according to location:



Operation during the day and night:





FOG CATCHER LIBRARY

Innovative fog-harvesting architecture for resilient landscapes
San Agustín Watershed
Program: Library
Total water:
minimum: 1.510 l/d
maximum: 6.030 l/d
Restoration area: 1.250 m²

Country/City	Santiago, Chile.
University / School	University Diego Portales / Architecture School UDP
Academic year	2024 - 2025.
Title of the project	FOG CATCHER LIBRARY: Innovative fog-harvesting architecture for resilient landscapes.
Authors	Pablo González Varas.

TECHNICAL DOSSIER

Title of the project	FOG CATCHER LIBRARY: Innovative fog-harvesting architecture for resilient landscapes.
Authors	Pablo González Varas.
Title of the course	Hydric Infrastructure: Climate Change Adaptation projects in Micro-watersheds.
Academic year	2024 - 2025.
Teaching Staff	Porf. Claudio Magrini / Assistant Sofia Navarro + Flavio Santisteban
Department / Section / Program of belonging	Landscape unit
University / School	University Diego Portales / Architecture School UDP

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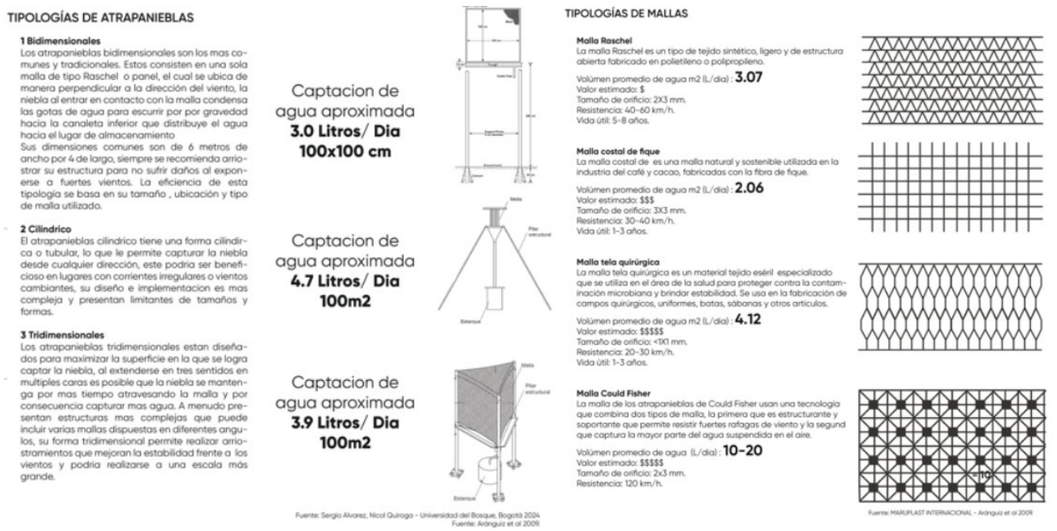
Types of Fog Catchers



Mesh Types

Fog Catcher Aerodynamics

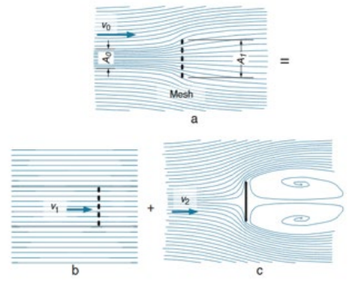
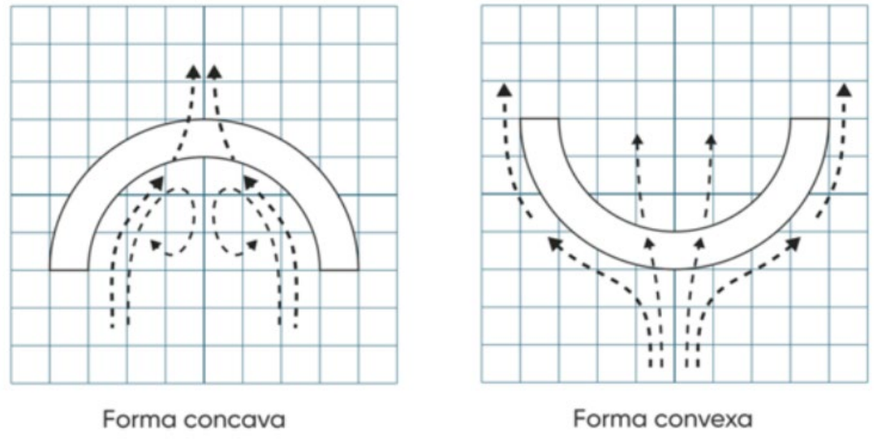


Table 2
Drag coefficients for rectangular plates and a C-section with the open side facing the flow.

Geometry	Aspect ratio (b/h)	Drag coefficient (C_d)
(1)	1	1.18
	5	1.2
	10	1.3
	20	1.5
	∞	2.0
(2)		2.3

Esquemas de forma



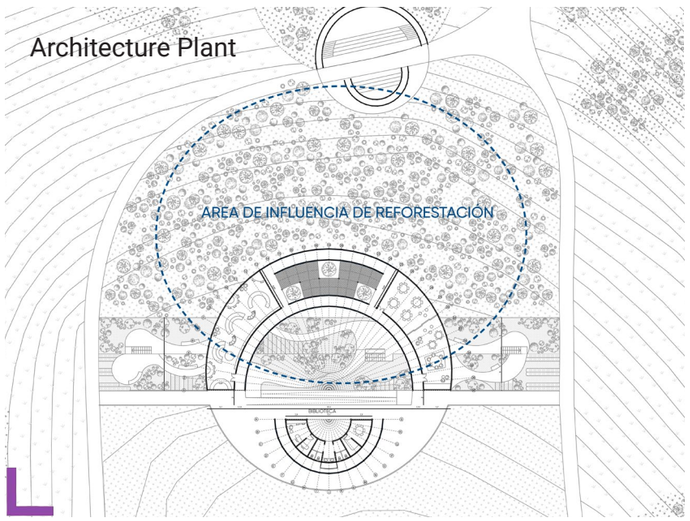
Strategy 2:

Climate change, combined with informal urban growth in the ravines of Valparaíso, has intensified water scarcity in these ecosystems. This condition has led to a loss of ambient humidity, soil degradation, and a decrease in vegetative cover, consequently increasing the risk of wildfires. In response to this scenario, the proposal introduces innovation in fog catcher design by integrating this technological component into a habitable architectural structure. The project envisions a community library located in the San Agustín watershed, oriented toward the prevailing southwesterly winds to optimize the capture of airborne moisture. Water collection is not limited to a series of fog-catching planes; rather, the form of the building itself is designed to enhance aerodynamic capture efficiency. The concave and convex shapes activate the Bernoulli principle, thereby increasing air friction over the mesh surfaces. The water harvested is used for subsoil infiltration and gravity-fed irrigation in degraded areas of the ravine, supporting reforestation efforts with native species. The hydric function of the device is complemented by the library's educational role, aiming to become a hub for applied environmental education. In essence, the project proposes a cultural, ecological, and technological space that transforms an environmental phenomenon into an active element of inhabitation. The proposal not only seeks to strengthen the landscape's resilience to climate change, but also to promote access to both education and water resources through an architecture that is deeply responsive to its territory.

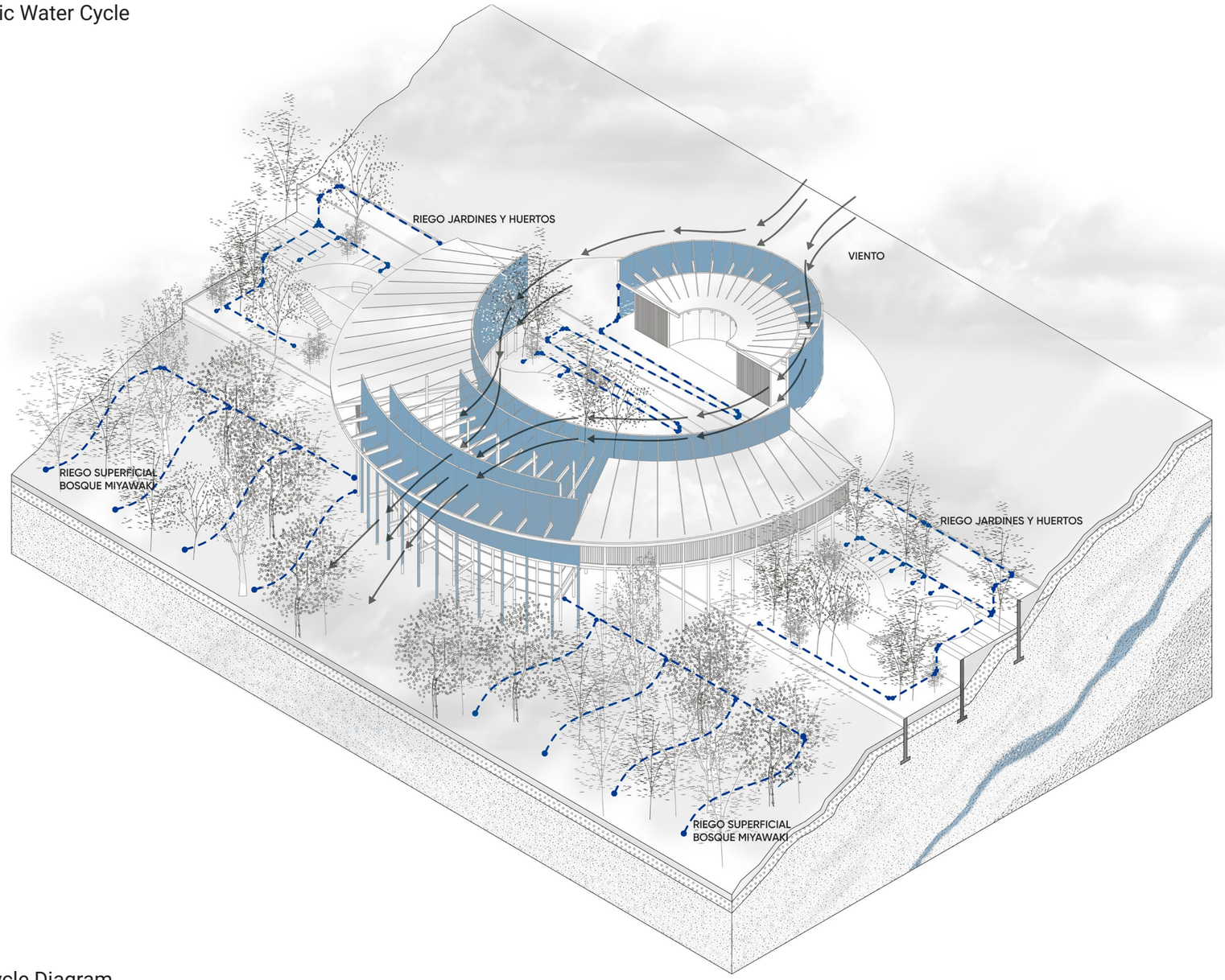
Target Image

Masterplan

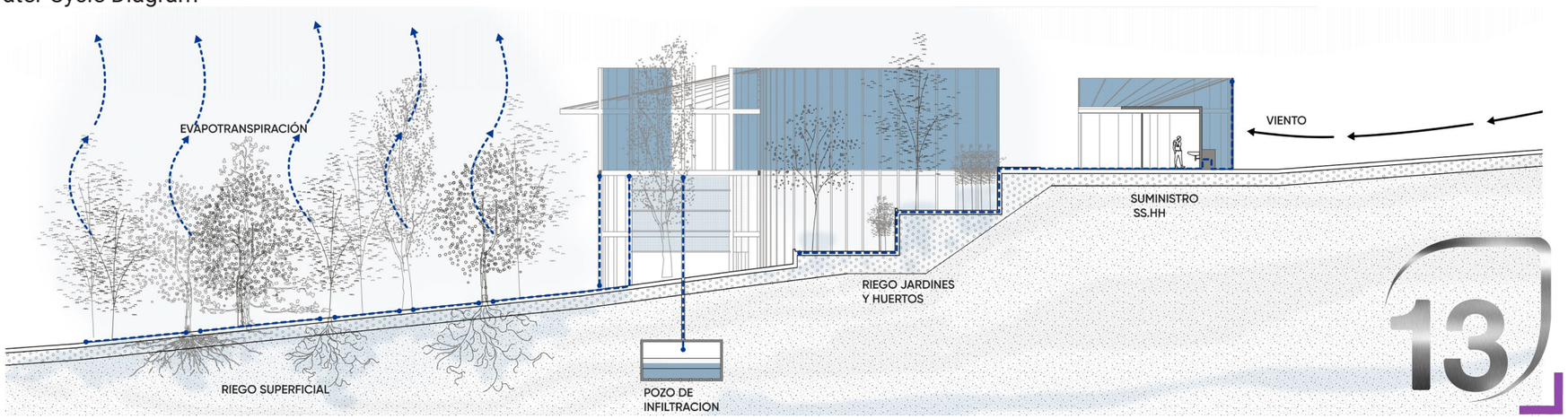
Architecture Plant



Isometric Water Cycle



Water Cycle Diagram



TERRACES OF LIVING WATER

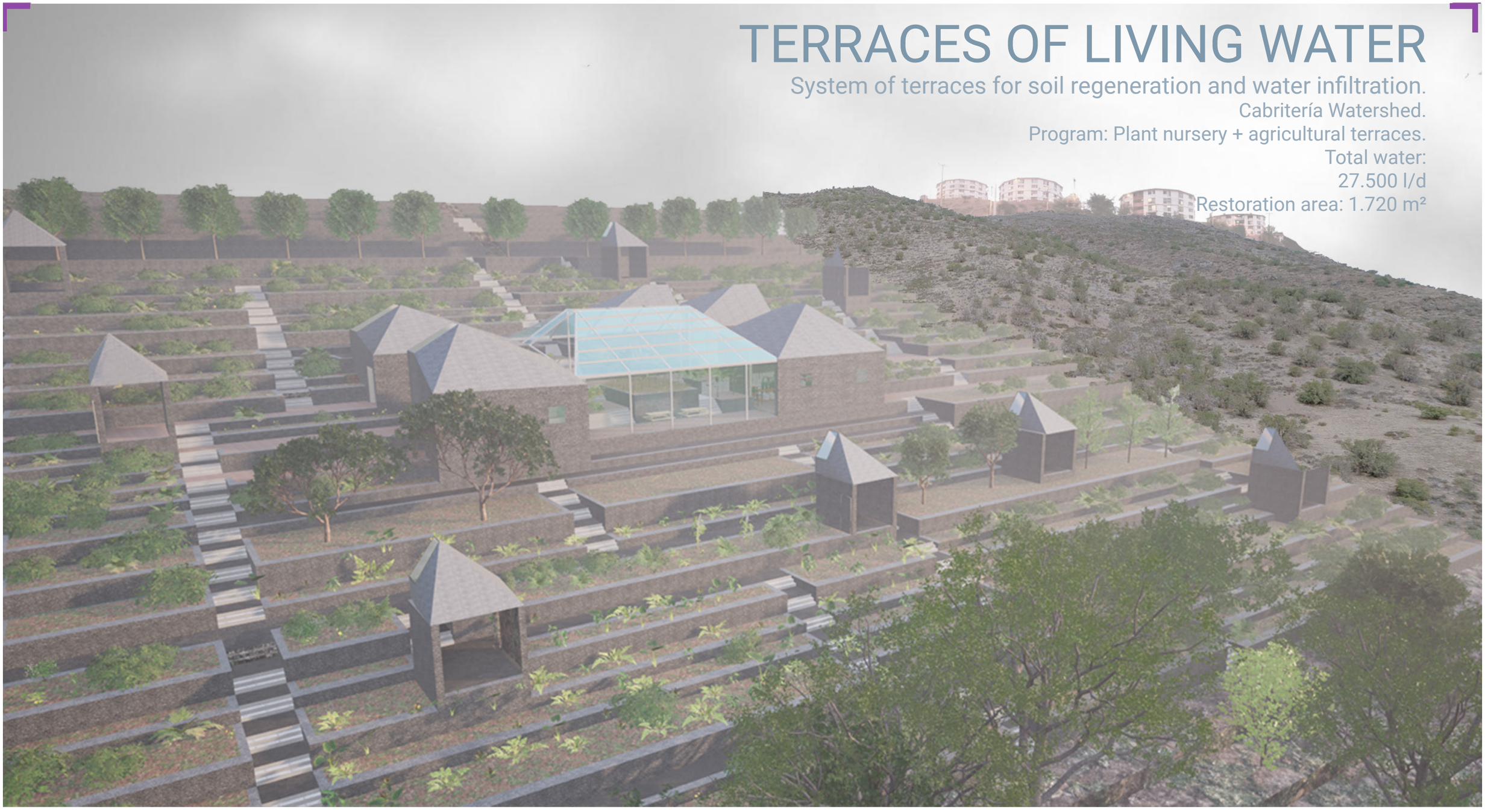
System of terraces for soil regeneration and water infiltration.

