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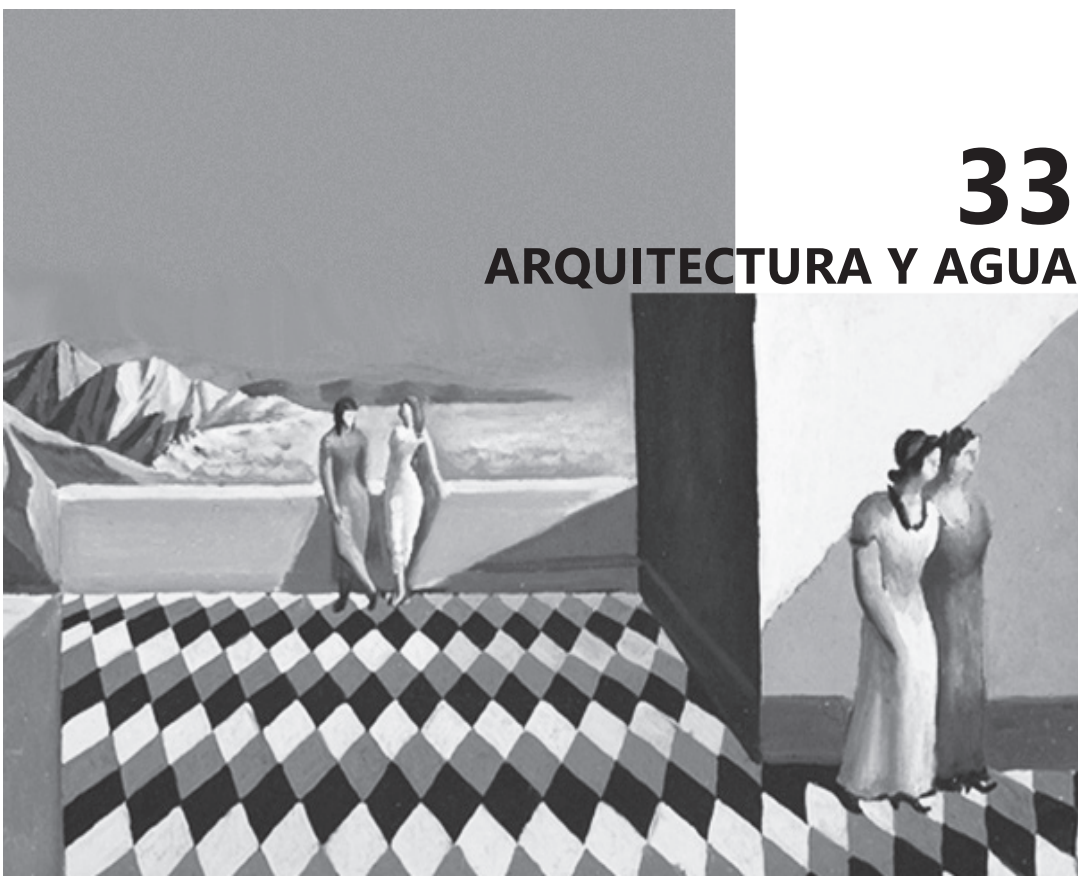

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ESPECULACIONES SOBRE ARQUITECTURA Y AGUA
SPECULATIONS ON ARCHITECTURE AND WATER
Gloria Rivero-Lamela (https://orcid.org/0000-0002-8683-0704

G. RIVERO-LAMELA "Especulaciones sobre arquitectura y agua". **Proyecto, Progreso, Arquitectura**. Noviembre 2025. Universidad de Sevilla. ISSN 2171-6897 / ISSNe 2173-1616 - RECEIVED 2025-10-18 / ACCEPTED 2025-10-19
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p.13 Water has occupied a foundational position in reflections on the world since the earliest days of Western philosophy. Thales of Miletus, regarded as the earliest philosopher of the European tradition, argued in the 6th century BC that the arkhé—the originating principle of all things—was water: a primordial substance, the basis of life, and matter in perpetual motion. More than two millennia on, this insight reads not only as poetic but as strikingly contemporary. Today, the relationship between water and architecture, the city and the wider territory calls for a renewed and critical examination.

Water is far more than a natural resource or a geographical parameter; it is a cultural agent, a formative force that shapes landscapes and patterns of habitation. Across all territories, its presence or its scarcity has long determined where communities settle, how they produce, and models of urbanisation. Historian Fernand Braudel reminds us that the history of societies cannot be understood without attending to the rhythms of the Mediterranean — that "*succession of liquid plains*"[1], that is, the logic of water as a fundamental condition of habitation. Architecture, in this sense, is not merely a response to a given environment, but acts as a mediator—an artefact capable of reading, channelling and symbolising water.

In recent decades, however, the technosphere described by Peter Haff —that planetary layer urbanised, paved, and technologised by human action— has tended to ignore the age-old lessons of natural water systems. The
p.14 indiscriminate expansion of cities over river basins, marshes and floodplains is the clearest indication of a disregard for the basic logic of water, "*an expression of a decline in the landscape*"[2]. As Rem Koolhaas observed in his seminal essay Delirious New York, urban modernity has long been characterised by a desire to suppress its natural substratum, giving rise to artificial islands of autonomy — Manhattan being the paradigmatic example[3]. What was once celebrated as a form of technical emancipation now appears as a precarious stance: nature, and water in particular, is reasserting itself with the force of catastrophe. The recent cut-off low (known in Spain as a DANA) that swept through Spain's eastern seaboard in October 2024 is a tragic reminder of this condition, bringing human and material devastation and leaving communities fractured in ways that will take years to mend.

Within this shifting landscape, architecture and urban planning are compelled to reconsider their very foundations. Peter Zumthor noted that "*where human work handles nature with care (…), one becomes aware of the dependence on the ground.*"[4] What may at first seem a modest assertion in fact articulates an ethic: design cannot be extricated from an understanding of water as both a vital resource and a cultural construct. It is an ethic that is simultaneously an aesthetic, for water imbues architecture with sensory, symbolic and poetic dimensions.

A glance at history is enough to reveal that architecture has long cultivated a fertile and nuanced dialogue with water. The channels of the Alhambra not only ensure irrigation and freshness in the courtyards, but also orchestrate a system of visual and acoustic resonances that elevate water into spatial experience. In his intervention for the Querini Stampalia Foundation in Venice, Carlo Scarpa recognised that the water of the lagoon should not be held back but welcomed, making the ebb and flow of the tides an essential component of the space.[5]. Luis Barragán, for his part, employed reflecting pools and fountains not merely as ornament but as instruments of contemplation and silence, introducing into everyday life, "*through the spell of their enchantment*", a moment of transcendence[6]. Closer to us, Juan
p.15 Navarro Baldeweg constructed with his Casa de la Lluvia (House of Rain) a radical metaphor: an architecture that does not oppose water but allows itself to be permeated by it, revealing the atmospheric dimension of dwelling.

But beyond these canonical examples, water has become a terrain of political contestation. Andrés Jaque has demonstrated this across numerous projects, from his research into water purification in Cosmo (2015) to his reflections on the politicisation of this resource in a world shaped by profound inequalities, presented in part at the 13th Shanghai Biennale, which he curated under the title *Bodies of Water*[7]. There is no such thing as neutral water: it is always distributed, regulated, privatised or defended. To think about architecture and water in the twenty-first century is therefore also to think in terms of environmental justice, equitable access and sustainability.

The contemporary challenge is twofold. The contemporary challenge is twofold. On the one hand, to reconceive water as infrastructure — supply networks, storage systems, purification processes and architectures capable of responding to the pressures of climate change. On the other, to recover it as a sensitive material, an element that can enrich architectural design in spatial, aesthetic, ethical and social terms.

At the same time, contemporary urban planning must reclaim the knowledge embedded in traditional water landscapes. Historic mills, irrigation channels, waterwheels and dams are not merely vestiges of the past; they are repositories of technical and cultural knowledge that can inform sustainable practice[8]. The primordial anthropic layer referenced in the call for papers — that historical network of water uses, diversions and discharges — should be approached not as a relic but as a lesson. Urban resilience depends on rearticulating these inherited forms of knowledge with contemporary technological tools, generating new forms of synergy between nature and technology.

In this vein, the Danish Pavilion at the 2021 Venice Biennale, *Con-nect-ed-ness*, is particularly compelling. It proposed a closed-cycle system in which water was collected, filtered and redistributed within the exhibition space

itself. This was not simply an ecological gesture, but a carefully staged demonstration of how water circulates, transforms and obliges us to think in terms of systems rather than objects. Echoing Braudel, the Italian Pavilion at the 2025 Biennale — entitled *Terræaquæ. L'Italia e l'intelligenza del mare* curated by architect and professor Guendalina Salimei — returns to the sea as the central axis of cultural reflection, highlighting Italy as a land both shaped by and receptive to the sea. p.16

Architecture is therefore called upon to play a decisive role in shaping a new culture of water. It is not enough to incorporate technical measures for water efficiency; what is required is the generation of new forms of awareness and sensitivity. As Iñaki Ábalos argues, contemporary practices in architecture and landscape design seek to overcome the modern dichotomy between nature and artifice[9]. Architecture becomes a tool for making visible and interpreting the invisible conditions of the natural world. Water, hidden when it flows beneath the urban ground or disappears into underground networks, must once again be sensed within our cities and buildings, reminding us of our radical dependence on it.

This issue of PpA seeks to contribute to a deeper reflection on the complex relationship between architecture and water from a broad perspective that is at once historical and contemporary. The articles assembled here explore this relationship at multiple scales and across diverse contexts: from the cultural landscapes of the Mediterranean and the historic irrigated fields of the Ebro, to the urban lagoons of Concepción and the community-based practices of thermal bathing in Baden. Water appears as a constructive material, an ecological resource, a public space and a symbolic element that shapes ways of inhabiting and imagining the territory. Through these varied approaches, the issue underscores the indissoluble bond between architecture, landscape and water, convinced that recognising — and designing from — this interdependence is essential to conceiving a genuinely habitable future.

"In the beginning was water", wrote Thales. Today, on a planet that is warming and drying even as it floods and desertifies, perhaps water may once again hold the possibility of a new beginning.■

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CASTILLOS DE ARENA Y AGUA. ENCUENTROS CRUZADOS EN LOS BORDES DEL MAR
SAND AND WATER CASTLES. CROSSING ENCOUNTERS AT THE EDGE OF THE SEA

Javier Navarro de Pablos (0000-0002-1315-3087)
Ángel Martínez García-Posadas (0000-0003-1393-9706)

p.19 ARCHITECTURES OF SAND IN THE SAND

In the same year that François Truffaut closed *The 400 Blows* with the memorable image of young Antoine Doinel running until he reached the beach – 1959 – René Magritte painted *The Castle of the Pyrenees*, one of those canvases in which his distinctive surrealism approached the realm of childhood reverie: on the shoreline, a boulder floats in mid-air without touching the sea, and upon its summit stands a fortress carved from the rock (Figure 1). The oil painting evokes the fantasy of weightless materialisation, prompting reflections on the ephemerality of architecture, the erosion of water, and childhood dreams. In the making of castles in the air – or in the sand – lies a meta-architectural impulse that anticipates solid concrete projects or pools hewn from stone. This modest experimentation with sand and water forms a little-explored yet crucial chapter for understanding the architectural imagination born by the sea – an essential precursor to works aspiring to permanence.

A castle is typically associated with solidity, given its traditional construction in stone; yet when made of sand, it acquires the condition of a malleable substance, one that can be shaped and modelled. The castle a child builds on the beach intuitively achieves that indissolubility often regarded as the primary architectural aim: the continuity of the work with its environment. In *Arquitecturas excavadas*[1], Mario Algarín noted that Vitruvius had already systematised – from an architectural perspective – the division previously established within sculpture: architecture created through the accumulation of elements, by composing pieces; that which appears through excavation, by subtracting mass; and that which results from modelling a pliable material such as clay. With the freedom of play, the architecture of the castle – requiring no inhabitable interior void – merges with sculpture, aligning with the second path outlined by
p.20 Algarín, subtraction, and with the third, modelling. The castle that a child forms in the sand, with their hands, is as much architecture as sculpture: its foundation is the entire beach, its matter identical to that of its base. A sandcastle is both construction with the ground and of the ground itself (Figure 2).

In *When Faith Moves Mountains*[2], Francis Alÿs orchestrated an army of four hundred collaborators – perhaps in a nod to Truffaut – to shift the profile of a dune in the Peruvian desert by ten centimetres, a feat poised somewhere between epic and fable. The anecdote of Jorge Luis Borges's visit to the Egyptian pyramids is well known: when he was seen taking a handful of sand and letting it fall, like an hourglass, into the wind, the writer justified the apparent futility of his act by saying, "*I am modifying the desert*."[3] Faced with the force of water's action along the coastline – which has produced ever-changing orographies, from cliffs to beaches – a sandcastle is nothing more than a few grains of sand displaced before the immensity of the pyramids and the desert. Perhaps, as a twilight image of sand architectures, one might recall that tale by Italo Calvino[4] in which a traveller devoted himself to collecting small vials of sand from the places he visited: within them he recognised the ashes of once-magnificent constructions, towering dunes, classical beaches and animal remains – all of which could now fit into a tiny container, an allegory of the passage of time and the vulnerability of architecture.

From a material standpoint, there exists a procedural similarity between the sandcastle and concrete, both dependent on water as a fundamental element. The castle attains its fleeting consistency from the moisture retained by the last tide, just as concrete, initially liquid, takes the shape of the mould that contains it. The momentary illusion of sand turned into a castle, or of stone in a liquid state, is made possible by water, which binds sand and stone into a ductile and transitory mixture.

Epiphanies on the Beach

The ambiguity of the malleable state of sand and concrete constitutes a veiled chapter in twentieth-century architecture and art. Around it converge several scenes from the life of Le Corbusier, each tied to water and experimentation: the photograph depicting him with the children of sculptor Constantino Nivola, his hand scoring a kind of bas-relief into the sand; the sequence of albums filled with scenes captured by his camera during his walks across diverse geographies where land meets water; and, finally, the seaward horizon that opens before his tomb.

In the first of these scenes several shared projects and a long-lasting friendship take shape – one that began
p.21 when the two were introduced by Josep Lluís Sert in 1945[5]. The sculptor, who had settled in the United States after the Second World War, would host the architect during his occasional trips to America, welcoming him as a member of the Nivola family during their summers in Long Island[6]. The masters of concrete, at different scales, converge in that image in which Le Corbusier delivers an impromptu lesson on materials in Montauk, on the eastern end of the New York island. The photograph is dated to the summer of 1948 (Figure 3), when they were working on a series of bas-reliefs, or sand-casts[7], with the beach transformed into an open-air workshop: once sketched, the drawings in the sand were cast in plaster, moving from model to sculpture, from landscape to object. In the article "Plastique et Poétique", the architect describes the decisive role of sand: "*Nivola has created sculpture upon sand, executed at the hour when the tide recedes, when the sand is damp. With knives, spoons and rudimentary tools, the cavity that will serve as the mould is carved into the sand. This mould is immediately filled with plaster, 'thrown' by hand upon the very sand:*

pieces of branches and burlap strengthen the plaster mass, and the whole is easily lifted from its ephemeral mould. An incisive sculptural manifestation!"[8]

Le Corbusier's experimentation on the beach at Montauk cannot be separated from the post-war cultural and intellectual context of 1940s and 1950s Paris, where sculptural, architectural and critical practices converged to **p.22** reconfigure the relationship between art and technique. Nivola's sand sculpture is inscribed within a genealogy that connects with the strategies of artists such as Constantin Brancusi and Isamu Noguchi – master and apprentice – whose works not only operate through subtraction, but also engage in a dialogue with the ground and the topography, anticipating a territorial reading of sculpture. This sculptural dimension, rooted in modernity, was critically systematised by Carola Giedion-Welcker[9], who understood the transfer of plastic principles to architecture as a phenomenon of its time. Within this framework, the sand-casts are not merely playful or poetic exercises but technical experiments in which mould, material and gesture converge – where architecture approaches a matrix logic shared with industrial processes. The technique of casting is not alien to contemporary developments in heavy industry, where the rapid moulding of components through heat and rotation was employed in armament production and later adapted for mass manufacturing in sectors such as the automotive industry. Far from being anecdotal, this convergence underscores how modern architecture and sculpture partake in a common technical culture – one that operates both in the design of permanent structures and in the ephemeral manipulation of littoral matter, producing works that are more discoveries than creations.

The enthusiasm of the account reveals an artist wholly devoted to matter, awaiting the result as if the evaporation of water from sand and plaster were a magical process. Brushing aside the grains of sand with a finger to sketch the outline of a bas-relief – and the subsequent creation of the mould to be cast – discloses a resolute commitment to extraction as a method. The newborn sheets of sand are at once sculpture and ground – like the castles of childhood – an architecture yet to be codified; markings that are only something more than hollowed traces in the minds of Le Corbusier and Nivola, just as they are merely stony fortifications in the child's imagination.

Barely three years after those summers on the beach, the commission for the layout of the new city of Chandigarh was formalised, and Le Corbusier had painted his open hand – perhaps city and hand fused months earlier in the sands of Long Island, as simple sketches of his magnum opus: the masterclass on composition and materials offered to his friend's children. The painted lines of his canvases and the traced lines of his urban plans dissolve their boundaries, for the master understood them to be one and the same[10]. Thus, the section of the Unité d'Habitation in Marseille, the plan of the Ville Radieuse, and the traces drawn in Long Island all follow a similar compositional pattern, one that seems to emerge from a codification of landscape learned during his formative journeys across Europe – a discovery of geometry originating perhaps in the Bulgarian fields or in the fluting of a Roman column (Figure 4). The rigidity of the canvas and the plan was replaced during that summer by the damp beach – a variation on Borges's fable: instead of modifying the desert, Le Corbusier built cities – perhaps the definitive plan of Chandigarh – with a simple furrow in the sand (Figure 5).

From his Indian experience – far removed from the Atlantic–Mediterranean duality – the master would derive **p.23** valuable lessons about water, humidity, and the behaviour of materials. The commission for the great city coincided with other projects, such as the villas in Ahmedabad, where he tested new formulas under extreme climatic conditions. In one of the models, that of Villa Chimanbhai – examined monographically by Miguel Ángel de la Cova[11] – Le Corbusier seems to reveal a new constant in his thinking, perhaps drawn from his experiences with the sands of Long Island, asserting that he had imagined the house as "*a snail shell*"[12]. The project is not only an allusion to the gastropod structure, but the photographs of the model suggest a desire to merge with its surroundings, situating it on the edge of a body of water to evoke a coastal landscape. The dismantling of the model itself once again evokes dissolution – fusion with the earth itself – as the dismembered wooden fragments are scattered across the terrain. The temporal coincidence of sand and sea, on opposite sides of the world, seems anything but accidental, pointing to the forging of a profound bond between his imagination and water.

Returning to the Atlantic shore, it is likely that the photographer on the beach was Nivola himself, exchanging roles with the architect-photographer. The dissolution of boundaries between urban plans and sandcastles extended to the motivations and interests of both artists – relentless explorers of materials and disciplines. Le Corbusier travelled throughout the Mediterranean between 1907 and 1917, accompanied by a camera and several notebooks. Three decades later, in 1936, he flew from France to Brazil aboard the *Graf Zeppelin* carrying a newly acquired cine-camera, which also allowed him to take photographs.

Over the next two years, he would record some 120 film sequences and capture more than 6,000 images. While his first phase focuses mainly on buildings – with the vernacular architecture of the Balkans sharing his reels with the Acropolis or Hagia Sophia – a second series was produced during his seaside holidays at Le Petit Piquey on the Arcachon Bay. In these close-up shots – photographed and filmed – of shells, bones, and driftwood, with the sea

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washing over and leaving patterns in the sand, we find the *objets à réaction poétique* that appear in his paintings
p.24 from the 1920s onwards[13]. In these discoveries, found only a few metres from his legendary cabin, Le Corbusier experienced an epiphany of bastions, dykes, and embankments – perhaps atolls and ravines in an inverse sense of scale – that inhabit shells, sand ripples, and small rocks (Figure 6). Tim Benton[14] notes that one could compile a book from the notable absences in Le Corbusier's travel photographs: in Venice there is no Palladio, in Florence neither Brunelleschi nor Alberti; he also observes how Le Corbusier avoided canonical scenes of major buildings, rarely framing them in full. From Versailles, St Peter's, or the Villa Medici he captured details that, out of context, appear as blank walls and shadowed projection Beyond those monumental works, the master focused on shells and stones, in which he seemed to recognise great refuges – authentic defensive architectures that began to populate his repertoire of references, as demonstrated by his aforementioned allusion to the snail shell of Villa Chimanbhai.

Years before his walks along the Côte d'Azur, the architect made a statement of intent: "*The eye does not see chaos, or rather, it sees badly in a chaotic or confused scene. It instantly seeks something with a recognisable feature. Suddenly, we stop, impressed, measuring, appreciating: we discern a geometric form – rocks standing upright like menhirs, the eternal horizon of the sea, the meander of beaches.*"[15] The construction of his cabin took place just a year
p.25 after his initiatory experience with sand alongside the Nivola family, and the second series of photographs continued until his death. The sea – the sculpting spirit of water beating against the coast – accompanied him from his earliest images to his last. Just as he discovered hidden universes within the Pantheon (Figure 7), by applying the right framing and scale to what appears as a vast shell of coffers, he also documented those sandcastles in his final years, within the intimacy of his retreats, as though they represented the culmination of his life's great project[16].

MEMORIES OF THE SEA

If someone had fictionalised Le Corbusier's inner voice – as Marguerite Yourcenar did for the emperor in *Memoirs of Hadrian* – we might read the architect recognising fragments of the rugged, rocky landscapes of the Greek islands in the sandy versions of his photographs. These might have taken him backwards, towards his wanderings in the *East*, or forwards, imagining the insertion of projects into those encounters of land and water, as temples were once arranged beside the Aegean[17]. In Yourcenar's voice, Hadrian defined architecture as an act of collaboration with the earth: "*To build is to collaborate with the earth, to imprint a human mark upon a landscape that will thus be modified forever; it is also to contribute to that slow transformation which constitutes the life of cities. How much effort is spent in finding the precise site for a bridge or a fountain, in giving a mountain road the most economical curve which will also be the purest…*"[18]. From the ephemeral bas-reliefs of Long Island to the footprints in the sand of Cap-Martin, Le Corbusier intuited that same inspiring force of a hollow line – whether drawn by a finger or carved by the tide – made architecture.

p.26 In the dense weave of stories interlacing the Mediterranean – its water and its matter – lies the unconscious encounter between Le Corbusier and Yourcenar. The summer following his stay in Long Island, in 1951, the architect decided to construct his coastal refuge, an attempt to experience firsthand the minimal unit of habitability (Figure 8). From his self-built altar, during those walks, he confirmed that certain theory of the beach: with stones arranged in the shape of menhirs (Figure 9), water became the architect of natural landscapes, which were then reinterpreted through the architect's sharpened gaze. While Le Corbusier was realising that 1:1 model of a Greek refuge, Marguerite Yourcenar was completing and publishing the celebrated apocryphal memoirs of the emperor. Given the book's success, it is not far-fetched to imagine that the architect read Yourcenar's text – a revelation likely akin to the topographies he found traced in the sand. The architect – photographer of beaches – and the Italic emperor meet, in separate times and voices, through the erosive force of water and the eternity of matter, which, in the form of castle or of sand, remains as one and the same substance:

"*In Rome I used, preferably, the eternal brick, which only very slowly returns to the earth from which it was born, and whose slow crumbling and imperceptible wear occur in such a way that the building continues to be a mountain even when it has ceased visibly to be a fortress, a circus or a tomb. In Greece and in Asia I used the native marble, that noble substance which, once carved, remains faithful to the human measure, so that the plan of the whole temple is contained in every fragment of drum.*"[19]

Among the architect's most intimate writings appear suggestive poetic fragments that reinforce the hypothesis that water is conceived as a deity, one that both extracts and adds matter wherever it pleases: "*And in this fountain of*
p.27 *uncertainties, thanks to water, all becomes clear: the sand, the mud, the still waters, the running waters, the underlying waters.*"[20] "*And you, Earth, oh desperately humid Earth, you are but apparent mould. And your water, vapour or liquid, manoeuvred by a distant star of fire, brings you everything – joy or melancholy, abundance or misery.*" In particular, it seems to be the waters of the Mediterranean that captivate his spirit: "*Over the years, I have become a man of the world. I have travelled across continents, and yet I have but one deep attachment: the Mediterranean. The queenly waters of form, of light, and of space.*"[21]

The reference to Hadrian must be understood in its double condition: as the literary voice of Yourcenar, but also as the material and cultural dimension of the historical figure, whose Villa Adriana in Tivoli stands as a masterful example of architectural synthesis among Mediterranean cultures. In this work, the interaction with water is not limited to mere landscape scenography, but functions as a true spatial matrix – configuring atmospheres, structuring movement, and articulating architecture itself.[22] This approach allows Chandigarh to be appreciated not only in its urban and material

dimension, but as the result of a process of reflection which, as in *Hadrian*'s villa, originates from a deliberate dialogue with the natural elements – whose essential organising principle remains water[23].

Le Corbusier absorbed the lesson of continuity between geography and architecture during his initiatory journeys through Greece – moving among islands, beside the waters of the same sea that would accompany his final walks, now camera in hand[24]. Given the evident permeability of Le Corbusier to his surroundings, his inclination towards the ground as a synthesis of the world around him should not be considered accidental: from the mosaic floors of *domus* and *villae* to the vast slabs of the Pantheon, the monumentality of Antiquity resides as much in the grand scale of its columns as in the thin layer of tesserae or the marble raised only a few centimetres above the earth. After his initiatory journey through Greece, he added to this equation the sandy floors of the beach, transformed into a precious quarry of unsuspected architectures in which, moreover, the action of water reveals the vulnerability of matter – almost as if in a kind of particle accelerator[25].

The horizon made architecture

It has often been remarked that Le Corbusier's relationship with water may be traced through certain specific projects[26]: the Venice Hospital, the reflecting surface on the roof of Marseille, the gargoyle of Ronchamp, the roofs of Chandigarh[27]. Yet an unexplored thread runs through the relation between his Greek memories and the way **p.28** those cartographic wanderings between water and land – water, sand, and stone – gave both spirit and form to his architecture in concrete – cement, and steel combined with water, sand, and stone. Just as it seems apt to approach Corbusian thought through Hadrian, perhaps the key to these bridges is not to be found in one of Le Corbusier's own projects, but in a Mediterranean work built on the Atlantic: Álvaro Siza's Piscinas das Marés.

The rocks near the beach of Matosinhos are sculpted through a strategy that mirrors Le Corbusier's maritime discoveries and Yourcenar's ruins: with the slightest gesture, with only a few linear traces, Siza contains the water – an inverse act to that of raising a monolith – carving the rocky profile just as the architect once inscribed furrows into the sand of a New York beach (Figure 11). At Leça da Palmeira, the essence of a primary, primitive architecture is materialised: the result of a process that begins in a childlike exploration of the horizon – an idea that accompanies the Portuguese architect throughout his career, whether in the form of altars or apertures of light – and the understanding of architecture as a *metaterrestrial* matter (Figure 12). From the stony particles of the planet, he draws the materials for an architecture – perhaps one that aspires to be nothing more than a hollowing-out – that will endure the constant erosion of the tides, without which the pools would be devoid of meaning or function. Water is therefore both destructive and **p.29** creative – a principle to which Le Corbusier must have arrived upon seeing the waves erase his newly discovered territories while simultaneously generating others, with the complicity of imperfect shells and stones.

It was precisely his master, Fernando Távora, who at the end of his career would point the way towards a project born from the Earth's own entrails, having witnessed first-hand how Siza shaped the landscape with a naturalness as innate as that of water: "*Architecture now appears to me as a great force – a force born of the Earth and of Man, bound by a thousand threads to the changing reality, a force capable of contributing powerfully to the happiness of the environment that gave it birth*."[28] In his potent prose, Siza himself employs a collection of terrestrial images as instruments for revealing the secrets of a place[29]emergent rocks and channels of water conceived as true pieces of architecture. In this descent towards the depths – those of his memory and of the planet – the project of the swimming pools resembles the act of painting in a cave, though in the open, on the coast, allowing the pigment of water to enter cavities that, contained by walls, condition surfaces. The sequence of their sections, like that of their model (Figure 13), reveals that what appears to be a single inhabited line, a wall excavated within a narrow strip, actually harbours a variability of routes and levels that seem a natural translation of the boundary between rock and water: a topography that, though new, appears always to have been there – floodable basins and stranded cliffs upon the shore, like those shells in which Le Corbusier saw architectures, *poetic objects*, perhaps the entire world.

