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Paradigm Change: A landscape-based approach as a new paradigm for Valparaiso

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Contemporary urbanization has positioned urban areas as pivotal in global development, with cities driving economic activity while facing critical environmental challenges. Alongside this, concerns about climatic pressures on urbanized and natural areas are evident worldwide. This paper presents a landscape-based approach as a new paradigm for urban planning and design in Valparaíso (Chile), addressing challenges posed by contemporary urbanization and climate change. Cities increasingly serve as economic hubs yet face significant environmental threats, particularly in regions like Valparaíso, which is vulnerable to wildfires, floods, and landslides due to its geography and socio-ecological fragmentation.

Recent climate change impacts, exacerbated by inadequate planning and regulatory frameworks that fail to recognize hydrogeomorphological structures and socio-ecological systems, have heightened urban vulnerability and ecological degradation, leading to the loss of vital vegetation and ecosystems. This study underscores the interconnectedness of urbanization and natural systems, advocating a shift from traditional paradigms toward an adaptive landscape model. This model aims to create a healthy water system for freshwater supply, groundwater recharge, diverse ecosystems, and ecotones, integrating green/blue infrastructure, risk, and resilience strategies.

The research methodology follows two approaches: first, situating the study within new paradigms that examine ecology, landscape, and infrastructure as urban-environmental articulators; second, analyzing historical urban processes that have led to Valparaíso's current deterioration. Finally, this study discusses urban paradigms that promote coexistence between urban development and ecological preservation, ensuring a sustainable future for the city and its inhabitants.

INTRODUCTION

Contemporary urbanization has made urban areas essential centres for global development. Cities play a vital role in economic growth, serving as centres for trade, innovation and job creation. However, alongside these economic opportunities, urban areas also face significant environmental challenges, such as pollution and significant loss of important areas of biodiversity. As people continue to flock to cities in search of better livelihoods, the need for sustainable urban planning becomes ever more pressing. In addition, the changing climate has led to more frequent and severe hazardous events, such as heavy rainfall and prolonged droughts, posing a higher risk to the population. Regarding Chile, as in the rest of Latin American countries, the ecological and social fragmentation of cities is directly linked to urban development, lack of planning and effective territorial management in socio-ecological terms that consider the understanding of its hydrogeomorphology conditions and the variables associated with it. All these factors have caused central Chile to experience a significant rise in wildfires, attributed to an increase in droughts and decreased precipitation[1]. Other effects resulting from extreme hydroclimatic events—such as drought, heat waves, and floods—impact biodiversity, water resources, forestry and agricultural activities, human health, land, and infrastructure, leading to an increase in risk scenarios. These scenarios multiply forms of degradation, including biodiversity loss, contamination of natural areas, and the expansion of informality in high-risk areas, fragmenting the urban and natural landscape and concentrating conditions of environmental deterioration and socio-spatial segregation[2]. In this sense, the discussion on the projection of the environmental health of cities becomes imperative in matters of planning, management and design, especially when it becomes evident that the conflict between the process of urbanisation and the management of natural ecosystems is constantly worsening and tends to impact in multiple and repeated ways, areas where the population is massively concentrated[3].

The Bay of Valparaíso as an environmental unit behaves like a geographical basin, where all its hydrographic basins are projected onto the bay (the plan), a large part of which is now used as port infrastructure (Figure 1). Under historical-social circumstances, cultural references have evolved from paradigms that ensured the sanitisation of the environment made possible by resources and technological knowledge (hygienist paradigm) to recent sustainability principles referring to the necessary contextual and integral understanding of territorial phenomena (landscape-based paradigm). Watercourses, siltation, sediment collection and compulsory dredging are effects of current phenomena activated by their hydrographic basins, present in Valparaíso as ravines. Natural systems try to maintain their original condition despite the innumerable infrastructural alterations that do not recognise natural dynamics. Man's response is multi-hazard and disaster, making urban conditions vulnerable.

figure 01 — page 16

1 González M. et al., 2020
2 Romero et al., 2009
3 Mansilla, 2000; Henriquez et al., 2013

Rainfall in Valparaíso is concentrated between June and August. Over the last 40 years, it is in this period that 90% of precipitation has been concentrated, with an average of no more than 420 mm[4]. The concentrated rainfall reinforces the eventual flooding and obstruction of the watercourses, transferring excessive and difficult-to-distribute loads (predominant current) across the bay of Valparaíso. The infrastructure works have taken the principle of "evacuation"[5] over any need for infiltration, accentuating the conditions of excessive and torrential dragging with predictable impacts. As a result, the action is expressed in accentuated erosion processes, flooding of the flat sectors of the city, lower relative humidity and scarce possibility of proliferation of natural conditions and ecosystem services.

The progressive urbanization, principally in the hills and ravines, is carried out through the implementation of new residential uses, the construction of roads and infrastructure, as well as informal construction processes, factors that contribute to the reduction of natural areas, contamination of soils and watercourses and loss of ecosystem services. Thus, the ravines, valuable landscape structures are transformed into remnants of urban development and critical areas in ecological terms.

The paradigm shift needed to change the residual state of the ravines is contrasted with the current pattern of urban development, understanding that sustainability and the vision towards ecological city planning can be strengthened by incorporating new social and ecological learning processes related to planning and design. These proposed measures translate into territorial interventions conceived in the long term, which seek to link the urban system with the environmental and cultural dynamics present in the place where there is a strong need for locally driven adaptation measures to guide their implementation in order to move towards true climate-resilient urban planning[6].

