



**Università
di Genova**

**Ecological Regeneration
of
Parco della Nora**

Master of Architectural Composition

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Chapter 1: Introduction and Thesis Goal

1.1 Urban Climate and Ecosystem Degradation

In the current era, the world faces unprecedented environmental and climatic challenges. Global warming and climate change have endangered biodiversity and the lives of humans and animals on planet Earth. Today, the protection of the environment and ecosystems has become a vital necessity on both micro and macro scales. At the urban scale, this challenge manifests specifically in the city of Genoa through 'Urban Heat Islands' and the fragmentation of "Ecological Networks". According to the *Piano del Verde (2024)* document, the regeneration of abandoned green spaces is not merely an option, but a 'Nature-Based Solution' to increase urban resilience against climate change and restore 'Ecosystem Services' to the dense urban fabric. The "Ecological Regeneration of Parco della Nora" project seeks to respond to this urgent need by re-establishing the link between native green spaces and the urban body.

Due to its unique topography, situated between the mountains and the sea, and its dense urban fabric, the city of Genoa faces serious climatic challenges. Among these is the 'Urban Heat Island' (UHI) effect, which has led to a significant increase in temperatures in the central and industrial areas of the city. Furthermore, the expansion of hard infrastructure has resulted in the fragmentation of 'Ecological Networks', destroying the migratory paths and habitats of native species. Consequently, abandoned green spaces such as Parco della Nora possess the potential to be transformed into "Cooling Spots" and "Biological Nodes". Such a transformation aims to restore essential 'Ecosystem Services' to Genoa's densely populated neighborhoods, particularly Sampierdarena.

1.2 Research objectives

- **Urban Regeneration and Social Integration:** To regenerate the green spaces and social foundation of Parco della Nora, reintegrating it into the urban life and functional fabric of the district.
- **Preservation of Collective Memory:** To preserve the historical and cultural heritage of the site (associated with Eleonora Torre) while addressing contemporary social needs and community requirements.
- **Biodiversity Restoration:** To reconstruct and enhance local biodiversity by creating suitable artificial habitats (stepping stones) for native species.
- **Micro-climate Improvement:** To mitigate the local micro-climatic conditions through the implementation of Nature-Based Solutions (NBS) and sustainable design strategies
- **Promotion of biodiversity and ecological awareness** by incorporating educational pavilions and wildlife-friendly zones.
- **Encouragement of community engagement and stewardship**, ensuring the park becomes a space of participation, learning, and shared responsibility.

1.3 Research Questions:

- **Biophilic Integration:** How can principles of biophilic design and biodiversity restoration guide the adaptive reuse of Parco della Nora?
- In what ways can the integration of native plant species and soil layering systems support ecological resilience and the rebuilding of the local web of life?
- **local web of life :**In what ways can the integration of native plant species and soil layering systems support ecological resilience and the rebuilding of the local web of life?
- **Lightweight Infrastructure:** How can the use of **lightweight, modular structures** minimize the physical footprint on the site while maximizing ecological resilience?
- **Materiality and Perception:** How can the choice of materials, specifically **polycarbonate and scaffolding systems**, create a "transparent interface" that enhances environmental education and public awareness?
- **Urban Social Role:** What design strategies can enhance the social and ecological role of urban parks within dense neighborhoods like Sampierdarena?

- **Adaptive Methodology:** How can the integration of **transparent pavilions** and bird observation towers act as a replicable model for transforming neglected post-industrial sites into living laboratories?

1.3 Methodological Approach

The methodology of this thesis is based on a multi-layered approach combining site analysis, environmental observation, and design experimentation. The study begins with an in-depth analysis of Parco della Nora its current ecological condition, spatial configuration, and patterns of human interaction. This phase includes mapping existing vegetation, soil conditions, and habitats for native species.

The second stage focuses on adaptive reuse as a design strategy to transform the neglected park into a living ecological and educational space. This involves the use of sustainable materials such as gabions, scaffolding systems, and polycarbonate sheets, which enable lightweight and reversible construction.

To integrate biophilic and biodiversity-based principles, native plants and soil compositions will be selected and layered to recreate habitats that encourage local fauna and flora. The project also proposes the inclusion of a bird observation tower and **educational pavilions** as tools for environmental education and research.

1.4 Expected Outcomes

The expected outcome of this thesis is the ecological and social revitalization of Parco della Nora through adaptive reuse and biophilic design principles. The project aims to demonstrate how the integration of biodiversity and native species can transform an abandoned urban green space into a self-sustaining ecosystem that benefits both nature and people.

The design proposal is expected to:

- **Rebuild the native web of life** by restoring soil health, native vegetation, and wildlife habitats through integrated ecological systems.
- **Strengthen the connection between residents and their local environment** through the implementation of **educational pavilions** and participatory spaces.
- **Enhance urban biodiversity and microclimate regulation** within the dense neighborhood of Sampierdarena by utilizing nature-based solutions.
- **Create an inclusive and flexible public space** that encourages environmental awareness and community interaction through the use of **lightweight and transparent architectural interventions**.

Ultimately, the thesis seeks to serve as a model for future urban regeneration projects that combine ecological restoration with social engagement proving that nature and the city can coexist in a mutually enriching way.

Chapter 2: Environmental Context of Genoa

2.1 Urban and Ecological Condition of Genoa

Environmental and Ecological Context of Genoa: Genoa's urban morphology is a unique example of a dense coastal fabric. The city is a narrow strip of land wedged between the Ligurian Sea and the Apennine Mountains. This specific topography has dictated a fragmented and discontinuous urban growth, leading to a complex relationship between the built environment and the natural landscape.

Industrial Legacy and Urban Density: The industrial expansion of the city during the 20th century significantly altered Genoa's ecological balance. In districts like **Sampierdarena**, the prioritization of maritime activities and industrial infrastructure led to the replacement of natural soil with impermeable concrete, resulting in a massive loss of natural land. This has created a "grey barrier" between the sea and the hills, which traps heat and obstructs the natural flow of ecosystem services. Consequently, this urban area faces a severe shortage of high-quality green spaces, and the remaining greenery has been reduced to small, isolated patches that cannot sustain a living and dynamic network.

Paradigm Shift: From Gray to Green In recent years, the Municipality of Genoa has recognized that the traditional model of development no longer meets the modern needs of the city and its ecosystem. The city's ecological condition is being re-evaluated through the "**Piano del Verde**" (Green Plan). This urban planning document introduces the city not merely as a collection of buildings, but as a "living ecosystem." The plan emphasizes environmental restoration as a key strategy to combat climate change risks, which are intensified by Genoa's unique geography.

The Role of Neglected Spaces Within this urban framework, neglected green spaces such as **Parco della Nora** are more than just forgotten areas. By revitalizing them as "ecological nodes", it becomes possible to bridge the gap between fragmented green zones, contributing significantly to the restoration of ecosystems and the strengthening of biodiversity.

The fundamental factors that determine the climate of the city of Genoa are its immediate and extensive contact with an open and deep sea, its southern exposure, and the presence of a mountain chain that protects it from northern winds.

As a result, the city enjoys a generally favorable climate for human activities: mild temperatures with limited variations, abundant rainfall, high solar radiation, and lively ventilation. However, these characteristics primarily apply to the coastal area and the central amphitheater of the city. In contrast, the inner peripheral zones, where the urban fabric extends inland along the valley axes towards the Apennines may differ significantly due to the rugged morphology of the territory and the increasing distance from the natural thermal regulator represented by the sea. The outcome is a climatologically diverse territory where the relative homogeneity of the coastal line contrasts with true internal "climatic islands", generated by specific exposures or elevations of the slopes.

2.2 Climatic Classification and Transitional Zones

According to the Köppen classification system (1936), Genoa's coastal strip, specifically the western part including the Sampierdarena district, falls within the **Csa zone**. This represents a Mediterranean subtropical climate characterized by dry summers, where the driest month records less than 30 mm of rainfall and average temperatures in the hottest month exceed +22 °C. However, this Mediterranean character is geographically narrow; moving inland or eastward, the territory quickly transitions into the **Cfsa zone**, where summer rainfall increases, and eventually into the **Cfsb zone** at altitudes above 500 meters, where summer temperatures remain below +22 °C.

2.3 Climate and Environmental Characteristics

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Meteorological Dynamics: Wind and Thermal Correlation A distinctive feature of Genoa's climate is the specific correlation between wind and temperature. Unlike inland plains where the lowest temperatures typically occur on clear, windless nights, Genoa experiences its thermal minimums during days characterized by strong northern winds. Furthermore, wind and precipitation are deeply intertwined; steady or calm rainfall is rare in this region. Especially during the winter months, the most significant precipitation events are almost always accompanied by high-velocity winds.

Shift Toward an Extreme Climatic Regime: Long-term historical climatic data indicates a significant evolution in precipitation patterns. While the total annual rainfall has remained relatively stable, the number of rainy days has decreased substantially over the last decade. This trend highlights a marked increase in rainfall intensity, signaling a shift toward a more extreme and unpredictable climatic regime.

Hazards and Ecological Risks (Based on Comune di Genoa Strategic Documents)

According to the **Piano del Verde** and urban risk maps of the Municipality of Genoa, the climatic characteristics mentioned above lead to the following vulnerabilities:

1. **Increased Flash Flood Risk:** The shift towards high-intensity rainfall (extreme events) poses a severe threat to districts like **Sampierdarena**. Due to the high percentage of impermeable surfaces (the "Grey Barrier"), the soil cannot absorb sudden water volumes, leading to rapid urban flooding.
2. **Structural and Thermal Stress:** The "Wind-Temperature" correlation means that structures and vegetation must withstand high mechanical stress from northern winds while dealing with sudden thermal drops. This justifies the need for **protected educational pavilions** and wind-resistant plant species.
3. **Erosion and Soil Degradation:** Intense rainfall on neglected urban soils leads to rapid erosion and nutrient washout. This environmental hazard necessitates the **soil layering and gabion systems** proposed in the project to stabilize the land and restore its "sponge" capacity.