THE SEA IN A VESSEL: TOWARDS AN ENVIRONMENTAL PREMONITION

In the Catholic tradition exists a passage that links the explorations of Le Corbusier and the architecture of Siza with the thread of sandcastles. The apocryphal scene recounts that during a contemplative walk along the beach, Saint Augustine of Hippo saw a child who had dug a small hole in the sand. After several trips carrying seawater with a shell to pour into it, the saint tried to explain the futility of the task, to which the child sagely replied that it was easier **p.30** to fill that hollow with water than to unravel the mystery of the Holy Trinity that troubled the saint's mind. From the eighteenth century onwards, as the legend spread across Europe and the Americas, representations of the scene became popular, and the shell came to be the saint's attribute – an allegorical model of the Portuguese pools. Like the mystic, Siza experienced at Leça da Palmeira an epiphanic moment, gifting the mirrored stillness of water contained within the rock basin as a counterpart to that which stirs in the ocean beyond. This deliberate and conscious stance – present also in the sand-casts and in the emperor's recollections – continues the unwritten task of invoking the dialogue between stone and water, between the Atlantic and the Mediterranean, with echoes of Rome and Greece.

Between the reverberation of the classical world and the mystical passages arises an impossible project, as improbable as that shell bearing all the waters of the oceans. When the young Le Corbusier had not yet explored photography but had already embraced travel, on 1 March 1928 the German architect Herman Sörgel presented Atlantropa[30] – a project proposing the construction of an immense dam across the Strait of Gibraltar to generate

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hydroelectric energy. This would have sealed the Mediterranean Sea, turning it into a giant basin destined eventually to dry out. In the inverse sense to Siza's sheet of water, the draining would have revealed an unprecedented topography of mountains and valleys, ravines, hills, and an immense plain strewn with sunken ships and unsuspected artefacts. Peter Behrens, together with Alexander Popp, even designed new plans for Tangier and Marseille, whose territories would have expanded greatly, as well as new ports along the redefined coastlines; for historical ports such as Genoa, the proposal envisaged no new cities but extensions of existing fabrics on the reclaimed land[31] (Figure 14). The project, abandoned four years later after the Gestapo banned dissemination of its images, now reads as an apocalyptic vision, one that seems ever closer given current climatic trends.

The redefinition of boundaries between water and land – with the uncertain margins of beaches and tides – is not unique to megalomaniac projects. It suffices to recall how the Lisbon earthquake and tsunami redrew the landscape where Siza's pools are carved, and to imagine how those rocks, formed by forces over millions of years, began to settle anew. Centuries before the architect, the Earth itself sculpted its own version of the pools through the tonnes of energy released from its incandescent core.

A sandcastle, a bas-relief, and pools carved in rock may differ in form and appearance, but they operate according
p.31 to the same logic of subtle transformation – just as Borges's hand altered the desert – modifying the relationship between water and earth. A castle would be a megalithic operation for the grains of quartz that Borges displaced, just as Atlantropa would have been for the Mediterranean. The interchangeability of scales and times – what are the ephemeral furrows traced in the sand compared with the erosion and crystallisation of rock particles? How long does it take to raise a castle, and how long to bring it down? – recalls a defining passage from the Hispanic emperor, where the family of builders of sand architectures is ultimately constituted:

"*To raise fortifications, in sum, was the same as to build dykes: it consisted in finding the line from which a bank or an empire could be defended – the point where the assault of the waves or the barbarians would be held and broken. To dredge the harbours was to fertilise the beauty of the gulfs.*"[32]

Hadrian equates the raising of a precarious castle with the building of a great bastion – just as Le Corbusier traces furrows in the sand and Siza contains the Atlantic within excavated rocks. In contrast to Atlantropa and the spectre of Mediterranean desertification, this reflection reveals an arid landscape devoid of dialogue between water and land, suspending the essential collaboration with nature. This drift among buildings, models, beaches and texts embodies the physicality upon which architecture must rethink itself if it is not to end up running – like Antoine Doinel – towards an ever more distant sea.

p.32 In reflecting upon the relationship between architecture, matter, and water, it is worth recalling that architectural evolution manifests itself not only in the punctual choice of materials or in ephemeral small-scale experiments, but also in the profound transformation of the spatial categories that govern how we inhabit and build through time. The ephemeral experiments of Le Corbusier and Álvaro Siza with sand and water, far from being mere symbolic play, embody those primordial spatial categories of which Sigfried Giedion spoke[33]: the continuity between interior and exterior, the dynamic relation between void and mass, and the constant negotiation with natural forces. Thus, from the sandcastle to Chandigarh or the pools of Leça, what unfolds is a coherent family of spatial strategies, in which architecture returns repeatedly to its foundations to reinterpret them – and where scale does not alter the profound validity of the gesture. This Giedionian perspective reminds us that certain veins of architectural modernity lie in recognising the permanent within the fleeting, understanding that every act of building is, ultimately, a collaboration with the essential forces of the world.■

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16 The bond with Mediterranean sand transcends his own life. As Luis Fernández-Galiano recounts, the master asked his collaborators to place a handful of sand from the Acropolis within his tomb—set before the sea, on the edge of a terrace in Cap-Martin's cemetery—together with a small vial of water from India's sacred river. The sand and water of that sea—and that river, closing the lines that had led him to Chandigarh—thus become the synthesis of his life: the place where the initial motivation of his career and the ultimate meaning of his existence reside.

17 It is within these two elements – water and earth – that the key to architecture resides. For it is in their equilibrium of particles, in the density of matter and the movement of water, that the actions described by Algarín – accumulation, subtraction, and modelling – are born: "*The route of the earth is millenary, the route of water is millenary, the route of iron – fire – has a hundred years, the route of air has just been born.*" In: LE CORBUSIER. *Por las Cuatro Rutas*. Gustavo Gili. Barcelona, 1972.

18 YOURCENAR, Marguerite. *Memoirs of Hadrian*. Translated into Spanish (*Memorias de Adriano*) by Julio CORTÁZAR. Barcelona: Edhasa, 1999, p. 107. ISBN 978-84-350-1839-5.

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22 Water was a fundamental element in Villa Adriana, as it would also be in the work of Le Corbusier. One could affirm, as Gaston Bachelard warns in *Water and Dreams*, that it constitutes the central theme of architecture – capable of shaping both imagination and matter, a decisive element for understanding the profound relations among memory, place, and construction.

23 The sand of the beach that builds the master's ephemeral architectures cannot be understood without the cultural genealogy of water that binds the emperor to Le Corbusier. It would be impossible to conceive of architecture without the liquid matter that shapes and transforms it, just as one could not comprehend the sculptures of Nivola, Brancusi, or Noguchi without their vast hollow moulds, nor the permanent architecture of Chandigarh without its formwork.

24 VÁZQUEZ, Carlos García. El papel del viaje en la formación del arquitecto y del estudiante de arquitectura. In: *Galerías 02: Anuario de la Escuela Técnica Superior de Arquitectura de Sevilla*. Madrid: Ediciones Asimétricas, 2024, pp. 88–97.

25 The surface, understood as an axiom, seems to run timelessly through Mediterranean architecture. One could pair the footprints photographed by Le Corbusier with the undulating floor of the Basilica of San Marco in Venice, where the constant ebb and flow of the tide has sculpted a topography of hollows and ridges; or with the neighbouring landing stage of the Querini Stampalia Foundation; or with the absent church of Salemi – reconstructed by Álvaro Siza with a marble slab – as part of a family of spaces that, stripped of walls, doors and vestibules, construct environments defined solely by the zero level, whether of marble or of sand.

26 PARRA MARTÍNEZ, José. Imágenes y metáforas del agua en el pensamiento de Le Corbusier [online]. In: *Via Arquitectura*. Alicante: Papeles de Arquitectura SL, 2001, no. 10. ISSN-e 1137-7402. Available at: https://www.via-arquitectura.net/10/10-008.htm.

27 Parra Martínez establishes an analogy between the stillness of the seabed and Le Corbusier's projects: "*The world of unperturbed silence—such as that which occurs beneath the deep waters—is the world of the sacred architecture of Ronchamp and La Tourette, whose first sketches—as noted by Cyrille Simonnet—show a kind of aquarium, a gigantic vessel on pilotis which might also represent a Noah's Ark set down within a nature washed clean of all corruption.*" In: PARRA MARTÍNEZ, José, op. cit. supra, note 28. This hypothesis invites us to consider the sacred condition of the seaside cabin—not because of any typological resemblance to the Greek sanctuaries, but through the presence of water itself, the giver of serenity.

28 TÁVORA, Fernando. Durante años pensé en la arquitectura... [online]. In: *DPA: Documents de Projectes d'Arquitectura*. Barcelona: Universitat Politècnica de Catalunya, 1997, no. 14 [consulta: 15-09-2025]. ISSN 1134-8526. Available at: http://upcommons.upc.edu/revistes/bitstream/2099/12170/3/DPA%2014_7%20T%C3%81VORA.pdf.

29 "*What one imagines becomes present and falls upon the undulating ground like a heavy white sheet, revealing a thousand things to which no one had paid attention: emergent rocks, trees, walls and paths, tanks, reservoirs and channels of water, ruined constructions, skeletons of animals.*" SIZA, Álvaro. Quinta da Malagueira. In: ANGELILLO, Antonio, ed., *Scritti di architettura*. Milan: Skira editore, 1997. ISBN 9788881180868.

30 Sörgel enlisted some of Europe's leading architects: Peter Behrens, Cornelis van Eesteren, Hans Poelzig, Fritz Höger, Hans Döllgast, and Emil Fahrenkamp. Le Corbusier appears to have paid little attention to the initiative, as did Mies van der Rohe, who never delivered to Sörgel the proposal for a seaside resort he had agreed to contribute. GONZÁLEZ MARTÍNEZ, Plácido. Atlantropa. Arquitectura y ciudad moderna para un sueño eléctrico del Mediterráneo [online]. In: *Cuaderno de notas*. Madrid: Universidad Politécnica de Madrid, 2010, no. 13, pp. 83-91 [consulta: 15-09-2025]. ISSN 2386-8376. Available at: https://polired.upm.es/index.php/cuadernodenotas/article/view/871.

31 The only city excluded from Sörgel's list was Venice, as the shallow Adriatic would have left the Serenissima some 450 kilometres from the sea. The pressure to preserve its condition as a museum-city led to revisions of the plan, including an estimate of visibility from the height of the Campanile to propose a containment dyke thirty kilometres offshore. GONZÁLEZ MARTÍNEZ, Plácido, op. cit. supra, note 33.

32 YOURCENAR, Marguerite, op. cit., supra, note 18, p. 107.

33 GIEDION, Sigfried. *El presente eterno: los comienzos de la arquitectura*. Madrid: Alianza, 1997. ISBN 978-84-206-7022-5.

J. Navarro de Pablos, Á. Martínez García-Posadas "Castillos de arena y agua. Encuentros cruzados en los bordes del mar, Progreso, Arquitectura. Noviembre 2025. E. Universidad de Sevilla. ISSN 2171-6897 / ISSNe 2173-1616 – RECEIVED - 10-03-2025 / ACCEPTED - 04-09-2025

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FORMAS DE LLEGAR AL AGUA: ARQUITECTURAS DEL BALNEARIO COMO GEOGRAFÍAS ARTIFICIALES

WAYS OF REACHING THE WATER: BEACH ARCHITECTURES AS ARTIFICIAL GEOGRAPHIES

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p.35 INTRODUCTION

The unknown, infinite and ancient sea was a recurring literary and artistic motif, from the epic narratives of ocean voyages, from Homer to Camões, to the appearance of landscape painting as an independent genre. The emergence of a new way of looking at nature, promoted by Romantic artists, highlighted water and the geographies of its enjoyment, both as a contemplative space and as a place of play. The famous print 'The Great Wave off Kanagawa' (1830-1833) by Katsushika Hokusai, or Gustave Courbet's 'Stormy Sea' (1869), show the sea in motion, uncontrollable, while William Turner's Ocean landscapes, painted between 1828 and 1840, capture its immeasurable surface effect, with no recognisable limits.

Less clear is the impact of this motif on architecture. Collins has pointed out that when Le Corbusier chose the 'machine for living' as the central subject of his discourse in 'Vers une Architecture' (1923), he was using a mechanical analogy that referred to Horace Greenough and James Fergusson, who defended the utilitarian nature of shipbuilding as a model for the renewal of architecture[1]. Damisch proposed Noah's Ark as an alternative origin for architecture. He argued that while Blondel resolves the entry '*Architecture*' in a page and a half of the *'Encyclopédie'*, the Abbé Mallet devotes four pages to describing and commenting on the legendary 'floating building', supposedly built to withstand the flood and protect various animal species. He thus shows less interest in proving the authenticity of the legend than in exploiting the *'functional implications'* of the Ark as a construction, in a *'initial foray into what might later be called functionalist thought in architecture.*'[2] In addition to establishing a relationship between floating construction and architecture, Damisch uses the Ark to point out the contradictory meanings implied in water as an element of nature for the human species—catastrophe and salvation—since it was "*both through water that the catastrophe occurred*
p.36 *and through water that the inhabitants of the ark escaped that catastrophe*."[3] On the other hand, the land itself and its edge at the sea represent the place to arrive safely.

Seaside resorts are a modern phenomenon linked to the enjoyment of leisure time, whose popularity and expansion have depended on a shift in the meaning of the sea, as formulated and articulated by its cultural representations. Corbin places the 'invention of the beach' as a phenomenon developed between 1750 and 1840. It is no coincidence that this phenomenon coincides with the Romantic interest in landscape painting. The invention of the beach did not occur until biblical cosmology and the catastrophism associated with the ocean, a place of mystery and a symbol of 'lack of order' before civilisation[4], were overcome. In stories of the flood, the sea is the instrument of punishment, and the coastline is nothing more than the ruin of divine retribution[5]. The shift from repulsion to admiration, according to Corbin, involved an 'education of the gaze', combined with a new scientific vision that sought to understand and catalogue nature. The conversion of nature into 'spectacle' was an essential stage in the reinterpretation of coastal areas and their subsequent exploration as tourist developments.[6]

The ambivalence between disaster and enjoyment still haunts architecture's disciplinary relationship with the sea. This liquid mass is difficult for architecture to work with, insofar as it resists being tamed into a designed form. The contemporary climate crisis and its impact on coastal areas have restored awareness of the ocean as a part of nature that humans can pollute but never fully control, and the perception of the coastline as the ruin of past disasters, and other imminent ones, requiring constant reconstruction. The coastal landscape, that changing boundary where human action disputes with nature, constitutes the physical and cultural locus in which architecture, as a discipline, can intervene.

Architecture has enabled new ways of reaching the water, accessing the beach, and enjoying sea bathing. In its potential for formal operation on the ground, it considers topographical differences to generate public spaces as a new interface between land and water. In some cases, public architecture, through buildings, walkways and terraces, even operates as artificial geographies on riverbanks, edges, cliffs, rocky areas, and dunes, as part of the interaction between land and ocean.

This article proposes an interpretation of the beach facilities buildings in relation to nature, examining three cases on the coastline of the city of Mar del Plata, a paradigm of mass tourism in Argentina: Playa Grande (1939), Playa Bristol (1939-1960), and Balneario La Perla (1985). All three cases involve architectural and urbanistic redesigns of the coastline, promoted by public authorities with the common goal of improving accessibility and ensuring public use of the beach. The chosen cases represent three different and complementary ways of accessing the water, while continually constructing public spaces that adapt to the geography and definitively transform it into a place for enjoying the beach and the sea.[7]

p.37 WATERSCAPES: THE PAMPA COAST AND THE ARGENTINE SEA

The sea has not been the most frequently depicted feature of the Argentine landscape. That place has been occupied by 'the desert'—the pampas as a representational, literary and pictorial construct[8]. Even so, the iconography of the 'Argentine sea' in the art and architecture of the first half of the 20th century offers examples that are particularly

interesting to the argument developed here, providing different perspectives on the relationship between architecture and nature.

In 1929, Le Corbusier recognised the geography of this part of South America. He drew a cross-section through it (figure 1), from the Pacific Ocean, marking the Andes, the plains, with trains crossing it and aeroplanes flying through its sky. Then it reaches the city and passes over it and its port to arrive to the sea (the river, he clarifies). In conceiving ideas for Buenos Aires, there is an awareness of the difference that nature proposes between land and water. In the ninth lecture he gave in Buenos Aires in October 1929, he summarised: *'A simple meeting of the pampa and the ocean, in one line, lit up at night from one end to the other'*[9], and that *'Nature has brought about this meeting of the pampa and the ocean, in an infinite low line.'*[10] He also drew attention to two particularly favourable facts: *'The ground of the pampas and of the city are not at the level of the Rio; it falls almost vertically with what you call 'the Barranca, a steep slope, so steep that the original city stayed behind it'.*'[11]

The vision of a future Buenos Aires from the Río de la Plata estuary is perhaps one of the most seductive images of the relationship between water and architecture (figure 1). Five skyscrapers rise against an all-encompassing darkness, duplicated by the reflective effect of an undisturbed liquid surface, which mirrors the architecture and the sky. The artificial reconstruction of the waterfront, in Le Corbusier's words, would enable the city's new business centre and allow it to recover 'the right to see the sky and to see the sea….'[12] However, he did not envision a way to reach the water, but only the enjoyment of the river's landscape. **p.38**

The pictorial imaginary makes it possible to situate the cultural components of the relationship between land and sea. It also allows to articulate the subtle differences that, on the coast, even on land, architecture proposes in the ways of reaching the water.

Mar del Plata (c. 1949), a landscape painted by Ludmila Feodorovna de Fiovaranti, shows the absence of any human intervention on the coast, presenting a wild place, a fragment of the shore with only the sea, sand and sparse vegetation (figure 2).

The painting *Terracita* (1933) by Lino Enea Spilimbergo clearly presents the idea of architecture as a viewpoint, whose presence transforms nature into a spectacle (figure 3). The transition between the terrace and the rocks—or the material encounter between architecture and nature—is a point of ambiguity. The pictorial elements corresponding to nature and architecture coexist on the surface of the canvas, their respective domains arranged along a Cartesian axis. However, we do not know what that union might look like in terms of a three-dimensional experience of space.

Playa (undated), by Horacio Butler, is a panoramic landscape that depicts the seashore as a flat, easily accessible expanse (figure 4). The architecture that can be distinguished, or the elements in the scene that are undoubtedly the result of human intervention, corresponds to the geometric profile of a sequence of roofs—the changing rooms—and a perfectly regular yellow block, an object placed on a natural setting from which it stands out clearly. **p.39**

In the coastal landscapes created by Feodorovna, Spilimbergo and Butler, a confrontation between human intervention and the natural environment is depicted, although there are varying degrees of abstraction from pre-existing geographical or urban conditions, as well as different conditions of emancipation of architecture from nature. In Butler's 'Beach', architecture and nature are clearly separate entities. The gabled roofs of the tents appear as the archetype of the built forms of Mar del Plata's beaches, much like Aldo Rossi's representations of the Elba cabins[13]. In Spilimbergo's landscape, on the other hand, the boundaries between the two spheres are more challenging to define, suggesting a more complex cultural relationship with nature.

Feodorovna's painting emphasises nature above all else, and it is the horizontality of the sea that highlights a form slowed down by the sloping topography.

The three interventions presented respond to this tradition of depicting water landscapes. In all three, the architecture shares a process of physical reconstruction of the coastal boundary, while promoting the view of the sea and conceiving devices for accessing the beach level (figure 5).

MAR DEL PLATA: CITY, COAST AND BEACH

The coastline of the Pampas plain is primarily low-lying and bordered by ravines and dunes, although it is rocky in some places near Mar del Plata[14].

The Pampas reaches the sea with a difference of about 12 to 15 metres and does so in two more or less defined ways. Coinciding with and close to the points where watercourses—rivers, streams, and creeks—reach the coast, the ground slopes gradually between dunes and sandbanks. In the highlands, the edge appears as a cliff or a ravine of rough clay. In both cases, the beach formed in the same way, with varying degrees of sand. These gentle or steep slopes characterise the landscape, the expanse of sandy soil and the horizon of the Argentine sea. **p.40**

Mar del Plata was founded in 1874 and soon became a popular destination for sea bathing. The construction of a railway line from Buenos Aires initially allowed it to become a tourist destination for the most privileged sectors of

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society. The city was established on the coastline, characterised by its geography of highs and lows. The grid pattern of its layout reached the sea unchanged, as if geometry could dominate the topography. However, the winding edge was originally a coastal road that would later become a boulevard running along the entire coastline.

There were many ways in which architecture made it possible to get closer to the water since 1888, when authorities identified suitable beaches and regulated sea bathing. The central sector would witness the construction of various forms of appropriation, ranging from the initial wooden cabins to the development of increasingly elaborate coastal promenades. Established on the sand in 1913, the Bristol Promenade became a privileged place for social interaction and enjoyment of the sea. The architectural forms typical of the Belle Époque became increasingly less suitable for popular recreation. What was needed then were ways of approaching the geography that would facilitate access and, at the same time, construct the urban space that the beach assumes par excellence in seaside resorts.

Mar del Plata then became a city specialising in leisure activities[15]. The spread of holidays led to an appreciation of nature, the beach and the sea. Leisure time became a time for socialising, characterised by a selective and aristocratic romantic naturalism. Since the completion of the coastal road connecting to Buenos Aires in 1932, a gradual process of change began, transforming the destination into one for the middle class. With the spread of labour rights, including paid holidays, bonuses, and social tourism, it became a place of mass tourism. Gradually, the landscape that had been exempt from the laws of economic profit transformed into public spaces shaped by the demands of a genuine industrial organisation of tourism.

SLOPING GROUND: PLAYA GRANDE, 1939

Playa Grande emerged as an area of urban growth around the beach of the same name, definitively shaped by the construction of the port. It was a long beach between rocky terrain to the north and the breakwater or harbour pier to the south. The area where the slope descended and extended horizontally was ideal for establishing the port, and where the coastal avenue that ran along the upper edge ended at a focal point.

Works on the beach foreshore began in 1936 and were completed in 1939. The project was designed by civil engineers Briasco and Perera from the Architecture Department of the Province of Buenos Aires (figure 6)[16], and was organised into a sequence of terraces on four levels to connect the upper coastal avenue with the beach, separated by approximately 18 meters in height. It is a 600-metre-long complex in which the topography's inflexion between one end and the other allowed for the layout of two roads at different levels, connecting the waterfront with access to the north harbour. One of the roads crosses the upper esplanade, and a lower road passes under the esplanade through a tunnel, providing access to a thousand parking spaces. The car thus became the protagonist of the organisation
p.41 of the waterfront. Still, its presence is minimised by having it pass and park under the esplanades that organise the intervention (figure 7).

Two unique buildings, located at each end, were the Yacht Club to the south and the Restaurant to the north. Between them are six almost identical buildings that are only one storey high and have a square floor plan with rounded corners and eaves, housing the changing rooms and toilets. In the middle, coinciding with the axis of the main staircases, there is a 20-by-50-metre swimming pool. Almost at sea level, a promenade with a 15-metre-wide strip of grass that bridges a slight slope gives way to a second, cobbled promenade level with the spa buildings (figure 8).

The entire complex was a magnificent example of the possibilities of modern architecture in representing new forms of seaside facilities. The Yacht Club building clearly took on nautical forms in its design. The Restaurant was composed of circular terraces that cantilevered out over the rocks, revealing their lightness. Modern architecture gave the project strength and character[17].

p.42 The differences in level were overcome by generous staircases, between gardens and flowerbeds bordered by railings and walls made of natural stone. The sea horizon dominated the project on every level, and the configuration of places for contemplating it was central to the layout and height of the buildings.

As in Lumidla Feodorovna's *Mar del Plata*, the operation recalls the typical slopes of descents to the sea, proposed by the dunes, in which the accentuated dimension of the ground and the possibility of establishing various routes on the slope are emphasised. The promenade along the edge, with the vehicle lanes running parallel to the waterline, makes cars disappear from this section. Instead, pedestrians are the protagonists of the successive conquest of the horizontal planes that make up the artificial topography, which brings together different activities on the way to the water.

MONUMENTAL TERRACE: PLAYA BRISTOL, 1939-1948

The city had established its relationship with the central beach in 1904, with a promenade and park project designed by Carlos Thays that ran alongside the coast road. In 1913, the Rambla Bristol completed a 400-metre-long neoclassical building that offered a wide promenade and services to bathers[18]. By the end of the 1930s, it was already evident that the building could not withstand the sea's onslaught. The demolition coincided with the economic sectors' aspiration to turn the city into a tourist destination for the masses.

At a key point between the city and the sea, the conservative and populist government of the Province of Buenos Aires proposed a significant project, which it entrusted to Alejandro Bustillo (1889-1982)[19]. The project was not built

on sand—like the old promenade—but on urban land, occupying parts of the park and part of the square, thereby disrupting the continuity of the coastal avenue and severing contact between the road and the beach.

The project consisted of a large 1,500-metre-long platform that follows the curve of the coastline and on which the monumental complex stands (figure 9). It is composed of two colossal buildings—the Casino (1938) and the Hotel Provincial (1948)—separated by a large rectangular square, 90 metres wide, which connects the diagonal axis of the city's green square with the beach (figure 10). The promenade is separated from the beach by one level; in the central axis, a large semicircular staircase provides direct access to the sand. In line with the buildings, the platform houses underground car parks and facilities for bathers, as well as connections to the hotel, restaurants, and bars, all in direct relation to the beach and its service licence holders. p.43

Both buildings propose a monumental order, evident in their forms and the treatment of their façades. The commitment to the formal rigour of Neoclassicism is reinforced by the wide stone galleries at the base, the stone and brick façades, and the black slate mansard roofs (figure 11).

The promenade space was configured on the extensive, continuous platform, in relation to the perimeter galleries of the buildings, as a large urban area. While access from the promenade to the beach was primarily mediated by the large central staircase, the division between the beach itself and the complex was defined by a second, lower promenade, separated from the sand by a series of gardens. The level below the esplanade was used for various public purposes, including changing rooms and cabins, as well as commercial premises and connections to the buildings. The difference was expressed by means of a continuous vertical wall that housed secondary staircases, located far from the buildings. Another area on the south side, housing swimming pools and sports facilities, complemented the extension of the esplanade. p.44

In *Terracita*, Spilimbergo proposed a frame defined by architecture that distances itself from nature, as the presence of the sea has become a spectacle, into the contrast produced by the orthogonal volumes and the diamond-patterned flooring against the rock formations and the agitation of the sea. Bustillo creates a monumental space for celebration, magnifying the view of the sea through the positioning of the buildings and making the floor a key feature in the design of the large terrace that provides the setting for the spectacle. The transformation of the geography was total, imposing a monumental systematisation that then became the iconic image of the city. The way to reach the beach from the city marked the imposition of artificiality over all the pre-existing natural features.

BUILDING THE RAVINE: LA PERLA SEASIDE FACILITIES COMPLEX, 1985

La Perla seaside facilities complex was the result of a national public competition promoted by the municipality in 1985[20]. The proposal submitted by Clorindo Testa (1923-2013) was the winner and was almost entirely built between 1985 and 1990[21]. According to Testa: p.45

'*I didn't want the buildings to blend in with those behind them when viewed from the sea, thus obscuring a natural feature. I wanted a 'ravine building' that would follow the undulating lines of the natural landscape, emphasising it and continuing to form a 'visual foundation' (...) I wanted to revalue the Mar del Plata theme of the walkable pavement*'[22].

Like Le Corbusier on the Río de La Plata, Testa also faced a significant difference in elevation between the water level and the city level. The presence of the 'barranca' (ravine), whose retaining walls reached up to five metres in height, was the mark of a long dispute against the action of the sea on the shore[23]. For Le Corbusier, overcoming the ravine required physically and figuratively moving away from the beach; in Testa's proposal, however, the architecture recovers, consolidates, and allegorically represents it. In a deliberately ambiguous position between building and landscaping, the intervention stitches the city and the beach together, reconstructing a linear perimeter of approximately 800 metres of coastline (figure 12).