METHODOLOGY: A PARADIGM CHANGE

It is in the territory with its resources that the survival of cities is at stake, and in the acquired awareness of the ecological impact of our actions, which does not always occur in the immediate context but often in broader contexts and territories on which we all depend. This implies thinking and projecting the city in relation to the region in which it is inserted. How, then, can these new challenges be met? Mostafavi[7] indicates two priorities. The first aims at overcoming the disciplinary isolation in which architecture, landscape architecture and urban design are usually placed in order to promote a transdisciplinary and collaborative way of working, where everyone can contribute their knowledge in an integral way. The second is related to scales, especially the large scale where the clash between the city and the region is manifested and where conventional planning methods usually fail. Consequently, this is the scale that presents the great opportunity to rethink the status quo, through innovation and creativity, in order to come up with new design methods and strategies that will guarantee greater sustainability in the future.

4 Center for Climate and Resilience Research CR2
5 Alvarez, L., 2001
6 Donati et al., 2022
7 Mostafavi, M., 2010

The union of these two spheres, urbanism developed through the lens of ecology, corresponds to a gradual process and reflects the ecological imperative of sustainability that the beginning of the new century has urgently imposed on us if we are to persist as a human species. In this sense, Mostafavi points out an unavoidable challenge related to exponential demographic growth, which is reflected in accelerated urbanization in stark contrast to the limited global resources. In this area, the architect is in debt, still not up to the demands of the new challenges, since all architectural efforts have been limited to the small scale, with technical devices (LEED), but have not addressed the larger scale infrastructure that has to do with the territory of our cities[8].

A more structured and precise approach is outlined in the essay Ecological Urbanism: A framework for the Design of Resilient Cities[9] by Anne Whiston Spirn, landscape architect. According to the author the term "*It weds the theory and practice of city design and planning, as a means of adaptation, with the insights of ecology ... and other environmental disciplines, such as climatology, hydrology, geography, psychology, history, and art.*"[10]

As the title itself states, the focus is on resilient cities as a necessary response to the new challenges of our time that threaten the human species, such as climate change with its effects on the territory, limited resources, and growing energy demand. However, the title does not specify how we can understand "resilience". Resilience is a term being defined by different disciplines of study. In this sense, resilience is understood as the capacity to "anticipate, resist, absorb, adapt and recover"[11]. Rosati et al.[12] argue that resilience can be understood as a cycle covering four action steps: Preparation, resistance, recovery, and adaptability, where the last step is the most significant to proposed resilience in cities. In a timely and effective manner, it is possible to plan and project more resilient territories. This resilient landscape brings together social systems and their experiences with the natural environment where they develop, seeking the efficient management of risks as exposure of the population to these[13].

Given the current conditions, we must adapt if we want to preserve the human species. Overcome the inertia of the status quo and think of cities that improve their metabolic condition by optimizing resources to lower their production and maintenance costs. In cities that increase the quality of life of their inhabitants by connecting with the cycles and dynamic processes of nature. In cities that are no longer satisfied with just being sustainable, since sustainability is based on the maintenance of a stable state Instead, these cities aim for resilience as an active strategy of continuous adaptation to the environment and to change.

In itself, all the principles and strategies presented so far are not new, nor is an architecture or urban planning according to an ecological approach. Both Mostafavi and Spirn agree that their origins can be traced at least as far back as the beginning of the last century in the figure of Patrick Geddes. If Mostafavi limits herself to a simple historical reference, Spirn, again, leaves us with a structured body of knowledge. The timeline she articulates shows us how ecological ideas, concepts and practices in relation to the shaping of our habitat have been reiterated and refined from Patrick Geddes, through Lewis Mumford and Ian McHarg, to Jane Jacobs, a trajectory that Spirn herself had already analysed in her book The Granite Garden: Urban Nature and Human Design of 1984.

8 Mostafavi, M., 2010
9 Ecological Urbanism: A framework for the Design of Resilient Cities, 2014
10 Spirn, A., 2014, p. 1
11 CNID-CREDEN, 2016
12 Rosati et al., 2015
13 Busquets J.; Cortina A.,2009

Patrick Geddes, Scottish biologist and botanist, is an inescapable figure for ecological planning. Placed in the industrial carbon era, he is the one who best analyses the change from rural life (pre-industrial) to urban life and, with it, the birth of the modern city, developing his research on urban planning and zoning. He began his academic career as a Professor of Zoology at Edinburgh University, Scotland (1880-1888) and then became a Professor of Botany at University College, Dundee (1889-1919) and ended as a Professor of Sociology and Civics at Bombay University, India (1920-1923). His versatility also expanded to the professional world, applying the biological principles of evolutionary theory to the planning of cities and their regions, an area in which he quickly became an international reference. “His ideas about social evolution, the design of local communities, and his repeated calls for comprehensive understanding through regional surveys and plans laid the groundwork for much practical planning in the mid-20th century, both with respect to an embryonic theory of cities and the practice of planning.”[14]

This complementarity between region and city, their holistic understanding as an interdependent unit, which ultimately reflects a notion of life coupled and integrated with nature, is picked up and developed by Ian McHarg. The particularity of his vision and operation is that he is one of the few, in assuming this binomial, that does not focus on the city, but on the territory that surrounds it. He inverts the look, not assuming an anthropocentric point of view but a naturalistic one, under the conviction that human welfare is the direct consequence of the correct functioning of nature. We are part of it and our role is to take care of it and improve it. Thus, his efforts are dedicated to understanding the phenomena of nature and its laws and then proposing scenarios and anthropic proposals that are coupled with these dynamics.

McHarg[15] has synthesized this ecological approach to the territory and the city in “Design with Nature”. In one of the chapters, entitled “The Naturalists”, he proceeds with a comparison between two states of evolution. If, in Geddes, the comparison was between two anthropic states of evolution, McHarg makes it between two natural states of evolution. What unites them is the scientific point of view and the search for demonstrable attributes.