Microclimatic Imbalance: The reduction in rainy days combined with intense heat during dry periods (Csa zone) exacerbates the **Urban Heat Island** effect. Without a dense and connected green network, the local biodiversity—including sensitive species mentioned in the site analysis faces habitat fragmentation.

2.4 Climatic Factors

For an accurate characterization of the Genoese climate, the individual factors are described below, analyzing their average values (since "climate" is essentially a representation of the average state of weather in a given location) and highlighting peak values when considered significant for the purposes of this study. For further details, reference can be made to the attached tables and graphs. Unless otherwise specified, the climatic data have been extrapolated from observations recorded over the thirty-year period 1971–2000. Regarding the validity and reliability of the data, the same considerations previously made about the homogeneity of Genoa's climate apply; therefore, these observations can be regarded as representative within acceptable deviations of the entire urban area.

2.5 Thermal Profile and Temperature Extremes

From a thermal perspective, Genoa fully corresponds to the Mediterranean climate classification. Data analysis shows that January is the coldest month, with an average temperature of 8.8 °C (ranging from a minimum of 6.4 °C to a maximum of 11.5 °C). Conversely, August, with an average temperature of 24.3 °C and an average peak of 27.2 °C, is the warmest month. An important and favorable feature of the temperature is its low thermal range, both daily and annually. The daily fluctuation between minimum and maximum temperatures is approximately 5 °C, while the seasonal difference between the winter and summer averages remains around 16 °C, thanks to the moderating effect of the sea (PIANO DEL VERDE DI GENOVA, Piano Urbanistico Comunale).

Extreme Temperature Events

While the average annual minimum typically reaches –2°C and sub-zero days are rare (averaging only 3 days per year), historical records show significant deviations. Extreme events, such as the absolute minimum of –8.0°C in 1929 and –6.0°C during the 1985 cold wave, demonstrate the potential for severe frost. Regarding heatwaves, while the typical annual maximum is around 32°C, the absolute record of 37.0°C (recorded in 1952) highlights the growing concern over peak summer temperatures (PIANO DEL VERDE DI GENOVA, Piano Urbanistico Comunale).

Hazards and Vulnerabilities (Based on Comune di Genoa - Climate Adaptation Plans) Urban Heat Island (UHI) Intensification:

In the dense industrial context of Sampierdarena, the “Grey Barrier” (concrete/asphalt) prevents the low thermal range from providing relief. The heat is stored in the buildings, making the perceived temperature much higher than the recorded 24.3°C (PIANO DEL VERDE DI GENOVA, Piano Urbanistico Comunale).

Thermal Stress on Native Species: While the average temperatures are mild, the “extreme peaks” (both -8 °C and +37 °C) pose a real threat to biodiversity. The native species of the area and the vegetation selected for the project must be resilient to temperature fluctuations. This justifies the soil layering strategy, which acts as a thermal buffer for the plant roots (PIANO DEL VERDE DI GENOVA, Piano Urbanistico Comunale).

2.6 Precipitation Patterns and Extreme Pluviometric Events: Rainfall Distribution and Intensity

Rainfall is perhaps the most defining element of Genoa’s climatic identity. While the average annual total of 1,296 mm and the monthly distribution align with Mediterranean norms—characterized by an autumn/winter maximum and a summer minimum, the city is uniquely defined by its extraordinary rainfall intensity. October is the wettest month (222 mm), while July is the driest (27 mm), with an annual average of 80 rainy days.

Record-Breaking Storm Events

Genoa holds some of the most significant pluviometric records in Europe. The city’s history is marked by extreme events where localized flooding transitions into major urban disasters when intense downpours persist. Notable examples from historical series include:

- **October 1970:** 948 mm recorded in 24 hours at the Bolzaneto station (the highest 24-hour total ever recorded in a European city).
- **October 1977:** An hourly intensity of 123 mm/hour.
- **October 2010:** 396 mm in just 6 hours recorded at Monte Gazzo.

Hazards and Hydrological Vulnerabilities (Based on Comune di Genoa - Piano di Protezione Civile)

According to the "**Piano del Verde**" and the **Hydrological Risk Maps** of the Municipality of Genoa, these rainfall patterns create a high-vulnerability scenario for the Sampierdarena district:

1. **Flash Flood Hazard:** The combination of extreme intensity (e.g., 396 mm in 6 hours) and the high "soil sealing" (impermeable surfaces) of the industrial context means that the urban drainage system is frequently overwhelmed. This necessitates the creation of "**Sponge City**" elements within Parco della Nora.
2. **Soil Erosion and Slope Instability:** Intense rain events cause rapid surface runoff that strips neglected soils of nutrients and stability. This risk justifies the project's proposal for **gabion retaining structures and specific soil layering**, designed to slow down water velocity and encourage infiltration.
3. **Hydro-Ecological Stress:** Sudden floods followed by long dry periods (like the 3-day rainy average in July) stress the local biodiversity. The native species and the selected plant species require a design that can manage both "too much" and "too little" water through sustainable irrigation and retention basins.
4. **Pressure on Infrastructure:** The "extreme climatic regime" mentioned in the municipal documents highlights that historical drainage infrastructure is no longer sufficient. Projects like Parco della Nora are seen as **Nature-Based Solutions (NBS)** that provide essential ecosystem services by reducing the peak flow of rainwater into the city's sewers

2.7 Hail and Snow

Although these phenomena are not particularly significant for the city's climate, they deserve a brief mention due to their impact on human activities. Regarding hail, there are insufficient data to provide a statistically meaningful study. Generally, about four hail events occur per year, and they can happen in any season, with a slight prevalence in summer. The most recent notable hailstorm occurred in March 2000, with local hail accumulations reaching up to half a meter.

As for snow, its occurrence is highly variable, with an average of three events per year, and significant ground accumulation occurs in at least one out of three events. Due to interactions between atmospheric currents and Genoa's particular topography (a subject beyond the scope of this work), snowfalls in Genoa can sometimes be considerable for an Italian coastal city, reaching 30–40 cm, as on March 3, 2005. Snow events are almost always accompanied by strong northern winds, creating a characteristic blizzard effect. The rapid rise in temperature that generally follows snowfall typically causes immediate melting of the snow cover, so that in rare cases snow remains on the ground for more than two days.

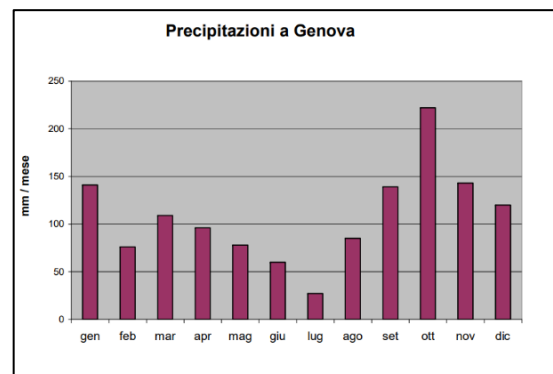


Fig. 1: Photo by comune.genova.it

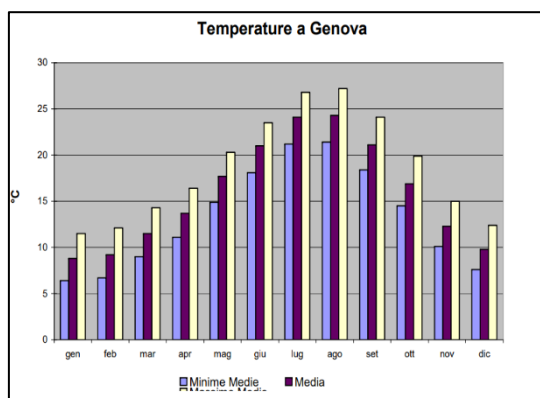


Fig. 2: Photo by comune.genova.it

2.8 Relative Humidity

A peculiar characteristic of relative humidity in Genoa is its annual trend. Contrary to what occurs in other Mediterranean climate zones of the Italian peninsula and even more evidently in the Po Valley's sub continental climate zone the least humid months in Genoa are in winter. The least humid month is January (62%), followed by February and December, with average values of 64%. This phenomenon, which is even more pronounced along the Riviera di Ponente, is related to Genoa's topography. The most humid month is typically June (72%), compared to an annual average of 67%. Moderate muggy conditions are usually reached during July and August, due to the combined effect of relative humidity—69% in July and 68% in August—and mean temperatures of 24.1°C and 24.3°C, respectively.

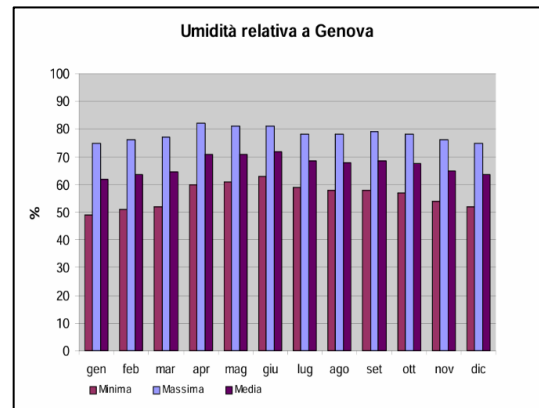


Fig. 3: Photo by comune.genova.it

2.9 Wind

With an average annual wind speed of 2.5 m/s, Genoa can be considered a well-ventilated city, with beneficial effects on air pollution. During the winter months (the windiest with averages of 2.7 m/s), winds are associated with the passage of disturbances and atmospheric depressions (in Genoa rain often falls “diagonally”). In the summer months, sea and land breezes maintain air movement. Consequently, the dominant wind directions in the winter half-year are northeast and north (winds associated with cyclones in the Gulf of Genoa), while in summer, the main directions are southwest and northeast (sea and land breezes). Analysis of windy days, defined as days with an average wind speed above 3.3 m/s shows a maximum occurrence in January and December (5 windy days, compared to an average of 2). Regarding absolute maximums, although there are no statistically significant observations, it can be stated that wind speeds can exceed 25 m/s, albeit as short-duration gusts, occurring on average once per year.