The project involved the construction of a continuous infrastructure, consisting of five similar built segments, called 'Balnearios', which provided promenades, terraces, commercial services, and public facilities to support beach use (figure 13). The buildings share a vertical section subdivided into three levels identified as 'beach', 'promenade', and 'walkway'[24]. The 'beach' level always forms the base and contains the services and changing rooms. It is built against the ravine, taking advantage of the existing slope, while the opposite façade opens onto the beach through a system of porticoed galleries. The 'promenade' level is the intermediate floor, where the commercial premises and dining rooms are located, which in the first building coincides with the level of the avenue that ascends to meet the high waterfront. It is set back from the base of the façade facing the beach, creating terraces that form a public walkway with views of the sea. The 'paseo' level features a walkable roof that combines stairs and flat sections, making the characteristic undulating profile of the complex and offering views at various levels towards the city and the sea. The three levels are relatively unified in the façades by the continuity of the exposed brick walls[25]. p.46 p.47

Arranged in sequence along the ravine, the spas define a ludic pedestrian route. The experience of climbing up and down the large staircases is reminiscent of Adalberto Libera's iconic Casa Malaparte on Capri (1938). Mele has highlighted the '*irregular, extensive and linear development without beginning or end*'[26] of the intervention. The order of repetition and the absence of hierarchy form the basis of the proposal. However, the unity of the whole is achieved through rhythm, as the syncopated movement of the walkable roof is repeated at each section, and through the continuous experience of the journey along the seashore (figure 14).

The interpretation of the beach facilities buildings has a dual dimension in relation to nature. The design is organised both as a response to the nature found on site and as an updated response to the visions of nature constructed by

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architectural and pictorial traditions, especially the picturesque one, which is also not foreign to the physiognomy of Mar del Plata as a summer beach resort. Testa's sketch depicts the sea and its power in the foreground (figure 15). The sequence of new seaside architectures is a mass of undulating profiles, a figuration of the open and rough sea. There is a picturesque component in the acceptance of the accidental, in the admission of irregularities, in the narrative condition of an architecture of passage, which is offered as a succession of episodes related to a theme, the experience of the sea environment, and which itself proposes to constitute different platforms for staying and observing[27].

Playa by Horacio Butler presents a panoramic view of the sea from a sandy slope, where the architecture stands out. What appears in the scene is the clear contrast between natural and artificial, clearly established by the sequence of roofs. In La Perla project, Testa constructs a sequence of floors that also serve as roofs. The architecture makes the event possible, establishes a view of the sea, and restores the ravine's shape.

ARCHITECTURES FOR REACHING THE WATER: THE BEACH AND ITS ARTIFICIAL GEOGRAPHY

p.48

Playa Grande, Playa Bristol, and La Perla propose three different interventions in the seaside geography that prepare for the event of reaching the water. They were not simultaneous, but rather successive in time and from south to north. The promotion was public, with the first two financed by the province and the third by the municipality. The construction and subsequent exploitation of the built spaces involved the participation of private investors. Comparing the three cases makes it possible to recognise a process of reconstruction of the seafront that spans four decades, united by the common purpose of re-creating the geographical condition that enables access to the sea.

Unlike Le Corbusier's aquatic landscape, in which nature is almost an abstract condition, the proposals refer to the memory of the real state of the coastline before the project. It is not the physiognomic condition that maintains continuity between the three projects, but rather the idea of constructing an artificial geography. The response to the onslaught of the sea and the need to connect the land and the ocean are what ultimately allow us to understand these three cases as part of a collective project, undertaken periodically by different actors. It was the repetitive nature of this process of producing artificial geography, of restructuring the boundary between the urban environment, the beach, and the sea, that led to the creation of a continuous linear route, organised according to a dual system of movement: parallel to the coast and perpendicular to it. One extends parallel to the sea and the other runs perpendicular to it, like the tides, down to beach level. In the spatial sequence of these projects, the differences are evident in the various forms that the coastline reconstruction takes. Playa Grande's architecture, whose roof is the ground, and which does not exceed the city's height, is countered by Playa Bristol's formal structure, where the symmetrical volumes of the Casino and Hotel stand out. And the concentric regularity of Playa Bristol contrasts with the fragmented buildings of La Perla, which are aligned and scattered along the promenade. Three distinct architectures that lead to the water.■

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16 Urbanización de Playa Grande de Mar del Plata. In: *Revista de Arquitectura*. Buenos Aires: Sociedad Central de Arquitectos, abril de 1939, n.° 4, pp.172-183.

17 This type of modern architecture, characterized by nautical references, was widely developed as public beach facilities, mainly restaurants, bars, terraces, changing rooms, and showers with capacity for hundreds of bathers. Some examples include: the San Sebastián Yacht Club building in San Sebastián, Spain (José Manuel Aizpurúa and Joaquín Labayen, 1929); Los Baños de Miraflores, Lima, Peru (Hector Velarde, 1934-1935); the Saltdean Lido, in Sussex, England (RWH Jones, 1938), or the Aquatic Park Bathhouse in San Francisco, California (William Mooser, WPA, 1939).

18 GUTIÉRREZ, Ramón. Las viejas ramblas de Mar del Plata. En: MÉNDEZ, Patricia, coor. *Alejandro Bustillo: la construcción del escenario urbano*. Buenos Aires: CEDODAL, 2005, pp. 73-80. ISBN 987-43-8455-7.

19 LEVISMAN, Martha. *Alejandro Bustillo: arquitecto: 1889-1982*. Buenos Aires: Museo Nacional de Bellas Artes, 1988.

20 On the construction of the complex as a political decision and economic operation, see: CICALESE, Gustavo Guillermo. Apertura democrática, gobierno local y políticas urbanas. Nueva apuesta a la construcción de la Mar del Plata balnearia en la década del 80: el caso del "Complejo Balneario La Perla". In: *Faces* [on line], Buenos Aires: Facultad de Ciencias Económicas y Sociales, Universidad Nacional de Mar del Plata, septiembre/diciembre de 2001, n.° 12, pp. 51-75 [consultation: 15-09-2025]. Available at: http://nulan.mdp.edu.ar/83/.

21 Associate architects: Juan Genoud y Osvaldo Álvarez Rojas.

22 SCHERE, Rolando. *Concursos 1826-2006*. Buenos Aires: Sociedad Central de Arquitectos, 2008, p. 452. ISBN 978-987-99741-3-1.

23 CUADRA, Manuel. *Clorindo Testa Architect*. Rotterdam: NAi Publishers, 2000 (with Alfonso Corona Martínez), p. 113. Even so, and despite the construction of retaining walls, the onslaught of the sea continued to cause destruction, leading to the morphology of ravines underscored by narrow or non-existent beaches. When it was decided to redevelop La Perla, the breakwaters in front of that sector were rebuilt to expand the beach area and provide the necessary public services for its use. See: CICALESE, op. cit. supra, note 25, pp. 58 y 173.

24 Clorindo Testa, Juan J. Genoud, Oswaldo Alvarez Rojas, Balneario La Perla, Mar del Plata, 1985. Fundación Clorindo Testa.

25 The reinforced concrete support structure is modular, with spans between 4 and 8 meters and exposed brick walls.

26 MELE, Jorge. El Camino de las Aguas. En: *Revista 3. Revista de Teoría, Historia y Crítica de la Arquitectura*. Orden... Caos. Buenos Aires: Syntaxis, noviembre/diciembre de 1993, n. ° 1, p. 21.

27 For Price, the most effective causes of picturesqueness are "the two opposing qualities of roughness and sudden variation combined with irregularity." Price also believed that water was the element of nature in which the distinction between roughness and smoothness was most clearly manifested. The sea, however, was exceptional in its "destructive and irresistible power" and because "the complexities and varieties of waves breaking against rocks are as infinite as their movement." See: PRICE, Uvedale. *On the Picturesque*. Edinburgh, London: Caldwell, Lloyd and Co.; Wm. S. Orr and Co., 1842, pp. 82-84; p. 190.

C. Costa Cabral, H. Torrent. "Formas de llegar al agua: arquitecturas del balneario como geografías artificiales" Proyecto, Progreso, Arquitectura. Noviembre 2025. E. Universidad de Sevilla. ISSN 2171-6897 / ISSNe 2173-1616 – RECEIVED - 16-03-2025 / ACCEPTED -04-09-2025

LA MEMORIA DEL AGUA: VIDA URBANA EN LAS LAGUNAS DE CONCEPCIÓN (CHILE)

THE MEMORY OF WATER: URBAN LIFE IN THE LAGOONS OF CONCEPCIÓN (CHILE)

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p.51 INTRODUCTION

Planned, built, perceived, and lived: an integrated reading of the city

The city can be understood as a complex network where four interdependent dimensions converge — the planned, the built, the perceived, and the lived — which, together, shape the urban experience. The *planned city* represents the expectations or desires for urban space, which are usually materialized in territorial planning instruments. Although these projections do not always materialize fully, they establish a discursive framework and a vision of the city's potential. The *built city*, on the other hand, is a tangible, objective space defined by its morphology and spatial organization. On the flip side, the *perceived city* is the subjective space where the urban form is interpreted, valued, and hierarchized by its inhabitants. At this point, individual and collective perceptions find expression in the urban image, that is, the shared visual framework that allows recognizing, learning, and remembering the city. Such an image is constructed from the cognitive maps each person builds from their daily experiences. When these individual representations overlap and interact with each other, the most recurring referents of the collective memory emerge[1]. Finally, the *lived city* is the space visited and used, beyond mere perception. It manifests itself through direct interaction with the environment and through the multiplicity of social ties, where the individual experience becomes a collective practice, configuring what is understood as urban life: a network of activities, movements, and encounters that endow the space with social functionality and transform it into an active support for daily life. In this context, Kevin Lynch (1960)

p.52 identifies three fundamental properties in the places that articulate urban life: identity, structure, and meaning. These qualities have been enriched with later contributions: Gordon Cullen (1974) incorporated the visual and experiential dimension, adding attributes of optics, place, and content[2]; Marc Augé (1998) defined the anthropological place as one endowed with historical, relational, and identity attributes[3]; and John Montgomery (1998) highlighted the triad made up of activity, form, and image[4]. In the same vein, Jane Jacobs (1961) and Donald Appleyard (1981) emphasize the central role of the street as an essential support of the *lived city*, pointing out that the city toured on foot has the potential to become a fully inhabited and appropriated space[5 6 7].

Regarding the relationship between the dimensions of the city, Richard Sennett distinguishes between the *built city* (*la ville*) and the *lived city* (*la cité*), noting that the greater the disconnect between the two, the smaller is the public space's capacity to diversify and decentralize urban life[8]. In a complementary way, Henri Lefebvre — although he refers to the concept of space more than that of the city–posits that the built dimension tends to occupy a dominant position and recognizes in the lived dimension a potential of resistance and appropriation capable of counteracting and transforming that predominance, placing the perceived dimension as the basis of the urban experience, because it conditions the way in which the other two are used and understood[9]. From both perspectives, collective memory serves as the medium that regulates the transition between dimensions, enhancing or inhibiting their interaction and, consequently, the capacity of urban spaces to adapt, resignify, and sustain urban life over time.

Concepción and its lagoons: When the perceived city precedes the built one

The city of Concepción, located in southern Chile, is the capital of the Biobío Region and the homonymous Metropolitan Area; the latter comprises 11 towns and is the second most populous urban metropolis in the country, after Santiago (the national capital). Since its foundation, the city has been marked by intense seismic activity, which has influenced not only its morphology and urban structure but also its relationship with the natural spaces surrounding it. The sequence of seismic events recorded in the city extends from 1570 to 2010[10]. The earthquakes of 1570, 1575, 1657, 1730, 1737, and 1751 led to the relocation of the city from its original location, in what is now the city of Penco, to its current location in the Mocha Valley. This change primarily responded to the subsequent tsunamis that repeatedly destroyed the city due to its seafront location.

This change of location was defined among four possible alternatives (Figure 1). The final decision was based on the defensive advantages of the Mocha Valley's landscape compared to the other options. This valley, far from the sea, provided an extensive plain protected by various geographical features that acted as natural barriers (Figure 2). The

p.54 surrounding hills protected from the prevailing winds and offered greater security against potential invasions by the Mapuche and other foreigners[11]. On the other hand, the natural delimitation of the Biobío and Andalién rivers provided a constant supply of fresh water to supply the first settlements.

However, the abundant presence of lagoons and grasslands generated divided opinions, and they became the decisive factor in moving the city to this location. On one hand, they generated suspicion in those who perceived them as sources of humidity and diseases, as recorded in historical texts, where it was noted that: "*... that place leads to sicknesses, because of the high humidity, the continuous fogs, and as it is low-lying, surrounded by lagoons…*"[12]. On the other hand, for those who favored the new location, the lagoons were a positive point, mainly because they provided an opportunity to extract water and build wells that would supply the entire city. Despite objections and

an extensive 13-year debate, the city's relocation was decreed in 1764, although the first layout and buildings were completed in 1752[13]. In this way, Concepción ceased to be a coastal city and became the city of lagoons, and this landscape shaped the *perceived city* long before the *built city* would take shape.

Question and Objective

This study arises from the following question: Why have the lagoons in Concepción, despite being a defining feature of the *perceived city*, had an uneven and intermittent presence in the *lived city* throughout its history? In response, the objective is to identify the moments when the lagoons were effectively used and visited, and to analyze the factors that favored or limited their integration into the *lived city*.

MATERIALS AND METHODS

The research employed a historical, qualitative approach, drawing on primary and secondary sources. The analysis covered five periods of the history of Concepción, defined by the earthquakes of 1751, 1835, 1939, 1960, and 2010, respectively (Figure 3).

Sources of information collection

The selection of sources tried to be representative of each analyzed period. Chronologically, cartographies, period photographs, regulatory plans, and georeferenced Instagram photographs were used as primary sources. For secondary sources, chronicles and historical accounts from books written by local historians were used.

Information processing

The information was processed through the hypothetical reconstruction of five plans, each corresponding to one of the analyzed historical periods. In each plan, the limits of the perceived and lived *built city* were contrasted, revealing the presence or absence of lagoons in each one. The representation of the *built city* was prepared based on the identification of the urban sprawl, obtained through the analysis of cartographies and historical regulatory plans. The *perceived city* was reconstructed considering the places mentioned in documentary sources or highlighted in the regulatory plans of each period. In the case of the *lived city*, its reconstruction was based exclusively on the spaces mentioned in documentary texts and represented in images, both in historical photographs and Instagram posts, thus evidencing that these are places that have actually been visited and used.

Analysis and interpretation of the information **p.55**

The plans were analyzed and interpreted comparatively, identifying in each period the presence or absence of lagoons across the city's different dimensions. This process allowed recognizing the factors that, over time, have favored or limited their integration in shaping the *lived city*.

RESULTS

First period: Discovery and Distancing (1751-1834)

The period in which Concepción moved to its current location, following the 1751 earthquake and tsunami, is called "Discovery and Distancing". This name arises from the relationship established between the urban structure and the lagoons, which were deliberately avoided and marginalized in the foundational layout. This decision was a response to a defensive strategy in the face of the risks posed by the water bodies and the need to avoid the hills, which are key points in the event of possible invasions (Figure 4).

In this context, the *built city* was the 1752 layout, which adopted a uniform grid of 11 blocks long and 9 blocks wide (Figure 5). This was organized around an incipient civic center, with the main square at its heart. Around this, the most important buildings were distributed: the Cathedral, the City Hall, the Royal House, the Palace of the Governors, an administrative sector, and another for military barracks. This central space was complemented by seven convents, **p.56** evenly spaced throughout the layout. In 1817, there is evidence of an expansion of urban design, extending to 13 blocks long by 8 blocks wide[14], maintaining the central square as the predominant element in the city's configuration and preserving the distance from the hills and the lagoons (Figure 6).

As for the *perceived city*, this was characterized by awareness of the natural environment in the periphery. The hills were equipped with artillery and were used for ammunition storage, which reinforced their distancing from the urban core. On the other hand, the lagoons, although initially valued as sources of fresh water, began to be perceived as sources of unhealthiness and as physical barriers to the city's growth. This vision led to the drying up of the Gavilán Lagoon and a body of water identified in historical documents as the Trench (*La Zanja*)[15] [16] [17]. In this regard, in 1801, **p.58**

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Bishop Tomás de Concepción warned about this process: "*The Gavilán lagoon is on its way to disappearing shortly (...), with positive hopes that this will happen within three years, ridding the city of this enemy that does so much harm to everyone's health*"[18].

Consequently, the *lived city* was limited to the civic and religious center. Urban and social life was concentrated in the main square, the cathedral, and the convents, while the hills and lagoons were left out of the daily experience. However, by 1832, the first initiatives emerged to transform the hillside of Caracol Hill (*Cerro Caracol*) into a recreational space, with the idea of "*visualizing a population that communicates directly with nature and to provide new meeting spaces for the community*"[19]. This discussion and its subsequent materialization marked a milestone in the relationship that Concepción would establish with its natural environment.

Second period: Encounter (1835-1938)

The period known as "Encounter" is the stage at which a new relationship is formed between the urban structure of Concepción and its lagoons. This "encounter" was not immediate, but the result of a series of interventions that allowed recognizing in these previously marginalized spaces, a recreational, symbolic, and cultural value within the urban experience. The earthquake of 1835 was decisive in this transformation, as the victims took refuge on Caracol Hill, which offered height and springs. This fact, beyond being a circumstantial response, marked the beginning of a new form of relationship between the city and its natural spaces, as it gave the hill a value that transcended its defensive role (Figure 7).

From that moment on, the *built city* began to expand towards the peripheral areas, gradually integrating the landscape into its structure. Two main factors favored this expansion:

The reconstruction of the urban center allowed the peripheral areas, previously considered marginal, to be recognized as safe havens from chaos and debris.

The expansion of the road network, strengthened by the incorporation of the tram and the railway, facilitated access to the lagoons and boosted movements to these bodies of water.

As for the *perceived city*, the foreign colonies—Spanish, English, French, and German—introduced and promoted the practice of nature walks, positioning the natural environment within Concepción's urban image. In this context, the first urban walks of the city emerged, becoming the new shapers of the *lived city*[20] (Figure 8). The first of them was the Alameda de las Delicias, created in 1839 on the slopes of Caracol Hill. The second one was consolidated around the Puchacay Mill (1848), located in the Nonguén Estuary, a tributary of the Andalién River. Later, the lagoons of Concepción acquired a central role in the city's recreational life, with the creation of the Regatta Club (1901) and the Velodrome (1908) in the Tres Pascualas Lagoon, the Regatta and Swimming Club (1919) in the Lo Méndez Lagoon, and the installation of a golf course (1920) in front of the Redonda Lagoon. Finally, a viewpoint and a 20-meter-high cross were built on Chepe Hill (1933), as a symbolic extension of the adjacent cemetery.

These spaces—hills and lagoons integrated as places for meeting, leisure, and contemplation—modified the
p.60 experience of the *lived city*, expanding its boundaries and complexifying its structure. However, during this period, the lagoons faced constant threats of drying up. The consistorial archive of 1890-1892 documents: "*... the Los Negros lagoon is drying up, while the lagoons near the banks of the Bío Bío River are being dried out*"[21].

Third period: Loss (1939-1959).

The period referred to as "Loss" represents a stage in which the relationship between Concepción's urban structure and its lagoons becomes significantly weakened. This name comes from the observation of a progressive rupture between the city and the water, where the lagoons cease to be meeting and recreation spaces and become a support for housing needs. This transformation began after the 1939 earthquake, when the first victims settled in the surroundings of the Tres Pascualas and Redonda lagoons, attracted by the availability of fresh water. This led to the clubs that animated the social life around the lagoons leaving, resulting in reduced protection and attention for these spaces and facilitating their informal occupation (Figure 9).

During this period, the *built city* is defined by a process of expansion towards the periphery, driven by housing demand stemming from the earthquake and the industrial boom in Concepción and neighboring cities such as Talcahuano. This pressure led to the development of social housing policies, which began in 1942 with the consolidation of the Lorenzo Arenas neighborhood around the Redonda Lagoon. Subsequently, around 1950, economic growth spurred strong rural-urban migration, leading to the formation of informal settlements in the vicinity of the Lo Méndez lagoon and on the northeastern slope of Caracol Hill, giving rise to the Lo Méndez and Agüita de la Perdiz neighborhoods, respectively. Thus, the natural landscape went from being a structuring element of leisure and urban identity to being absorbed by informal or housing urbanization, reduced to a physical support without greater symbolic value.

As for *the perceived city*, this lost the reference to the lagoons, although it maintained a particular connection with the hills, which were relegated to the background as urban promenades of a primarily religious nature. In general terms, the perception of the city centered on its zoning, with the urban center gaining prominence and clearly distinguishing itself from the newly developed peripheral neighborhoods. In this context, the *lived city* was concentrated in the historical center. This was revitalized primarily by the Regulatory Plan of 1948, which proposed breaking the rigidity of the founding checkerboard by creating intersections that culminated in squares. One of the most relevant was the Pedro Aguirre Cerda Diagonal street, which linked Peru Square (*Plaza Perú*) with O'Higgins Square (today *Plaza de los*

Tribunales), then continuing along Barros Arana to Independence Square (*Plaza de la Independencia*) and finally to España Square (*Plaza España*), which is linked to the railway station, the main access to the city. This axis, energized by the cultural and student dynamism between the University of Concepción and the station, became the main stage of urban life, displacing the prominence previously held by the lagoon walks.

Fourth period: Recognition and Approach (1960-2009)

This period is called "Recognition and approach" because it marks the first explicit attempt to recognize lagoons as urban shapers, proposing a direct relationship between urban structures and these bodies of water. In 1960, Concepción suffered the most devastating earthquake in its history. This accelerated the implementation of Emilio Duhart and Roberto Goycoolea's regulatory plan, which introduced, for the first time, the idea of Concepción as "the city of lagoons" and recognized their scenic and urban value. Although this plan was interrupted by the civic-military dictatorship (1973-1990), it introduced concrete, pioneering proposals to restore the link between the city and its water bodies (Figure 10).

Therefore, during this period, it is possible to recognize not only the *built, perceived, and lived city*, but also the *planned* one. In this, the idea of a network of green areas to allow the recovery of the Redonda, Lo Méndez, and Tres Pascualas lagoons was proposed as a target image, highlighting that "*Concepción is the only city in the country with natural water mirrors within its urban area*[22]." To integrate them, a green belt was projected that connected the lagoons with the Caracol and Chepe hills, as well as with the banks of the Biobío River, through linear parks and tree-lined avenues. This proposal outlined a *built city* around a natural system, where the lagoons served as landscape nodes and potential meeting spaces for citizens. In this way, the lagoons, along with the rivers, the hills, and the main green areas of the time, were once again positioned as shaping the *perceived city.* However, by 1962, the *built city* focused on reconstructing the historic center and providing housing for both earthquake victims and the growing working population migrating from the countryside to work in the industries of the neighboring city of Talcahuano. This led to the development of housing in the vicinity of the lagoons, promoted by the Housing Corporation (CORVI), a state entity that between 1953 and 1976 promoted the construction of high-standard social housing. The surroundings of the lagoons, previously informally populated, began to transform into the El Golf neighborhood, located in front of the Redonda Lagoon, and the Remodelación Paicaví neighborhood, near the Tres Pascualas Lagoon, consolidating the city's expansion along those main roads. Although these projects aimed to revitalize the lagoons for the city, they ultimately relegated them to a neighborhood scale, isolating them from other public spaces and thereby weakening the concept of the "green belt" envisioned in the regulatory plan.

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p.62

In 1982, at the height of the dictatorship, a new communal regulatory plan was passed. In this, and under the excuse of a supposed economic revival, land-use regulation was lost. As a consequence, the urban center lost its zoning and regulatory controls, transforming into a homogeneous space devoid of hierarchy, form, and structure[23]. As for the relationship between the city and its lagoons, the plan proposed creating green areas around them to encourage recreational use. However, the coexistence of dissimilar land uses — residential, commercial, and industrial — diluted this character, hindering adequate ecological protection and recognition as recreational spaces. The latter was reversed in 2000, when the current Regulatory Plan of Concepción was approved, which has been in force since 2004. This plan proposed, for the first time, official protection for the lagoons, including the Lo Galindo Lagoon and other water bodies. In addition, the plan noted that *"One of the most relevant challenges of the city will be to recover its link with the natural resources it has, enhancing the integration of its lagoons, hills, forests, rivers and wetlands, which together are the source of urban and collective identity of the* Penquistas *(People from Concepción)*"[24].

p.63

However, despite the valid intentions of the regulatory plans, the *lived city* remained configured in the urban center, based on the relationship between the diagonal street, the squares, the pedestrian walkway, and the commercial galleries built inside the blocks, whose axis was strained by the configuration of the forum space located on the campus of the University of Concepción. At the same time, the lagoons continued to have a significant impact on their neighborhood.

Fifth period: Interrupted Reunion (2010–present)

The last period, called "interrupted reunion", is characterized by the renewed relationship between Concepción's urban structure and its lagoons. However, it is still interrupted by physical and functional barriers that prevent its full integration. In 2010, the most recent earthquake to affect Concepción occurred. One consequence was a shortage of drinking water for about two weeks[25]. During this period, the lagoons temporarily became the shapers of the lived city, serving as an improvised source of fresh water. They were visited not only by residents of neighboring neighborhoods but also by people from different sectors of the city, resulting in mainly foot- or bicycle-based movements due to the suspension of public transport and the lack of fuel for private vehicles.

Although the presence of the lagoons in the *lived city* was only temporary, the post-earthquake episode enabled their repositioning in the *perceived city*. This reassessment within the collective imaginary later coincided with the remodeling of the urban parks located in the Redonda and Lo Méndez lagoons, as well as with the construction of new parks in the Lo Galindo and Lo Custodio lagoons. These interventions, typical of the *built city*, created an encounter between the lagoons and the neighborhood structures in which they are located, and water once again positioned itself as a promoting element of urban life, once the lagoons recovered the recreational role they had previously acquired through urban walks (Figure 11). However, beyond the neighborhoods, the reunion between the city and its

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lagoons has been interrupted by road infrastructure that, far from strengthening integration with the urban structure, weakens and disrupts it. These elements impose pedestrian routes that are conditioned by over- or underpasses, which hinder spatial continuity, discourage pedestrian circulation, and limit access for different users and modes of transportation, generating physical and social barriers that fragment the urban experience and restrict accessibility to only private vehicles or public transportation.

Although these urban parks play an essential role in the diversification and decentralization of public space, the *lived city* continues to be organized around the historic center, articulated by the forum, the diagonal street, the pedestrian promenade, the shopping galleries, the squares, and Ecuador Park. On the other hand, the lagoons remain peripheral spaces that only acquire prominence at the citizen scale at specific moments.

To strengthen this connection and project the lagoons beyond their neighborhood scale, the current regulatory
p.64 plan contemplates, in what would be the *planned city*, the future execution of the "Interlagunas and Paicaví Valley Wetlands Park", an ecological corridor that will link the Redonda Lagoon with the Lo Méndez Lagoon through the Paicaví and Tucapel Bajo Wetland. If materialized, this would make it possible to partially recover the "green belt" imagined and proposed in the 1960 regulatory plan and to enhance the recovery of water spaces as an essential part of Concepción's urban development.

DISCUSSION AND CONCLUSIONS

The relationship between Concepción's urban structure and its lagoons has historically been dynamic and unstable, manifesting itself across five key periods. These periods show fluctuations in the presence or absence of the lagoons within four dimensions of the city: the *planned,* the *built,* the *perceived,* and the *lived.* The results show that, in the *lived city*, the presence of the lagoons has been intermittent and ephemeral, and that this has historically been defined around the urban center through the forum, the diagonal street, the pedestrian promenade, and the squares, which were mainly consolidated during the 1950s. This suggests that, over the past 75 years, the lived city has not managed to expand or diversify its boundaries to the extent that it has integrated the lagoons into its daily dynamics in a sustained manner.

The persistent prominence of the historic center highlights the absence of new centralities within the urban area,
p.65 despite these lagoons having the potential to promote the development of at least micro-centralities, given that they have contributed to decentralizing public space and have been consolidated as significant elements of the *perceived city*. The absence of centralities in the neighborhoods where the lagoons are located reflects a lack of mixed uses and low housing density, making these sectors spaces with little public activity and a high dependence on the car. This appears to be a trend in Chilean cities, where there is a functional dependence on the urban center, as large residential areas predominate in the periphery, and there is an insufficient provision of goods and services[26]. To this, an important historical aspect is added: after the 1939 earthquake, the tram networks suffered severe damage, leading to the definitive suspension of service. As a result, Concepción's public transport is based exclusively on a bus network, whose lack of diversity and interconnection makes it challenging to reach the lagoons farthest from the center, as coverage and frequency are reduced in these neighborhoods. In addition, there are no expedited pedestrian routes that facilitate smooth itineraries from the urban center, as these movements are often conditioned by crossing the railway line or highways, either through overpasses or underpasses. Other studies agree that pedestrian accessibility is a decisive factor in the actual use of urban parks, because even when they are located close to homes, their use is limited if there are no conditions or willingness to reach them on foot[27].

At the same time, among the factors that have strengthened the presence of lagoons in the *lived city*, the ludic-recreational role they have assumed stands out, first as urban promenades and, more recently, as parks. Likewise, the collective memory around lagoons as identity elements has contributed to these "places of water" acquiring a shared symbolic value, consolidating their perception as significant urban scenarios.