Today's cities have a negative or highly entropic function because they expend more and more energy to maintain the status quo. With a lot of effort they even manage to increase it, but never proportionally to the increase in energy. This dynamic implies a constant increase in energy, or resources that are limited. Given the exponential demographic increase, this model will soon run into a deficit in which our future survival depends on our ability to reverse the efficiency of the urban growth model and change the paradigm tending to focus on the growth of the city in terms of settlements, housing and roads to the neglect of environmental aspects. To tend towards a negentropic model, to use McHarg's words, where over time, energy expenditure will decrease, and complexity will increase.[16]

This paradigm shift has to be structural. It must not only be reflected in small actions that seek to promote change, but it implies a radical change of the established status quo—a change of system, both operational and ideological. In Geddes, the contrast was between the paleo-technical and the neo-technical; in McHarg, between the anthropocentric and the naturalistic point of view, and that, in the case of Valparaiso, from a model based on the

14 Batty, M.; Marshall S., 2017, p. 4
15 McHarg, I., 1969
16 McHarg, I., 1915

economy to a model based on the landscape in which the city and its natural context are part of the same system and, for this, new paradigms need to be proposed to install principles of sustainability in which the city and its territory are transformed into the support of the city's natural conditions.

The urbanisation systems and different urbanism paradigms until the 20th century have not considered this need, reducing the retention capacity of the subsoil, and generating free evacuations without the possibility of absorption or retention of the necessary water for the proliferation of biodiversity. In response to the growing inertia of urban planning and the undisputed dominance of civil engineering at the end of the 20th century, landscape infrastructure emerges to redefine the conventional role of infrastructure in the future of urbanized regions. Belanger establishes the concept of “Landscape Infrastructure” that foregrounds the dynamics of life, the biophysical systems historically marginalized by the gap between the economy and the ecology of large cities[17], repositioning the landscape as a complex system, instrumental to the essential services, resources and processes that sustain contemporary urban economies.

EXPERIMENT / RESEARCH: VALPARAÍSO

Valparaíso is limited by the Andes mountain range system and by the Pacific Ocean, which means that the region has well-established natural limits, and it also contains the Coastal Mountain Range as an important part of its geomorphology.

According to the National Institute of Statistics[18], the region has an approximate area of 16,396 km2, which represents 2.17% of the total area of Chile, with 8 provinces and 38 communes and a population of 1,815,902, making it the second most populated region in Chile. This point has undergone considerable change over time due to the constant growth of urban areas in the region over the years, which has led to the expansion of the urban area considerably over time.

figure 02 — page 16

The natural system of the Valparaíso region is made up of different natural elements: mountain ranges, hills, hydrography (rivers, streams, estuaries), as well as natural areas of great importance such as La Campana National Park which, in turn, is part of the biosphere reserve present in one of the 36 biodiversity hotspot worldwide called Chilean Winter Rainfall - Valdivian Forest Ecoregions where Mediterranean Forest, Woodlands and Scrub is one of the two biomes present[19]. The aforementioned scenario highlights the natural richness of the region, comparing it considerably with the Metropolitan Region, and allows for the recognition of a series of natural elements in the interior that enable them to be integrated in order to recognise their environmental logic as a network of ecological systems.

For a better understanding of the case of Valparaíso, it would be explained in three elements of analysis:

1. Geomorphology
2. Hydrography
3. Territorial unit

17 Berlanger, P., 2009
18 INE, 2017
19 Weller, R. et al. 2017)

1. GEOMORPHOLOGY

The Region develops in a complex territory, where the fundamental units that make up the morphology of the region are restricted to two large groups: The marine coastal plains and an inland mountainous area, where the presence of the Cordillera de la Costa and the Andes stand out from the relief point of view.

This is a determining factor in the regional boundaries of Valparaíso and the Metropolitan Region, which defines areas of urban and agricultural consolidation as part of the image and character of the Region itself, as well as its biodiversity, which is preserved not only by reserves or protected areas, but also by the characteristics of the territory in terms of the preponderant diversity in the area of the Chacabuco range, a unique ecotone that contains both flora and fauna of the Region, as well as the territorial climate cross between the temperate zones and the desert zone.

If we think of conserving part of these relevant ecosystems both regionally and for the country, it will allow us to resolve the installation of settlements compatible with the existing natural environment, generating a link and crossroads between the anthropic and the natural that could be reflected both on a territorial scale, as well as on a more local scale.

figure 03 — page 17

2. HYDROGRAPHY

The inland watercourses of this region are nivo-pluvial[20], generating clear lines in the territory given by the rivers (Aconcagua to the north and Maipo to the south) that cross from east to west, this due to the water basins of nivo-pluvial origin, also generating a powerful biological corridor that occurs mainly in the Aconcagua and Maipo basins.

On the other hand, the water basins of pluvial origin are only supplied by rainwater, so the flow and constancy of the water is less frequent than those of nivo-pluvial origin. These lines are present in territorial elements, such as the streams, due to geographical faults in the territory that make the water flow in springs.

These relationships of the water holes generate different limits to the administrative ones that occur within the region and that are also transferable to the territory in terms of relief, as well as to other natural elements that are present such as geographic, anthropic, productive and urban systems.

In this way, considering hydrographic criteria provides information on how to act, granting geographical limits from the water holes, as well as in water management actions within these axes that can be considered as potential biological corridors, which is added and linked in geographical elements that could promote the improvement of new ideas on how to manage water in the territory.

figure 03 — page 17

3. TERRITORIAL UNIT

The relationship that exists at regional level of important elements such as hydrography and topography, there are others that determine a field of action for the characterisation of a biological corridor., ecological, green, etc. These elements or territorial units can be characterised as: important reserves, national parks, agricultural land, grasslands, scrublands, forests,

etc. They determine the natural factor of the whole region and which, by contrast, gives evidence of the anthropic context which makes its structure more logical as an artificial organism in the territory.