Cabritería Watershed.

Program: Plant nursery + agricultural terraces.

Total water:
27.500 l/d

Restoration area: 1.720 m²



Country/City	Santiago, Chile.
University / School	University Diego Portales / Architecture School UDP.
Academic year	2024 - 2025.
Title of the project	Terraces of Living Water, System of terraces for soil regeneration and water infiltration.
Authors	Karla Osorio Salazar.

TECHNICAL DOSSIER

Title of the project	Terraces of Living Water, System of terraces for soil regeneration and water infiltration.
Authors	Karla Osorio Salazar.
Title of the course	Hydric Infrastructure: Climate Change Adaptation projects in Micro-watersheds.
Academic year	2024 - 2025
Teaching Staff	Prof. Claudio Magrini / Assistants Sofia Navarro + Flavio Santisteban
Department / Section / Program of belonging	Landscape unit
University / School	University Diego Portales / Architecture School UDP.

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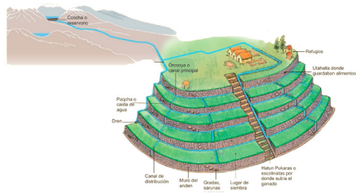
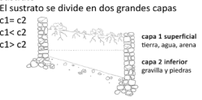
Terraces



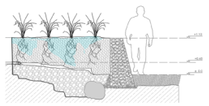
ELEMENTOS PRINCIPALES DE LA ANDENERIA

Sustrato
El sustrato se divide en dos grandes capas
c1= c2
c1< c2
c1> c2

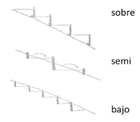


Pendiente de la plataforma
El sustrato se ubica dentro de la plataforma, cuenta con diferentes grados de pendientes

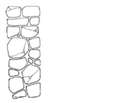
Sistema de Riego
Riego por Goteo
Riego por zanjas



Posicionamiento de andén
El posicionamiento de la andenería en la ladera puede ser:

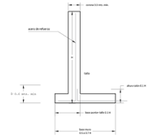


Muros
Altura de muro 0,5 y 2,. en promedio
Dentro de su composición cuenta con diferentes categorias



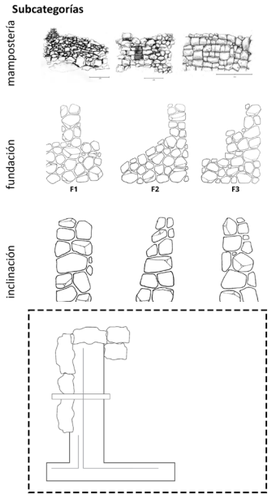
MU1 muro tipo **MU2** muro perforado

MU3 muro con borde **MU4** muro peldaño

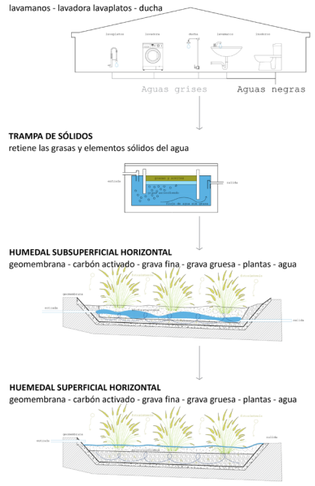


- base del muro -> 0.5 a 0.7 H
- corona -> 0.3 mts. mín.
- base punta+tallo -> 0.1 H
- altura talón -> 0.1 H
- emplazamiento D -> 0.6 mts. mín.

Subcategorías



greywater

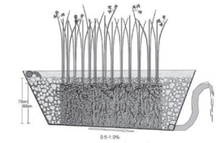


Fuente	verano	invierno	Tipo de agua
Ducha	50	72	Aguas grises
Lavamanos	10	12	Aguas grises
Lavaplatos	16	18	Aguas grises
Lavado general	30	37	Aguas grises
Riego	4	33	Aguas grises
WC	60	60	Aguas negras
Gastos totales	170	230	
Aguas grises	110	170	

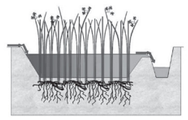
Familia de 4 integrantes consume 680 litros diarios.

Nombre Común	Nombre Científico	Familia	Crecimiento	Altura	Dimensiones de Raíces	Largo de Raíces
Luchecillo	*Egeria densa*	Hydrocharitaceae	Muy rápido	Hasta 1.5-5 metros	Raíces adventicias a intervalos a lo largo del tallo	5-20 cm
Totora	*Schoenoplectus californicus*	Cyperaceae	Moderado a rápido	Hasta 3 metros	Rizomas gruesos y extensos que estabilizan el suelo	30-50 cm
Lenteja de Agua	*Lemna minor*	Araceae	Muy rápido	1-5 mm	Pequeñas raíces flotantes	1-2 cm
Juncos	*Juncus spp.*	Juncaceae	Moderado	Hasta 1.5 metros	Rizomas y raíces fibrosas	20-40 cm

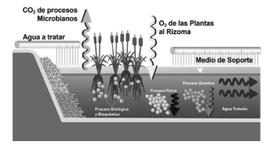
Humedal subsuperficial horizontal (Anaróbico)
Fuente: (Delgadillo, O., et al, 2010)



Humedal superficial (Aeróbico)
Fuente: Adaptada de Llagas, W. & Guadalupe, E. (2006).