In Sampierdarena, the wind regime, primarily characterized by Tramontana (north) and Scirocco (south-east), does not constitute a primary hazard but significantly influences microclimate, plant stability, and outdoor thermal comfort. The design therefore integrates vegetative wind mitigation strategies and spatial orientation adjustments.

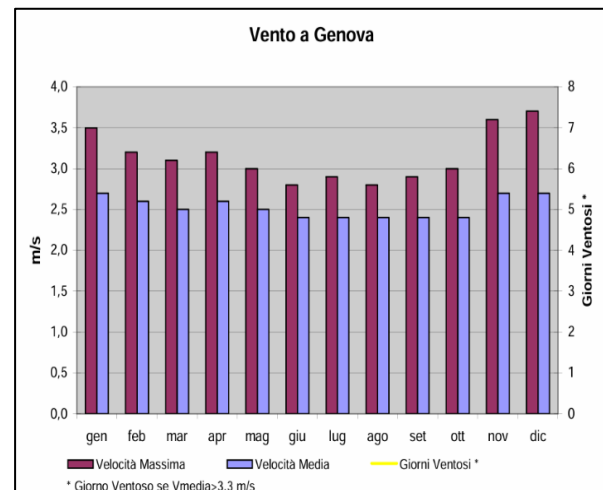


Fig. 5: Photo by comune.genova.it

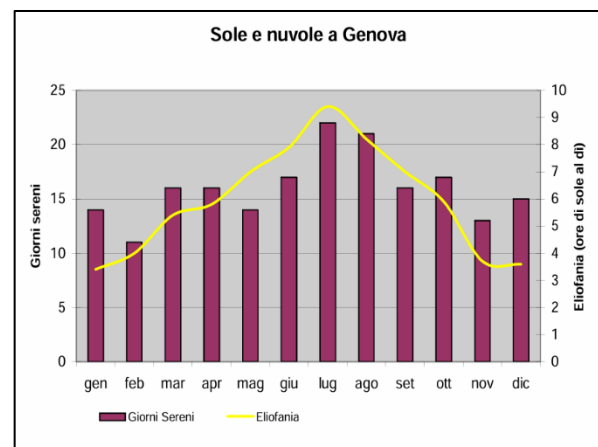


Fig. 4: Photo by comune.genova.it

2.10 Solar Radiation and Sky Conditions

Solar Exposure and Heliophany

Genoa is characterized by significant solar potential, with an annual average daily radiation of 13.8 MJ/m². The monthly solar path dictates a minimum radiation of 5.4 MJ/m² in December and a peak of 22.9 MJ/m² during June and July. In terms of sunshine duration (heliophany), the city averages 5.9 hours per day annually, ranging from a minimum of 3.4 hours in January to a maximum of 9.4 hours in July.

Cloud Cover and Atmospheric Clarity

The city enjoys a high frequency of clear skies, with an average of 192 clear days per year. The atmospheric conditions follow a typical Mediterranean pattern: July and August represent the periods of maximum clarity (3/10 average cloud cover), whereas January, February, and November are the most overcast months (6/10 cloud cover). The overall annual average cloud cover stands at 5/10.

2.11 Urban and Policy Framework:

The Role of the PUC in the Sustainable Redevelopment of *Parco della Nora*

The *Piano Urbanistico Comunale (PUC)* of Genoa represents the main urban planning instrument of the municipality, defining the city's spatial, environmental, and socio-economic strategies for the coming decades. Developed within the framework of regional and European sustainability goals, the PUC establishes a long-term vision for Genoa as a compact resilient and ecologically balanced Mediterranean city. Its core objectives include the reduction of land consumption, the revitalization of abandoned urban areas, the promotion of sustainable mobility, and the enhancement of the city's green and ecological infrastructure.

Within this framework, the district of Sampierdarena is identified as a strategic area for urban regeneration and environmental improvement. Historically characterized by industrial uses and dense residential patterns, the area is now the focus of policies aimed at reintroducing nature, increasing accessibility, and improving environmental quality. The Parco Verde di Nora project aligns directly with these objectives by transforming an underused green space into an ecologically vibrant and socially inclusive public park.

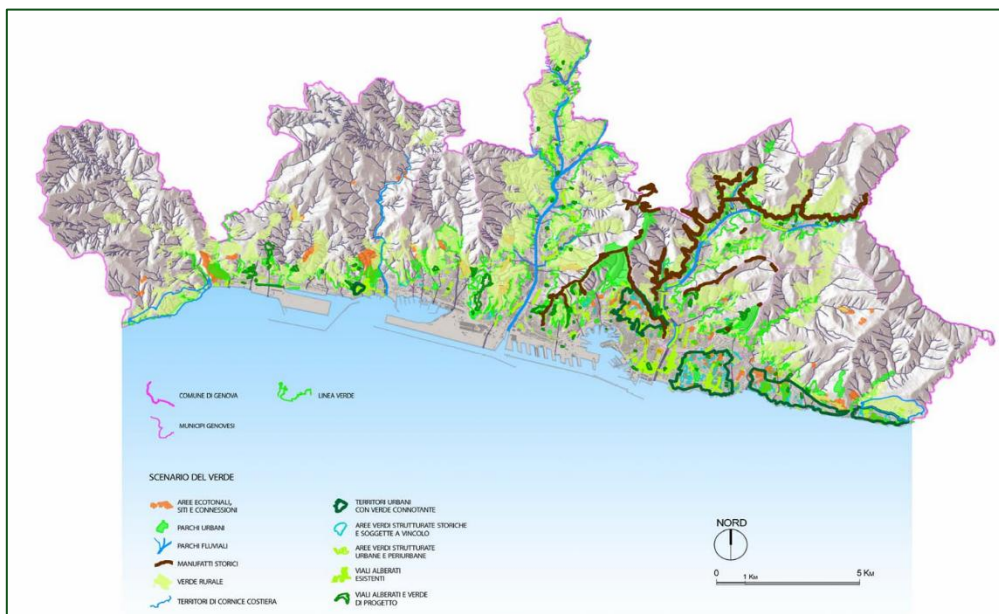


Fig. 6: Photo by comune.genova.it

The PUC promotes an integrated approach to urban transformation based on three interrelated dimensions: environmental quality, socio-economic development, and cultural identity. It recognizes the importance of the “green and blue lines”, the continuous system of green corridors and coastal connections, as fundamental elements for rebalancing the relationship between the built environment and the natural landscape. The redevelopment of Parco Verde di Nora contributes to this systemic vision by enhancing local biodiversity, restoring ecological continuity, and creating new opportunities for environmental education and community engagement. Furthermore, the project embodies the PUC’s commitment to biophilic and climate-responsive design. By prioritizing native vegetation, ecological connectivity, and user well-being, the park becomes a prototype of nature-based urban regeneration. It supports the broader municipal strategy to mitigate the impacts of climate change while improving the city’s microclimatic and social conditions. In summary, the sustainable reconstruction of Parco Verde di Nora reflects the implementation of the PUC’s strategic principles at a local scale. It translates Genoa’s urban planning vision into a tangible example of ecological and human-centered design a green infrastructure node that strengthens both the environmental resilience and the biophilic identity of Sampierdarena.

2.12 Local Urban Context:

Sampierdarena district (particularly the Campasso neighborhood)

The selection of the Parco Della Nora site within the Campasso neighborhood is deeply consistent with Genoa’s urban and environmental planning strategies defined by the *Piano Urbanistico Comunale* (PUC). Campasso, located in the northern sector of Sampierdarena, represents one of the most critical areas of transformation identified by the municipality. Historically shaped by industrial activities and infrastructural barriers, the area suffers from high spatial fragmentation, limited ecological permeability, and a lack of accessible green spaces. These conditions make it a priority zone for ecological and social regeneration, aligning perfectly with the PUC’s objectives for sustainable redevelopment and improved environmental quality. From a design perspective, the site provides a unique opportunity to reconnect the urban fabric of Campasso with the city’s broader “green and blue infrastructure”. Situated between the *Linea Verde* (the ecological belt along the hills) and the *Linea Blu* (the coastal and hydrographic system), the park becomes a strategic ecological hinge, a node where natural systems can be reinforced and human-nature interactions reactivated.

The proposed intervention applies biophilic design principles to restore the environmental and psychological balance of the area. By introducing native vegetation, shaded pathways, sensory planting, and biodiversity-supportive habitats, the park functions both as a local refuge and as an ecological corridor that contributes to Genoa’s wider resilience strategy. Moreover, the design promotes social inclusion and wellbeing, offering spaces that encourage interaction, contemplation, and environmental education. Ultimately, the choice of Campasso and Parco Verde di Nora is not arbitrary but grounded in a clear ecological and policy-based rationale. It translates the PUC’s vision of “urban regeneration through nature” into a tangible design framework, one that restores ecological continuity, mitigates the

Legenda – Integrazione dei livelli PUC e 3
– Area di Campasso e Parco Verde di Nora

- Urban or peri-urban public green spaces
Aree verdi pubbliche urbane e periurbane
- Areas of ecological or environmental requalification
Ambiti di riqualificazione ambientale / Reti ecologiche urbane
- Coastal, fluvial or water-related systems
Linea blu / Sistema idrografico e costiero
- Main ecological corridor / Green belt connection
Linea verde / Corridoio ecologico principale
- Built-up zones with urban transformation potential
Distretti di trasformazione urbana (DTU)
- Ongoing or planned redevelopment interventions
Aree di riqualificazione in corso o previste
- Mixed-use or transition zones
Zone miste o di transizione
- Infrastructure corridors
Corridoi infrastrutturali principali
- Industrial or logistic zones under reorganization
Aree produttive o logistiche in riorganizzazione
- Direction of ecological fabric
Tessuto urbano consolidato



Fig. 7: livelli PUC 2 e 3 – Area di Campasso e Parco Verde di Nora (photo: comune di genova)

impacts of climate change, and redefines the district as a living example of sustainable and biophilic urbanism in contemporary Genoa.