This can determine guidelines on how to develop projects in which both urban and rural settlements, road networks and other urban structures of great importance can be integrated into the natural variables of the territory, since nowadays these become the cause of the fragmentation of habitats and ecosystems present in the Region, which does not allow the continuity of biodiversity, causing their isolation. In this sense, the natural elements that contribute to biodiversity are reduced and replaced by areas of exogenous forest plantations, which not only displace native vegetation, but also contribute to the propagation of fires as they are more combustible, in the absorption of water from the subsoil and erosionl[21].

The change in land use, together with the spread of micro-dumps and clandestine dumps, reinforce territories with greater vulnerabilities and which are located to a greater extent towards the urban boundary. The expansion of the urban sprawl is perceived as a threat that impacts on the behaviour of the territories and shows a progressive increase. This factor reveals that the growth of the city has repercussions on the atomisation and fragmentation of the natural elements of the natural landscape, which in the long term promotes their extinction.

It is understood that the serious environmental problems and the loss of biodiversity, as a consequence of the urbanisation process and other human processes, position the city as the most extensive expression and propitious space for the consummation of the degradation of ecosystems, disproportionately affecting the poorest and most vulnerable sectors of society, who, subjected to unequal access to environmental goods and services, as well as to security in the face of risks, find themselves in a permanent state of marginalityl[22].

RESULTS: FROM A NATURAL PARADIGM TO A LANDSCAPE-BASED PARADIGM

The city of Valparaiso has historically made water management decisions, starting with the sanitation proposals at the end of the 18th century, where urban water bodies were channelled to the sea. This process undervalued water streams, leading to abandonment, loss of natural resources and ecosystemic services, and neglect the values of the ravines and their waters systems offered to the city[23]. The fast urbanisation has provoked at hills and mainly on its ravines a loss of value over time, determining an spreading a socio-ecological decay through the formal and informal changes in land uses, lack of regulations and technical capacities enhanced by an economic decrease in the urban economy. These factors contribute to the reduction of green areas, especially in the native vegetation, contamination of soils and water courses, and loss of ecosystem capacities. Thus, the ravines have transformed into remnants of urban sprawl and critical zones in socio-ecological terms.

According to its urban morphological configuration, it is evident that both, the historical deficit of city planning, added to growth based on environmental degradation, have contributed to the negative image of the ravines as a space difficult to urbanize and inhabit, which gathers especially fragile and insecure territorial conditions[24]. In this sense, the

21 CONAF, 1999
22 Romero, H. 2007
23 Álvarez L., 2001
24 Serrano, P. 2009

idea of the urban remnant that weighs today on these natural corridors is consolidated and, together with denying their present social and ecological value, disregards the importance of the ravines as a construction of the city image and also as an articulating means for the development of public spaces.

Scientific revolutions are episodes of non-cumulative development where an old paradigm is totally or partially substituted by a new and incompatible one[25]. In the case of Valparaiso, 4 paradigms can be highlighted in its historical process from its discovery in 1536 to a new position towards a new paradigm shift today: The natural paradigm, the hygienist paradigm, the modern-developmental paradigm and the landscape-based paradigm.

25 Kuhn T., 1970

a. The naturalist paradigm (Colonial period 1536-1817): It understands and interprets the natural conditions; these considerations made it possible to interact with the territory and its natural systems directly for the extraction of its resources. First of all, the abrupt geographical condition exposed to the north allows the adaptation of a natural harbour, exposed to the north and protected to the south; the slopes, for their part, provide retained water and the native forest of the ravines, an exchange of resources sufficient for the development of the original habitability, before the transformations of the industrial revolution.

figure 04 — page 18 

figure 05 — page 18 

b. The hygienist paradigm (Republican period 1818-1928): Built on the need to resolve the city's sanitary conditions. In Valparaíso, a "more equalitarian" city was promoted, due to the transformations of the early industrial revolution in the city. The thesis in this period insisted on the need to hide the problem by burying the water coming from the ravines and its future invisibility and gradual loss of its natural conditions and ecosystemic services offered to the city. The revolution of the hygienist paradigm generated the gradual abandonment of the ravines of Valparaíso, giving way to the modern-developmental predominance, as a national republican project after the centenary.

figure 06 — page 19 

figure 07 — page 19 

c. The modern-developmental paradigm (Modern period 1928-current): The modern-developmental development that prevailed during a large part of the 20th century (1928 onwards) is based on the progress of science and technology, which reveals the human capacity to control the destiny of the environment, domesticate it and make use of it. The territory is transformed into a medium. The modern movement that accompanied it reduced the city to the functions of living, working, spreading and circulating. Developing a value on the built environment (the urban), neglecting and ignoring the natural systems. In

Valparaíso, natural systems were forgotten, ignored, neglected and abandoned until they became ruins and manifested themselves as "risks".

figure 08 — page 20 

figure 09 — page 21 

d. The landscape-based paradigm: This approach, under construction, based on scientific evidence, supported by proof of climate change, urban growth occurring at the expense of essential areas for biodiversity, and the invisibility of natural systems required effectively address the complexities of spatial development in Valparaiso, it is essential to adopt a holistic approach that considers the natural landscape not only as a backdrop, but as the basis for social and economic progress[26]. This holistic approach requires multi-stakeholder collaboration and consideration of diverse factors, recognizing that development strategies must be socially and ecologically inclusive. The proposed methodology should encompass multiple scales, from local community initiatives to broader regional planning, ensuring that each level of intervention is aligned with the overall goal of improving resilience in these invisible areas, particularly the Valparaíso ravines[27]. Given the challenges posed by climate change and ongoing urbanization, it is crucial to create adaptation strategies that not only address immediate socioeconomic issues, but also foster long-term sustainability. Through these efforts, we can transform streams into thriving ecosystems that support both the environment and the communities that depend on them.