Finally, among the main opportunities to integrate urban lagoons into the *lived city*, there is the possibility of adopting ideas previously outlined in various regulatory plans. One of these is to promote a connection to the urban center, mainly through the road network, green areas, and pedestrian routes. Likewise, the possibility of diversifying the uses in their surroundings is glimpsed, which would favor the development of micro-centralities capable of revitalizing urban life around them. Additionally, the lagoons represent a strategic opportunity for the future of the city, since, in addition to their landscape and identity value, they have the potential to consolidate themselves as nodes within a broader green-blue infrastructure, integrating ecological, social, and cultural functions that strengthen both sustainability and the quality of urban life[28]. In this sense, several authors agree that free spaces play a fundamental
p.66 role in urban resilience, particularly when examined through the lens of urban ecology and the Nature-Based Solutions approach[2930]. From this perspective, lagoons can be understood as part of an integrated system capable of providing key ecosystem services, such as water regulation, ecological connectivity, and improving the quality of life. In this way, free spaces are not limited to a recreational function; they also play an essential role as biodiversity reserves and as corridors connecting natural areas with built areas, which opens the discussion towards future lines of research.■

Contribution of each author CRediT:
Carolina Catrón Lazo (CCL), Julián Galindo González (JGG). Conceptualization: CCL (50%); JGG (50%), Research: CCL, Methodology: CCL (50%), JGG (50%), Writing: CCL. Authorship: CCL (50%), JGG (50%).

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DEL MONUMENTO AL JUEGO. LA FUENTE Y EL PARQUE DE LA CRUZ ROJA EN BURGOS (LEANDRO SILVA, 1973)

FROM MONUMENTALISM TO PLAY: THE RED CROSS PARK FOUNTAIN AND GARDEN IN BURGOS (LEANDRO SILVA, 1973)

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INTRODUCTION

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Between 1971 and 1973, the landscape architect, Leandro Silva (Salto 1930-Segovia 2000), newly resident in Spain, completed a project to build a fountain and public gardens in Logroño plaza, Burgos (a space later known as the Cruz Roja [Red Cross] park). Silva's fountain takes an innovative step away from monumentalism towards a focus on play, meanwhile, the intimate and biomorphic design of the gardens, with their organic, fluid outlines, provide the perfect backdrop.

Landscape architecture in Spain has a somewhat contentious history, and it is only recently that Silva has, at last, begun to receive the recognition he deserves. Concerning the project of interest here, those[1] who have studied his work point to not only to how it interprets the language of Burle Marx but also its innovation in water management. This is seen, above all, in the ground-level water jets of its splash fountain which allow visitors to enjoy it through direct contact; something that has since become a playful feature of many public parks.

This Burgos fountain, then, is the principal focus of the present investigation. Although we cannot be sure that it was the first of its kind in the world, built shortly before other pioneering water-play features became commonplace in public spaces, it may well have been the first in Spain. The object of this investigation is to characterise the project and reach a better understanding of its context as well as the influences and references that demonstrate its value. The investigation began with an extensive revision of the bibliography concerning water use in landscape architecture, the development of the discipline between 1940 and 1970 and Leandro Silva's career. This was followed by in-depth archive work at the Municipal Archive in Burgos, the *École Nationale Supérieure de Paysage* (ENSP) in Versailles and

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Escuela Técnica Superior de Arquitectura de Madrid (ETSAM)[2]. Finally, it was necessary to combine these historical methods with techniques of compositional and landscape analysis.

The article is organised such that general contextual considerations are examined first before moving on to look at Silva's personal context and how this led to his designs for the Burgos fountain. Finally, we draw together our conclusions to provide insight into what Silva gained from the project as well as how it contributed to the discipline of landscape architecture, particularly in Spain.

WATER USE IN PUBLIC FOUNTAINS: FROM SCENOGRAPHY TO PLAY IN THE MODERN PUBLIC GARDEN

The fountain, in its many forms—monumental, intimate, playful, somewhere between a roar and a murmur—, has been one of the driving forces shaping architecture and public spaces. Having established its place in historic gardens it moved into the town square and later into the public gardens and parks of our cities. From the *howz* found in a mosque's *sahn* or the typical Hispano-Arabic garden, which, with their ground-plane water distribution models are perhaps most similar to the case examined in this work, to the baroque fantasies that included music and light shows for the pleasure of visitors[3].

Bearing in mind this cultural context, the 'public garden-water-play" interaction has emerged as the result of a lengthy process drawn out over the span of the twentieth century. In the ill-defined period at the edge of the modern era, while the inclusion of *greenery* in urban spaces was becoming progressively standard it was generally quite impoverished and unnatural in form. Indeed, in the best cases it tended to follow the nineteenth century model of providing a backdrop for architecture. However, by 1939, Garrett Eckbo, Daniel U. Rose and James Kiley were starting to make the case for bringing living landscapes back into our cities[4]. In this journey, water has had an important role flowing over and re-greening the hard surfaces of the built environment and encouraging interaction.

In parallel with this re-gardening, stimulating play—not simply in the physical sense but also in terms of the cognitive and sensorial—has been another active front in the design of modern public urban spaces. This is seen in the evolution of the standard *playground* into the adventure playground a process that began shortly after the 2nd World War due to the work of figures such as Paul Friedberg and Isamo Noguchi in North America and Japan (figure 1) and,

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in Europe, the pioneering Danish architect, Carl T. Sorensen (the first *junk playground*, in Endrup, 1940), Marjorie Allen in Great Britain, Aldo van Eyck[5] in the Netherlands and Jacques Sgard in France (the play zone in Malreaux park in Nanterre, from 1964).

Where this evolution crosses with that of the public fountain—with or without play or a garden—first Germany and later the United States have led the way. Most strikingly, starting in garden festivals and shows, water play (*wasserspiele*) became part of German garden design even before the 1940s. In the 1939 Reich Garden Show (Stuttgart), the landscape architect, Hermann Mattern (1902-1971) undertook an emblematic project that many of his colleagues dismissed as un-German. Despite the expressive limitations of its location—a disused quarry—its design was progressive (a factor leading to its reconstruction in 1950). Among its many playful water features, it included the so-called "Valley of Roses" comprising a rectangular platform with ground-level water jets. Also in Stuttgart, the early 1960's saw the introduction of numerous water features achieving a special atmosphere through their diverse and ingenious forms several of which included "an element of fun as well as enchantment (…). You could almost say that

[the Germans] have developed a new artform"[6]. In Düsseldorf, meanwhile, Ulrich Wolf, head of the Parks Department, had, since 1955, instigated a programme to create nine water parks in the city's green zones. His vision included metal climbing frames, water slides and sprays, with attention paid not only to play but also hygiene (compared to more traditional bathing pools) and it was to become the model for the whole country (figure 2)[7].

Towards the end of the 1950's, fountains combining strong design with playful intent also appeared in the designs for new shopping centres in several of Stockholm's satellite cities: at *Vallingby centrum, Blackerberg torg*, *Kärrtops centrum*, and Farsta, as well as in other Scandinavian cities, for example, Tapiola in Finland (more green space and less playground). In the same way, in North America there were several high-profile experiments with public or semi-public water parks (for example, Robert Zion's *Paley Park* or Noguchi's Manhattan *Sunken garden* from the1970's or those already referred to in figure 1).

However, it was Lawrence Halprin (1916-2009) who marks a definitive point of inflection in several aspects of **p.72** landscaping, but most importantly, in the *public garden-play-water* triad. The sketches included in an article he published in 1949, gave expression to the notion that design could guide, not limit, activities in a given space. In this way, he initiated a move away from the classical garden where visitors are passive spectators in a scene—that may or may not have various kinetic opportunities—to spaces designed for free participation in a wide range of activities[8]. This way of thinking and designing reached its maximal expression with the introduction of water into the famous *Open Space Sequence* in Portland (1965-70), where "Halprin's and the city's unyielding embrace of new public spaces **p.73** designed solely to foster civic joy was nothing short of radical"[9]. Its sequence of three interconnected spaces takes us from Lovejoy plaza, designed to maximise participation without limits and a place where people would be "engulfed in the thunder and foam of the torrent"[10], to the theatricality of another immersive environment, the *Auditorium Fountain* (now the Keller Fountain) that "more than any other water feature of this century, was responsible for re-establishing the multipurpose"[11], before finally reaching the most self-contained and intimate space, *Pettigrove park*, which in some ways reminds us of Silva's Logroño plaza in Burgos (figure 3).

Towering over these hypothetical influences on Leandro Silva's work, however, is the figure of Roberto Burle Marx (1909-1994), his teacher and later a lifelong friend. Although Burle Marx's use of water may lack a certain dinamicism, in his expressive force and radicalism as a landscape architect, gives him a stature comparable to Halprin's with respect to modernism. Originally a painter, like Silva, Burle Marx introduced a new language through his use of plants and demonstrated great formal freedom (figure 4).

LEANDRO SILVA DELGADO THE LANDSCAPE ARCHITECT: FROM HIS TRAINING TO HIS FIRST PROJECTS IN SPAIN

Silva is part of the tradition that recognises water and landscaping as being intimately united in the urban; a tendency rooted in his training and running through his whole career. Furthermore, because his intellectual development took place across two continents, he must have been aware, directly or indirectly, of a vast array of pioneering landscape architecture.

Even before 1952, the year in which he enrolled to study architecture at Montevideo University, Silva had participated in exhibitions as a painter. He met Burle Marx for the first time in 1955 when his work was selected for the 3rd São Paulo Modern Art Biennial (his work was also chosen for the 4th Biennial in 1957) and this was the start of a life-long friendship. In 1959, while still a student in Montevideo, he visited the principal teaching centres for landscape architecture in the United States: San Francisco[12], Los Angeles, Chicago, Washington and New York and also travelled in Italy, Spain, and France. It was Lewis Anderson, from the Parks Department in New York who suggested he get in touch with the French landscape architect, Ferdinand Duprat, who in turn, put him in contact with the horticultural engineer, Jean Pasquier, sub-director of the *École Nationale Supérieure d'Horticulture -ENSH-* at Versailles. In this way, Silva obtained a grant from the French government as a student-trainee (*stagiaire*) and throughout the academic year 1961-1962 he audited (i.e., he attended as an *auditeur libre*) the course entitled: *Section du Paysage et de l'Art* **p.74** *des Jardins de l'ENSH*. Until this point, his recorded academic achievements were: a few years studying drawing and painting, four years of an architecture degree, some courses on landscaping and botany in preparation for an agronomy degree and a fervent desire to become a landscape architect[13].

After completing the course at Versailles, he obtained a professional internship at the *Atelier de Paysage* a collective formed by the landscape architects Jacques Sgard, Pierre Roulet and Jean-Claude Saint-Maurice, all of whom had previously been his teachers[14]. His collaboration with these three luminaries of French landscape architects lasted until at least 1968 during which time he also had the opportunity to work with many other acclaimed figures such as Robert Joffet, Daniel Collins, Alain Provost and Michel Viollet[15]. He also worked as a teaching assistant (*assistant d'enseignement*) at the *ENSH* giving classes and organising study trips (figure 5).

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The most notable project to emerge from Silva's time in France was the *Parc Floral*, a new, 28-hectare park in Bois de Vincennes, designed in preparation for the 1969 *Floralies internationales de Paris* (the third such show) by the *Groupe d'Études Paysagistes* under the supervision of Collins. Working with Caroline Stefulesco and Lucienne Tailhade—the first woman to receive a qualification in landscape architecture in France—Leandro Silva's contribution was the *Vallée Fleurie*. While the *Parc Floral* might still be considered a "great" exception—a neo-pictorial botanic garden created for a show—it united a set of important features and elements, including water and play[16], and demonstrates, even at this early stage in his career, Silva's conviction that shape of the ground is the essence of garden structuring[17] (figure 6).

In 1969, Silva established himself professionally in Spain. Already living in Madrid, he formed an association with Michel Viollet, and together with Burle Marx they worked on the central garden-courtyard for *Cité Scolaire du Port* (Le Port, La Réunion) [18], completing the project in 1969. Highlights included its biomorphic composition, its botanical richness and its landscaping based around a principal circular space of 40 m in diameter (figure 7).

Burle's Marx influence was present throughout Silva's career in his preoccupation with the pictorial and compositional aspects of his work; however, it was in France that he developed his craft and in Spain where he forged
p.76 his personal style as a landscape architect. From some of his most well-known pieces it is clear that Silva was a master at reading the climactic conditions and historical references of the Spanish context (see for example, his home in Romeral de San Marcos, Segovia or his remodelling of Madrid's Real Jardín Botánico [Royal Botanic Gardens]: water plays a key part in both in keeping with Hispano-Arabic traditions)[19]. Nevertheless, perhaps the international experience and more peripatetic nature of his early career gave him the greater creative freedom that imbues his first works with such innovation.

Silva's first project in Spain was his 1970 project to integrate a monument to Pérez Galdós in the Feria plaza, Las Palmas de Gran Canaria. The plaza is surrounded by heavily trafficked roads and a heterogeneous mix of buildings and the sculptor, Pablo Serrano requested Silva's participation in preparing the 9,000 m^2 plot. The design ultimately involved a circular sunken area which Silva called the crater; this was protected on all sides by hilly contours—half paved, half planted—with the statue at the apex of one slope like the keel of a boat cresting a wave. Protected by native vegetation, preserving most of the pre-existing plants, this undulating, partially paved area seamlessly joins with the plaza's main access routes, giving the garden a great fluidity and plasticity. In Silva's own words: "Children have discovered the paved slopes and they have transformed them into a true adventure playground. Their elders, a little perplexed, watch this transformation from the benches (…). The most important thing still remains to be done: ensuring that, one day, this vision is integrated into a kind of Urbanism with a capital U (…). In the meantime, we must be content in the knowledge that we have contributed to the birth of another small 'bubble' of urbanism"[20] (figure 8).

Silva and Serrano collaborated on two further projects, both completed in 1970: the monument to Gregorio Marañón in Madrid's Ciudad Universitaria [University City] and the monument to Juan Ponce de León in Palencia's Pío XII plaza. Once again, in both projects, water was used to complement sculpture and each in its different way attempted to integrate and approach the human scale. In the first case, this was done by locating the monument without the use of a pedestal and in the second, by the inclusion of a fountain contained in a basin[21] within a secondary "lake" of sand where children might play[22] (figure 9).

Finally, in the period 1970-1971, not long before taking on the commission for the fountain and garden in Burgos, Silva was involved in the planning and planting of Fuente plaza located between the Navy Headquarters and Mar Avenue in Las Palmas de Gran Canaria (one block away from Feria plaza). The project involved the installation of a huge fountain—complete with illuminations and music—designed by the engineer, Emilio Carretero Alba (see figure 8).

THE LOGROÑO PLAZA GARDEN AND FOUNTAIN PROJECT IN BURGOS

Planning began for the Logroño plaza garden in Burgos (now the site of Cruz Roja [Red Cross] park and Rey plaza)
p.77 in 1971; this project is, thus a pioneering use of ground-level water jets in a public space. At a moment in time when the fashion for spectacular, illuminated fountains was at its height—a trend Burgos City Council wished to join—the winning bid was, instead, an innovative project proposed by the industrial engineer and physicist, Eugenio Fernández Castro and the landscape architect, Leandro Silva Delgado.

During the1960's and early 1970's, illuminated fountains of the were very much in vogue in Spanish cities. Indeed, since the success of Barcelona's monumental Montjuic illuminated fountain built by the electrical engineer, Carlos Buigas i Sans (1929, restored and perfected in 1954), the creation of spectacle using light and water had become a
p.78 growing phenomenon in the West generally and numerous, novel electro-mechanical illuminated fountains were built in this era.

According to Roura[23], between 1965 and 1971, Buigas completed 51 illuminated fountains at various locations in Spain. Meanwhile, De La Fuente[24] tells of how Madrid not only gained new fountains but also restored existing fountains, for instance those along the Recoletos boulevard (1969) and at Republica Argentina plaza (1970). Of all the many electro-mechanical illuminated fountains across the country, perhaps the largest and most impressive is the previously mentioned fountain in Las Palmas de Gran Canaria completed in 1973 under the direction of engineer-inventor Emilio Carretero Alba who, like Buigas, was a prolific fountain builder. This trend for illuminated fountains, of course, occurred in the context of Spain's dictatorship; and while this was a period of economic growth to contrast with the stagnation of the dictatorship's first 25 years and a time that saw significant urban expansion as well as an

increased interest in urban planning, in terms of landscaping and gardening, this was an impoverished environment. In this context, Silva's small interventions represented a breath of fresh air.

The Burgos project: a classical illuminated fountain with ground-level water jets

The pervading atmosphere during the 1970s meant that Spanish town councils were very open to projects involving illuminated fountains and Burgos, was no exception[25]. In August 1968, the Commission for Roads, Streets and Gardens [Comisión de Caminos, Paseos y Jardines] made a proposal for an illuminated fountain around the statue **p.79**
of Cid Campeador. This monument had been inaugurated in 1955; thus, the proposal represented a fashionable upgrade to an already emblematic city landmark. However, the Works Commission [Comisión de Obras] had concerns that the project might impact negatively on the growing traffic in the plaza while the Commission for Public Ornament [Comisión de Ornato Público] felt that, in addition, the light and water show would not blend well with the existing classical style of the statue and its pedestal. The project was turned down only to reemerge two years later when the company, "Anthos, Explotaciones Forestales y Hortícolas S.A." presented a historic brief for an artistic-ornamental installation in the city's Logroño plaza—as yet without any concrete designs—comprising a fountain, a sculpture of a castle and cradle built on ruins, and a surrounding green space.

Thus, it was that the mayor placed before the Town Council a proposal to install an illuminated fountain in Logroño plaza and on 12th March 1971, the council approved a call for competitive tenders[26] for the project. The full brief included an ornamental public fountain with a park (landscaping and planting) on a plot adjacent to the plaza in question. The competitive tendering process was announced in an Official Provincial Bulletin dated 10th April 1971 and a three-month period was allotted for interested parties to submit their bids. There was plenty of available land on the proposed site and, although the Red Cross had already built a clinic on municipal land in the vicinity, the remaining area was extensive and boasted almost one hundred ten-meter-high poplar trees.

Three project proposals were submitted[27]. The first, from a firm local to Burgos: "Constructora Abraham de las Heras S.A." working in collaboration with the architects Fernando Arroyo Iglesias and Pedro del Barrio Riaño, can be summarised simply as a fountain with a large sculpture, garden zones and a children's playpark. The second was submitted by the Barcelona-based firm "Anglo Española de Electricidad S.A.". This proposal, signed by their director, Juan Batlle Sais, and involving the close collaboration of Buigas' office, included a very detailed plan for a central plaza containing a large fountain with changeable illumination (within a 25 m diameter water basin) and three further, secondary zones with smaller fixed-illumination fountains that would act as a counterpoint to the grander, central fountain. There were also plans for an arboretum, benches and simple lawned spaces to surround the four fountains and keep the public at a distance (figure 10).

The third and final bid, was from Madrid's "Industria Eléctrica Francisco Benito Delgado S.A." signed by its **p.80**
technical director, the Leonese engineer, Eugenio Fernández Castro. It contained two distinct options for the park: a splash fountain comprising 90 water jets (some vertical shoots, others creating low-level turbulent springs) in a 40 m diameter plaza (the same dimensions as Silva and Burle Marx's joint project in Le Port) or a 20 m diameter illuminated fountain.

In December 1972, the Town Council approved the plans from this last bid on the basis of its first option[28]. In February 1973, the planning committee presented the "Logroño Plaza Project. Burgos" with its technical specifications, 18 layout plans and a proposed budget and it was approved by the Town Council on 24th March 1973 [29] (figure 11).

Although his signature does not appear officially on any of the project's documentation, there is no doubt that the landscape architect, Leandro Silva had a key role [30] in its planning and execution. This goes to show how his discipline was considered a "lesser art" or simply "know-how", something subsidiary, subcontracted and, in its invisibility, clearly undervalued.

Technical documents relating to the project from 1973 provide details of the proposed layout for the site: the ornamentation, landscaping and the installation of the illuminated water shoots and springs:

"*The site designated for landscaping and ornamentation has been conceived such that, as it is distanced from the surrounding traffic, an organically developed pathway will take pedestrians towards the plaza itself from existing points of influx. The plaza is intended to be entirely pedestrianised and visitors will be immersed in the landscape coming to* **p.81**
be part of it rather than being merely observers of it. At the entrance to the site, as a form of ante-room, visitors will be greeted by a small, 5 m diameter, fountain that will draw them towards the crescendo: the breathtaking magnificence of 90 water jets in the form of either vertical shoots or bubbling springs. The jets will be arranged in five non-uniform groups arranged obviously asymmetrically leaving easily accessible pathways through the fountain so enabling visitors to approach the water freely. In this way, the play of the water in the landscape is literally within the grasp of visitors rather than being a distant visual spectacle that they merely watch but take no part in"[31] (figure 12).

Essentially, the principal fountain, strikingly positioned on a wide plateau within a wooded area was envisaged precisely such that visitors would not be simple observers but, instead, be active participants in the spectacle of its leaping water jets. Concerning the smaller, 5 m-diameter fountain that marked the entrance to the principal-fountain-zone, the specifications explain:

"*Due to its setting, the water prepares the landscape in such a way that visitors form part of the composition, taking us away from the traditional Renaissance fountain found in Italian-style, geometric gardens and bringing us more toward the grand complexes of Arabic or Baroque parks where the basin becomes a rock formation while the fountain is the*

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waterfall. Thus, our aim is to achieve an ornamental fountain more like the water features seen in Granada's Alhambra with their refined landscaping based on water use as an integral element of the architecture (…). At the same time, in accordance with the demands of modern urbanism that considers green spaces as a necessary social determinant
p.82 *of landscape architecture in our new cities, we have attempted to design a garden reflecting the classical period represented by, for instance, the Generalife in Granada. In this garden, fountains and lakes are flanked by pathways, trees and bushes enhancing the brilliance of the design as a whole and comprising a landscape rich in distant focal points and peaceful intimacy*"[32].

Here is a declaration of intentions demonstrating how the project was conceived of not as an exercise in planting a simple *green zone*, but as a space designed using clear principles of landscaping related to garden composition and the incorporation of water. This said, water use in this project, although it owed much to Moorish traditions in this regard, we believe it was more informed by new international trends in fountain design for public spaces: keeping in mind the human scale and playfulness; a factor that is even more noteworthy in Spain's particular socio-political context of the time.

An innovative garden: hard landscaping and water use

The 1973[33] project involved 90 water jets of two different types: 60 vertical spouts with 25 mm exit diameter and 30 turbulent water springs each comprising four tubes grouped together with a combined exit diameter of 30 mm. The vertical spouts reached a height of 1.50 m while the turbulent springs were at 0.50 m. These heights were lower than first envisaged to enable visitors to get close to the jets and participate in the water play.

Furthermore, to delimit the space containing the water jets, it was necessary to create "*a new ground morphology, treating the contour levels in a novel way to gain a better appreciation of space and accentuate the pathways*"[34]. In this way, the ground-level adjacent to the fountain was raised to a maximum of one and a half meters, the small, 5 m-diameter, illuminated fountain was placed at a lower elevation and 142 new trees were planted among the 95 *Populus nigra* (black poplars) already established on the site which had to be preserved even where they grew on the proposed paved pathways (figures 13, 14 and 15).

The list of plant species to be used included 73 *Pinus pinea* 3-5 m high; 27 *Liriodendron tulipifera* 4-5 m high[35], 9 *Liquidambar styraciflua* 4-5 m high; 33 *Platanus orientalis*; 893,50 m^2 of *Prunus laurocerasus* bushes; 650,50 m^2 of *Spirea Van Houttei* bushes; 181 m^2 of *Crataegus pyracantha* bushes; 5 764,44 m^2 of lawn and 1,725 m^2 of mixed bush-cover. We should note that the *Liquidambar* trees were substituted for *Acers*, perhaps due to the impoverished stock of nurseries at that time.

In March 1973, while the project was in progress, it was decided that the garden area should be extended as far as the Red Cross clinic[36]. This involved planting a further 14 *Pinus pinea*, 15 *Platanus orientalis*, 180 m^2 of bush-cover including *Pittosporum tobira*, *Viburnum tinus* y *Pyracantha angustifolia*, as well as 4 800 m^2 of lawn. In this way, planners avoided the problem of continuity between the lateral gardens, the back of the hospital and the main park; this solution also contributed to the park's subsequent change of name.

CONCLUSIONS. A DISTINGUISHED *MINOR* LANDSCAPE

Its use of water is, of course, one of the most note-worthy aspects of the Burgos project, however, there is much more to be said about it. Its finer details mark the progress of Leandro Silva's exceptional career and constitute some of international modernism's most experimental landscape architecture.

Continuing with the splash fountain, its circular setting is in contrast to some of the most famous ground-level
p.84 fountains that came later which are square and while their jets are arranged on a grid pattern[37], those of Silva are apparently placed randomly. The fountain's circularity accentuates its centrality but also its fluidity in space and this reiterates certain formal and even dimensional elements: with its almost 40 m diameter, like those used in the cases of Le Port and Las Palmas, speaks of an ample but not disproportionate space. And in comparison with other spaces shared or conceived with or for other reputed sculptors, here the focal monument is the fountain itself making it both self-referential and also part of a dialogue with the smaller, 5 m diameter, fountain nearby[38]. The topographical composition of the garden area and the organic design of its pathways which suggest a conceptual link with the sculptures of Jean Arp or Joan Miró and the landscaping of Thomas Church or Burle Marx[39], not only contribute to spatial fluidity but, at the same time modulate the space of that central welcome area. Thus, sinuous paths that ascend to the heights of a composition that, with the sound of falling water as a backdrop, is both visual and acoustic. What is more, in keeping with work by other renown landscape architects of the time, hard borders disappear into the form and shape of the planted areas. The use of different plant species is equally notable: from the maintenance of the pre-existing poplars as part of a dialogue with the waterside area, to the way the space is punctuated by the most outrageous autumn colours of the acers that substituted the sweetgum trees, to the stone pines that complete the rhythm kept between the perennial and deciduous species thus creating a melodious harmony as we turn to take in every perspective[40].

Considering the garden as a creative act spanning historical eras, Silva himself once asked what a person might hope for, replying that these spaces are "*for their moments of depression or euphoria"* and constitute a *"desire to escape, fantasy or nostalgia"*. In the Burgos project, we see the embodiment of Silva's personal answer to this question

contained in his admonition that to increase its potential to welcome, the design of a garden was a matter of "*the use of elements with a clear sense of their function, of their expressive potential*[41].

Nevertheless, it must be said that the Burgos fountain-garden represents a relatively minor project—it covers little over a hectare and a half—whose execution did not appear to accomplish all the project parameters initially envisaged by Silva and whose subsequent evolution could be taken to exemplify ignorance and apathy on the part of local authorities[42]. However, it is a testament to the excellent judgement of Burgos Town Council that, in 1970, rather than opting for an imposing, monumental fountain, they sought to put this space into the service of everyday play. Not only this, its fluid lines and the simple yet efficient use of the water-landscaping-planting triad give it a protective layer of nature while also providing a multitude of possibilities. Each of these elements is but an episode of design and as such, especially in a hostile context, might seem purely anecdotal; however, they define a set of positions from which to effect a change of view-point[43].■

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Contribution of each author to CRediT:

Marina Jiménez Jiménez (MJJ); Luis Santos Ganges (LSG). Conceptualization, formal analysis, research, methodology, and drafting of the document in its various phases (MJJ 50.00%-LSG 50.00%). Authorship (MJJ 50.00%-LSG 50.00%).
All authors declare that there is no conflict of interest with the results of this work.

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1 ANÍBARRO, Miguel Ángel et. al., ed. *Imaginar jardines. El legado de Leandro Silva en la Escuela Técnica Superior de Arquitectura de Madrid*. Madrid: Mairea Libros, 2011, pp. 57 y 87. ISBN 978-84-92641-51-2; SUÁREZ MENÉNDEZ, Margarita; SANZ HERNANDO Alberto. La memoria del paisaje. Organización y gestión del legado del paisajista Leandro Silva Delgado. In: MARTÍNEZ OLMO, María del Pilar, ed. *Quintas Jornadas de* Archivo *y Memoria. Extraordinarios y fuera de serie: formación, conservación y gestión de archivos personales.* Madrid, 17th-18th of February 2011. Madrid: CSIC, 2011. Additionally, access was granted to the private archive at Leandro Silva's house in Segovia, and we would also like to thank his wife, Julia Casaravilla, for her living testimony, GÓMEZ MUNICIO, José A. *El universo en el jardín. Paisaje y arte en la obra de Leandro Silva*. Valladolid: Junta de Castilla y León, 2002, pp. 14 y 205. ISBN 84-9718-101-8.