Microorganismos



Written statement, short description of the project in English, no more than 250 words

Strategy 3:

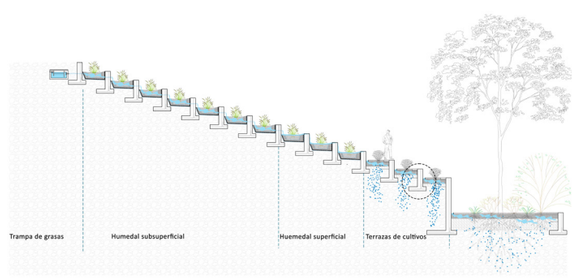
The territory shows signs of environmental degradation, primarily due to water erosion caused by surface runoff on a steep hillside, compounded by the lack of vegetative cover and the presence of informal housing lacking proper planning and infrastructure.

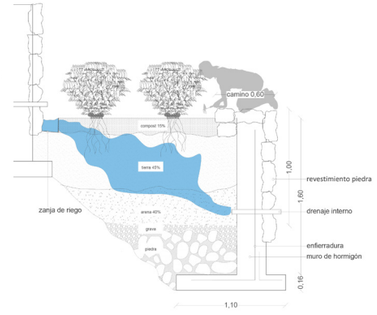
In response, the proposal envisions a landscape intervention with a regenerative focus, aiming to restore the ecological functions of the soil by stabilizing the terrain, improving water management, and strengthening the relationship between the community and the territory.The central element is a productive terracing system, whose uppermost tier is fed by constructed wetlands that treat nearby domestic greywater. This treatment improves water quality, enabling its reuse in a productive and ecological cycle. Once purified, the water serves three main purposes: irrigating the agricultural terraces, supplying a plant nursery, and supporting reforestation areas. Additionally, any unused water is automatically infiltrated into the soil, minimizing hydric entropy.The project includes four groups of agricultural terraces dedicated to aromatic herbs, vegetables, fruit trees, and legumes. These are complemented by viewpoints, gathering spaces, and pathways, organized through trails and stairways that converge at a large plant nursery system, which acts as the central hub for all agricultural activities: composting, germination, education, planting, caretaking, and harvesting. The nursery also supports the cultivation of native plant species for reforestation purposes.

Architecture project

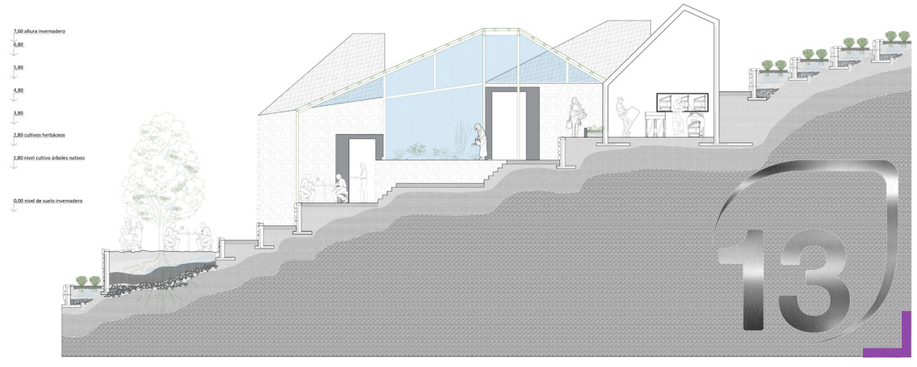
Eroded area

Water infrastructure elements

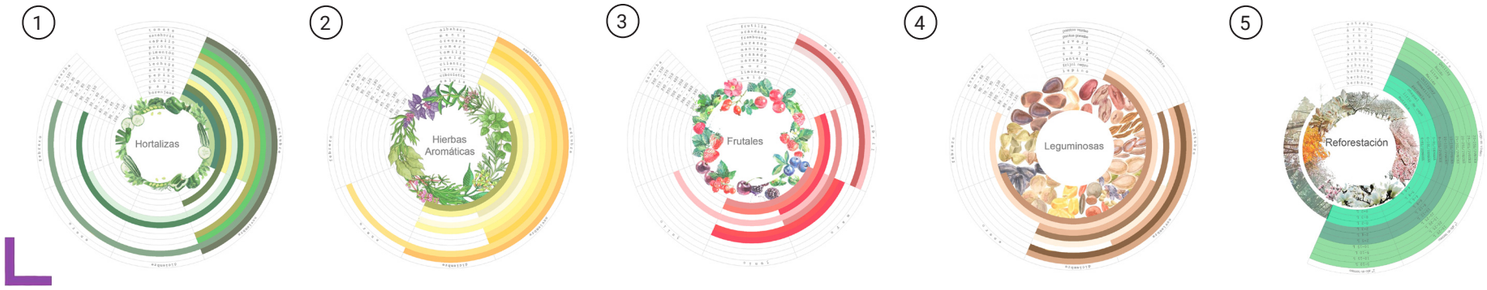




Architectural artifact – Plant nursery



Vegetative period



FUNGI FACTORY

For Water Harvesting and Ecosystem Regeneration
Borde Este Watershed.
Program: Fungi-based productive and educational center.
Total water:
minimum: 2850 l/d
maximum: 5400 l/d
Restoration area: 6450 m²