The challenge of climate change calls for a paradigm shift from cities as artificial landscapes, separated from nature, to green urban innovations such as nature-based solutions in their role in transitions to sustainability. Until now, transformative change in a city was considered to be driven by technological innovations[28]. As nature and urban life are deeply intertwined, transformational change can occur through socio-ecological innovations[29], thus strategies and policies need to be outlined.

The principles that today are built from the logic of sustainability and dialogue with the context and its phenomena built a new paradigm under which new systems are proposed for conscious management of water, going "from wasting to retaining, as a necessary convention to reactivate the spaces of life"[30], diverse ecosystem and ecotones and promote ecosystemic services. The landscape-based paradigm under construction is based on the recognition of the hydro-geomorphology of Valparaiso as an important condition that supports the different socio-ecological variables of the territory and the analysis of the effects of urban growth and climate change, the invisibility of natural systems and the capacity to observe in them the logic for sustainability, the restoration of systems and the resilience of the territory.

figure108 — page 22 

26 Nijhuis, S. 2022
27 Nijhuis, S. 2024
28 Haase et al., 2014
29 van der Jagt et al., 2020
30 Álvarez, L., 2001

CONCLUSIONS

In Chile, the unbridled process of expansion experienced by cities, especially those that make up metropolitan areas, has developed in a precarious territorial planning, where immediate economic retribution takes precedence and territories are modified without considering the continuity of natural systems or safeguarding the landscape particularities of each place. These dynamics have caused severe alterations in the landscape that not only contribute to growing environmental instability, diversifying risk factors and levels of degradation, but also influence the loss of ecosystem services that the natural environment provides to communities.

In Valparaíso, there has been a lack of consideration of the hydrogeomorphologicalcondition of the territory. This combined withsocio-ecological deterioration consolidated the ravines as a remnant of the urbanisation process. These places, even when congregate multiple conditions of vulnerability and segregation, are adressed only when disaster scenarios, triggered by natural or anthropic hazard such as flood, fire, or landslide,occurs.

The measures adopted in response to these problems have normally focused on the consolidation of infrastructure projects that are based on immediacy and aim to solve an isolated problem, ignoring the variables that converge in the territory, often leading to the reproduction of new adverse scenarios in the long term.

Understanding that the elements that make up the territory interact and develop in a dynamic and systemic way, the study of the landscape is considered as a new change of paradigm that integrates the socio-ecological variable and the hydrogeomorphology condition as a methodological strategy and active instrument in the search for a better projection of the city.

This new paradigm makes it possible to rescue the uniqueness and reality of the place as a potential, linking with the local ecosystem through the development of complex projects that are beneficially inserted into the urban fabric and the existing natural environment, considering the dynamics of the landscape and its constant transformation over time.

To develop from the field of action of the design and planning of a micro-basin inserted in a city like Valparaíso requires addressing the problems exposed above in a holistic and integral way. This involves enhancing the strategic role that the streams maintain for their environmental and landscape value. It also requires recognising the ecological variables in the formulation and resolution of projects with criteria of sustainability in the use and management of the natural environment as well as the cultural system.

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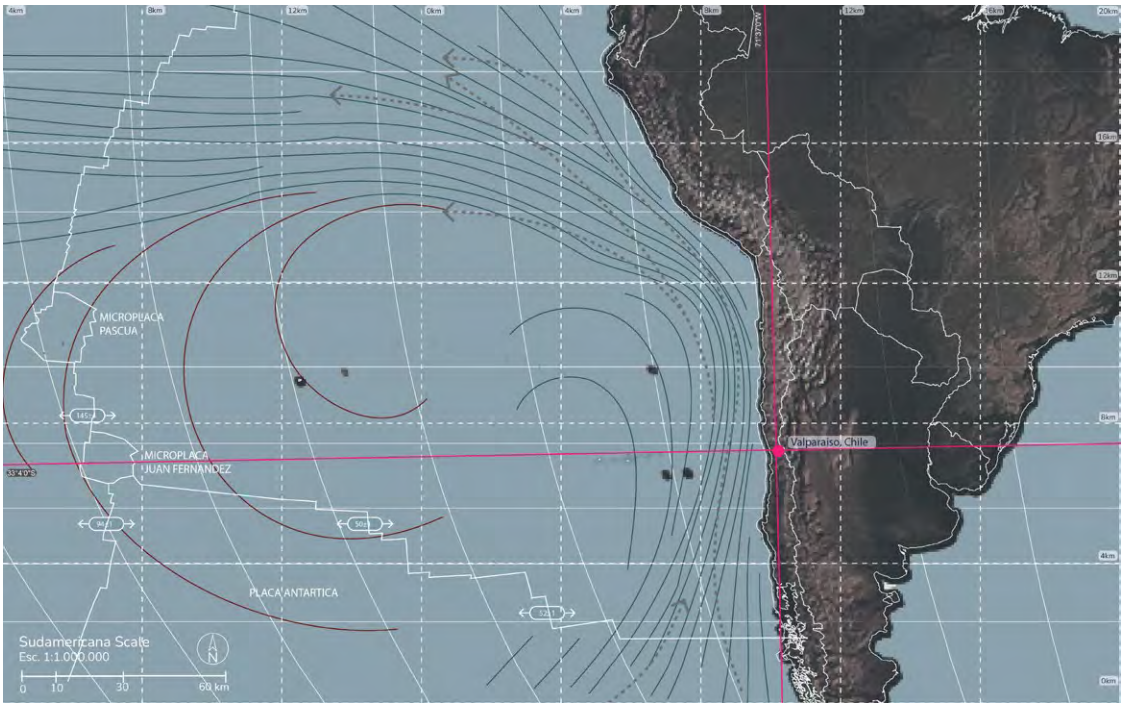