2.13 Geological Context Analysis

The districts of Sampierdarena and Campasso, located in the lower basin of the Val Polcevera, lie within the transitional zone between the Alpine and Apennine geological systems. The subsoil in this area mainly consists of turbiditic, marly, and argillitic formations (Formazione di Ronco and Montanesi), deposited during the Cretaceous period. These layers show low to medium permeability and, where they meet the overlying calcareous units, they generate localized surface humidity and potential slope instability.

Such geological conditions have direct implications for a biophilic approach. The marly and clayey soils retain moisture efficiently, offering suitable conditions for native Mediterranean plant species adapted to dense and humid substrates. Meanwhile, the presence of steep slopes and possible landslide zones suggests that the design strategy should follow the natural morphology, integrating green corridors, permeable surfaces, and bioswale systems to guide rainwater naturally across the site.

At a conceptual level, understanding the geological framework supports the idea of “designing with the land”. Using local stone materials (marly or calcareous), responding to natural drainage patterns, and aligning built structures with geological formations help create a spatial identity rooted in the place, a key principle of biophilic architecture.

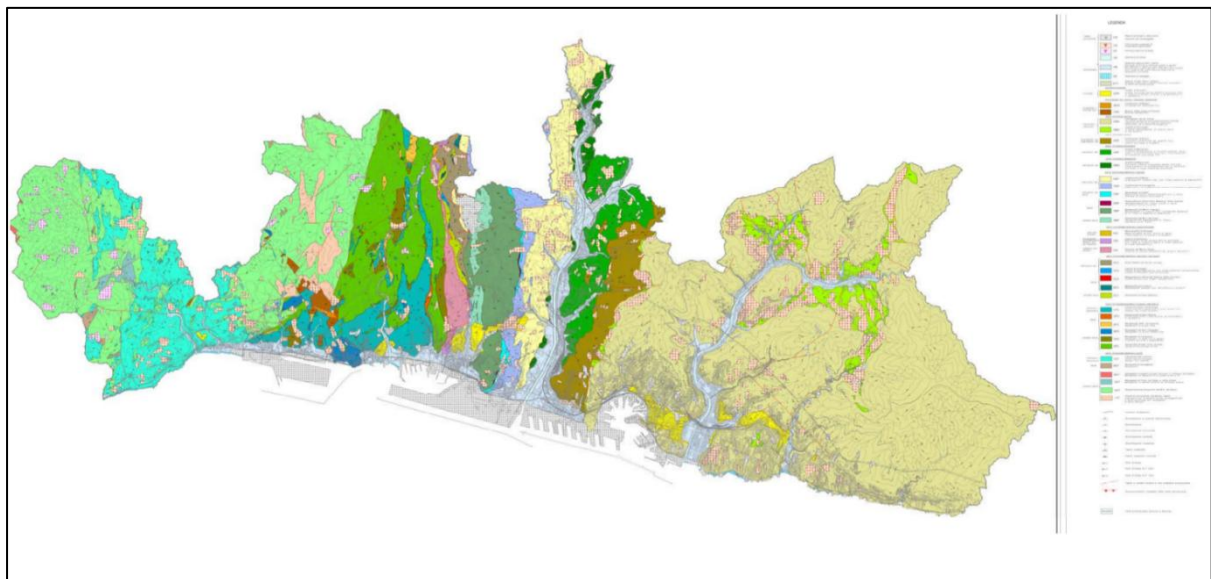


Fig. 8: Carta geologica

2.14 Biodiversity Challenges

Fragmentation of the Ligurian Coastal Ecosystem

According to the **Quaderni Habitat (QH6)** series, the Liguria region historically possesses one of the richest biodiversity reservoirs in the Mediterranean basin. However, scientific records indicate that modern anthropogenic interventions, unlike traditional land-use patterns of the past, have led to severe **habitat fragmentation**. In the coastal stretch of Genoa, particularly within the Sampierdarena district, massive port infrastructures, railways, and highways have created a physical barrier that severs the connection between the native *Macchia Mediterranea* (Mediterranean maquis) and the urban fabric. The **QH6 (Aspects of Conservation)** document emphasizes that when the width of coastal biological strips is reduced below a certain threshold due to industrial and infrastructural development, the ecosystem's self-purification capacity and species survival rates drop significantly. In Sampierdarena,

this phenomenon has resulted in “Ecological Islands”, isolated green patches where native species are trapped without connectivity to the inland mountain ridges. (Reference: Minelli, A. (Ed.) (2002). *La Macchia Mediterranea. Quaderni Habitat 6*).

Urban Biodiversity and Goal 15 (Agenda 2030)

Based on the **Agenda 2030** strategic document developed by the Municipality of Genoa (Comune di Genova), the city is committed to the implementation of **Goal 15: Life on Land**. The report explicitly states that approximately half of the species in the region are in an “unfavorable” conservation status. In the context of Sampierdarena, the primary challenge is the transition from “ornamental greenery” to “functional greenery”. According to the local strategy, the municipality is mandated to transform abandoned “brownfields” into urban lungs.

2.15 Nature-Based Solutions (NBS) as a Recovery Tool

The **National Strategy for Urban Greenery** (*Strategia Nazionale del Verde Urbano*) advocates for a paradigm shift from “square meters of grass” to “functional ecosystems”. It prioritizes the reduction of impermeable surfaces (de-paving) and their replacement with resilient urban forests. In Sampierdarena, a district under intense industrial and acoustic pressure, design interventions must be rooted in **Nature-Based Solutions (NBS)**. This project, inspired by the national strategy, utilizes **gabion systems** and specific **soil layering** to restore essential “Ecosystem Services”. These services include carbon sequestration, atmospheric particulate filtration, and the management of storm-water runoff, a critical issue given Genoa’s extreme rainfall patterns. The objective is to evolve the site from a derelict gap into a “Green Infrastructure” (*Infrastruttura Verde*) that provides tangible environmental and social benefits. (Reference: Ministero dell’Ambiente (2018). *Strategia Nazionale del Verde Urbano*).

References:

1. **Comune di Genova (2025)**. *Agenda 2030 - Biodiversità*. CEA - Centro di Educazione Ambientale.
2. **Ministero dell’Ambiente (2018)**. *Strategia Nazionale del Verde Urbano: Foreste urbane resilienti*. Comitato per lo Sviluppo del Verde Pubblico.
3. **Minelli, A. (Ed.) (2002)**. *La Macchia Mediterranea: Formazioni sempreverdi costiere*. Quaderni Habitat (QH6), Ministero dell’Ambiente / Museo Friulano di Storia Naturale.
4. **Comune di Genova**. *Strategia Locale per lo Sviluppo Sostenibile: Goal 15*.

Comprehensive Biodiversity Analysis and Ecosystem Dynamics in Genoa

2.16 Floral Structure and Native Flora: Refuges and Food Sources (Ref: QH6 & Agenda 2030)

The ecological restoration of the Genova follows the stratified model of the **Macchia Mediterranea**, which provides both the visual identity and the primary food web of the park:

- **The Canopy Layer (Structural Backbone):** The **Holm Oak (*Quercus ilex*)** acts as the primary habitat for large raptors and provides essential shade for the lower vegetation layers.
- **Fruit-bearing Shrubs (Nutritional Stations):** Species such as **Strawberry Tree (*Arbutus unedo*)** and **Mastic Tree (*Pistacia lentiscus*)** produce fruits that are vital for the survival of birds and small mammals during the critical autumn and winter months.
- **Pollinators and Aromatic Layer (Genoa Goal 15):** In alignment with the **Agenda 2030 of Genoa**, the planting of **Lavender, Rosemary, and Rockrose (*Cistus*)** is essential for the survival of **wild bees and butterflies** (e.g. *Papilio machaon*). These insects are recognized as key bio-indicators of urban health in Genoa's local strategy.
- **Coastal Specialists:** The **Mediterranean Dwarf Palm (*Chamaerops humilis*)**, native to Ligurian cliffs, provides a unique micro-habitat and shelter for specialized insects and small

Mammals: Coexistence and Management of Invasive Species (Ref: ISPRA QCN)

The management of mammals in the urban-industrial fringe of Genoa faces contrasting challenges:

- **Endangered Native Species (Red Squirrel):** The native **Red Squirrel (*Sciurus vulgaris*)** is under severe pressure from the invasive **Grey Squirrel**. The project supports the Red Squirrel by planting specific trees like **Hazelnut (*Corylus avellana*)** and Oaks, providing dedicated food sources to increase its competitive resilience (Ref: QCN No. 2).
- **Urban Conflicts (Wild Boar):** According to **ISPRA QCN No. 34**, wild boars in Genoa frequently damage urban green spaces due to the lack of natural predators. The park design utilizes **elevated gabion systems** and biological barriers to protect sensitive planting zones from being uprooted.
- **Nocturnal Guardians (Bats):** As highlighted in **Agenda 2030**, bats (*Chiropteri*) play a crucial role in biological pest control. The inclusion of **Bat-boxes** in the "Observation Tower" facilitates the colonization of these mammals, providing a natural solution to mosquito population control.

Avifauna: Protection Amidst Industrial Transformation

- **The Eurasian Eagle-Owl (*Bubo bubo*):** This apex predator utilizes abandoned industrial silos as "synthetic cliffs." By preying on rodents and invasive birds, it maintains the ecological balance of the Sampierdarena district.
- **Vulnerable Species (Hoopoe and Scops Owl):** These species, noted in the municipal report, rely on tree cavities and old building crevices. The project integrates artificial nesting sites within the pavilions to provide secure breeding grounds.
- **The Invasive Parrot Threat:** The **Rose-ringed Parakeet**, abundant in coastal Genoa, aggressively outcompetes native birds for nesting sites.

Micro-Fauna and Reptiles: Natural Pest Control

- **Lizards and Geckos:** The Municipality of Genoa emphasizes the protection of reptiles that inhabit wall crevices. The project's **stone gabion systems** replace the impermeable concrete walls of the port, providing a perfect micro-habitat for **Wall Lizards (*Podarcis*)**, which naturally control fly and mosquito populations.