Country/City	Santiago, Chile.
University / School	Diego Portales University.
Academic year	2024 - 2025.
Title of the project	Fungi Factory for Water Harvesting and Ecosystem Regeneration
Authors	Katherine Llanquileo Lorenzo

TECHNICAL DOSSIER

Title of the project	Fungi Factory for Water Harvesting and Ecosystem Regeneration
Authors	Katherine Llanquileo Lorenzo.
Title of the course	Hydric Infrastructure: Climate Change Adaptation projects in Micro-watersheds.
Academic year	2024 - 2025
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Department / Section / Program of belonging	Landscape unit
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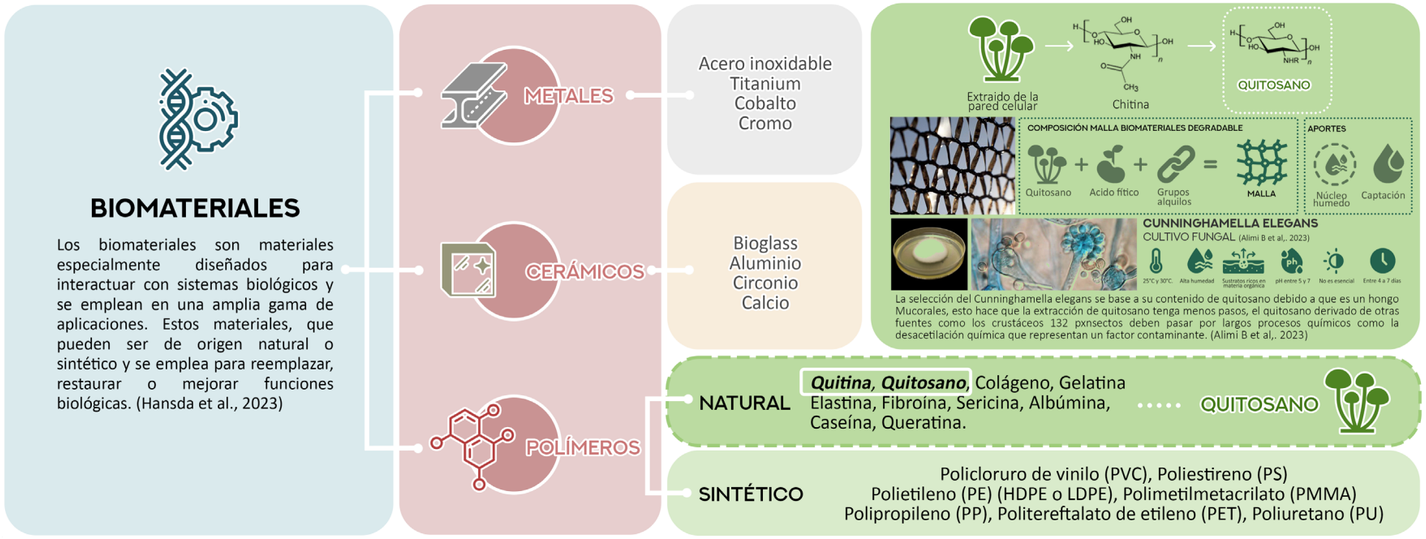
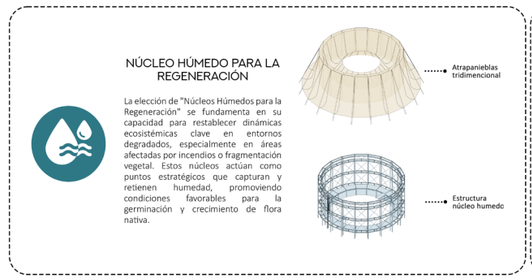
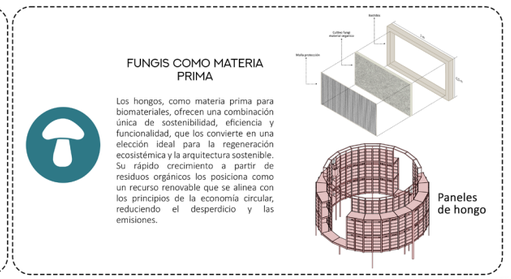
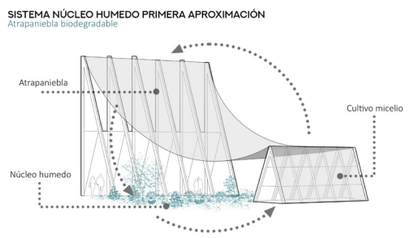
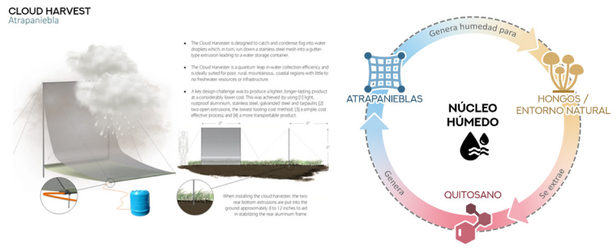