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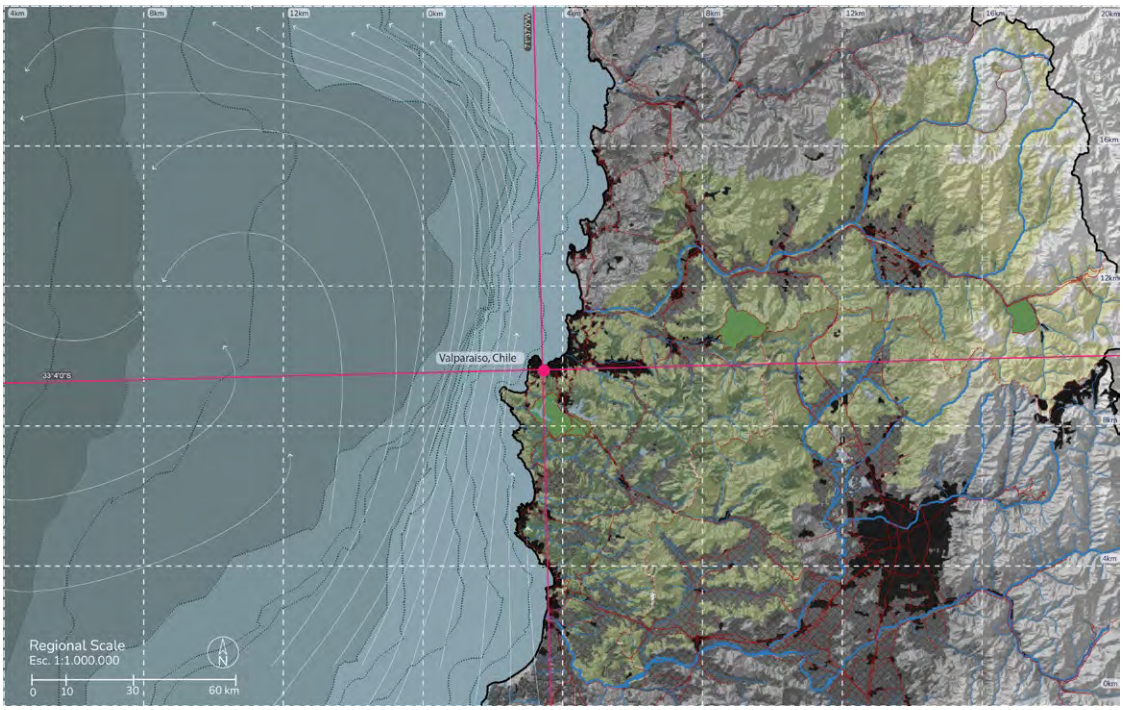
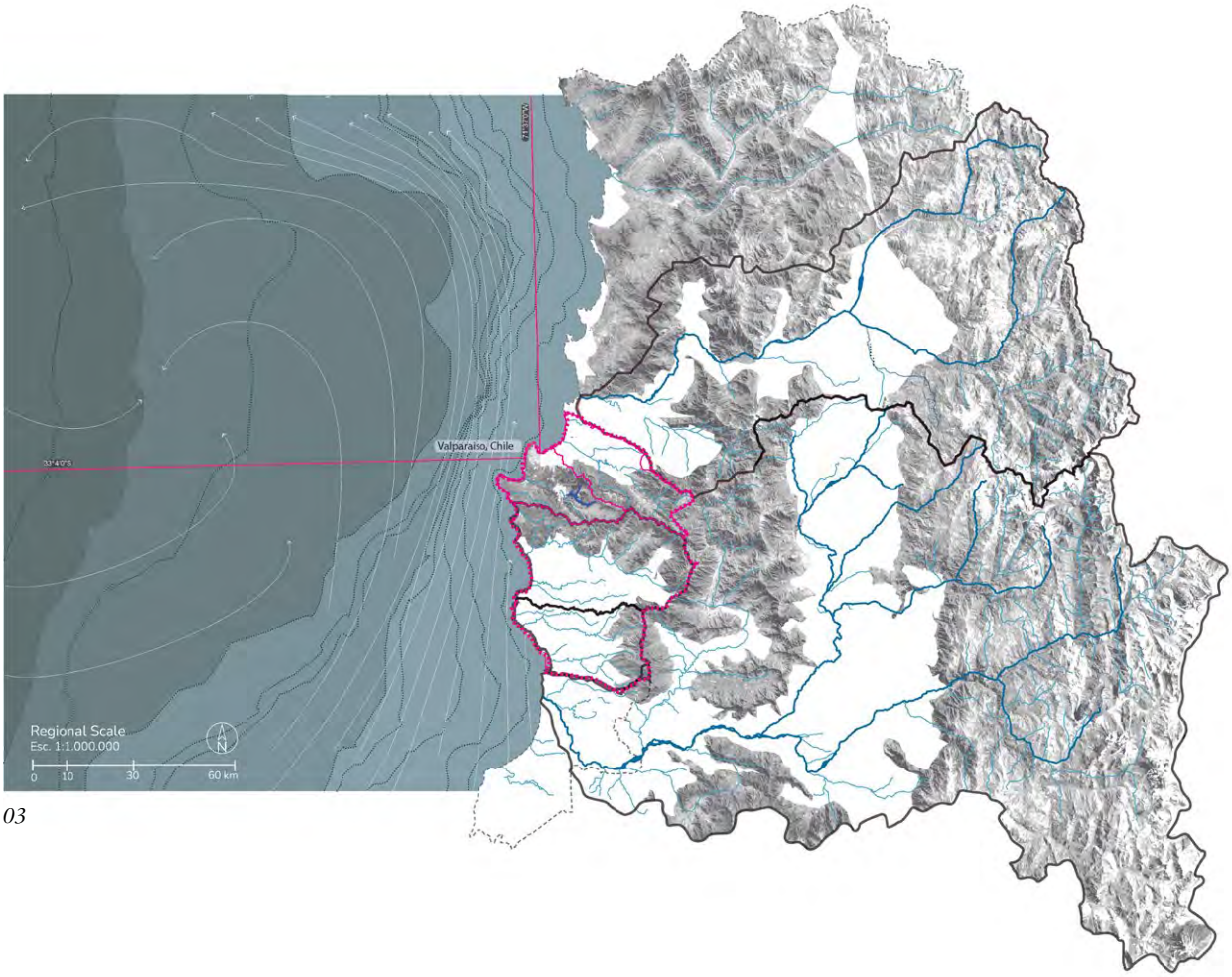