- **Bio-control of Mosquitoes (*Zanzare*):** Instead of chemical treatments, the project manages mosquito populations through bat attraction, ensuring surface water circulation, and planting repellent species like Rosemary and Lavender.

2.17 Ecological Connectivity and Educational Strategic Role (Ref: Agenda 2030)

The **agenda 2030 Genoa** report states that 50% of local species are in an unfavorable state. Parco della Nora responds to this crisis through two strategic roles:

- The Green Bridge:

Breaking the industrial barrier of the port and reconnecting the Ligurian hills to the coastline, allowing for the free movement of fauna.

- Environmental Education (Educazione Ambientale):

Following the Municipality's recommendations, the pavilions serve as learning stations. They transform the site into a hub for citizens to engage with **Biophilic design** and understand the importance of protecting Genoa's unique biodiversity.

Chapter 3: Theoretical Framework

3.1 Biophilia, Urban Nature, and the Resilient City

With the growing awareness of human dependence on nature, a concept called biophilia emerged and gradually entered the fields of architecture and urban planning. Biophilia, literally meaning the love of nature and life, as well as life-like processes, is a term first used by Wilson in 1984. This concept challenges the human-centered perspective of cities by arguing that psychological well-being, health, and social cohesion are deeply connected to regular contact with nature. Timothy Beatley's book *Biophilic Urbanism and Planning* reframes this biological and emotional connection as an essential urban quality rather than a luxury, emphasizing that modern cities should be reimagined as living systems capable of nurturing the human-nature bond.



Fig. 9: The first example of a 'Vertical Forest' (il Bosco Verticale) was inaugurated in October 2014 in Milan in the Porta Nuova Isola area, as part of a wider renovation project led by Hines Italia. Photo by: Paolo Rosselli

3.1.1 The Concept of Biophilia and Human – Nature Connection

The biophilic theory posits that humans have evolved in close connection with nature and the natural world. Therefore, exposure to natural elements such as light, plants, water, and so on fulfills deep psychological and biological needs. Beatley argues that nature is not optional but vital for a healthy city. Empirical research and medical experiments support this claim. A landmark study by Roger Ulrich in 1984 showed that hospital patients with views of trees recovered faster and required less pain medication compared to those facing brick walls. This indicates that both the human body and mind respond positively to biophilic stimuli. Furthermore, the Attention Restoration Theory by Rachel and Stephen Kaplan (1989) demonstrated that exposure to nature helps restore cognitive functions impaired by prolonged directed attention and reduces mental fatigue and stress. Accordingly, the design of urban green spaces becomes not only an aesthetic choice but also a necessary and restorative one.

3.1.2 Biodiversity in Urban Environments

Contrary to popular belief, cities can effectively serve as important reservoirs of biodiversity. Beatley adds that urban areas often host a wide range of species, sometimes even more than nearby industrial or agricultural regions. Parks, rooftops, vacant lots, and even interstitial spaces within the urban fabric provide habitats for various animals, from birds and rodents to insects.

Biodiversity in cities is not static but dynamic and adaptable. Studies show that certain species modify their behaviors to survive within the urban ecosystem, for example birds that adjust their songs to align with traffic noise or plants that tolerate air pollution. In urban environments, the coexistence of humans and other organisms creates a new form of symbiosis. As Timothy Beatley suggests, recognizing cities as habitats for many other species reshapes the ethical and environmental responsibilities of urban

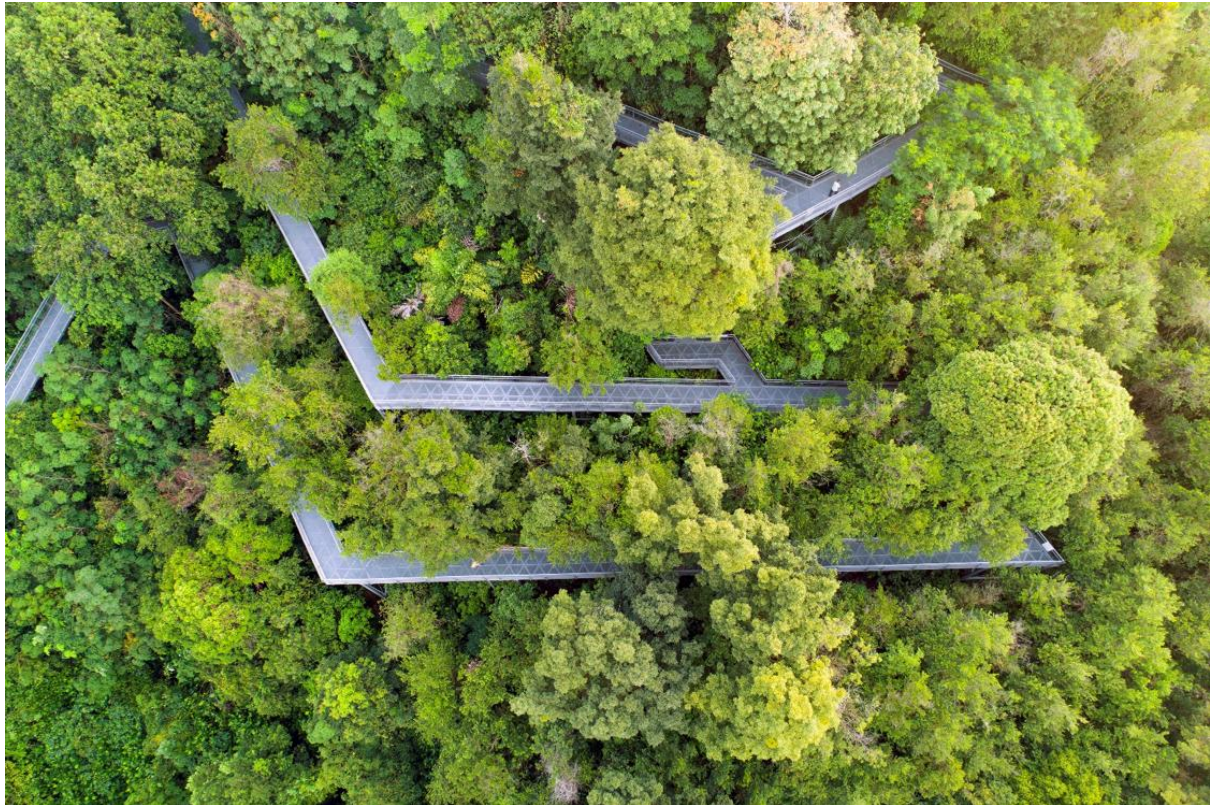


Fig. 10: Singapore, the garden city. Photo by www.ifla2018.com

design.

3.1.3 The Power of Urban Nature

Urban nature offers psychological, ecological, and economic benefits. It has been proven that exposure to nature and green spaces reduces stress and improves mood. Economically, the presence of trees and parks increases the value of nearby properties and lowers public costs related to healthcare and water management. Therefore, investing in urban nature yields returns that go far beyond aesthetic appreciation.

Beatley emphasizes that nature is perceived through multiple senses it is heard as much as it is seen. The songs of birds, the rustling of leaves, and the rhythm of rainfall enrich the urban landscape and restore a sense of vitality often lost amid the city's noise and chaos. Acoustic ecologists argue that these soundscapes strengthen our sense of belonging to nature and empathy toward it, reminding urban residents that they share their environment with many other species.

3.1.4 Biophilic Cities and Urban Resilience

The relationship between biophilic design and urban resilience is increasingly recognized in climate adaptation discourse. As Beatley notes, cities face a convergence of crises climate change, heat stress, water scarcity, and social inequality that demand integrated ecological responses. Biophilic planning directly contributes to resilience by moderating urban heat islands through vegetation and reflective materials, improving air quality, and managing stormwater through green infrastructure. The cooling effects of tree canopies, for example, can reduce urban temperatures by several degrees, mitigating the health risks of heat waves.

Beyond physical resilience, nature enhances social and psychological resilience. Green public spaces promote community interaction and a sense of collective stewardship, which are crucial for recovery during crises. Holling's (1973) classical definition of resilience, the capacity of a system to absorb disturbance and reorganize while retaining its function, aligns seamlessly with biophilic principles: diversity, adaptability, and regeneration. In Beatley's framework, a resilient city is inherently a biophilic one, capable of *bending without breaking* because it is structured through natural processes that sustain life.

3.1.5 Understanding the Nature of Biophilic Cities

To understand what makes a city biophilic is to appreciate its layered interactions between design, ecology, and culture. Beatley describes biophilic cities as places where nature is “visible, accessible, and abundant”, not confined to parks but woven into streets, rooftops, courtyards, and even building interiors. Nature in these cities assumes both organic and designed forms: vertical gardens, green walls, and indoor vegetation extend the sensory reach of nature into the built environment. Drawing on the biophilic design frameworks of Stephen Kellert and Terrapin Bright Green, Beatley identifies patterns that elicit positive human responses, such as visual connections with natural systems, the presence of water, biomorphic forms, and dynamic light. These qualities foster emotional comfort, aesthetic delight, and symbolic connection, transforming urban architecture into a medium of ecological empathy.

Ultimately, biophilic cities cultivate a *nature-rich urban culture*, where citizens not only experience but actively care for the living environment around them. Beatley envisions an “urban nature diet,” suggesting that frequent, even brief, encounters with nature—seeing a bird in flight, hearing the wind through trees—accumulate into profound well-being. The goal is not only to design greener cities but to nurture citizens who perceive themselves as participants in a shared ecological community. In this sense, the biophilic city represents both a physical transformation and a moral one: an urban civilization reconciled with its biological roots.

3.2 Adaptive Reuse as a Regenerative Practice

Adaptive reuse has emerged in recent years not only as a sustainable design strategy but also as a regenerative and re-creative practice capable of revitalizing the social and cultural dynamics of cities. From this perspective, **old buildings and abandoned green spaces** are no longer regarded as obsolete remnants of the past; Rather, they are perceived as living elements within the constantly evolving cycle of urban life. The aim of this approach extends beyond mere preservation, it seeks to generate new layers of meaning, function, and interaction between people, **their natural landscapes**, and their built environment.