Strategy 4

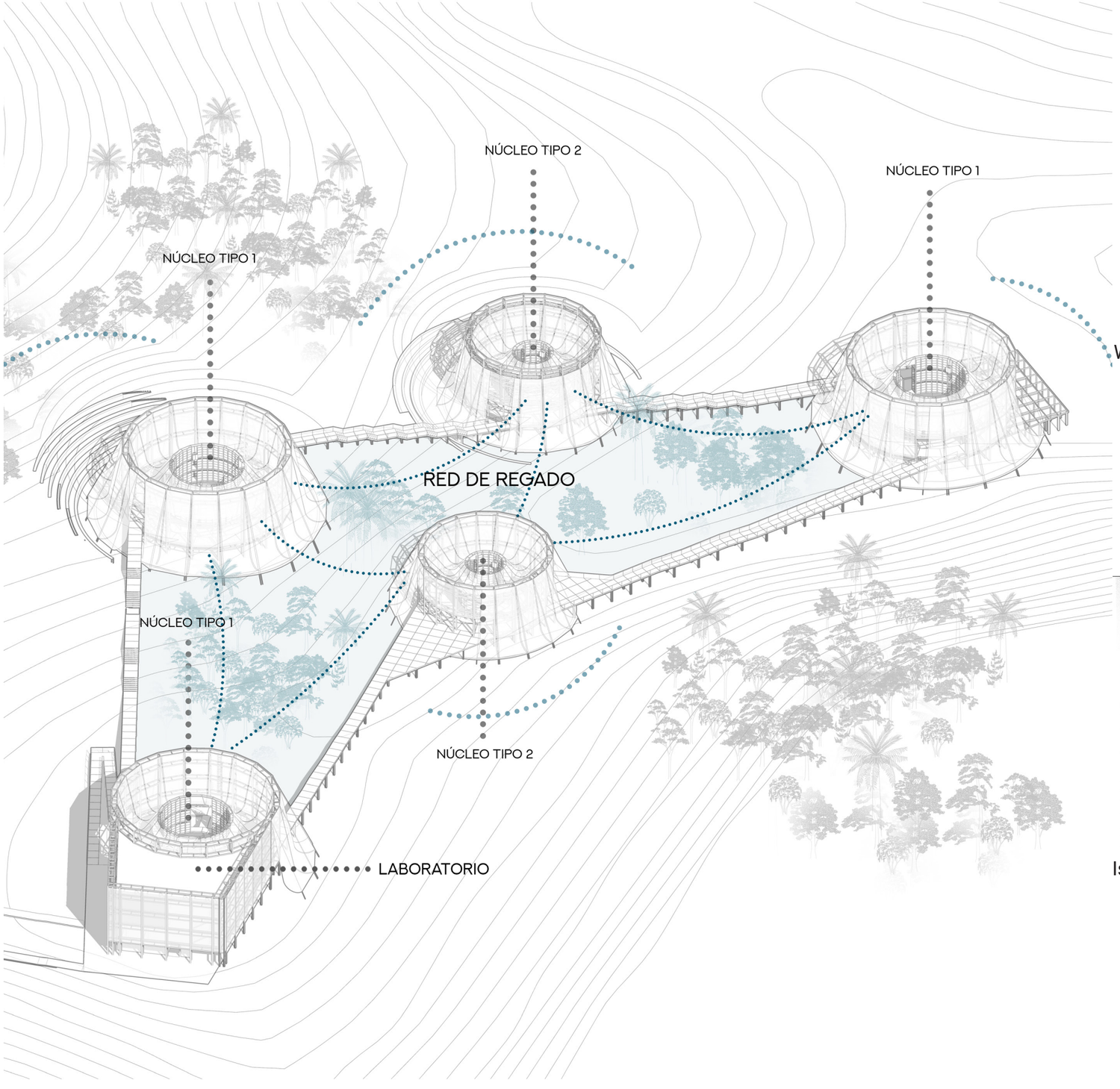
The ravine ecosystems of Valparaíso are facing water scarcity as a direct consequence of climate change and human intervention. This scarcity has led to the spatial fragmentation of native vegetation, putting key ecological processes in the region at risk. To address this fragmentation, the project proposes the creation of a network of humid cores strategically located throughout the territory. Each core integrates a biotechnological fog-catching infrastructure made from biodegradable and regenerative biomaterials, specifically chitosan—a biopolymer derived from the chitin found in fungi, which will be cultivated within the cores themselves. In this way, each humid core functions simultaneously as a water-harvesting infrastructure and a productive platform for the very material that composes its own fog-catching mesh, implementing a self-sustaining system based on the principles of circular design. This strategy closes the production cycle by using a locally sourced biomaterial (Cunninghamella elegans), thereby strengthening the ecological resilience of the environment. The humid cores are composed of modular panels used for mushroom cultivation, from which chitosan is extracted and used to manufacture the fog-catching meshes. At the same time, the panels that are connected directly to the ground form an underground mycelium network, which links the roots of trees and plants and supports the regeneration of the ecosystem. This productive circuit is anchored by a publicly accessible laboratory and research center located within the project. This center plays an educational role, aiming to disseminate and democratize knowledge about fungal biomaterials beyond the boundaries of the scientific community.

Barcelona International Landscape Biennial

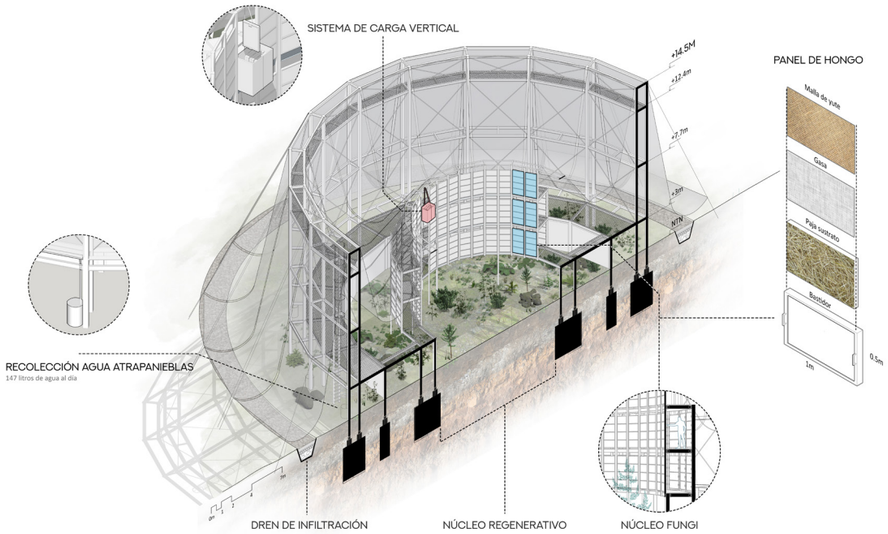
Contact via email:
biennaladm@coac.net

Venue:
COAC - Col·legi Oficial d'Arquitectes de Catalunya
Carrer Arcs 1-3, 08002 Barcelona - Spain