02

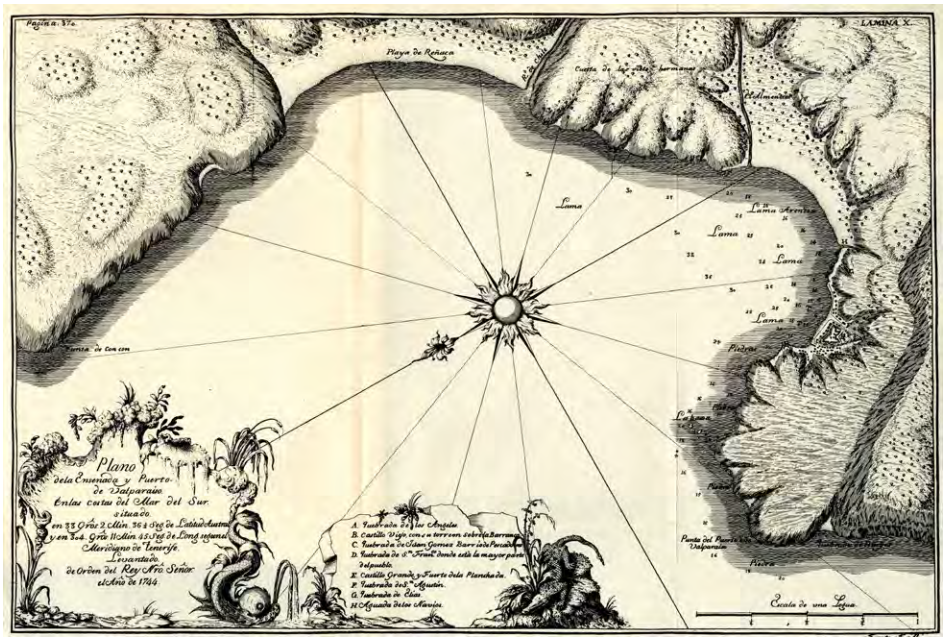
01 Sudamericana Scale, Valparaiso
Source: By the author.
Esri, USGS; IDE, Chile.