2 This archive has housed Leandro Silva's entire documentary legacy since 2004 and was made accessible in 2011 (SILVA Collection) under the direction of Margarita Suárez Menéndez, who has so efficiently and kindly provided us with the relevant materials.

3 See JELLICOE, Susan and Geoffrey. *Water. Water use in Landscape Architecture.* London: Adam & Charles Black, 1971, pp.46-55, 66-73 and 100-105; and CAMPBELL, Craig S. *Water in Landscape Architecture*. New York: Van Nostrand Reinhold Company, 1978, pp. 15-46.

4 TREIB, Marc., ed. *Modern Landscape Architecture: A Critical Review*. Cambridge (Mass.): The MIT Press, 1993. ISBN 9780262700511. In particular, the article by the authors cited reproduced on pp. 78-82. And, of course, if there are early modern references about the garden in a constant exterior-interior (architectural) relationship, it is for this reason that, in the majority of cases, they retract into the private or domestic sphere or are linked to the building.

5 See for example MAYORAL, E. Pensamientos compartidos. Aldo van Eyck, el Grupo COBRA y el arte. In: *Proyecto, Progreso, Arquitectura.* Arquitecturas en común [online]. Sevilla: Editorial Universidad de Sevilla, 2014, n.º 11 [accessed: 15-09-2025]. ISSN-e 2173-1616. DOI: https://doi.org/10.12795/ppa.2014.i11.05

6 JELLICOE, Susan and Geoffrey, op. cit, supra, note 3, pp.120-125. They compare the role of fountains here with that of the pavilions in the Stourhead landscape garden, UK.

7 PFANNSCHMIDT, E.-E. *Fountains and springs*. London: Georgr G. Harrap, 1968. This also illustrates other references, mostly from Germany (Hannover, Kassel, Hamburg, Berlin...).

8 HALPRIN, Lawrence. The Choreography of Gardens. In: *Impulse: Annual of Contemporary Dance.* University of Iowa, 1949, pp. 30-34.

9 Listed on the National Register of Historic Places (United States) in in 2003, this quote by Ada Huxtable can be found in the extensive records of the *National Park Service / National Register of Historic Places Registration Form*.

10 JELLICOE, Susan and Geoffrey, op. cit. supra, note 3, p. 134.

11 CAMPBELL, Craig S., op. cit. supra, note 3, pp. 51-54.

12 Among other places we contacted the *College of Environmental Design* of the University of Berkeley (ANÍBARRO et. al., op. cit. supra, note 1, p. 85), where Halprin taught intermittently. HALPRIN, Lawrence; BURNS, Jim, ed., *Lawrence Halprin: changing places*, [exhibition]. San Francisco Museum of Modern Art, 1986. ISBN 9780918471062.

13 Data taken from the "Dossier étudiant de Silva Delgado, 1961-62". *Service documentation, archives et collections de l'École nationale supérieure de paysage*. This material was very kindly supplied by the archivist, Hanna Sorsa-Sautet.

14 GOMEZ MUNICIO, José a., op. cit. supra, note 1; BLANCHON, Bernadette. Les paysagistes français de 1945 à 1975. In: *Les Annales de la recherche urbaine*. Paysages en ville [online]. Paris : PUCA. 1999, n.° 85, p. 29 [accessed: 15-19-2025]. ISSN 2497-7098. DOI : https://doi.org/10.3406/aru.1999.2275. BLANCHON, Bernadette. La première formation de paysagistes concepteurs en France, ruptures et continuités. Les trois temps de la Section du paysage et de l'art des jardins (1945-1975) à l'École nationale d'horticulture de Versailles. In: *Projets de paysage* [online]. Paris: ENSP,2022, Hors-série, p. 9 [accessed:15-09-2025]. ISSN-e 1969-6124. DOI: https://doi.org/10.4000/paysage.27577.

15 ROQUERO, Luisa. El paisajista Leandro Silva, un bosquejo biográfico. *Blog de la Asociación Española de Paisajistas* [online], 2019 [accessed:06-03-2025]. Available at: https://aepaisajistas.org/el-paisajista-leandro-silva-julio-2019/.

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L. Santos y Ganges, M. Jiménez Jiménez "del monumento al juego. La fuente y el parque de la Cruz Roja..." Proyecto, Progreso, Arquitectura. Noviembre 2025, E. Universidad de Sevilla. ISSN 2171-6897 / ISSNe 2173-1616 – RECEIVED - 16-03-2025 / ACCEPTED - 04-09-2025

16 PANTU, I. M. New trends in urban public parks–the French postwar period and its influence in Romania. In: *Scientific Papers. Series B, Horticulture* [online]. Bucharest: University of Agronomic Sciences and Veterinary Medicine of Bucharest, 2015, vol. LIX, pp. 393-400 [accessed:15-09-2025]. ISSN 2285-5653. Available at: https://horticulturejournal.usamv.ro/pdf/2015/art61.pdf. At the bottom of the *Vallée Fleurie*, la *Grande Fontaine*, a sculptural fountain with water jets, work of François Stahly, Provost's water garden, and the area next to the garden sculpted by Sgard, where the paving is moulded and rises to form something like a set of chimneys.

17 GÓMEZ MUNICIO, José A., op. cit. supra, note 1, p. 157.

18 Several letters document the design process. In one of them, Silva tells Burle Marx about its progress from his "forceful initial idea", SILVA/F0021/C01-02 (from the Archival Unit SILVA_045).

19 In post-war Spain, little investment was made into public gardens, and the results were uninspiring, what innovation did occur being confined to the private sphere (in the homes of certain architects). Nevertheless, prior to this point, personalities such as the French landscape architect, Forestier and latterly Winthuysen and Rubió i Tudurí had defined the Spanish Garden as something of quality with a distinct identity (see SANZ HERNANDO, A.; HERNÁNDEZ LAMAS, P. García Mercadal y la idea del jardín moderno en España. In: *Academia* [online]. Madrid: Real Academia de Bellas Artes de San Fernando, 2017, Anexe iii, pp. 129-160 [accessed:15-09-2025]. Available at: http://www.realacademiabellasartessanfernando.com/assets/docs/boletines/ANEXO%20III%20RABASF_web.pdf) and Silva knew how to interpret these ideas. See also, HERNÁNDEZ LAMAS, Patricia. *El jardín moderno en España (1926-1980)*. Supervisors: Miguel Ángel Aníbarro Rodríguez and Alberto Sanz Hernando. Doctoral Thesis [online], 2017. ETSAM, UPM [accessed:06-03-2025]. DOI: https://doi.org/10.20868/UPM.thesis.48763.

20 SILVA DELGADO, Leandro. Plaza and monument to Pérez Galdós in Las Palmas de Gran Canaria. In: Arquitectura. Madrid: COAM, 1970, n.º 137, 1970, pp. 58-61. Available at: https://www.coam.org/media/Default%20Files/fundacion/biblioteca/revista-arquitectura-100/1959-1973/docs/revista-articulos/revista-arquitectura-1970-n137-pag. 58-61.pdf.

21 Although this fountain is similar in several respects to a *Splash* fountain, similarities also seen in the fountain at *Blackebergs torg* (one of Stockholm's satellite cities, 1957), the Palencia project has a more monumental and less playful feel, possibly due to the formal requirements imposed by the Francoist regime. See SANZ HERNANDO, A.; HERNÁNDEZ LAMAS, P., op. cit. supra, note 17, p. 132.

22 ARA FERNÁNDEZ, A. Pablo Serrano: El anhelo de un arte unitario. In: *Archivo Español de Arte* [online]. Madrid: Centro de Ciencias Humanas y Sociales, CSIC, 2007, n.º 320, pp. 415-419 [accessed:15-09-2025]. ISSN-e 1988-8511. DOI: https://doi.org/10.3989/aearte.2007.v80.i320.87.

23 ROURA, J. M. Carlos Buigas. Mago y poeta del agua-luz. Barcelona: Ediciones Unidas, 1974, pp. 343-346.

24 FUENTE BORREGUERO, Carlos de la. Breve recorrido por la historia de las fuentes. Orígenes, evolución y su relación con el hombre. In: Técnica industrial. Economía circular [online]. Madrid: Fundación Técnica Industrial. July 2021, n.º 329, pp. 50-60 [accessed:15-09-2025]. Doi:10.23800/10509.

25 ARCHIVO MUNICIPAL DE BURGOS (A. M. Bu.), classmark 18-5011.

26 A. M. Bu., 18-5011 and LA-579.

27 A. M. Bu., 18-5019 and AD-514/1.

28 A. M. Bu., LA-580.

29 A. M. Bu., AD-518/8 and AD-596/19.

30 This is demonstrated in numerous records in the ETSAM Architecture Archive and an incidental mention in a municipal document referring to the "*instructions given by yourselves, Mr. Tárrega and Mr. Carracedo with the agreement of Mr. Silva*" (A. M. Bu., AD-404/24), that is, the municipal architect Martín Tárrega Pérez and the municipal engineer, José Carracedo del Rey in agreement with the landscape architect, Leandro Silva Delgado, representing the contracting company. What is more, the somewhat substandard quality of the plans and errors in the identification of species leads to the conclusion that the contracting company must have made copies from and re-interpreted Silva's original designs.

31 A. M. Bu., AD-596/19.

32 Ibidem.

33 Project specifications were initially certified in 1973 and finalised in 1974. Once plans were provisionally accepted in March 1975, the bill for their definitive acceptance was passed and signed on 20th March 1976, outlining the works as: "the installation of water jets, a decorative fountain and gardens in the Logroño plaza, Burgos".

34 A. M. Bu., AD-596/19.

35 There appears to have been a problem concerning this species on the planting plans: the graphics representing these species have been over-drawn in ink to indicate other plants which, for the most part, seem to correspond to the *Populus nigra* that were already present on the site and were left in place.

36 A. M. Bu., AD-519/6.

37 Like that built for the *Parc Citröen*, París (from1986) by A. Provost, with whom he studied and worked in Versalles; or the *Fountain Place*, Dallas 1985, by Kiley and Walker with WET Design. See SYMMES, Marilyn. *Fountains, Splash and Spectacle. Water and Design from the Renaissance to the Present*. New York: Rizzoli & Cooper-Hewwitt National Design Museum, 1998. Principally Chapter 8 by Marc TREIB, "Fountains as Urban Oases", pp.161-181.

38 With respect to this dialogue of circular forms, the biomorphically focussed landscapes he painted from memory in which he often depicted the silhouette of Segovia's mountainous surroundings presided over by a solar disk remind us of the composition of this garden and of others. Yet, water comes above form in one of his most well-known works: the renovation of Madrid's Real Jardín Botánico (1977), where he lowered the ground-level rediscovering the fountains, large and small, that had originally stood at the crossings of its many paths returning meaning to these ancient routes.

39 TREIB, Marc. Axioms for a Modern Landscape Architecture. In: TREIB, Marc, op. cit. supra, note 3, pp. 47-64.

40 Contrast, repeat, isolate, explains Marta Nieto Bedoya concerning her approach to planting (in ANÍBARRO, Miguel Ángel, et al, op. cit. supra, note 1, pp. 78-79). Pines and sweetgums were the species that Silva most often worked with at Romeral de San Marcos, Segovia. We are also aware of Silva's preoccupation with designs aimed at different age-groups and those with various sensory impairments; he put these concerns explicitly into practice in later projects (BONELLS, Elías. "Leandro Silva, paisajista, pintor y arquitecto" [online], 2018 [accessed:06-03-2025]: Available at https://jardinessinfronteras.com/2018/04/04/leandro-silva-paisajistapintor-y-arquitecto/).

41 All of this is dealt with in the article: SILVA DELGADO, L. El jardín en el tiempo y en nuestro tiempo. *Arquitectura* [online]. Madrid: COAM, 1977, n.º 203, 1977, pp. 57-60 [accessed:15-09-2025]. ISSN 0004-2706. Available at: https://www.coam.org/media/Default%20Files/fundacion/biblioteca/revista-arquitectura-100/1975-1977/docs/revista-articulos/revista-arquitectura-1977-n203-pag 57-60.pdf. In this article, he also explains that, to do this, design draws on "every strategy that might multiply routes, create shaded zones, areas for play or relaxation" to "achieve an exhaustive use of the space". Faced with people's aggressive response to the lack of design in the *green zones*, that administrative bodies simplistically dismissed as anti-social behaviour, he recommends "inaugurable" green spaces coupled with "illuminated fountains, little

waterfalls, floral arrangements that last ten days". Against this, "the correct use and mastery of light... the control of scent and sound (nothing other than the sound of the breeze playing through the pine needles rather than through the foliage of a poplar), the good use of water, irrigation, jets, drainage, pond, reflection or murmur...", and intuiting future dynamics, allowing for a sense of time.

42 "El parque de la Cruz Roja: ni en cuerpo ni en espíritu", H.J. In: *Diario de Burgos*, Friday, 22nd October 2021. Available at: https://www.diariodeburgos.es/noticia/zed88489c-e1fc-6d1f-502e52be1b0335a9/202110/el-parque-de-la-cruz-roja-ni-en-cuerpo-ni-en-espiritu. In brief, the "Proyecto de urbanización del Parque de la Cruz Roja" (*Project to urbanise the Cruz Roja park*) was completed in 2016 without any consultation and without providing any design proposal; the only announcement made concerned the intention to fell all the poplars and certain examples of other species.

43 This space demands protection and renovation, the incorporation of biodiversity and a water culture suitable to our present epoch; aspirations that would not contradict the philosophy of its creator who always wished to dialogue with time.

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HEISSE BRUNNEN, BADEN Y ENNETBADEN, SUIZA: EL AGUA COMO ESPACIO COMÚN

HEISSE BRUNNEN, BADEN AND ENNETBADEN, SWITZERLAND: WATER AS A COMMON SPACE

Alba Balmaseda Domínguez (0009-0004-3986-1163)

A. Balmaseda Domínguez "Heisse Brunnen, Baden y Ennetbaden, Suiza: el agua como espacio común" Proyecto, Progreso, Arquitectura. Noviembre 2025. E. Universidad de Sevilla. ISSN 2171-6897 / ISSNe 2173-1616 - RECEIVED - 11-03-2025 / ACCEPTED - 12-09-2025

p.89 INTRODUCTION: WATER IS MORE THAN JUST A RESOURCE

The functionalist role of water in cities had already been questioned 40 years ago by Ivan Illich, in *H2O and the Waters of Forgetfulness: Reflections on the Historicity of "Stuff"* (1985), in which he states that it has been "reified"[1], piped and stripped of its symbolic, spatial, relational, and social importance. In this line, Matthew Gandy, in *Rethinking Urban Metabolism: Water, Space and the Modern City* (2004), highlights that water in the city is not merely a material resource, but rather "*a series of connectivities between the body and the city, between social and bio-physical systems, between the evolution of water networks and capital flows, and between the visible and invisible dimensions to urban space*"[2]. Cecilia Chen, Janine MacLeod, and Astrida Neimanis, in *Thinking with Water* (2013), further support this critique by noting that in dominant cultures "*waters are all too often made nearly invisible, relegated to a passive role as a `resource´, and subjected to containment, commodification and instrumentalization*"[3]. From this perspective, we propose that we need to stop thinking of water as a product to be consumed and instead understand it as a common *space* which is in constant interaction with its environment.

Few spatial practices allow the body to consciously experience its connection with aquatic spaces in an urban context that has neutralised them. There are limited spaces in which, as Anna Halprin points out in *Dance as a Healing Art* (2000): the sensory, "*often neglected and denied in our industrialized culture*," leads us to interact with a broader collective body: our environment. One such practice is bathing, where immersing oneself in water is a physical experience and an act of symbolic dissolution of the boundary between the individual and the environment. It is a
p.90 return to a primitive state of being, an awareness of the matter that constitutes us, a healing act, an understanding of an ecological dimension, and a revelation of water as a common space.

With this perspective in mind, this article analyses the *Heisse Brunnen* (Hot Fountains) project, inaugurated in 2021 in Baden and Ennetbaden, Switzerland, by exploring the historical context, the initiators of the project, the consolidation process, the design strategies, the impact on everyday life, and its potential as a model for future infrastructures. The project, promoted by the *Bagno Popolare* citizens' initiative, active since 2012, has reintroduced collective bathing in public spaces, challenging the logic of water as a mere resource, recovering the right to collective well-being, and reconfiguring the relationship between the city, the body and the aquatic environment after decades of continual privatisation.

METHODOLOGY: BETWEEN DOCUMENTAL AND EXPERIENTIAL

This article is based on the doctoral thesis *Cities, Bodies, and Water: Urban Bathing as a Spatial Practice*, which was defended at Roma Tre University under the supervision of Professors Michele Beccu, Roger Connah, and Giovanni Longobardi. *Heisse Brunnen*, alongside other initiatives promoted by collective action, features in the part of this research which examines water architectures linked to the spatial practices of urban bathing. However, the present article develops an independent analysis of the hot springs of Baden and Ennetbaden.

The methodology combines participant observation on site, including regular visits between 2022 and 2024; interviews with some of the founders of *Bagno Popolare* (Marc Angst and Kathrin Doppler); reviews of historical archives (Historisches Museum Baden and ETH Zurich); and analysis of the collective's internal documents (plans, diagrams, photographs, and audiovisual material). It also incorporates an autoethnographic approach, based on the author's direct experience in teaching and applied research contexts. This perspective allows for the exploration of the relationships between architecture, the body, and water as an embodied experience, beyond simple empiricism.

BACKGROUND: THERMAL WATER TRADITION AND PRIVATIZATION

The public baths of Baden, Switzerland, and the privatisation of thermal water

Baden, which means "to bathe" in German, is a Swiss town in the canton of Aargau and it has strong links to the tradition of thermal baths. Its medicinal waters[4], which flow from 21 springs at 47 °C, have been enjoyed since Roman times, when the town was founded as *Aquae Helveticae* and the first thermal baths were built. Recent archaeological research led by Andrea Schaer (2024)[5], has pinpointed the location of these baths beneath what is currently the *Kurplatz*[6] in the *Bäderquartier* (Baths Quarter). This is where the thermal springs are concentrated and where most of the hotels are now located. But what is interesting about Baden is that the thermal water tradition did not end with the fall of the Roman Empire but rather, it evolved over the centuries and continues to this day. Even more notably, this tradition has historically been associated with public spaces and the communal use of water. The Roman thermal baths were transformed into
p.91 open-air public baths, meaning that bathing took place in the town square, rather than inside a building.

These outdoor public baths coexisted with private structures, as attested by several historical accounts: a 1416 letter by Poggio Bracciolini[7]; the manuscript by Johannes Stumpf (1548) with a drawing of the open-air public baths on the *Kurplatz* (figure 1)[8]; engravings from the 18th and 19th centuries (figures 2, 3, and 4); and Michel de Montaigne's
p.92 diary (1580) in which he also describes the open-air public baths of Baden[9].

Open-air public baths disappeared in the mid-19th century when the cadastral administrators granted hotels the right to exploit the thermal waters, which they continue to do to this day[10]. This marked the beginning of their gradual privatisation for tourism, which, alongside industrialisation, boosted the local economy. Access was limited to private thermal baths until the construction of the *Thermalschwimmbad* in the 1960s, a public thermal pool designed for the local population.

The Thermalschwimmbad and its demolition

The project, designed by Swiss architects Otto Glaus and Ruedi Lienhard, operated between 1964 and 2012. It was built on the site of what is now a spa named *Fortyseven*, designed by Mario Botta (2021)[11]. The terrain sloped between the road and the Limmat River. This determined the design of stepped terraces that followed the topography, dividing the programme and blending almost seamlessly into the river landscape (figure 5). The aim was to offer bathers a ritualistic descent, to reduce the environmental impact of the building and to provide the city a public space with nice views. It was conceived as a "landscape building" in three levels: the first, three metres below the entrance, housed the indoor swimming pool, a garden area, an atrium with entrances, changing rooms, and rest areas; the second consisted of a public garden terrace at street level, above the roof of the main volume, from which only the pool room and the lift tower protruded; the third was a floor for the technical facilities underneath the swimming pool, with a 300 m^3 tank for water collection, filtration, and disinfection[12].

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Despite the concrete structure, the space was very transparent because the non-structural areas featured large glass panels looking out over the landscape (figures 6 and 7). Its texture was smoothed using ceramic and stone cladding. From a technical point of view, the swimming pool was an extremely complex and very modern facility. It included underfloor heating, a ventilation system that mixed fresh air and hot air depending on the area, an innovative solution to prevent condensation on the windows in winter, and controlled electrical systems. The water came from several springs and was stored in a central reservoir located at the building's water intake. From there, it was distributed to the *Verenahof*, the *Ochsen* and the *Thermalschwimmbad*. Initially, the water emerged at a temperature of around 47 °C, but it was cooled to a suitable bathing temperature of 35-36 °C. During the 12 daily opening hours, the water was circulated and kept topped up, and it was changed every night. The facility could accommodate up to 1,000 visitors per day. Despite its functionality and spatial quality, the building was eventually demolished.

CASE STUDY: HEISSE BRUNNEN, BADEN AND ENNETBADEN, SWITZERLAND

The beginnings of Bagno Popolare

The closure of the *Thermalschwimmbad* led a group of residents to question the ownership and management of water, as well as the future possibilities for bathing in the city. The loss of the last public thermal baths, set to be replaced by a tourist-focused private complex, led them to combine activism and research, with the goal of "*bringing back [bathing] waters to the city*"[13]. Thus, *Bagno Popolare* (Popular Bath)[14] was born, with a name inspired by the Italian tradition of public baths and the letter by Poggio Bracciolini on the open-air public baths of Baden. The group initially organised informal baths with friends, using the thermal water from the old *Thermalschwimmbad* without permission. This recreational activity evolved into "guerrilla bathing"[15] actions with a political dimension: the group wanted to reverse the paradox of living in a city called Baden without having free access to thermal bathing[16].

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The first events, called *Plopp up Bädli*, a play on words combining the English term *pop-up* and the sound of falling water, consisted of building temporary pools using pallets and plastic sheets, filled with water from pipes running from the hot spring (figure 8). As they were illegal, they were set up and dismantled in a single night with the help of volunteers. According to a 2023 interview with Marc Angst and Kathrin Doppler, these gatherings created spaces for care, coexistence, and social cohesion, where tasks, food, drink, and conversations about personal and political issues were shared.

But their activism was not limited to this. At the same time, the group used municipal archives to research the ownership of the thermal waters and, with local experts, they uncovered two key findings. First: until recently, part of the bathing culture in Baden took place in open-air public spaces, as evidenced by archaeological findings and documents about the *Kurplatz*. Second: although the cadastral registry granted hotels exploitation rights, a percentage of the water was still owned by citizens. In other words, it is a common good. This led them to map the springs, calculate the flow rate of each one, and estimate the amount of water corresponding to collective use.

Consolidation

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This knowledge gave their initiative a major boost, which they used as a tool to engage public and private actors. In 2017, the group was established as a non-profit organisation with the aim of restoring, with a solid structure and

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the help of public and private funds, the open-air public baths that were formerly available to residents, thereby allowing them to enjoy the water that is legally theirs. In short, they de-privatised a common good that had been used exclusively in private buildings for the last century, returning it to the local community[17]. Without these two precedents, the historical existence of public baths and the legal right to thermal waters, the collective's journey would have been very different. Both of those factors were decisive in legitimising and formalising *Bagno Popolare*'s activism[18].

Trials

Having been established as non-profit association, *Bagno Popolare* promoted a series of temporary structures between 2015 and 2020, this time legally. These trials served as preliminary tests for their ultimate goal: the design and construction of a permanent outdoor structure for public bathing, inaugurated in 2021 under the name *Heisse Brunnen* (Hot Fountains). The first trial was the *Verenabäder* (Verena Baths), an open-air public bath built in 2015 on the site of ancient Roman and medieval baths. Made from recycled beams and sheets of plastic formerly used for advertising, it combined thermal bathing with screenings, lectures, and performances by various local artists (figure 9). Due to its popularity, *Verenabäder* was repeated in 2016, 2018, and 2020. The second trial run was *Thermal Wasser Spiele* (Thermal Water Games), a temporary open-air public bath laboratory installed next to the future *Fortyseven* private spa, in collaboration with the *Limmathof* hotel. It included a swimming pool, a foot pool, a fountain, and a changing room/toilet (the latter made from materials from the old *Thermalschwimmbad*). Free of charge and with no lifeguards, it combined art and bathing, reflecting the diversity of the collective's profiles: architecture, art,
p.96 urban planning, carpentry, and engineering, among others. At the same time, in 2017, the association promoted the restoration of a thermal building mentioned in 1299, which was transformed into a museum and bathing area by a cooperative: the *Bad zum Raben*[19].

Heisse Brunnen

The *Heisse Brunnen* project, in operation since 2021, is the culmination of nearly a decade of activism and research (figure 10). These public 'hot fountains' have given the residents of Baden and Ennetbaden, Switzerland, a permanent, free, open-air space for communal bathing. As an accessible alternative to the new and expensive private spa built on the former site of the *Thermalschwimmbad*, the project includes several thermal pools of differing temperatures (40-42 °C, 37-39 °C and 34-36 °C) on both banks of the Limmat River. The design not only restores the practice of communal bathing in public spaces, applying the concept of water as a common space, but also reinterprets and reintroduces the ancient urban architectures of the Roman, medieval, and modern eras, adapting them to current social and spatial dynamics.

In addition to the bathing spaces, *Heisse Brunnen* includes drinking fountains, foot baths, showers, benches, information panels, and other elements to facilitate the bathing ritual. There are no changing rooms, toilets or kiosks. The fountains are conceived as an extension of the domestic space, designed for residents who already have this infrastructure in their homes. For this reason, it is common to see people wearing bathrobes around the city. The fountains operate without supervision, as they are the responsibility of the individual bathers, who must respect some basic rules. The spaces are open every day from 7:00 to 22:00, with occasional closures for cleaning. Nude bathing is not permitted and changing clothes must be done discreetly. Showering before entering the water is
p.97 mandatory and bathers must avoid submerging their heads. Visitors are encouraged to promote calmness, mutual respect, and coexistence in this communal environment.

Prior to construction, *Bagno Popolare* carried out a feasibility study commissioned by the local council (*Einwohnerrat*), initially focusing on the thermal springs on the banks of Baden, and the council subsequently approved it in January 2019. Ennetbaden subsequently joined the initiative and a second study was carried out in collaboration with its respective council, which approved it in June 2019. Both studies included references to similar projects in other Swiss regions, as well as technical and economic feasibility assessments, design sketches, and management modalities. The project and its management were financed by the two local councils and commissioned to *Bagno Popolare*.

The current location was chosen after evaluating various areas with the local authorities. The two structures face each other on either side of the Limmat River, establishing a visual relationship between them, although in very different urban contexts (figure 11). On the Baden shore, the pools are lined up along the riverside walkway, in a public area at street level. There are three connected basins with decreasing temperatures (40-42^{o}C, 37-39^{o}C and 34-36^{o}C), a shower, a drinking fountain, and benches which bathers can use when changing clothes and to store
p.98 their belongings. The pools are of different sizes (1.5 $\times$ 1.5 m, 2 $\times$ 2.5 m) and depths (59 cm, 49 cm and 17 cm), offering a variety of options. On the Ennetbaden shore, the atmosphere is more intimate and secluded, as the pools are located in a "cul-de-sac" which runs below street level, at the same height as the river. There are two separate basins: one for bathing, measuring approximately 3 $\times$ 1.5 m, with a water depth of 60 cm and a temperature of 37-39 ^{o}C, and another elongated pool for feet, as well as showers and a fountain. They are both positioned against the retaining wall which rises from level of the riverside path up to street level.

Despite its apparent simplicity, the project demonstrates a profound grasp of the issues surrounding water ownership and the relationship between the body and urban spaces. These two factors determine the size and

shape of the basins. On the one hand, the basins are located and designed taking into account the thermal springs and the specific volume of water that belongs to the citizens. *Heisse Brunen* is actually interconnected with the complex network of springs and its size is based on the volume of available public water.

On the other hand, the relationship between the designed space and personal space was explored through a series of tests using full-scale simulations. The designers themselves affirm that they tested different pool sizes in a sports hall, using benches to simulate a full-scale pool before building it: "*We wanted to sit in the basin and feel the distance from one side to the other, to see if it was close enough or too far away*"[20]. They were interested in studying not only the comfort of bathers in the water, but also whether they could attain a certain level of privacy from passers-by, keeping in mind the relationships that could develop between bathers in the water. This attention to design is noticeable when you immerse your body in the water: the shape of the basins creates psychological comfort by offering protection in a public environment whilst also ensuring physical comfort, because the dimensions are adapted to a relaxed posture (figure 13). In addition, the very smooth materials caress the skin and the stone-like materiality retains the heat of the water in contact with the body. The two sides are different in nature. The Baden side is made of exposed concrete, reminiscent of Roman baths and the *Thermalschwimmbad*, and it combines recycled stone with local marble in the form of an agglomerate. The Ennetbaden side is comprised of a large block of natural stone integrated into the containing wall.