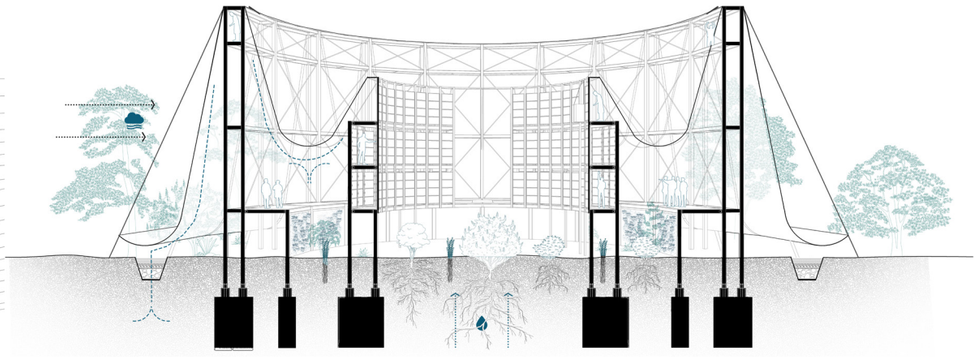
Isometric reforestation area



Isometric section humid node



Water Cycle Section



NÚMERO DE ÁRBOLES QUE PODRÍAN REGARSE EN UNA HECTÁREA DE BOSQUE ESCLERÓFILO DENSO.

El número de árboles por hectárea para la situación de bosque denso es de 3.266 y el área basal por hectárea alcanza los 17,49 m2/ha (Garfias et al, 2019)
Dado que hay 3,266 árboles por hectárea:
Con 15 litros por árbol/mes:
Mínimo: 6,156÷3,266 =1.88 hectáreas
Máximo: 14,364÷3,266 = 4.40 hectáreas
Con 5 litros por árbol/mes:
Mínimo: 18,468÷3,266 = 5.65 hectáreas
Máximo: 43,092÷3,266 =13.19 hectáreas

TOTAL: Se podría regar 5.65 y 13.19 hectáreas de bosque esclerófilo al mes, dependiendo de las necesidades hídricas de los árboles.
Radio para 18,800 m^2:
√(18,800/π)= √5,981.32 = 77.3 m
Radio para 131,900 m^2:
√(131,900/π)= √41,988.45 = 204,9 m
TOTAL: radio correspondiente sería aproximadamente entre 77 m y 205 m en un mes

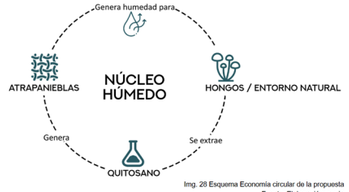
NÚCLEO 1

CÁLCULO DE LA CANTIDAD DE AGUA RECOLECTADA POR UN ATRAPANIEBLAS DE 3580 M2 EN UN DÍA

-Superficie del atrapanieblas: 3580 m^2
-Rendimiento del atrapanieblas: 2 litros de agua por metro cuadrado por día

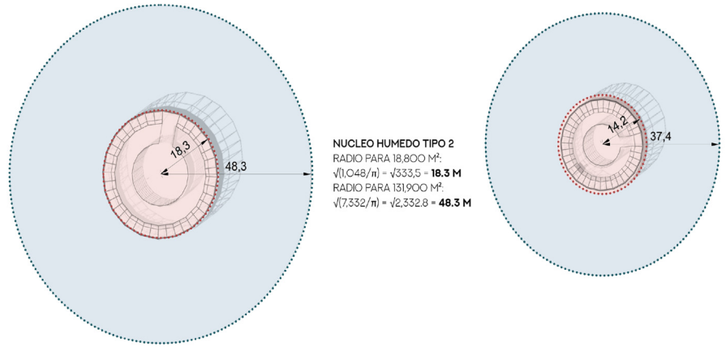
Agua recolectada por día=Superficie×Rendimiento
Agua recolectada por día=3580 m2×2 litrosm2
Agua recolectada por día=3580m2×2m2litros
Agua recolectada por día=7160 litros
Agua recolectada por día=7160litros

Agua recolectada=3580m2×2m2litros=7160litros por día
Entonces, un atrapanieblas de 3580 m^2 puede recolectar 7160 litros de agua en un día bajo esas condiciones.



Img. 28 Esquema Economía circular de la propuesta
Fuente: Elaboración propia

Isometric section humid node



NUCLEO HUMEDO TIPO 2
RADIO PARA 18,800 M^2:
√(1,048/π) = √333,5 = **18.3 M**
RADIO PARA 131,900 M^2:
√(7,332/π) = √2,332.8 = **48.3 M**

NUCLEO HUMEDO TIPO 1
RADIO PARA 630 M^2:
√(630/π) = √200,6 = **14.2 M**
RADIO PARA 4,400 M^2:
√(4,400/π) = √1,400.1 = **37.4 M**