At the core of this concept lies the understanding that cities operate as living and dynamic systems. Therefore, any intervention within this system should not only minimize harm but also actively contribute to ecological, economic, and social regeneration. Adaptive reuse extends the lifespan of **architectural structures and neglected urban terrains**, preserving the embodied energy contained within their materials and **the biological potential of their soil**. This process prevents the waste of matter and energy that results from demolition and reduces the demand for new resources, aligning closely with the principles of the circular economy.

Nonetheless, adaptive reuse is not limited to material preservation; it requires the reactivation of **abandoned buildings and forgotten landscapes** through new programs that respond to contemporary urban needs. At the urban scale, adaptive reuse functions as a catalyst for urban regeneration, bringing **neglected structures and fragmented green voids** back into active life. The integration of **historic architecture with restored natural systems** enhances walkability, strengthens the local economy, and enriches social interaction.

The transformation of former industrial complexes or **post-industrial wastelands** into mixed-use cultural and **ecological spaces** increases social resilience and architectural value. Ultimately, adaptive reuse is not a nostalgic gesture toward the past but an active process aimed at urban and environmental renewal. When supported by investment incentives, policy frameworks, and interdisciplinary collaboration, this approach has the potential to transform the linear model of urban growth into a circular and regenerative system, one that continuously rebuilds itself through creativity, care, and collective engagement.

3.3 Rebuilding the Native Web of Life: An Ecological Perspective

The concept of **rebuilding the native web of life** represents an approach to restoring native ecosystems that aims to reconstruct the complex and interactive networks of species which sustain the resilience and functionality of ecosystems. In recent decades, industrial and human activities have led to the loss of habitats and food resources for many forms of wildlife, both in urban and natural environments. Therefore, ecological restoration efforts are no longer limited to planting vegetation or protecting existing species; rather, they have evolved into **systemic interventions** within ecological networks, seeking to reestablish the relationships among living organisms, native species assemblages, and the natural processes that sustain ecosystems.

In this approach, ecosystems are understood as **complex and adaptive systems**, where the existence and health of each species depend on interactions with others. Rebuilding the native web of life goes beyond the simple reintroduction of species; it relies on the recovery of **keystone and foundational species** that shape communities, regulate populations, and maintain ecological cycles. For example, the reintroduction of native plants, large herbivores, or apex predators can trigger cascading effects that improve biodiversity and enhance habitat structure. Human communities must also be recognized as an integral part of any ecosystem restoration process. Urban, suburban, and rural populations play a significant role both as beneficiaries of ecosystem services and as active participants in ecosystem management. Collective initiatives, public participation, and environmental education are essential for the long-term success of these strategies. By aligning ecological restoration goals with human well-being, the rebuilding of native ecological networks becomes a **regenerative process** that strengthens both nature and society.

Ultimately, **rebuilding the native web of life** represents a fundamental shift in how we understand conservation and ecosystem restoration. This approach goes beyond restoring individual species or habitats and instead focuses on **revitalizing the entire system**, emphasizing functional diversity, key interactions, and resilience. It exemplifies a **regenerative ecological practice**, a process that not only repairs damage but also revives the intricate web of life that underpins both natural and human systems.

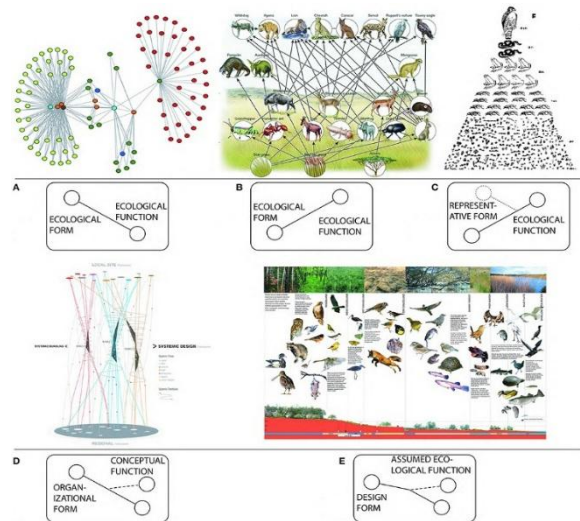


Fig. 11: The native web of life

3.3 Soil as a Living System in Regenerative Ecology

The concept of **soil as a living system** offers a fundamental framework for understanding the processes of ecosystem regeneration. As Mark Schonbeck (2006) emphasizes, soil is far from being an inert substrate; it is a **dynamic, self-organizing system** composed of minerals, organic matter, water, air, and an immense diversity of living organisms. Within a single teaspoon of healthy topsoil, billions of bacteria, fungal networks, protozoa, nematodes, insects, and earthworms coexist within a complex food web that maintains the biological and chemical cycles essential to life. From an ecological standpoint, soil represents the **biological foundation of ecosystems**, linking biotic and abiotic components through continuous cycles of transformation and renewal. In natural environments, soil operates as an **engine of ecological metabolism**. Organic residues, such as fallen leaves, roots, and decomposing organisms, are broken down and recycled by soil biota, releasing nutrients and forming humus that retains carbon and moisture.

This cyclical process not only sustains vegetation but also regulates key environmental functions, including water infiltration, air exchange, and surface temperature stability. Consequently, living soil contributes directly to **climate regulation, carbon sequestration, and the preservation of biodiversity**. Healthy soil functions both as a medium and a memory of the ecosystem, recording its biological history within layers of organic and microbial material that reflect long-term ecological interactions.

Within the field of **regenerative ecology**, perceiving soil as a living system transforms contemporary approaches to landscape and urban design. The ground is no longer considered a static platform for construction, but rather an **active ecological infrastructure** a habitat supporting not only plants but also microorganisms, insects, and the microclimatic conditions necessary for their survival. Designing with soil involves fostering the natural processes that sustain its vitality: reducing compaction and surface sealing, integrating vegetated layers, incorporating organic materials, and maintaining natural hydrological cycles that promote microbial activity. In this framework, soil health is inseparable from the regeneration and resilience of the broader ecosystem.



Fig. 12: Photo by Conscious Planet Org

Moreover, understanding soil as a living system helps to **bridge the gap between built and natural environments**. Urban green spaces, green roofs, rain gardens, and rehabilitated brownfields can all serve as extensions of the living soil network. When designed to host diverse microbial and plant communities, these areas function as ecological nodes that enhance pollination, regulate water systems, and improve environmental and human well-being. This perspective aligns with the principles of **regenerative design**, which emphasize reciprocity and co-evolution between human activity and natural processes. Ultimately, soil is far more than a physical material or economic resource, it is a **living organism at the foundation of the biosphere**, an invisible yet vital architecture sustaining all terrestrial life. Reintegrating soil vitality into both urban and ecological systems constitutes a central act of regeneration. By nurturing soil life, we restore the Earth's ecological metabolism and create the conditions for ecosystems and cities to heal, adapt, and thrive.

3.4 The Tectonics of Porosity: Gabions as Habitat-Foundations

Gabions are structures made from **wire mesh boxes** filled with **durable rocks and coarse or fine aggregates**. They are widely used in civil engineering for **soil erosion control** and in the design of green spaces and natural ecosystems. Gabions are a practical example of material ecology; in addition to stabilizing soil, they interact with the natural environment, allow plant growth, and contribute to the long-term sustainability of structures and ecosystems.

In the context of adaptive reuse of urban green spaces, gabions can play functional and ecological roles. They provide structural support for slopes, pathways, and retaining walls, while allowing natural processes like plant growth, water infiltration, and soil stabilization to happen. This aligns perfectly

with the principles of material ecology, where materials are not only construction elements but active participants in the surrounding ecosystem.

For example, in an urban park, gabions can be used to:

- Construct **pathways and terraces** that allow water to penetrate the soil, maintaining moisture and reduce runoff.
- Stabilize **slopes and embankments** with stone-filled gabion walls, which gradually become integrated with vegetation and wildlife habitats.
- **naturalistic retaining walls** that evolve over time, adapting to soil settlement, plant growth, and seasonal changes.

By using gabions in such adaptive reuse projects, the park becomes a living, dynamic system, rather than a static, artificial space. The combination of engineering stability and ecological functionality represents a sustainable approach that benefits both humans and nature.



Fig. 13: Green noise barriers bring a piece of nature back into the city. Thanks to the innovative integrated trellis system of the Noise Guard Green, it is possible to green the noise barrier. Graffiti and other defacement on the noise barrier are concealed by climbing plants after a short time and are therefore virtually invisible to the observer.

Noise Guard Green in combination with the extra-narrow Monolith-S gabion column with internal static system (EU patent)

RAU green noise barriers

Chapter 4: Site Selection and Analysis

4.1 Criteria for Site Selection – Ecological Relevance

The selection of Parco della Nora is grounded in its strategic alignment with the ecological and sustainability frameworks of the Liguria region. Beyond the mere availability of land or its potential for urban regeneration, the site's true value lies in its capacity to function as a vital interface between existing ecological belts.

Parco della Nora is classified as a micro-scale intervention area, yet its spatial positioning is highly strategic. The site sits directly adjacent to a macro-forest system that forms part of the city's upper ecological structure. This location places the park at a transitional edge, a point where natural vegetated slopes meet dense urban development and railway infrastructure.

The 'Ecosystem Services Assessment' map supports this analysis. The site currently falls within a medium-value zone (scoring 9 – 10), typical of structured public greenery and urban vegetated surfaces. However, immediately uphill, we see higher-value areas (scoring 11 – 12) associated with forest systems, regional corridors, and protected natural zones. This gradient indicates the presence of an ecological 'ecotone.' By reinforcing the vegetation and increasing habitat complexity in this area, we can significantly boost the performance of its ecosystem services.

4.2 Municipal Ecological Framework

According to the *Piano del Verde*, Genoa's green structure is organized into three complementary systems: linear systems (*sistemi lineari*), macro-scale ecological parks (*sistemi puntuali – macro*), and micro-scale intervention areas (*sistemi puntuali – micro*). The primary challenge identified by the Plan is the discontinuity between the forested hillside systems (*città forestale*) and the compact, infrastructuralized urban fabric.