The space offers multiple opportunities for interaction between bathers. During visits to the site, these aspects were observed at different times of day (figures 13 and 14). It was noted that there was almost always someone bathing, including older persons, children returning from school who were warming their feet while sitting in a row, families, and groups of friends. The basins have a limited capacity, with room for about ten people in the larger pool on the Baden shore and six on the Ennetbaden shore. The first is favoured by families, as it is shallower, while the second is favoured by older persons. While bathing in these spaces of collective intimacy, it is normal for people to share experiences as if they were acquaintances. Although it has only been in operation for four years, *Heisse Brunnen* has quickly become part of the everyday lives of the inhabitants of Baden and Ennetbaden.

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Heisse Brunnen is a model of how to integrate and open a "hot fountain"[21] for bathing in an urban public space. The intervention was selected for the 2023 European Prize for Urban Public Space because "*it shows water as a restorative element for health and community gathering in a city where free access to this natural resource had been lost*"[22].

CONCLUSION: WATER AS A COMMON SPACE

p.100

The *Bagno Popolare* experience and the construction of the hot springs in Baden and Ennetbaden, Switzerland are part of a wider trend towards reviving urban bathing in public spaces[23]. The disappearance of these spaces in the 19th and 20th centuries was driven by economic, technical, and social factors. However, their absence has not only resulted in a loss of access to water, but has also led to the erosion of a vital aspect of urban life: the collective practice of bathing as a means of care and social interaction, the idea of water as a common space.

Heisse Brunnen demonstrates that water is far more than a mere "resource". As Illich (1985), Gandy (2004), and Chen, MacLeod, and Neimanis (2013) have pointed out, water is a *space* of relations. The case study also offers a contemporary example of architecture and social activism around water, reflecting on new ways to reclaim urban waters for collective enjoyment, in line with the theories of Lefebvre (1974) and Harvey (2012). In this project, water architectures act as drivers of change, exploring how water can become a transformative "commons" that reshapes our relationships with the environment and urban practices.

There are more examples of initiatives that are reintroducing this type of project, having been influenced by the *Bagno Popolare* initiative. In cities such as Basel, the Hotel Regina collective has been heating public fountains once or twice a week for bathing since 2017[24]. In Aachen, the *Warm Kömp* project[25], has provided the city with an open-air public bath through temporary architecture.

Rather than seeking to replicate the structures of the past, these examples reinterpret them in light of new urban and environmental needs. They all emerge from the citizens themselves, through artistic initiatives, urban activism, and participatory management models. This demonstrates that water-based architectures remain a powerful means of promoting social cohesion and well-being.

The architectures of Baden and Ennetbaden are particularly significant because *Heisse Brunnen* not only brings thermal water back to the local population, but also raises fundamental questions about water ownership and enjoyment. As Marco Navarra notes in *Dell'informe* (2022)[26], water has been a catalyst in debates on common goods. In this sense, architecture for urban bathing is not only a space of well-being, but also a political act that challenges the commodification of water and reclaims alternative meanings.

Finally, this article opens new questions about the potential of water architectures in urban regeneration. What role should public administrations play in the revaluation of water as a common space? And how can architecture continue to act as a tool for creating common spaces in which the relationship with water becomes central? ■

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21 The project was designated as a "fountain" for regulatory reasons, since there was no existing urban device typology that matched the proposal. Using this term made it possible to obtain the necessary construction permit. Creativity in administrative management becomes a key strategy for enabling projects that challenge traditional models of public space use.

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EL AGUA COMO PRINCIPAL CONDUCTOR DE VIDA EN LA COMUNIDAD MULTIESPECIE DE HARIE

WATER AS THE FUNDAMENTAL CONDIT OF LIFE IN THE MULTISPECIES COMMUNITY OF HARIE

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p.103 INTRODUCTION

Water is a vital conduit that enables coexistence between species. For this reason, amongst others, it is a critical resource. Its role as a connecting medium has been displaced by a focus on supplying human needs exclusively, leading to the consolidation of a water management model based on extraction and unmindful consumption. From the earliest periods of urbanisation, humans have transformed the hydraulic environment as an integral part of their territorial organisation, giving rise to a progressive anthropogenic transformation that has profoundly weakened symbolic, ecological and cultural connection with water.[1] However, there are examples of early civilisations, including sites in ancient Rome, that shaped and transformed the aquatic environment not just to supply water to cities, but also to transform the urban landscape. This evidences a considered relationship with this resource. Generally, however, this more balanced approach to the presence and management of water in urban environments was marginalised from the 19th century, due to the institutional adoption of a technocentric conception of water as a product disconnected from the natural cycle and the consolidation of modern sanitary infrastructure in cities including London and Paris. This trend towards artificialisation has continued to intensify, and now includes the construction of thousands of massive hydraulic structures including dams and reservoirs. The ecological consequences of these reveal the limits of an accelerated development model. The primary drivers of water policy have been the need to meet the demands imposed by demographic and economic expansion, while also ensuring water security. Water has become an increasingly valuable strategic resource. The accumulation of hard, impenetrable layers, designed exclusively to channel water towards meeting human needs and dynamics, also represents a rupture between water's ecological role and the city. This excludes all forms of otherness.[2]

An increasingly dramatic duality is becoming manifest: on the one hand, water is indispensable to life. On the
p.104 other, in the context of an increasingly acute climate crisis, it is an agent of destruction. In this context, it is essential to question the anthropocentric,[3] extractivist approach that has come to dominate urban planning, and to move towards a reconfiguration that would recognise water as an interactive interspecies entity, within the framework of architecture able to re-establish interconnectedness of nature, culture and community.[4]

Over time, water has gone from being a symbol of life and ecological exchange to just another resource to be consumed for economic growth. However, this vision is proving inadequate in terms of addressing the challenges of the current climate emergency. Problems related to water quality and availability have been exacerbated. This in turn aggravates social inequality and increases forced migration, and is one factor driving urbanisation.[5] Water cannot be understood as a passive object or a resource to be used instrumentally, exclusively for human benefit. Instead, it must be recognised as part of a dynamic and relational whole in which infrastructures, bodies, landscapes and structures converge.[6]

Urban planning is currently at a turning point at which it has become imperative that water be understood as an interlocutor of life in multiple processes. This means "*knowing when to stop and allow other species to build freely*."[7] A transformation of the current model must therefore reintegrate the great water cycle, and leave behind a management approach based essentially on risk management. Instead, water must afford the status of a resource vital to both environmental and social ecosystems. For a healthy and sustainable relationship between humans and water to be possible, multispecies relationships[8] must flourish and the damage caused by an anthropocentric view that prioritises human needs and comfort over natural balance must be redressed.

This reality compels a reflection on conventional water management systems and the recognition of the value of hybrid or mixed systems that allow the water cycle to be de-artificialized in order to recentre human-water interactions that are often nullified in urban environments. Within this general framework, the case of Harie in Japan provides an exceptional paradigm of how traditional infrastructures can inspire new forms of water management.

KABATA, A HYDROLOGICAL MODEL THAT INTEGRATES INTERACTIONS BETWEEN SPECIES

Lessons can be learned by observing the interchange between certain cultures and nature, specifically in cases where water regains its ecological character generating an environment of harmonious more-than-human coexistence.[9] One example is the village of Harie in Japan. Here there is a clear effort to balance existing conventional infrastructure and the natural water cycle, promoting a more sustainable and resilient arrangement.

The water system in Harie is decentralised, adapted to the local context, and employs several means to integrate
p.105 human and non-human inhabitants into a sustainable cycle. It is a paradigmatic example of a *soft path of water* approach developed by Gary Wolff and Peter H. Gleick. The term *soft path* was originally popularised by Amory Lovins, who used it to describe his theory on energy, and was later adapted to the field of water.[10] Integral to *the soft path of water* paradigm is the objective to reduce cities' dependence on external water sources and decrease the volumes of wastewater and stormwater discharged into the environment.[11] Wolff and Gleick identify two basic means to meet water-related needs. The first, *the hard path,* relies on major infrastructure such as dams, reservoirs and

pipelines, and centralised decision-making. *The soft path,* on the other hand, may include centralised infrastructure but emphasises decentralised approaches based on efficiency and active participation. The adjective 'soft' refers to immaterial elements that are central to a comprehensive approach to sustainable water management and use. This includes equitable access to water, appropriate economic incentives and incentives for efficient use, social objectives for water quality and supply reliability, and public participation in decision-making.[12]

The village of Harie is located near Lake Biwa in Japan's Shiga Prefecture, in a unique ecosystem between the Hira mountain ranges, the Harie-Okawa River and the Koike River. It features a water distribution system that is considered exemplary due to the harmonious coexistence of humans and other species in the functional structure, and is a key point of reference in terms of ecological management. It has worked to supply fresh water to homes for over 300 years. The core of this system are the *kabata*, small constructions that incorporate a series of tanks and through which spring water is channelled using bamboo pipes and slides.

Kabata are used for drinking, washing, conversing and even caring for more-than-human others. Each *kabata* is home to at least one carp, which feeds on domestic food waste and keeps the bottom of the canals and tanks clean. This relationship between companion species, in which the domestic and the wild are somehow blurred, inspires us to imagine alternative forms of domestication with different agreements between species (figure 1).[13]

Basic elements

Kabata are traditional installations inside or next to a house, which channel spring water into stone or wooden tanks. **p.106**
These are interconnected at different heights to facilitate subsequent recycling and purification, with each tank having different applications. The water supply comes from between 10 and 24 metres underground and emerges at approximately 13 °C year-round. Each *kabata* is linked to artificial channelling that runs through houses. Water flows into the system continuously and leaves through the lowest level. This ensures water quality, as waste and other sediments do not accumulate and the entire system remains clear and clean. In most cases, the water from each *kabata* flows from an individual household into a canal network, and subsequently into a nearby river and finally Lake Biwa. In the village of Harie there is a greater concentration of buildings in the southern area due to the greater abundance of groundwater from the spring in that area. In total, there are an estimated 107 *kabata* buildings in Harie (Figure 2).[14]

Kabata can be interior or exterior. Exterior *kabata*, located outside the main dwelling, are more common as they are placed specifically in locations with a reliable and sufficient water flow. Most are simple, shed-like structures, mostly unroofed, built using local materials. Wood is the most common material due to its accessibility, and is often complemented by concrete, galvanised metal and polycarbonate elements.

Kabata include three interconnected water tanks which serve a variety of functions. This system means that water **p.107**
can be reused, increasing efficiency reducing consumption (Figures 3 and 4). The three basins are:

(a) The Motmoike *moto* basin (source basin). This reservoir holds the cleanest water for drinking and cooking.

(b) The tsuboike *tsubo* basin (intermediate basin). This is used for washing and cooling agricultural products.

(c) The hataike *hata* basin (final basin). This receives the wastewater from the *tsubo* basin and is the last in the sequence. It is used to wash kitchen utensils, and is where carp are bred as a natural wastewater treatment system. This reduces the amount of waste generated by each household and helps filter the water before it returns to Lake Biwa through the canal system. This basin is located partially outside the building to allow good air circulation, so that the interior space of the *kabata* is adequately ventilated and food such as fruit, vegetables and pickles can be stored. If the *hata* reservoir were placed completely inside the building, the humidity would increase considerably, requiring two or more openings for ventilation. The position of the *hata* pond both inside and outside the *kabata* building makes it easy for anyone to access the water from the outside. This means that all local residents can use the water in the *hata* pond freely for activities such as watering plants or washing their cars, while the interior space of the small *kabata* buildings is reserved for private household use.

Spaces, characteristics and dynamics

Harie's water management system generates a unique ecosystem that includes interactions between different agents, and transcends the logic of a simple distribution network. The fact that the process is so visible encourages greater ecological awareness among residents, which promotes a relationship of awareness and responsible care among all agents brought together by a shared need for water.

In this context water, a basic element of living sustenance, connects different forms of existence and acts as a **p.108**
nexus of balance between more-than-human communities. *Kabata* captures the essence of this ideal in a built space.

This conception of water that operates in the *kabata* shares characteristics with architectural projects such as Naturbad Riehen, a natural swimming pool in Switzerland designed by Herzog & de Meuron (Figures 5 and 6). This

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pool is filtered through biological systems and natural materials without the use of chemicals. Aquatic plants act as natural purification agents, filtering the water and, at the same time, providing shelter for other species and increasing local biodiversity. This creates a recreational landscape in which the processes used to maintain water quality are not hidden industrial mechanisms, but instead present in ecological processes.[15] As is the village of Harie, this recreational facility is built around a direct relationship between the build and natural landscape. Across both contexts the importance of processes that are visible and participatory is unquestionable.

Kabata as a multifunctional space

The spaces that constitute the small-scale infrastructure of the *Kabata* not only serve as kitchens, bathrooms, and utility rooms, but are also garden sheds, work areas, rest areas, and meeting points, integrating different daily life
p.109 activities.[16] Also in these spaces, animals are raised and plants cultivated. This encourages hybridisation between the domestic, community, and the ecology.

The canal system is an integral part of public space. They operate as a parkland in which a wide variety of floral species are planted to attract insects, from red-veined dragonflies to the rare *Asagi Madara* butterfly.[17] This increases local biodiversity and provides refuge for local wildlife. Caring for these spaces fosters residents' sense of belonging and responsibility and sense of connection with the local ecosystem.

The *kabata* water cisterns, understood as multifunctional spaces that serve domestic, productive and community functions, integrate everyday infrastructure with the natural environment and foster a connection with the local landscape and ecosystem. UrbanLab's Block Party project has produced a design that would allow this integration of infrastructure, community and ecology to be transferred to other contexts. Their localized mini-water treatment facilities would scrub water with efficient, organic filtering systems, while also doubling as bus shelters, food kiosks, bike stations and recycling centres (Figure 7). Beyond their environmental function, these public facilities would make the dynamics of water flows visible through their presence in the daily experience of citizens. The two examples of Block Party and *Kabata* show how different approaches can converge around similar objectives. Despite differences in scale and context, both projects coincide in reimagining infrastructure as a means of connection between human beings, place, and ecosystems.

Water for consumption and food preservation

Water for drinking and cooking is taken from the upper *moto* pond, which is an alternative to the conventional water supply system. Inhabitants draw water directly from the *motoike* using traditional filtration and pumping systems, which promotes sustainable practices and respect for water.

Preserving water quality is key to the ongoing health of the more-than-human ecosystem that is the village of Harie. Monitoring is facilitated by indicator species, including an aquatic alga called *baikamo*[18] that blooms year-round.
p.110 As this plant is very sensitive to pollutants, it provides a visual indicator of water quality. Water in the canal system is clear except at the end of April, when rice ploughing in the surrounding fields raises the turbidity. This hides the carp, whose presence can only be identified by their characteristic gurgling noises.

The idea that monitoring based on communication between human and more-than-human species can deepen our understanding of and connection with the environment is also present in the Amphibious Architecture project by The Living studio in collaboration with xDesign. This installation involves aquatic structures that monitor and communicate water quality at two locations, New York's East River and Bronx River (Figure 8). The installations are equipped with sensors that monitor a number of environmental parameters including fish activity. They facilitate communication between humans and the aquatic environment by responding to SMS messages with real-time information about the river. The design of interactive interfaces that explore animal subjectivity in urban spaces poses a challenge for architecture based on reciprocity.[19] As in Harie, where living species act as indicators of the health of the ecosystem,
p.111 this project reveals what usually remains hidden beneath the surface. Similarly, both projects demonstrate a capacity to articulate empathetic relationships through water.

The role of carp in waste management

Dishes with food scraps are placed in the lower *hata* pond. Here, carp feed on these scraps, cleaning the dishes and ultimately consuming the same diet as humans. In this third and final level of the *kabata* system, waste management is not only about feeding the carp, but also recognising their contribution to a sustainable cycle of waste management.

Carp have become a symbol of Harie, and for its inhabitants these creatures are part of the family. Within the *kabata* they are protected from birds such as herons as well as other predators that feed on fish, such as weasels, foxes and raccoons.[20] Carp are not really domestic animals, but neither are they completely wild. *Hata* ponds often also host a number of aquatic species taking advantage of the available food and shelter, including mud gobies and freshwater shrimp.

This symbiotic interaction between infrastructure, waste and non-human life finds a conceptual echo in the Oystertecture project, developed by SCAPE for the coastal industrial area of Brooklyn, known for its high levels of pollution (Figures 9 and 10). This proposal consists of a design, to be constructed using biodegradable materials, for "a living reef composed of a woven web of 'fuzzy rope' that supports marine growth and generates a 3D landscape". This framework would act as a substrate for oyster reefs in this vulnerable coastal area. Oysters, like carp in Harie, act

as biological filtration agents, improving the quality of a marine ecosystem. In addition, this reef would act as living infrastructure to protect the city from erosion and rising sea levels, while also restoring degraded habitats and increasing biodiversity in a manner comparable to the ecological function of *kabata*. Taking networks of interdependence as a new urban paradigm, SCAPE proposes marine animal infrastructure as a means to improve water quality and mitigate the effects of rising sea levels.[21] In both the Japanese village of Hare and this design proposal, water infrastructure shapes ecological relationships in a shared environment, demonstrating how the interaction between humans, fauna and built elements can generate sustainable ecosystems.

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Kabata is an example of small-scale architectural infrastructure that is able to generate a direct connection between locals and water, which results in a sense of attunement and a commitment to care for this living resource. Residents become part of a sustainable cycle made possible by multi-species alliances successfully intertwined in the local ecosystem. Carp are a topic of conversation among locals, which helps strengthen neighbourly bonds based on respect and care for the local environment.[22] Local residents take care of their homes' exteriors to preserve a harmonious urban landscape. This landscape is seen as a place that other species can inhabit and benefit from. These types of interactions reflect a general principle of infrastructure design and management that integrates non-human life. The visibility of ecological processes and the participation of different species can strengthen community ties and foster a shared commitment to caring for the environment.

LIVING INFRASTRUCTURE IN TRANSFORMATION

The Harie *kabata* system is a unique example of living infrastructure in which water is more than just a resource; it is an agent that structures community life and the symbiotic relationship between humans and non-humans. This model of traditional architecture raises many questions about adaptation and future of these practices in the face of globalised models.

Modern water supply infrastructure faces growing threats, and dependence on particular factors can make it particularly vulnerable to the effects of climate change. As well as impacting hydraulic and cultural heritage, these threats have the potential to compromise the very viability of this model. Relatedly, the recent growth of tourism in Harie is double edged, as it both expands possibilities for preservation and poses the risk that overexposure will result in the loss of everyday functionality, as a living system is transformed into an object of cultural consumption. This context demands management strategies that integrate heritage management and climate resilience to safeguard practices such as *kabata.* It is important to remember that preservation does not mean freezing a system at a particular point in time, but rather ensuring it remains useful and dynamic.

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In the current context, the Harie's traditional water framework offers opportunities to reinterpret infrastructure from a more-than-human perspective. It shows a glimpse of how emerging principles of ecological urbanism, such as decentralisation, circular water management, multi-species cohabitation and community resilience, might be enacted (Figure 11). It represents a paradigm able to inspire green and blue infrastructure strategies in dense cities, with direct experience making water cycles visible and fostering an ethic of care.[23]

Kabata challenge the technocentric paradigm of hidden infrastructure, and propose an ecological pact in which water sits within a web of relationships.[24] In the context of water crisis, this traditional Japanese model represents a living laboratory for imagining urban futures based on mutuality.

INHABITING WATER: APPLIED ARTS AND RELATIONAL ARCHITECTURES

The community of Harie, with its springs and domestic basins open to the neighbourhood, constitutes a hydraulic network that establishes an ecosystemic way of living. Small-scale vernacular devices, where water flows through sequences of consumption and purification, establish relationships of care that link inhabitants to their environment and to each other. Other contemporary interventions also explore ways of articulating architecture, landscape and community. Four of these, implemented at different scales, are discussed below. Some are aimed towards practical ends, while other offer a sensory experience,

In the Japanese village of Momonoura, which suffered catastrophic damage from the 2011 tsunami, water has become an ambiguous presence, representing both opportunity and threat. Atelier Bow-Wow's project employs a strategy of minimal intervention based on the reconstruction of the community.[25] The *Core House* is a basic, expandable module which, like the *kabata,* fits comfortably into the landscape without imposing itself on territorial configuration. Instead, it is simply integrated with its surroundings and creates a direct link between infrastructure and community (figure 12). For the island's inhabitants, water is associated with memories of a traumatic event which conditions the way they inhabit the space. The architecture employed in the project adapts to this through *soft path* construction characterised by the use of local materials and traditional techniques that respect the cultural knowledge of place. Similarly, the active participation of the inhabitants in the development and management and evolution of the *Core House* units reflects the principle of community that is also present around the *kabata.* The infrastructure acquires meaning and value through the involvement of the people in its care and daily use. The reconstruction of the environment is carried out through a participatory process involving the inhabitants, similar to how *kabata* require continuous maintenance practices. The *Core House* is conceived of as a minimal infrastructure that acquires meaning as it is inhabited and transformed collectively.

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A very different project, Ryue Nishizawa's Moriyama House, is a residence located in Tokyo. This residential building, in fact a cluster of ten small volumes on the same block, translates the sensibility of the watercourses that flow between *kabata* constructions into the spatial voids that organise living in between the different architectural units that make up the project (figure 13). Interstitial spaces, including gardens and courtyards, become places of exchange.[26] This project generates a permeable microcosm, and the spatial configuration can be linked to the relational character of Harie's architectures, as both promote forms of cohabitation that transcend the concept of housing being bound within a closed container. In both cases, courtyards are configured as dual spaces, exterior in that they are exposed to water falling in the form of rain, but also interior in that they belong to the private sphere of the dwelling. This ambiguity, in which the domestic is traversed by natural forces, turns the courtyard into a stage where water is tangibly present. This establishes an immediate link between nature, space and everyday life. The assemblage of housing complexes and *kabata* in Harie fuses human participation and the presence of other species within the built landscape. Similarly, Moriyama House operates as a porous infrastructure that invites collective existence.

Also in Tokyo, Kazuyo Sejima's Suimei Pavilion in the Hama-Rikyu Gardens elevates reflection on water to a more sensory and symbolic level (figure 14). The pavilion draws attention to water through a perceptual experience that seeks to recognize its value as a vital element.[27] Through an interplay of light, reflection and sounds, the pavilion invites a reflective interaction with water. This creates space for contemplation and a focus on the environment. The installation can be interpreted as a contemporary metaphor for the watercourses that run through the *kabata*. While
p.115 situated in very different contexts, both seek to revalue the relationship between water resources and the communities whose life is bound to them. The Suimei pavilion also demonstrates how liquid infrastructure can promote a conscious connection with an essential resource. Exposure to the weather emphasises the temporal and dynamic dimension of the space, as falling rain especially transforms surfaces, generates ephemeral sounds and activates sensory perception, inviting users to directly experience the interaction between architecture, climate and nature.

Kazuyo Sejima deepens this exploration in the Inujima Art House Project, a series of galleries that seeks to integrate tourism and everyday life in the small island community of Inujima.[28] The project seeks to offer a new model able to weave connections between architecture, landscape, the community and new visitors, and thus addresses precisely the challenge faced in Harie. The Inujima Art House Project, which represents itself as living heritage infrastructure, not only fulfils practical and technical functions, but also operates as a mediator of social practices within the context in which it is situated. Architecture at the scale of a landscape produces new abstract elements that stand out from a habitual reading of a territory. This makes historical, social and natural layers of place visible (figure 15). The strategy seeks to activate a region impacted by demographic crisis through participation in community processes centred on art and architecture. The island of Inujima is in a phase of transition towards a *participatory landscape* model in which the local community reasserts an active role in the management and sense of place. In Harie, water is the element that structures the landscape and relationships. In Inujima, interventions such as the Art House Project act as a framework for new community practices, helping communities and visitors to share a territory without either being nullified by the other. The organisation of infrastructure and connections between inhabitants highlights the connections between heritage, territory and ecosystem.

p.116 Each of the four examples above describes architecture that mediates between bodies and landscapes, and understands the duality of water. As such, they share a transversal relationship with the *kabata* system, by including adaptive ecosystemic mechanisms.

In Momonoura, the modularity of the Core House accompanies a process of community rebuilding. The spatial fragmentation of the Moriyama house allows for open and dynamic forms of cohabitation. The architecture of the Suimei pavilion reawakens fond memories of water in the city. Finally, on the island of Inujima, a heritage experiment at a landscape scale seeks to reconcile community and contemporaneity.

While these projects provoke a series of reflections, the most significant shared feature is the focus on the 'minor arts of doing', that is, everyday practices of care, maintenance and adaptation that sustain the dynamics of collective life. See in this way, the *kabata* in Harie are not simply a vernacular curiosity, but a model of situated collective infrastructure. Reinterpreted in contemporary contexts, they can inspire ways of living capable of addressing imminent environmental collapse through humility, attention to small things, and a commitment to the common good.

CONCLUSION

The *kabata* system in Harie is capable of sustaining environmental cycles, promoting biodiversity and strengthening the social fabric. This makes it an invaluable case study valuable for understanding visible dynamics of water management. The evident effectiveness and sustainability of the *kabata* pushes us to rethink current water policies and forms of urban planning, in a context impacted by the climate crisis and dwindling natural resources. This worrying context poses a twin challenge: first to resist the ongoing treatment of water as a resource managed by invisible infrastructures, and second to reactivate practices of community care. Both are needed to address the disconnection and environmental deterioration that negatively affects all forms of life.

The Japanese concept *of everyday life environmentalism*[29] *(seikatsu kankyo shugi)* aims to address environmental problems by taking into account the logic and practices of residents in a local affected area. This particular approach, formulated by Japanese environmental sociologists in 1980, was developed as part of a search for ways to remedy the unfortunate consequences of industrialisation.

Unlike other frameworks, such as *natural environmentalism*, which focuses on the preservation of 'pure' nature, or *modern technocentrism,* which relies on modern technologies to solve environmental problems, *everyday life environmentalism* argues that, in order to generate effective environmental policies and practices, it is crucial to understand and adopt the ways in which residents interact with their local environment and resources over time. It is often based on place-specific values and practices that may not fit comfortably with modern science.

In Harie, *everyday life environmentalism* is reflected in the way residents maintain a harmonious relationship with their environment,[30] using appropriate technologies and traditional practices to maintain a sustainable balance between multiple stakeholders.[31]

While the village's hydrological system, based on the availability of natural springs, is not replicable, it can and does inspire contemporary urban strategies for participatory and resilient landscapes. In this way, *soft path* systems and the 'minor arts of doing' serve as tools for reconnecting cities with their hydrological cycles. Designs should aim to produce urban landscapes in which visible water is not just ornamental, but active ecological infrastructure that promotes more-than-human thinking and recognises other species as cohabitants of urban space. The principles that underlie the *kabata* system have been successfully translated to a number of different urban contexts. These experiments show that making water visible and fomenting multispecies interactions can foster ecological and social resilience. The village of Harie demonstrates that infrastructure can be an active agent in community life. The city of the future should function as an extended *kabata*, an expanded platform for interspecies coexistence, with water bringing together different forms of life to participate in practices of mutual care. This vision translates into a series of principles for amphibious urbanism,[32] centred stripping away layers of waterproofing and making the water cycle visible in buildings and public spaces, including microclimates and green and blue corridors able to mitigate the effects of climate change and foster communities that manage water as a common good.

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To achieve these objectives, cities must undergo a gradual metamorphosis through achievable interventions that will ensure a gradual but consistent transformation, with the primary objective of making the presence of water visible and encouraging interaction with it. Amongst others, it is essential to:

- Restore the urban water cycle by making streets, squares and roofs permeable to allow rain to infiltrate through the surface. This has been achieved in the Naturbad Riehen swimming pool project, where water is filtered using visible ecological processes that reinforce the link between the built and natural environments.
- Design green and blue corridors as biodiversity refuges and flood buffers, such as the Harie water system where canals and gardens manage excess rainwater while creating habitats for other species.
- Incorporate small wetlands on city edges and in parks, which can function as natural rainwater filters and habitats for wildlife. One proposal is the Oyster-tecture project, in which oyster reefs act as biological filters to regenerate marine ecosystems and protect against coastal erosion.
- Create community water points, such as fountains, canals, and even drinking troughs for other species, as meeting places. These would follow the example of the *kabata* system, where water articulates multifunctional spaces that combine domestic, productive, and community uses, encouraging interaction.
- Integrate visible water collection and circulation systems into buildings so that this becomes integrated into everyday experience. An example is the Block Party project, in which wastewater treatment plants would function as public facilities displaying water flows and raising awareness of urban ecology.
- Incorporate water mirrors, temporary flood zones and adapted vegetation to create a perceptible link between humans and ecosystems. These features can also operate as environmental monitors revealing the health of the environment. This idea has been implemented in the Amphibious Architecture project in New York.