02 Regional Scale, Valparaiso
Source: By the author.
Esri, USGS; IDE, Chile.



03

03 Geomorphology structure and hydrographic watershed in Valparaiso.
Source: By the author
Esri, USGS; IDE, Chile

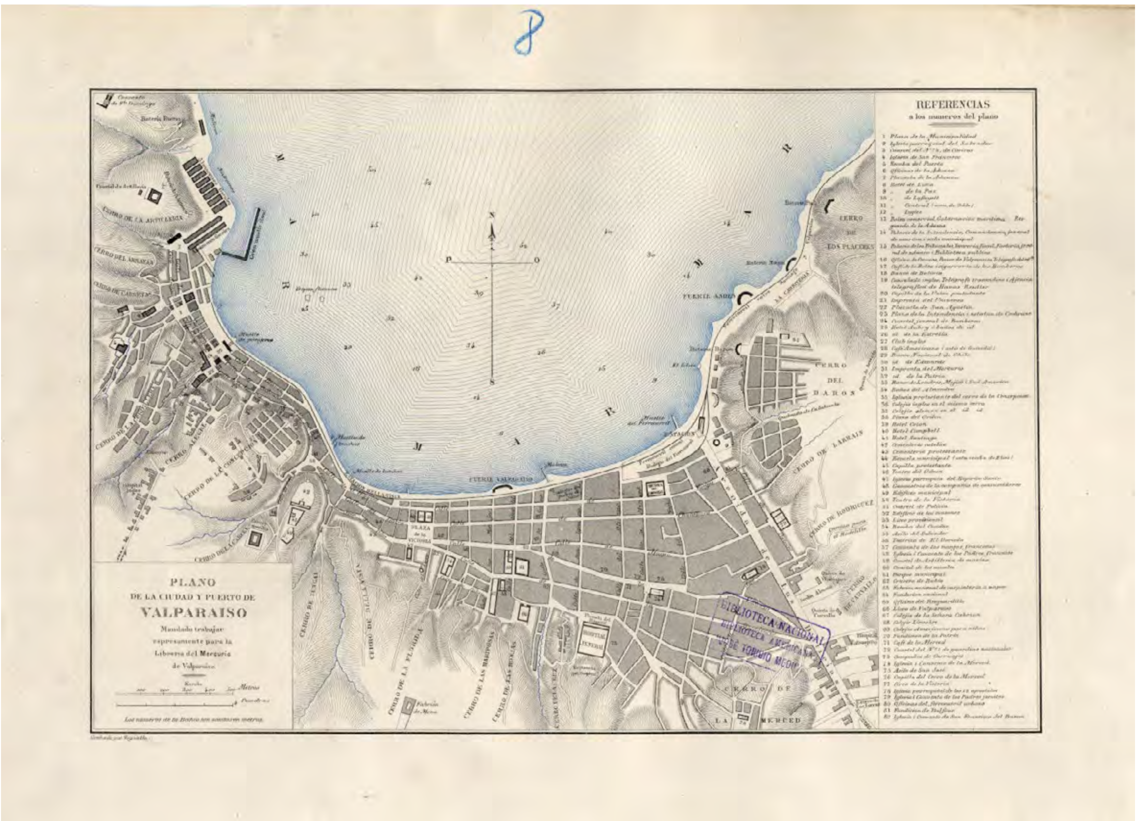


04

05

04 Plane of Valparaiso 1744
Source: Memoria Chilena
(https://www.memoriachilena.gob.cl/)

05 View from the hills of Valparaiso
Drawing by Claudio Gay
Source: Memoria Chilena
(https://www.memoriachilena.gob.cl/)

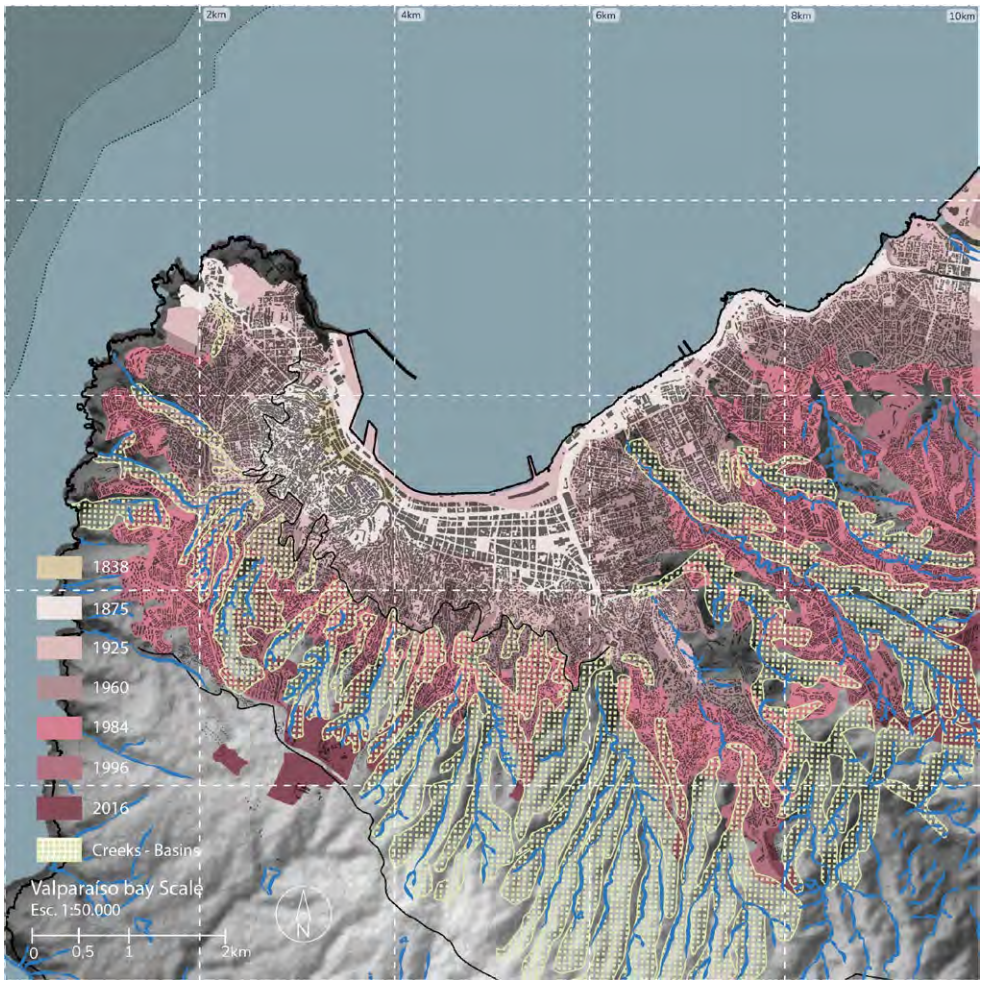


06

07

06 Plane of Valparaiso 1890
Source: Memoria Chilena
(https://www.memoriachilena.gob.cl/)

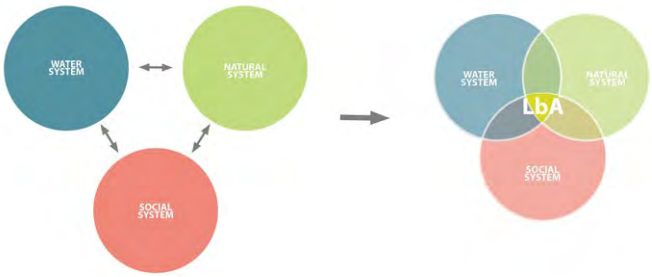
07 Las Delicias stream 1905 (above), Vaulting
of Las Delicias stream 1931 (below).
Source: Valparaiso del Recuerdo
(Instagram: @Valparaisodelrecuerdooficial)



08

08 Urban expansion from 1838 - 2016 in Valparaiso
Source: By the author
Esri, USGS; IDE, Chile.

09



10

09 Valparaiso 1960 (above) and the informal urbanisation in the hills and the forestal industries 2011 (below).
Source: Valparaiso del Recuerdo (Instagram: @Valparaisodelrecuerdooficial)

10 Transition from an understanding of the multiple systems present in a territory separately (left). Integration and systemic understanding of the elements of territory from a landscape-based approach (right). Source: By the author.

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