These action strategies seek to foster a harmonious relationship with water in urban environments. They would help manage risk while also activating spaces of encounter and coexistence. As the village of Harie demonstrates, the most resilient infrastructure is that which demonstrates an understanding of the landscape and is able to adapt to its rhythms and foster connections with place. Reasserting the presence of water on the city surface is not only an ecological necessity, but also an action that would regenerate multiple forms of urban life.

Formulating the city as an amphibious body, capable of adapting to and coexisting with water, represents a paradigm shift that would allow a move away from control towards cohabitation. Incorporating the water cycle as the central axis of a city's dynamics would allow progress towards inclusive built environments, with inter-species care underpinning resilience. "*Liquid urbanism could be a mutualistic effort that gives liquid its own agency and allows for its dynamism*".[33] Water should be understood as a vital point of encounter in built environments, connecting more-than-human beings and facilitating interdependent relationships that enrich the environmental architectural experience.■

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2 POIRIER, F., VIGNAL, B. *Terres fertiles.* Paris: Backland éditions, 2023, p. 64. ISBN 978-2-9588234-0-5.

3 The term anthropocentric refers to a perspective that places humans at the centre of the interpretation of the world, and prioritises their needs, values and experiences over those of other entities or forms of life. In the context of ecology, it is often identified as a vision that has contributed to environmental imbalance and the domination of nature.

4 The term interspecies refers to those relationships or forms of interaction that occur between beings of different species. The concept is used to question human centrality and promote more symmetrical links between humans and non-humans.

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7 Various authors, op. cit. supra, note 5, p. 67.

8 The concept *multispecies* refers to contexts in which multiple forms of life, human and non-human, coexist, interact or co-evolve. It refers to living assemblages that transcend species boundaries, challenging the classical notion that autonomy and agency are exclusive to humans.

9 *More-than-human* is a concept developed within the framework of post-humanist studies and critical ecology. It attempts to decentre humans as the central axis of interpretation. The term encompasses networks of relationships between humans, other species, technologies, and the environment, also recognising the agency of multiple forms of life. It embraces plants, animals and all other forms of life and offers an alternative to terms such as 'non-human' or 'inhuman'.

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16 KAMETANI, Y., op. cit. supra, note 14, p. 85.

17 PETERMANN, S. op. cit. supra, note 13, p. 29.

18 The aquatic plant Baikamo (*Callitriche japonica)* is a bioindicator of water quality. Its presence and condition change in response to physicochemical variables, which provides information about water quality. Baikamo reveals the dynamic interaction between biotic and abiotic factors in aquatic ecosystems.

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20 PETERMANN, S., op. cit. supra, note 17.

21 HARRISON, A.L. Oyster-tecture. In: *Architectural theories of the environment: posthuman territory.* New York, NY: Routledge, Taylor & Francis Group, 2013 . ISBN 978-0-203-08427-4.

22 KAMETANI, Y., op. cit. supra, note 14, p. 91.

23 It is a coordinated network of natural spaces and bodies of water that provides basic ecosystem services in urban and rural areas. Green infrastructure encompasses vegetation, while blue infrastructure includes aquatic systems for water management. Infrastructure that integrates both elements promotes biodiversity and environmental balance.

24 The term technocentric refers to a perspective that sees technology and technical progress as the main driver of human development. This view tends to prioritise technical solutions to environmental and social problems, often undervaluing cultural, ethical and ecological considerations.

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31 Agency refers to the capacity of an agent to act, influence or generate effects within a given system or context. In contemporary social and ecological studies, the concept has been expanded to include non-human forms of agency, recognising the active capacity of non-human participants, whether human, animal, plant or even objects, in processes and relationships.

32 Amphibious urbanism is understood as a model that integrates and emphasises the agency of water in cities, safeguarding its ability to move, filter, flow, and connect with other natural systems. It also recognises the need to be able to adapt to hydrological phenomena including floods, tides or heavy rainfall.

33 CARPENTER, T. "Liquid Urbanism." In: FRANCH, E.; LUZÁRRAGA, M.; MUIÑO, A. *100 Words for Water: A projective Ecosocial Vocabulary.* Zürich: Lars Müller Publishers, 2025, p. 144.

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UN PAISAJE DE REGADÍO EN RIESGO: LA HUERTA PERIURBANA DEL EBRO AGUAS ABAJO DE ZARAGOZA

AN IRRIGATED LANDSCAPE AT RISK: THE PERI-URBAN *HUERTA* OF THE EBRO DOWNSTREAM FROM ZARAGOZA

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p.121 IRRIGATED LANDSCAPES AND PERI-URBAN *HUERTAS*: A CHALLENGE FOR THE CONTEMPORARY CITY-TERRITORY

Historically, human settlements have been established in close proximity to rivers, which have been key to the foundation and development of urban nuclei. Peri-urban *huertas* (orchards) are an echo of that intimate relationship, a remnant of the historical bond between communities and floodplain agriculture. Although contemporary cities have drastically reduced their dependence on rivers for water and food supply, these *huertas* persist as valuable heritage sites. They still retain some of the original fertility of alluvial plains and provide support for the ecosystem, while also offering potential as spaces for community gatherings, environmental education, and reconnection with nature and food cycles.

Nevertheless, since the last third of the twentieth century, historic *huertas* have faced serious threats. The intensification of urban expansion, together with the development of transportation systems and changes in production and consumption patterns, has strongly impacted them, reducing their productive value and fostering their decline. Recent peri-urbanization processes are manifested in the simplification of agrobiodiversity, the abandonment of traditional buildings, the deterioration of irrigation networks, the dissolution of the hierarchical system of paths, and the emergence of barriers and residual spaces.

In the face of these threats, it is essential to redeem peri-urban *huertas*. Firstly, their aesthetic-artistic value can be recognised, contributing to the to strengthening of their historical identity and the community's sense of belonging. On the other hand, their ecological value is undeniable: despite the artificialization inherent in agricultural activity, they function as agro-systems that demonstrate a sustainable use of natural resources[1].

p.122 Alberto Magnaghi, a central figure of the Italian territorialist school, emphasised the potential of agriculture at the end of the last century. He added further functions to the two mentioned above, such as enabling a new public use of the territory that brings the urban and rural closer together, fostering the development of educational and scientific agrotourism, and, above all, exalting the complexity of a historic heritage landscape by giving continuity to local productive knowledge, always from an innovative perspective[2]. This integration of attributes and valorisation of irrigated landscapes is only possible through a prior effort to understand the cultural identity of the place, a particularly arduous yet necessary task in the context of today's peri-urban areas, with generic spaces that are difficult to read and laden with negative connotations associated with marginality or insecurity.

Interest in the conservation of territorial heritage, and in particular of conventional agricultural landscapes linked to watercourses, has grown significantly in recent decades, driven by increasing awareness in academic and institutional circles. The broadening of the concept of landscape to "ordinary landscapes" has been essential, as has the renewal of the regulations governing their protection following the signing of the European Landscape Convention (ELC)[3]. This new sensibility has been reflected in numerous studies addressing the preservation of irrigation systems through their analysis and cartographic representation. At the international scale, protection mechanisms have emerged, such as the FAO's GIAHS Programme (Globally Important Agricultural Heritage Systems Programme). Although these mechanisms focus on safeguarding landscapes of exceptional value, their existence confirms the need to preserve traditional agricultural spaces as a legacy for the future[4]. Other studies highlight the relevance and timeliness of this topic[5].

In Spain, this trend is embodied in significant research on historic *huertas*, such as those of Valencia[6], Alicante[7] and Murcia[8], recognized for their ecological and cultural value. This research highlights the richness and diversity of these agro-systems. Beyond the peri-urban sphere, the study of the Ribeira Sacra, with its combination of terraced viticulture and cultural heritage, offers another relevant example of this line of research[9]. The application of innovative methodologies to historical cartography allows for a better understanding of the evolution of these landscapes, thus contributing to the development of more effective strategies[10].

p.123 THE PERI-URBAN *HUERTA* OF THE EBRO AS A CULTURAL LANDSCAPE

The experience accumulated in works such as those mentioned serves as a reference for addressing the problems of Zaragoza's *huerta*. In light of the weakening economic performance of the irrigated peri-urban landscapes linked to the Ebro as it passes through Zaragoza, this article places emphasis on their value as eco-cultural heritage. Accordingly, some key factors that threaten their integrity are analyzed, with the aim of provoking a reflection that may lead to strategies for strengthening their resilience in the face of urban pressures and new challenges[11].

Perspectives on the Ebro: the peri-urban huerta *of Zaragoza*

The Ebro is characterised by its broad channel, wide meanders and gentle slope in its middle course, as well as its abundance of organic sediments. These features have fostered both intense agricultural production in its floodplain and the formation of an extensive ecological corridor. This corridor is composed of several unique habitats concentrated in *sotos*, *galachos* and *mejanas*, which host a wide variety of birds and aquatic plants.

Figure 1 provides an overview of Zaragoza's peri-urban *huerta*, showing the footprint of the built city and the location of several metropolitan municipalities. Also included are the watercourses of the Ebro and its tributaries, the Gállego and the Huerva, as well as the layout of the Imperial Canal of Aragon. A clear division can be seen between the dryland fields on the *muelas* and piedmonts, and the cultivated spaces that stretch along the valley bottoms, where plots currently declared as irrigated land are indicated (figure 1).

Figure 2 provides additional relevant information about the hydraulic functioning of the *huerta*, delimiting the various irrigation communities and representing their main channels (*acequias*). As in the previous figure, the rectangle located in **p.124** the lower right corner frames the area studied in this article, which includes the Zaragoza neighbourhoods of La Cartuja Baja, Movera and Santa Isabel, and the municipalities of Alfajarín, El Burgo de Ebro, La Puebla de Alfindén, Nuez de Ebro, Pastriz and Villafranca de Ebro. It can be seen how this area largely coincides with the district known as Urdán (figure 2).

However, despite the central role that river courses have had—and continue to have—in the genesis, configuration, functioning and dynamics of Zaragoza's peri-urban agricultural landscape, they are now considered irrelevant in terms of how the territory is perceived socially. The courses of the Ebro and Gállego rivers have been progressively dominated by the construction of bridges, weirs, dams and defences, and have undergone processes of environmental degradation, at times through negligence. Similarly, the hydraulic heritage associated with agricultural activity has suffered a progressive deterioration due to disuse and the passage of time[12]. Historical photographs bear witness to the value of this legacy (figure 3). Only after the developmental excesses of the 1960s and 1970s, when the Ebro lost large tracts of land to clearing and urbanization, did local initiatives begin to emerge demanding the safeguarding of riverfronts[13]. **p.125**

Despite the notable improvements in the central sections of the Ebro brought about by Expo Zaragoza 2008 and its Accompanying Plan, the metropolitan environment of the corridor, both upstream and downstream, remains disconnected from the city. This lack of integration prevents it from being perceived as an attractive place for sports, leisure or educational activities. The disconnection is exacerbated by poor communication between the riverbanks and the presence of significant barriers such as ring roads and railway lines. In addition, the lack of "soft mobility" **p.126** alternatives to fast roads hinders access to and appreciation of the river areas and the local *huerta*[14]. As a result, a generalized perception has arisen of the peri-urban *huerta* as an alien space. This research project takes a retrospective approach to re-signify the cultural landscape of Zaragoza's *huerta baja*.

Historical values of the hydraulic heritage: the perception of travellers

During the heyday of travel books, between the mid-eighteenth and nineteenth centuries, the area analysed here functioned as the "eastern gate of Zaragoza." The route of access to the city from Catalonia involved passing through the *huerta* and then crossing the Gállego River, offering a first impression of the city that contrasted with the aridity of the Monegros (figure 4). Testimonies of the period, such as those of enlightened travellers, document the agricultural wealth and customs of this landscape. At the same time, they reveal the significant change in the social perception of this environment over the last two hundred years.

John Moore describes the landscape around the city of Zaragoza at the beginning of the nineteenth century as "*a fertile plain of great extent, highly cultivated land, olive plantations, picturesque country-houses, called* torres*, with extensive gardens, vineyards, a noble river flowing through this diversified plain, a clear sky, the city with its towers and spires, and its recollections —all unite to please the eye and interest the feelings—*"[15]. The words Moore dedicates to the *huerta* may well serve as an example of the impressions that other Enlightenment and Romantic travellers also experienced on their journey to the city, most of them taking the Madrid–France route[16]. **p.127**

British, French, Italian and Spanish chroniclers coincide in praising the clarity of the skies, the distinctive sinuosity of the Ebro riverbed, the ideal layout of the rural "torres" that at the time proliferated as leisure estates for the bourgeoisie[17]; and especially the fertility of the entire plain, which in that period must have been covered with vineyards and olive trees, in sharp contrast with the barren, uncultivated landscape that precedes the valley. Numerous testimonies attest to the landscape richness of these territories. One is that of the writer Joseph Baretti, who states that he does not remember in his country any city "*that presents a better appearance, or a more enchanting territory than Zaragoza. Its cupolas and steeples, the vineyards and numberless trees on every side, the plain bordered by mountains, together with the brightest sky that is it possible to imagine, formed a landscape well deserving the pencil of a Claude Lorrain*"[18]. At the end of the eighteenth century, the traveller Antonio Conca described the location of Zaragoza "*on the banks of the Ebro, in a very spacious plain, irrigated by the waters of the Gallego and the Huerva, and surrounded by gardens, orchards, verdant promenades, and elegant country houses, it could not be more beautiful or mor advantageous*"[19]. A few decades later, the traveller Henri Cornille explicitly referred to one of the distinctive elements of Zaragoza's suburb, the aforementioned "*torres*": "*The surroundings of the city are adorned with country houses called* Torres*, which, scattered across the plain, amidst the woods that cover it, appear, in the glimpses between them, like hermitages reserved for the avenues of the convents*"[20].

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Nevertheless, it is in Alexandre de Laborde's well-known *Itinéraire descriptif de l'Espagne* (1827) that the entrance to Zaragoza is described in greater detail: "*One no longer loses sight of the banks of the Ebro, though somewhat distant, nor of the charming countryside adjoining this river […]. One passes by the village of Alfajarin, […] and Puebla de Alfinden, which is crossed […]. The countryside becomes increasingly beautiful on every side, and particularly to the left, where it offers interesting views; it finally becomes magnificent: a carpet of greenery spreads across the entire surface of the plain; fields, vineyards, orchards follow one another; careful cultivation is evident everywhere; trees multiply; especially olive and fruit trees, which display their abundance and extend for three-quarters of a league*"[21]. The 1668 engraving by the Italian architect Pier Maria Baldi, depicting the surroundings of the municipality of La Puebla de Alfindén, complements the image evoked by this author (figure 5).

Ultimately, the historical and graphic documentation available—including narratives, engravings and photographs,
p.128 among other sources—allows Zaragoza's *huerta*, and specifically the *huerta baja* studied here, to be characterized as a peri-urban landscape of remarkable eco-cultural richness. This landscape is also known alternatively as "la harta," "la huerta honda" or "the eastern gate." These sources not only document what has been a vital space for the city but also demonstrate its potential to foster the participation of both local residents and visitors in its recovery and enjoyment.

AN IRRIGATED LANDSCAPE AT RISK. COMPARATIVE CARTOGRAPHIC ANALYSIS

As has just been shown, Zaragoza's *huerta* has historically been identified as a productive traditional irrigated landscape, characterized by a close interrelationship between the elements of its agricultural fabric. In recent decades, however, it has experienced a severe loss of identity. Recent transformations — stemming from uncontrolled urban development, ambitious infrastructural and industrial projects, and the proliferation of illegal land subdivisions— have generated a complexity that considerably hampers the legibility of this peri-urban landscape. The decline began to intensify after Zaragoza was declared an industrial development hub in 1964, which led to the extensive rezoning of agricultural land for housing and infrastructure. Although the 2002 General Urban Development Plan of Zaragoza already noted in its Explanatory Report the need to regenerate the peri-urban *huerta* through "*the elaboration of inventories and detailed cartography of its heritage elements:* torres*, irrigation ditches, irrigation systems and their regulation, road networks, hierarchy and functions, characteristic trees and vegetation, landscape units or crop types*"[22], political action for its protection has been notably weak.

Given the broad and complex field of analysis, this study focuses on providing a precise diagnosis of Zaragoza's peri-urban *huerta*, identifying its risks and proposing interventions that go beyond the ineffective conventional urban regulations. The urgency of revalorizing this irrigated landscape in all its dimensions is emphasized, with the aim of integrating it into strategic planning that is sensitive to its values. Using a methodology that combines the recovery of historical memory with GIS-based territorial analysis, the *huerta* emerges not only as a heritage legacy, but also as a key resource for sustainable metropolitan development. The fundamental objective is for the relevant authorities to adopt these diagnoses and explore possibilities for intervention that surpass rigid catalogues and sectoral visions. To this end, operational analytical tools are provided to underpin future regeneration strategies, ensuring that this space is reinterpreted as a pillar of cultural identity and environmental sustainability in the territory. A comparative cartographic analysis is one of the tools that makes it possible to verify in detail the processes experienced in specific areas.

In preparing the analysis presented here, the first sources consulted were the recently digitized cadastral topographic maps by the Dirección General de Catastro. These maps, drawn up less than a century ago, between the 1930s and the 1960s, depending on the municipality, accurately reflect the rural landscape of the time. They therefore constitute a highly valuable source, as they document the state of the territory prior to major transformations and enable intentional comparison at different scales[23] (figure 6). Secondly, current cartography, already available in vector formats, was consulted for the characterization of the present condition of the area (figure 7). The territorial analysis is completed with
p.129 aerial photographs, an essential document for approaching reality. Together, these sources allow a comparative exercise contrasting buildings, land parcels and infrastructures (roads and irrigation systems) that make up the peri-urban *huerta* in two specific periods: from the 1930s to the 1960s, on the one hand, and today, on the other. The comparative analysis
p.130 of historical and current sources, both cartographic and photographic, is not a mere technical exercise but a critical one. The result is the confirmation of a landscape erasure: the progressive and systematic disappearance of a substantial part of Zaragoza's *huerta*, sacrificed in favour of disorderly peri-urban development.

The study carried out in the area shown in figures 6 and 7 is developed in detail across three 400 × 400 m zones, selected as paradigmatic cases that allow the observation of the most evident transformations[24]. These three zones are then situated within a broader context of 1600 × 1600 m (figure 8).

In order to record —cartographically and through quantifiable indicators— the changes in the morphological components of the *huerta baja*, a comparative analysis of the three 400 × 400 m zones has been carried out using aerial photographs (above) and planimetries (below) in two precise moments: the mid-20th century (left) and the present day (right). In each case, the buildable area and the number of parcels has also been calculated for these two moments (figures 9, 10 and 11).

The comparative analysis of these three areas reveals the magnitude of the transformations undergone by the morphological components of the *huerta baja*.

With regard to the nuclei of rural origin, all of them are located according to a colonization logic that can be considered universal: at the natural limit of the terrain, along the border between dryland and irrigated areas. Consequently, the main communication routes, as well as the Imperial Canal of Aragon, were built along the upper

edge of what is known as the "fourth terrace," at around 200 meters above sea level. Each of the six municipalities within the area has grown modestly in recent decades. This has involved prioritising infrastructural and industrial expansion over agricultural and livestock activities, in order to consolidate the metropolitan area of Zaragoza.

The detailed analysis of Zaragoza's *huerta*, and particularly of the three study areas, reveals a profound metamorphosis in the parcel structure. Until the mid-20th century, this territory was organized around the "torre", a unit of exploitation and habitation intrinsically linked to the irrigation system of the Ebro valley. This cell constituted the essence of a cohesive and productive cultural landscape, as evidenced by the historical sources[25]. However, in recent decades **p.131** the evolution of the plot fabric reveals two opposing trends that have fractured the traditional model. On the one hand, agricultural modernization has fostered a process of land concentration. Seeking profitability through mechanization **p.132** and economies of scale, the horticultural surface has been reduced in favour of convenient extensive forage irrigation systems located further away[26]. On the other hand, and in the opposite direction, there has been a fragmentation of land, driven by speculative construction of second homes, often within the framework of illegal subdivisions[27]. **p.133**

The resulting structure, visible in the current planimetry, is increasingly fragmented and undifferentiated, a disjointed mosaic where the imprint of such a singular heritage is ever more difficult to recognize, consolidating the loss of an identity forged over centuries. The study area of this research is precisely one of the last strongholds of Zaragoza's characteristic model of scattered "torres". A total of 104 different toponyms has been identified in the area, of which 51 have been completely destroyed and 23 are abandoned and subject to vandalism; only 2% of the holdings maintain their agricultural or livestock vocation (figure 12).

As for the road systems, the two main routes are the current N-II (the old Madrid–France highway) on the left bank of the Ebro, and the N-232 on the right. In the last fifty years both have been expanded into dual carriageways by **p.134** state intervention (figure 11). These two historic roads connect the various towns and currently either cross through them (La Puebla de Alfindén, Alfajarín) or bypass them (Nuez de Ebro, Villafranca de Ebro). However, when analysing the entire area, it is evident that ring-road layouts and railway lines have had a greater impact. The Z-40 (fourth ring road) and the ARA-A1 (possibly a future fifth ring road) were built in 2008, cutting through agricultural land and raising large barriers. Necessarily elevated on embankments or platforms to cross the Ebro River and its floods, they have generated marginal and degraded spaces around them.

Meanwhile, the road and irrigation networks follow internal patterns and hierarchies in continuous dialogue, as noted by several authors[28]. Irrigation is organized from the Urdán ditch, which originates in the Gállego River and supplies the left bank of the Ebro. Its many branches and sub-branches irrigate the land and flow into the Ebro or, further from the city, into the Acequia Vieja de Pina. The irrigation communities have been responsible for managing the entire system of *caminos de herederos* and *acequias*, inventorying resources and carrying out various maintenance operations. Among these, since the 1950s they have promoted the replacement of earth and reed banks with cement, thereby inhibiting the ecological corridor function of traditional canals.

Due to new land uses encroaching on the *huerta*, many *acequias* have had to be covered or dismantled. Built **p.135** heritage linked to water—such as mills, washhouses or flour factories—is likewise in a state of abandon. Nevertheless, vegetation still reveals the imprint in the landscape of now-hidden *acequias* (continuous reed belts), of main access paths to "torres" (tree-lined avenues of cypresses or plane trees), and of "exotic" gardens in former estates (ornamental palm plantations) (figure 13).

INTERACTIVE WEB MAP OF VULNERABLE HERITAGE

Within the framework of the ongoing research project in which this article is inscribed, an interactive web map has been developed. A series of geospatial data had to be processed with the aim of inventorying the current state of the most vulnerable and unprotected heritage in Zaragoza's *huerta baja*. The elements selected to appear in this map are: the rural "torres," the hydraulic network, and, as baseline information, the cadastral plots and buildings. For the first two groups of elements, several subcategories are distinguished (figure 14).

The following provides a brief description of the GIS methodology employed to produce the interactive map. Manual generation or modification of data was required, since, for both the "torres" and the irrigation channels, the available sources are incomplete or non-existent. In the case of the rural "torres," it was necessary to create a KML file with the coordinates of each site, its name, and information regarding its current condition. These aspects were defined through the detailed comparison of historical cartography with more recent maps. An additional parameter was included to record the relative paths of a series of aerial images edited from Microsoft Bing 2024 and linked as pop-ups to the corresponding layer. As for the hydraulic network, the task consisted mainly in filtering data and creating rules to represent irrigation systems according to their condition and internal hierarchy. Interaction with this layer is also based on the use of pop-ups, in this case displayed as "balloons" containing the name of each selected element. Finally, the export and publication of the web map were carried out using the QGIS2web plugin, through the Leaflet library and the Netlify hosting service.

Access, navigation and interaction with this map are provided via the URL https://huertaperiurbanazaragoza. **p.136** netlify.app/#16/41.6405/-0.8090 thus modelling a kind of digital graphic inventory of Zaragoza's agricultural heritage and enabling its dissemination among the general public. This simple tool can contribute to knowledge of this heritage and to raising awareness among both the population and public administrations regarding its conservation and revitalization (figure 15).

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CONCLUSIONS

This research highlights that the peri-urban *huerta* of the Ebro, downstream from Zaragoza, constitutes an eco-cultural landscape of notable heritage and environmental value. Historically, this landscape was shaped through a complex interplay between agricultural activity, a dense hydraulic network, and the dispersed rural structure of the "torres." Today, however, it faces an advanced process of fragmentation and deterioration, resulting from uncontrolled urban expansion, infrastructural pressure, and the progressive depreciation of agricultural activity.

External competition, increasingly restrictive regulations, and rising land prices driven by the speculative market of illegal subdivisions have led, among other factors, to the rationalization of peri-urban agriculture. This situation has forced a change in land use: the historic fruit and vegetable area is progressively shrinking, being replaced by extensive forage crops, less demanding but eroding the unique identity of this valuable territory.

The dual methodology applied in this study has allowed, on the one hand, a historical reading of the area and the identification of traces of a fabric in the process of disappearing, thereby highlighting its heritage value; and on the other, the recording and representation of the recent morphological evolution of the *huerta*. The combination of these two approaches provides a solid foundation for planning recovery strategies, connecting the memory of the
p.137 place with present challenges and future opportunities. The comparative cartographic analysis carried out on three representative areas reveals a drastic transformation: the disappearance of more than 70% of the "torres," as well as the profound alteration and infilling of the traditional system of irrigation channels and rural paths. This process has generated an undifferentiated landscape, where it is increasingly difficult to recognize the historic agricultural imprint that characterized Zaragoza's *huerta* for centuries. Likewise, the proliferation of road and railway infrastructures and the disorderly occupation by residential subdivisions have contributed to the loss of territorial continuity, fostering a negative social perception.

Political action has been ineffective, as evidenced by the fact that only one "torre," the Torre de Santa Engracia, has been officially listed with the grade of monumental interest. Meanwhile, the classification of land as Non-Developable (*No Urbanizable*) has proved ineffective, lacking supra-municipal coordination and failing to curb illegal subdivision. This lack of protection for agricultural heritage contrasts starkly with the treatment of natural heritage. Specifically, 1,536 hectares around the Galacho de La Alfranca are included in the European Natura 2000 Network, where two Special Areas of Conservation (ZEC) and a Special Protection Area for Birds (ZEPA) converge. These are governed by a Natural Resource Management Plan (PORN, 2007) and a Master Plan for Use and Management (PRUG, 2022), demonstrating a far stronger conservation commitment than that devoted to the historic *huerta*.

In this context, and in contrast to the ineffectiveness of conventional urban planning, this study underlines the urgency of revalorizing the peri-urban irrigated landscape in its threefold dimension: ecological, productive, and cultural. The aim is to integrate it into a more strategic planning framework, sensitive to its values. The recovery of historical memory through graphic sources and travellers' accounts, combined with territorial analysis using GIS technologies, not only documents its legacy but also reveals it as a key resource and a fundamental pillar for a more sustainable and integrated metropolitan future.

p.138 Safeguarding Zaragoza's *huerta* from contemporary pressures ultimately requires reinterpreting it as a key element of the cultural identity and environmental sustainability of the territory. This work provides diagnostic tools and operative analyses designed to inform and underpin future strategies for landscape regeneration, thus ensuring the survival and enhancement of this valuable heritage.■

Each author's contribution CRediT:

Cecilia Sanz-García (formal analysis, research, writing, review and editing), Carmen Díez-Medina (conceptualization, methodology, writing, review and editing), Javier Monclús (conceptualization, methodology, writing, review and editing). The order of authorship in this article follows the SDC model (Sequence-determines-credit)
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11 The present article is part of a broader study on the peri-urban area downstream of the Ebro River as it passess through Zaragoza. The research is framed within the PER-START project (*PERi-urban STrategic AReas in Transformation. Eco-cultural challenges in urban regeneration processes in Spanish Cities*), funded by the Spanish Ministry of Science and Education. Principal investigators: Carmen Díez-Medina y Raimundo Bambó. Project period: 2022-2025. See the resulting publication: Bambó et al. *Paisajes Periurbanos. Procesos y retos eco-culturales en seis ciudades españolas*. Zaragoza: PUZ, 2025 [in press]. Available at: https://pupc.unizar.es/perstart.

12 RIVAS, F. *Patrimonio hidráulico en la huerta de Zaragoza*. Zaragoza: Ayuntamiento de Zaragoza, 2017. Available at: https://www.zaragoza.es/sede/servicio/publicacion-municipal/11378.

13 CAL NICOLÁS, P. de la. *Zaragoza: construcción urbana en un territorio de ríos y huertas. Dinámica fluvial, infraestructura hidráulica y ciudad* [online]. Director: Juan Luis de las Rivas Sanz. Doctoral Thesis, Universidad de Valladolid, Departamento de Urbanismo y Representación de la Arquitectura, 2019 [accessed: 15-09-2025]. DOI: https://doi.org/10.35376/10324/36272.

14 The only accessible route for pedestrians and cyclists to the lower *huerta* is the GR-99, a path connecting the Las Fuentes neighbourhood with El Burgo de Ebro if one stays on the right bank, or with the La Alfranca estate if one chooses to cross the river via the Bicentennial footbridge.

15 MOORE, J. *Scenes and Adventures in Spain from 1835 to 1840*. Philadelphia: J. W. Moore, 1846, p. 32.

16 This itinerary is recorded in many contemporary sources, such as the travel guides by Reichard (1793) and Ford (1845), which provide information on the number of post stations and the distances between them. The stops most relevant for this study correspond to the entry into the city from the east: Venta de Santa Lucía (still in use, adjacent to the N-II)-Pina de Ebro-Aguilar de Ebro-Osera de Ebro-Villafranca de Ebro-Alfajarín-Puebla de Alfindén-Bridge over the Gállego-Bridge over the Ebro-Zaragoza.

17 *"La torre de labor o torre es una unidad agraria, una explotación agrícola y ganadera constituida por unas tierras, vivienda y dependencias [...]. La torre en su momento fue el motor de los intercambios campo-ciudad y punto de arranque de los circuitos comerciales de abastecimiento con productos perecederos."* BOURRUT LACOUTURE, H. *La huerta de Zaragoza, agrosistema y ecosistema*. Zaragoza: Consejo de Protección de la Naturaleza, 2014, p. 22. Available at: https://bibliotecavirtual.aragon.es/es/consulta/registro.do?id=4473.

18 BARETTI, J. *A journey from London to Genoa, through England, Portugal, Spain, and France*. London: T. Davies and L. Davis, 1770, p. 251.

19 CONCA, A. *Descrizione odeporica della Spagna in cui spezialmente si dà notizia delle cose spettanti alle belle arti degne dell'attenzione del curioso viaggiatore*. Parma: Stamperia Reale, 1797, p. 265.

20 CORNILLE, H. *Souvenirs d'Espagne*. París: Arthus Bertrand, 1836, p. 202.

21 LABORDE, A. *Itinéraire descriptif de l'Espagne*. París: Imprimerie de Firmin Didot père et fils, 1827, pp. 413-413.

22 2002 General Urban Development Plan of Zaragoza. Ayuntamiento de Zaragoza, 2007, p. 162. Available at: https://www.zaragoza.es/sede/portal/urbanismo/planeamiento/pgouz-2002-guia3p.

23 Scales of 1:2000 or 1:5000, depending on the degree of parcelization. Maps: Topographic survey works of the cadastral parcels of Nuez de Ebro (1930, 11 sheets); Topographic survey works of the cadastral parcels of Villafranca de Ebro (1934-1935, 27 sheets); Topographic survey works of the cadastral parcels of El Burgo de Ebro (1935, 29 sheets); National topographic cadastral map of Pastriz (1946-1947, 9 sheets); National topographic cadastral map of La Puebla de Alfindén (1946-1947, 18 sheets); National topographic cadastral map of Alfajarín (1946-1948, 27 sheets); Cadastral map of the municipality of Zaragoza (1962-1969, 39 sheets).

24 Some authors consider these dimensions to be the most suitable for this type of analysis: *"Un paso de trama de 400 m × 400 m es la dimensión idónea: establece un área suficientemente representativa como muestra porque permite la valoración conjunta de una proporción elevada de tablas de huerta en relación al resto de elementos existentes en la zona."* GARCÍA MAYOR, M.C., op. cit. supra, reference 7.

25 In the 18th century, the peri-urban *huerta* was already organized according to these estates. As the city grew, most of the country houses disappeared, resulting in the loss of some singular examples of palace-style or Neo-Mudéjar architecture.

26 Irrigation on the left bank: in Movera there remain remnants of predominantly peri-urban agriculture, mainly vegetables and borage; in Pastriz this practice declines, but especially in La Puebla and Alfajarín, municipalities where industrial development has created many part-time farmers. On the right bank: up to La Cartuja, peri-urban vegetable farming rotated with forage continues, and beyond that, crops become more extensive. SANCHO MARTÍ, J. *El espacio periurbano de Zaragoza*. Doctoral Thesis, Universidad de Zaragoza, 1989.

27 *"Hay, pues, muchas parcelas pequeñas, inadecuadas para las máquinas modernas. Y cada día se dividen más, por herencias. [...]. Tiene que llegar un día en que se haga la concentración parcelaria como se va haciendo en otros pueblos."* LABARTA, Fermín. *La acequia, la presa y la huerta de Pina*. Zaragoza: Sindicato de Riegos de Pina de Ebro, 1968, p. 210.

28 *"Los sistemas de acceso corren principalmente por las divisorias de mínima pendiente, por lo que formalizan una estructura ramificada que se intercala con la también estructura ramificada de las escorrentías superficiales, facilitando una alternancia constante entre los caminos y el agua."* EIZAGUIRRE I GARAITAGOITIA, X. *Los componentes formales del territorio rural: los modelos de estructuras agrarias en el espacio metropolitano de Barcelona: la masía como modelo de colonización en Torelló* [online]. Director: Manuel de Solà-Morales Rubió. Doctoral Thesis, Universitat Politècnica de Catalunya, Escola Tècnica Superior d'Arquitectura de Barcelona, 1990 [accessed: 15-09-2025]. DOI: http://dx.doi.org/10.5821/dissertation-2117-93189.

C. Sanz García et al. "Un paisaje de regadío en riesgo: la huerta periurbana del Ebro aguas abajo de Zaragoza". Proyecto, Progreso, Arquitectura. Noviembre 2025. E. Universidad de Sevilla. ISSN 2171-6897 / ISSNe 2173-1616 – RECEIVED -15-03-2025 / ACCEPTED - 04-09-2025

A. Patricia Minguito García. "Tres arquitecturas del agua para una reconciliación antroponatural en el paisaje" Proyecto, Progreso, Arquitectura. Noviembre 2025. E. Universidad de Sevilla. ISSN 2171-6897 / ISSNe 2173-1616 - RECEIVED - 11-03-2025 / ACCEPTED - 10-09-2025

TRES ARQUITECTURAS DEL AGUA PARA UNA RECONCILIACIÓN ANTROPONATURAL EN EL PAISAJE
THREE WATER ARCHITECTURES FOR AN ANTHROPONATURAL RECONCILIATION IN THE LANDSCAPE
Ana Patricia Minguito García (0000-0003-4117-6400)

p.141 THREE LANDSCAPES IN IMBALANCE

Water is one of the traditional materials which shape the anthropocentric habitat, whether in the primitive cabins providing shelter from the rain, as illustrated by Laugier, or in the murmurs which offer hygrothermal regulation in the Generalife. This interdependence is heightened in "landscape architecture", where water goes from being an auxiliary resource to become the main variable for the design and construction process. Not only does this determine the context conditions which affect the integration of the architecture, it also influences morphology, and adapts it to the local pace of the ecosystems.

Current climate instability further highlights this relationship, making water the main element for countering the rapid increase in temperatures and droughts, an even more precious asset if possible. These changes have also resulted in a threat to the existence of the water itself, erasing aquifers and polluting oceans through overexploitation. In order to counter the imbalances stemming from this paradox, contemporary architectural strategies have arisen which can act positively in the surrounding landscape. Among these it is worth highlighting three actions linked to three ecosystem imbalances in three different landscape contexts. The common link for all these is simply the use of water as a means of restoring anthroponatural coexistence.

In marine environments near the coast, communities of concrete balls are introduced to the sea bed, creating a series of artificial reefs which the ecosystem ultimately adopts as its own, and halting the destruction of the coral reefs caused by the acidification of the water and blast fishing. Furthermore, some coastline mountain profiles are crowned with new permeable façades which intercept fog to produce water droplets for hydrating deforested areas. Finally, on the degraded soil of inland moors, once used exclusively for agriculture and livestock and now occupied by photovoltaic plantations, a positive coexistence of both uses is achieved thanks to the creation of a stable microclimate through evapotranspiration.

Beyond their diverse techniques and contexts, both examples share a conceptual reasoning which views water as a metabolic agent and the driving force of resilience. This change is a response to the challenges of the Anthropocene, linking the concepts of "slow infrastructure" and "water-sensitive design" supported by Shannon Mattern, John Tillman
p.142 Lyle and Rosi Braidotti to promote a redesign of the limits of the discipline, actively benefitting reconciliation with the environment. Landscape architecture must operate on a long-term scale in order to successfully become part of local hydrological flows, instead of merely interrupting or simplifying these. Therefore, the systems for the three architectural devices bear closer relation to the water cycle for recovering damaged habitats and mitigating anthropic and climate impact. This explains why, rather than opting for a common formalist solution, each of these devices is formulated as an open framework which can be adapted to the surrounding conditions. These "proactive tools" eventually act as the nucleus for the activation of a stable relationship network, becoming mediators between the natural ecosystem and human life.

A work methodology combining photographs and analytical fieldwork shows how these mediation dynamics work. This experience is complemented with specialist sources providing a context for each action in the landscape, recording its antecedents and challenges to achieve a greater understanding of the role of water. The results obtained are organised according to a single structural classification to pinpoint the causes of the ecosystem imbalance which have led to the introduction of each device. This establishes the main key points for the constitution of an environmental restoration model using water as a mechanism to construct tangible symbiosis in the landscape.

CENOTAPHS FOR REEFS

Coral is one of the main foundations of the marine food chain, the element on which reefs are built given its role for connecting different species. Without coral there are no reefs, and without these, the architecture of the habitat cannot be built. However, these settings have reached a major turning point, as more than half of the world's coral communities are under permanent threat. Although this cannot be reversed, the progressive degradation can be halted, incorporating a regeneration strategy which gradually restores balance.

The main cause of imbalance is the warming and acidification of oceans. Greenhouse gas emissions, together with the pollution caused by lucrative blast fishing which seriously harms the ecosystem, increase water temperatures and bleach the coral. In fact, the greatest extent of its destruction is not found in the fish specimens *per se*, but in the coral system itself. This degradation is so widespread that it prevents the reef from regenerating on its own, making external intervention and management necessary[1].

In addition to the reinforced concrete structures which shape the coasts at will, another type of artificial reef has been engineered as a tool for the active restoration of these damaged ecosystems[2]. The key to this paradigmatic shift is biomimicry: the ability to replicate a three-dimensional coral structure on a rocky bed[3]. Thus, the resulting habitat is not purely artificial despite being the product of an anthropocentric strategy. For this, it is essential to design architectural tools in keeping with surrounding conditions, as reported in the studies conducted between 1990 and

2020[4]. Only thus did the benthic blocks introduced as freestanding spherical pieces into the sea bed become a direct part of the physical, biological, ecological, and socio-economic processes of the ecosystem, functioning as just another component. p.143

The precursor of this strategy can be traced to traditional Filipino fishing methods, based on the interweaving of rocks and submerged timber to build weirs in shallow tidal waters[5]. These weirs become objects which concentrate activity when fish and crustaceans absorb their structure as a breeding habitat protected from predators and other harmful fishing practices. In 1993, with this legacy in mind, researchers from the University of Georgia encouraged the construction of concrete balls with perimeter perforations forming interconnected cavities and imitating the shape of the structure of natural reefs[6]. The glass bottles used to manufacture the homemade explosives for blast fishing went on to become formwork moulds for these openings. As a result, the element which initially destroyed the coral ecosystem is now viewed as a resource to promote its recovery.

The basic design of these reef balls is a sphere with a 60-130 cm diameter[7] (figure 1), which changes shape in order to more faithfully reproduce the functional structure of a reef, speeding up regeneration. One of these transformations revolves around their material form. The original sphere is built with an aggregate mix of different particle sizes which are locally available: lime, sand, volcanic ash, and Portland cement. However, this composition can become toxic for some species upon contact with the corrosive marine environment. Therefore, additives are incorporated to reduce the pH of the mix to match the neutral alkalinity of the sea water, thus ensuring structural compatibility[8]. Furthermore, no steel reinforcement of any sort is used to guarantee durability, although plant fibres or mollusc shells can be added to increase surfaces for species to grip[9]. p.144

Another remarkable alteration is the unique design of the envelope. Perforations are distributed along the perimeter on the upper hull, while 70% of the mass is found on the lower part of the sphere, ensuring its stability. Although the main objective is to lower the centre of gravity, the design facilitates the adherence of species and the connections between them. Different opening sizes are gradually introduced by replacing the plastic material with fibreglass, while inflatable elements replace glass bottles. Hulls generally feature 18 holes with different diameters following a coherent pattern with equal distances, interconnected through a large central opening which provides shelter to larger species. Finally, a third alteration is the frequent addition of a corrugated treatment on the inner face of the formwork to produce different rugosities on the surface of the ball, allowing a greater capacity for grip. Consequently, the original sphere also evolves to change shape in the form of basins with handles, trapezoidal prisms or stratification.

These spheres are not designed to ensure the reintroduction of a specific species, but rather to restore the habitat, allowing it the freedom to manage this. Each reef ball operates as a community in and of itself, but if species from different balls interact, this results in a "neighbourhood" which speeds up the recovery of the global ecosystem. To do so, these reef balls produced in workshops are deposited on the sea bed forming "reef blocks" of four or five pieces, placed at prudent distances to form a commune (figure 2). This results in the establishment of up to four scales of interaction: as an object, each concrete ball provides a medium for installing coral and fixing the sandy substratum; as a complex, a station is established for shelter and fertilisation within the migration cycle of different species; on a neighbourhood scale, the geometric and hydrodynamic properties of the reefs prevent them from being shifted by tidal movements, mitigating the erosion of the low coast; and at district level, these artificial reefs operate as veritable CO_2 sumps[10] (figure 3).

In short, as well as aiding the propagation of coral, the construction of these water structures enables the regeneration of complete reefs and increases the amount of local biomass, while simply operating as a meeting point. Thus, although the cause of the imbalance is anthropocentric, so is the implementation of a restoration measure, which is in fact manufactured in concrete, a characteristically anthropocentric material and the most suitable solution. It is worth highlighting the regeneration strategy promoted by the Subutuni community in Tanzania to counter blast fishing, increasingly prevalent since the 1980s, as well as the strategies developed in the Chilean coves of Quintay and Maitencillo between 2013 and 2017, and that of Malvarrosa beach in Valencia in 2014[11]. p.146

FOG COLLECTOR FAÇADES

As liminal spaces between sea and land, we find territories for attenuation facing their own imbalance due to a lack of hydration. The disappearance of reservoirs and aquifers caused by the rising temperatures is accompanied by a sharp rise in forest fires which, together with uncontrolled felling and widespread abrasive agricultural activities, contributes to increasing desertisation of the soil, destroying the cover of timber and shrubs. However, the unique characteristics of this border territory can transform weaknesses into opportunities to halt this erosion: the presence of moving fog banks (figure 4).

Vegetation, the first known passive collector of fog water, is the basic element of the functional structure of the terrestrial ecosystem. On the island of El Hierro, this natural phenomenon has been known for over 2000 years using p.147

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olive trees and Garoé or linden trees, which the early inhabitants of the island, *bimbaches,* considered vital to their survival. The operation of these "trees which distil water" is simple: when fog collects in the dense treetops forming a "cloud" it condenses upon contact with the surface of the leaves, sliding down the stems to the ground where it is collected in a pool, pitcher or saddlebag[12]. Just as Don Quixote's "windmills" evolved into aerogenerators which use wind energy to produce electricity, these pitchers are transformed into artefacts known as fog collectors which can intercept water particles in movement.

The key to successfully incorporating fog collectors lies in the alignment of three types of phenomena: a "dynamic or advection fog" caused by the shift of a warm and humid air mass over the cold surface of the sea[13]; an "orographic fog" produced by the adiabatic cooling of the humid air mass travelling up the mountain profile, the Foehn effect; and a "static or radiation fog" created when the air humidity is dissipated in a process similar to that of dew (figure 5). In other words, when the humidity-charged trade winds rise along the coastal ridges following daily atmospheric heating
p.148 from the Atlantic or Pacific Oceans, reaching an altitude of 300-800 m, there is a thermal inversion in the layers of air closest to ground level. This in turn leads to a decrease in the initial 25-35 km/h due to the change in density caused by cold air reaching the lowest levels, giving rise to the precipitation of a sort of driving rain[14].

The architecture of a fog collector is designed to function as an exterior cooling machine, tasked with lowering the air temperature in order to condense the water found within it. This work dynamic is again based on biomimicry, as it imitates the catchment system of trees, but replaces the flat sheet or plant limbo with plastic mesh to intercept the fog. When this fog is dragged by the wind, the 1-40 μm thick[15] microparticles saturating the ambient air strike the threads of the mesh, accumulating until they are sufficiently dense to form droplets. At this point they become so heavy that they fall due to capillarity, travelling down the petiole of the leaf. Subsequently, gravity causes them to reach the base of the structure, feeding the roots or the PVC or galvanised steel U-bend of the storage deposits[16].

In order for this process to perform viably a specific structural geometry must be adopted, as the volume of water gathered by a fog collector is fully dependent on its efficiency in terms of aerodynamics, impact, and drainage[17]. While the existence of fog collectors is documented as far back as the 16th century, research into these became particularly prominent four centuries later, in the Basin of Mexico and the Atacama Desert. Bearing in mind the legacy of Inca culture for the "air wells" which passively collect ambient humidity, and taking advantage of the difference between daytime and night-time temperatures, they began to resemble "sheets hanging in the wind".

In 1954, Chilean doctor Carlos Espinosa patented the first "fog collector", combining a cylindrical structure and a nylon thread mesh. In the 1960s, researchers Robert Schemenauer and Pilar Cereceda designed a new model which increased the ratio of water collected, by placing a rectangular screen perpendicular to air masses. Thus, the commercialisable standard collector, also known as SFC or Standard Fog Collector, was born, built with a structural framework, a filter mesh and a collection channel. Two posts 3.00-4.00 m high made of timber, steel or PVC with an inner rod reinforcement were secured to the ground using counterweights on each, with a system of cable tensors and bolts to brace them. These support a 1.00-6.00 m^2 rectangular frame at a height of 0.70-2.00 m, where the plastic filtering mesh is tensed, anchored or zip tied 15-20 cm apart (figure 6).

p.149 An individual collector gathers between 3 and 5 l/m^2 a day but, if environmental and architectural design parameters are coordinated correctly, performance can increase tenfold. The key to this is not limiting the installation to a single collector, but rather building a "façade" which follows the mountain ridge. These are placed in a triangular layout orbiting a fictitious line, or overlapping to form a diagonal outline (figure 7), creating a network of devices working jointly and flying like a large sail powered by moving fog. Instead of generating movement, resistance is created to achieve
p.150 condensation. Thus, the space previously occupied by trees destroyed by fires now hosts a forest of fog collectors.

It should be borne in mind that there is not always a predominant wind direction and convective currents are also frequent. If only flat fog collectors are available, it is no longer possible to intercept a fraction of the particles. Therefore, in the 1980s, Professors Luis Santana Pérez and M.ª Victoria Marzol Jaén from the University of La Laguna continued to perfect the commercially available model. In 2008, substantial advances were made by researcher Theo Hernando Olmo, and the parallelepiped collector[18] became available (figure 8). The mesh surface is quadrupled to create a "shoebox" in which fog currents are intercepted and allowed to slowly condense, thus improving the performance of the individual prototype.

Attempts are also made to resolve another conditioning factor in the design of these water architectures: porosity. Resorting once again to biomimicry, the "Life Nieblas" project developed in Gran Canaria installed a "pine needle collector". This device consists of a structural framework at a 50º angle in relation to the vertical, with cross beams from which steel threads hang, imitating the needles of the Canary pine trees (figure 9). This type of harp or "metal comb" allows air to circulate, barely generating resistance and optimally capturing water microparticles in suspension[19].

Finally, the original design of Carlos Espinosa's circular prototype was recovered and combined with metal ion meshes and organic compounds (MOFs) and a small biodegradable deposit at the base, known as a "cocoon",
p.151 to be placed at ground level, ensuring constant irrigation to a given example of repopulation. These fog collectors were placed in triangular formations on different strata in the territory, breaking with linear formation and continuously facilitating convective interception dynamics[20] (figure 10).

The microclimate is restored in two ways: following a passive approach, where captured water is accumulated in permeable deposits to provide a source of hydration for the surroundings and reduce the risk of fire; and following an active approach, whereby water is transported through channels to specific reforestation points. In short, taking

advantage of the pre-existence of fog in movement, a device is obtained for the potential regeneration of areas affected by desertisation. Notable examples of implementation include the different types of collectors installed in 2021 on the ravines of Valleseco, la Virgen and Andén in Gran Canaria, and the fog collectors which halt the southerly advances of the Atacama Desert in the Chilean reserve of Coquimbo[21].

ANIMAL AGRIVOLTAIC FARMS

The classification of agrivoltaic farms as water architectures is established not only by its energy and agricultural logic, but also by its operation as an infrastructure which can handle, conserve and redistribute hygrothermal cycles in arid territories. By establishing a closed evapotranspiration circuit, the water condensed on the panel surfaces as a result of sweating and plant and/or animal metabolism and falls to the earth, hydrating it. **p.152**

The landscape where this type of practice takes place is also one of mass desertisation, in this case due to overproduction of the land. Rural exodus to the cities is leading to a considerable degradation of the activities of the primary sector in favour of an increasing number of photovoltaic farms. The mass expansion of this technology to a large extent cancels out the network of ecosystem relations which are in fact the result of cultivation systems[22]. In contrast, in recent years the viability of combining food and energy production in a single point has been confirmed, taking as reference the agroforestry intercropping system[23]. This system is based on grouping trees and crops in low and tall rows on a single plot. If these trees are replaced with rows of photovoltaic panels respecting existing crop lines, this becomes a shared agrotechnological production model. In 1982, German researchers Adolf Goetzberger and Armin Zastrow began to work in this field[24], to be followed by the engineer Christian Dupraz who deliberately merged the terms agriculture and photovoltaic to coin the term "agrivoltaic"[25]. The first successful experiments combining agricultural-electric production were carried out in Montpellier in 2010, proving the all-round benefits of using panels to generate shade for crops, creating a stable microclimate by making use of humidity cycles. If livestock activity is included in this equation, the name changes from agrivoltaic to "solar grazing", and if all activities are combined the system is then termed "animal agrivoltaic". **p.153**

In order to solely produce electric energy all that is needed are rows of interconnected panels. However, if agricultural and/or livestock activities are added it becomes necessary to adopt a spatial design strategy in the form of a net (figure 11). To build on the heterogeneous nature of the ecological functions it becomes necessary to establish a correct relationship between the two parameters determining the density of an installation: panel height from the ground of 1.10-2.10 m[26], and the interaxis or separation between rows, which increases to 2.40-3.20 m and, occasionally, to 4.80 m (figure 12).

Generating a techno-pastoralist symbiosis between artifice and nature ensures that the soil on which the photovoltaic infrastructure is placed is not annulled, but contributes to the rehabilitation of local ecosystem cycles. As is the case with fog collectors and reef balls, by including a three-dimensional artefact apparently alien to the local environments, paradoxically new life can be breathed into the degraded landscape to improve the performance of solar capture. Establishing a correlation between the static nature of photovoltaic structures and the dynamism of plant and animal species establishes a sort of greenhouse microclimate as the shade cast by the panels cools the surface temperatures at ground level, increasing the concentration of humidity and promoting evapotranspiration[27] (figure 13). Plants and livestock benefit from the shade and protection provided by the rows, reducing thermal stress indicators in summer and maintaining comfort levels in winter (figure 14). This contrasts with direct solar exposure which burns leaves and raises the temperature for the livestock. Thus, land unsuited to cultivation can become fertile following the installation of these panels, in contrast to what happens with the traditional installation model. **p.154**

Livestock also recovers the lost task of pollination, distributing spores and seeds while reducing the dusting effect more efficiently than mechanical maintenance methods. On the one hand, the sediment is in suspension thanks to the hydration of the soil caused by the shade cast, and on the other, the transit of animals helps to keep the photovoltaic surfaces clean from the accumulation of particles which hinder solar capture. Furthermore, livestock clears the plantations of any possible weeds or invasive species which create a degree of "panel shade", preventing maximum performance from being reached and increasing the risk of fire due to the "magnifying glass effect"[28]. Finally, the hygrothermal climate created has a direct bearing on the efficiency of energy production: thanks to the water evaporation resulting from plant photosynthesis (figure 15), a localised constant cooling effect lowers the high temperatures which negatively affect the efficiency of the panels. **p.156**

Like the reef hulls, animal agrivoltaic farms add heterogeneity to the rhythms of ecosystems at many different levels. Firstly, photovoltaic panels provide the environment with a physical structure that adds an awning to protect a wide range of botanical species; secondly, the presence of vegetation concentrates water vapour under the panels, significantly reducing the initial temperature and preventing damage to birds or insects due to overheating; and thirdly, increasing the interaxis accessible to the livestock means that birds can roam freely, greatly reducing their mortality index. This is confirmed by farms in Carmona, Totana and Guadamur; as well as those in Domaine de Nidolères and Monticelli d'Ongina; Taupō and Canterbury in New Zealand; and the cooperativist farm in Qinghai. **p.157**

CONCLUSIONS FOR AN ACTION MODEL

These strategies, devised for the regeneration of areas degraded by imbalances resulting from anthropocentric activity, face a major challenge from the configuration of an environmental recovery model that can be replicated

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in other contexts. A viable opportunity, pointing to the possibility of initial steps towards a latent reconciliation, is that of resorting to non-conventional sources more linked to technology than to nature, building devices that can replace traditional water collection and reduce water scarcity in the region, leading to a slowing down of the rhythm of the ecosystem. In this regard, reef balls, fog collectors, and animal agrivoltaic systems represent three potential mechanisms for the promotion of proper action guidelines.

It should be borne in mind that the conditioning factors of the surroundings determine the operation and morphology of each of these architectures, creating a need for a detailed action protocol. In order for all three engineering devices to be involved in the local metabolic rhythms and reactivate the ecosystem, specific materials, dimensions, and position must be adopted. However, this does not guarantee other different imbalances can be resolved. Territorial planning laws offer common ground. Although biomimicry is used to determine the architectural features for each device, implementation strategies form complexes, rows or grids by configuring groups, systems or networks which use the historical urban planning models as reference. This transfer of architecture to territory and vice versa specifically guides anthroponatural symbiosis, showing a wide range of performative spaces with variable morphology. After all, a landscape is not only defined by its natural wealth, but also by the memory, identity and resilience created through interaction.

Despite all this, incorporating these artefacts can lead to a degree of conflict between technological innovation, restoring the environment, and cultural preservation, all requiring a critical evaluation of the implementation strategy. Inserting spheres to restore ravaged coral habitats must be based on prior studies to avoid altering the perceived morphology of the sea bed[29]. As these artefacts replicate the physiognomy of a natural reef, this issue is mostly avoided. In the case of the fog collectors installed in the Andes or mountain ranges in the Canary Islands, community management is needed to prevent the abandonment of infrastructures or the appearance of conflicts arising from water distribution. It should also be emphasised that fog collectors are installed as temporary structures which are removed leaving no trace once the imbalance is corrected. This is done specifically to avoid permanent visual impact. Finally, it is vital to vary the density, height and orientation of the panels in agrivoltaic farms to avoid radically transforming the reading of rural territory[30]. Although the recovery of soil must be prioritised over sociocultural impact, it is advisable to include autochthonous plant species on the fringes of the crop plantations, involving local farmers and local shepherds in this management, as well as monitoring ecosystem services.

The key to the joint success of all these implementation strategies is based mostly on the understanding and handling of a single variable, water, either in the form of liquid or vapour. This resource has been proved to be a proactive asset in the construction of deliberate equilibrium in the landscape, allowing the creation of tangible links between the poles of the anthroponatural equation. Successfully ensuring that each artefact adapts to the specifications of the

context defines the quality of the landscape, not only for its capacity to absorb an intervention without conflict, but also for the transformation of this intervention into a new narrative within a space that has been culturally codified by anthroponatural interaction. In short, the agreement established such mutually beneficial results that the presence of these architectures has become indispensable to the continued survival of the stabilising dynamics, in turn ensuring the survival of the ecosystem itself if these imbalances should ever reappear.■

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