While Parco della Nora is technically categorized as a micro-scale intervention area, its strategic positioning is far more significant. It sits in immediate proximity to a macro-forest system that serves as a primary ecological backbone for the city. This is further validated by the 'Ecosystem Services Assessment' map: the site itself is currently within a medium-value zone (scoring 9–10), characterized by structured urban greenery and vegetated surfaces.

However, moving uphill, we observe high-value zones (scoring 11–12) linked to dense forests, regional ecological corridors, and protected natural areas. This gradient confirms that the site functions as a transitional 'Ecotone' between urban fabric and the forest. By reinforcing the vegetation structure and enhancing habitat complexity in this specific area, we can significantly upgrade its ecological performance and the quality of environmental services it provides.

At a scale transcending the municipal boundaries, the Ligurian Regional Ecological Network (RER) identifies the Polcevera Valley as a key element within a broader natural structure of metropolitan significance. Due to its river system, riparian vegetation, and flanking green slopes, this valley serves as a longitudinal natural axis that facilitates regional-scale species movement. While the Natura 2000 protected areas are situated at a distance from Campasso, the uphill slopes remain integral to a more continuous forest system on a regional level.

However, the 'transversal' connectivity between the valley floor and the adjacent slopes has been compromised within the urban perimeter. The presence of railway infrastructure, the compact urban fabric, and industrial facilities has fragmented the natural continuity between these two systems, severely limiting ecological permeability.

Although Parco della Nora is not formally designated as a protected core or an ecological corridor in the regional network, its location within the transition zone between the urban fabric and the green slopes is of strategic importance. The site sits precisely where the natural link between the valley and the hillside has been ruptured. Consequently, it can be viewed as a local-scale 'intermediary space' a site where targeted ecological reinforcement can improve permeability between the valley and the slopes, ultimately strengthening the continuity at the threshold between urban structures and natural systems.

4.3 Inquadramento Urbanistico

The Parco della Nora site, situated within the Campasso district and the Polcevera Valley, is governed by the regulatory framework of the Genoa Urban Plan (Piano Urbanistico Comunale - PUC) . According to the plan's structural hierarchy, specifically Level 3 (Urban Structure), the municipal territory is organized into "Conservation Areas," "Regeneration Areas," and "Transformation Zones."

The park's perimeter is officially classified as a Consolidated Area designated for Public Greenery , falling under the Urban Services System (SIS-S). This formal designation reinforces the site's public and collective function, effectively prohibiting any development or land use that is incompatible with its status as a green space.

Furthermore, the site is defined by its immediate proximity to critical metropolitan infrastructure, including the railway corridor (FER) and the primary road network (VIAB) . This locational context positions the park as a strategic "threshold space"—a buffer zone at the intersection where the established residential fabric of Sampierdarena meets the city's heavy industrial and logistical systems. By occupying this boundary, the project serves as a vital tool for mediating the tension between urban living and surrounding infrastructural barriers.

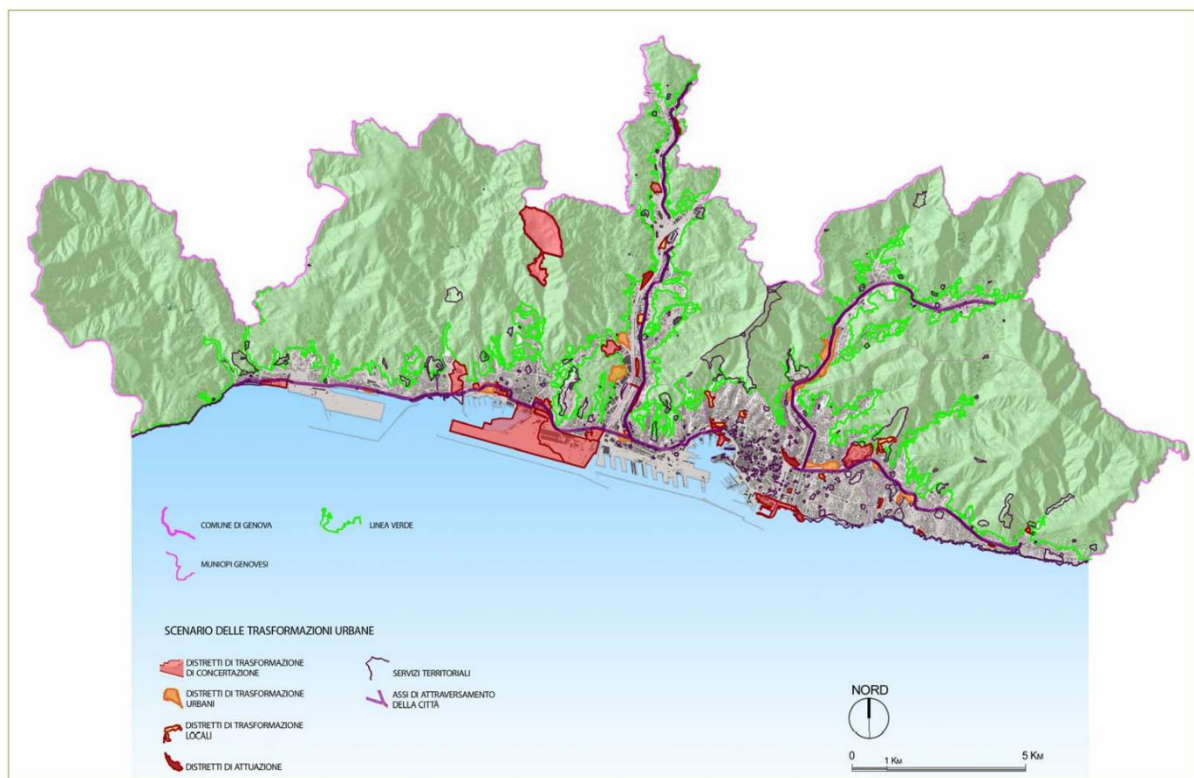


Fig. 14: Scenario delle trasformazioni urbane Sono rappresentati sia i distretti di concertazione che quelli di trasformazione urbana, ed insieme a questi (che assieme agli ambiti complessi degli assi di attraversamento e della valorizzazione del litorale) rappresentano le grandi trasformazioni urbane previste dal piano, sono rappresentati anche i servizi di scala urbana e metropolitana, così da ricostruire il quadro delle grandi aree di intervento in programma e le loro relazioni con il tessuto urbano esistente.

4.4 Zoning and Land Use (Zonizzazione e Destinazioni d'Uso)

In terms of zoning, specifically at **Level 3 (Urban Structure)**, Parco della Nora is integrated into the **Public Services System (SIS-S)**, a category that encompasses public greenery, equipped open spaces, and collective services.

The site's immediate surroundings are characterized by a heterogeneous mix of land uses:

- **Consolidated residential zones:** Primarily categorized as AC-IU and AC-NI, representing established residential fabrics.
- **Railway infrastructure:** Classified under the SIS-I (Infrastructural Services) system, which exerts a significant physical and acoustic presence.
- **Industrial and Productive Regeneration Areas:** Located primarily on the valley floor, highlighting the district's industrial heritage.

This combination of land uses indicates a condition of high **urban pressure**, where green spaces act as a critical tool for mitigating environmental impacts and establishing a functional balance within the neighborhood. The proposed project does not seek to alter the existing land-use designation; rather, it focuses on the **ecological regeneration** of an existing public green space to enhance its performance and accessibility.

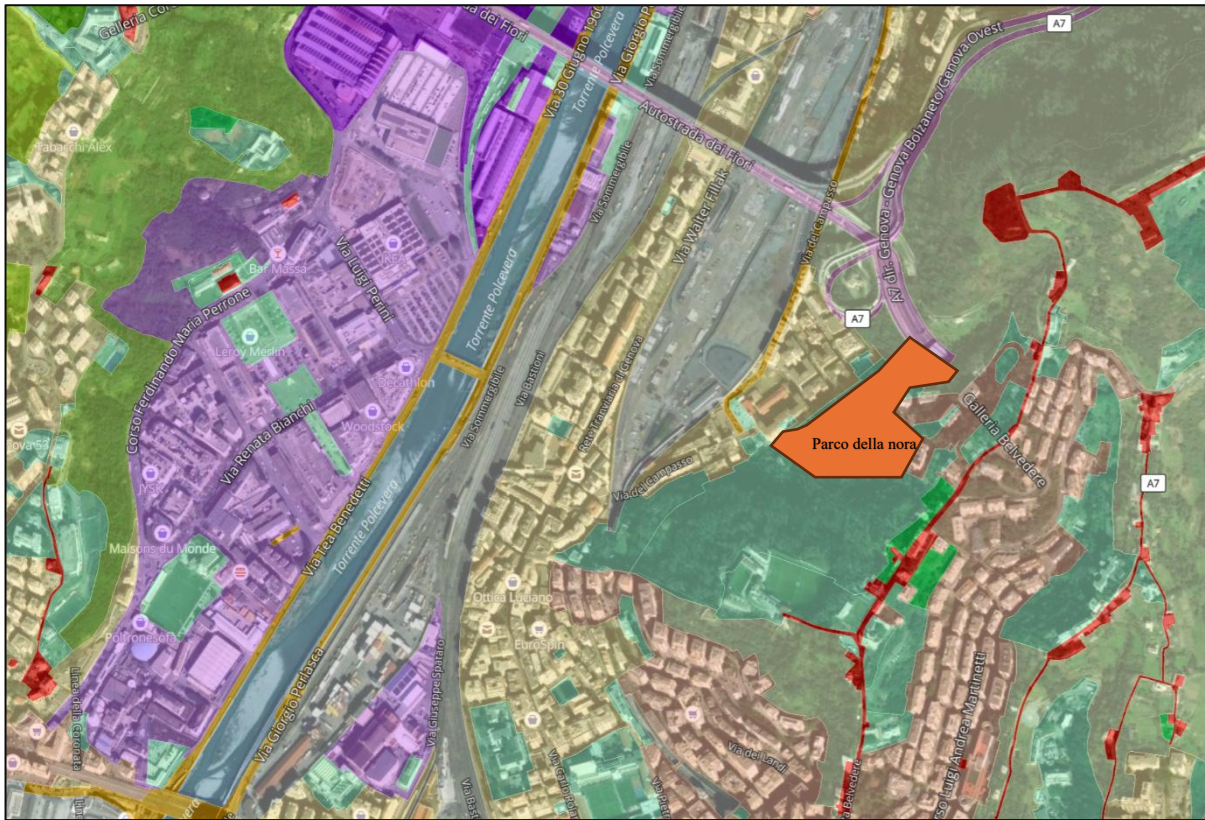


Fig. 15: Photo by <https://www.urbismap.com/>

4.5 Green Systems and Ecological Corridors (Sistema del Verde e Corridoi Ecologici)

Within the framework of the Genoa Urban Plan (PUC), the “**Green Scenario**” represents one of the three primary structural pillars. This scenario focuses on the following strategic priorities:

- **Ecological networks and green corridors**
- **Urban and peri-urban green spaces**
- **Landscapes with significant vegetative cover**
- **Visual and physical connections between natural systems and the dense urban fabric**

Parco della Nora is situated along a slope that serves as a physical link between the Polcevera valley floor and the upland green systems. While the park is not formally designated as a regional ecological

corridor, its geographical position allows it to function as a **vertical connector** between the urban fabric and the natural areas at higher elevations.

The regeneration of this space is therefore intended to reinforce **local-scale ecological continuity**. By strengthening this link, the project transforms a fragmented site into a functional node that supports biodiversity movement and enhances the overall resilience of the district's green infrastructure.

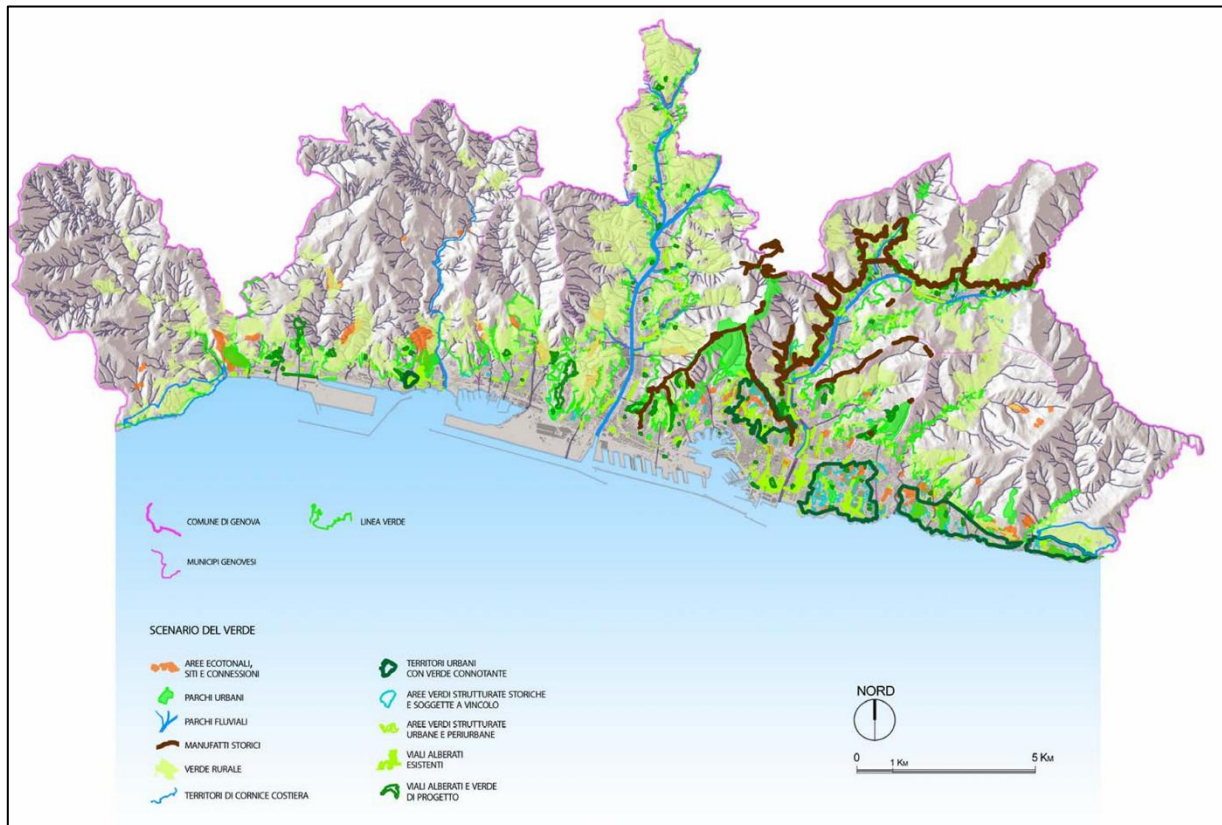


Fig. 16: Lo scenario del verde Nello scenario del verde sono rappresentate le reti ecologiche ed i corridoi verdi, i SIC e le zone di protezione speciale, i territori urbani con verde connotante, le aree verdi strutturate storiche, le aree verdi strutturate urbane e periurbane, i viali alberati esistenti e di progetto.

4.6 Alignment with Urban Plan Objectives (Coerenza con gli Obiettivi del PUC)

The **Genoa Urban Plan (PUC)** identifies three macro-strategic axes, one of which is dedicated to “**Environmental Quality and Territorial Protection**”. Within this framework, two specific objectives are directly addressed by the proposed project:

- **Objective C4:** Enhancement of urban and peri-urban public greenery.
- **Objective C2:** Protection and reinforcement of soil and hydrogeological structures.

The regeneration of Parco della Nora is intrinsically aligned with these goals for the following reasons:

- It directly upgrades the **ecological quality** of the existing green space.
- It improves the management of **sloped surfaces**, contributing to soil stabilization—a critical factor in the Ligurian landscape.
- It reinforces the **urban green network** as envisioned in the plan's structural scenarios.

Consequently, the project does not represent a shift in urban land use; rather, it is a practical implementation of the environmental strategies already established within the municipal planning framework.

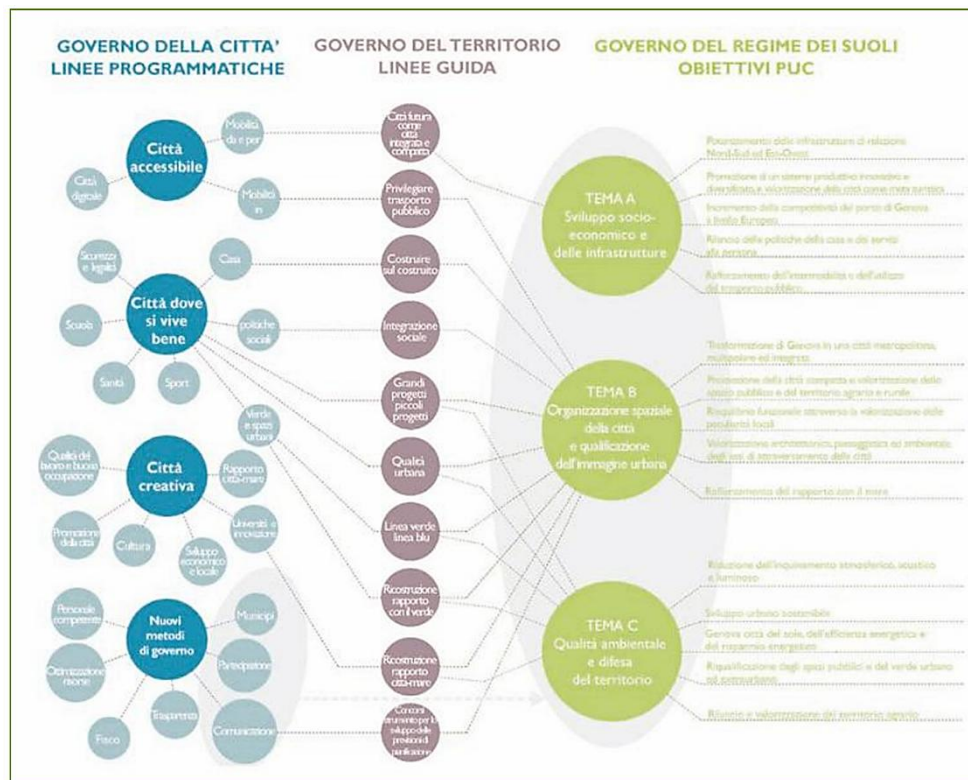


Fig. 17: Ideogramma delle relazioni tra le linee programmatiche del sindaco, le linee guida del piano, gli obiettivi tematici e quelli specifici

4.7 Topographic and Slope Analysis

The site's character is defined by its dramatic position on a hillside overlooking the Polcevera Valley. This elevation gradient is not merely a geographic feature but the primary factor dictating the project's spatial logic. Data from the contour mapping reveals a significant vertical transition, ranging from **56.6 m** at the lower boundaries to **125.8 m** at the highest ridges. With the central park plateau sitting at approximately **79.0 m**, the area contends with a total height clearance of nearly **50 meters**.

Analysis of the contour spacing confirms that the terrain's ruggedness is varied. The central sectors are particularly steep, with gradients locally exceeding **30 %**, creating sharp transitions in the landscape. In contrast, the peripheral zones offer a more manageable incline, averaging between **15 % and 25 %**. The entire landform follows a consistent **south-westward** descent toward the valley floor.

From a design perspective, this topography forces a move away from traditional flat surfaces. Instead, it necessitates a strategy rooted in terracing, careful stormwater routing, and controlled pedestrian ramps. Rather than viewing these slopes as a constraint, the project leverages the verticality to establish a clear spatial hierarchy, carving out scenic vantage points and integrating ecological systems that work with, rather than against, the natural flow of the water and terrain.

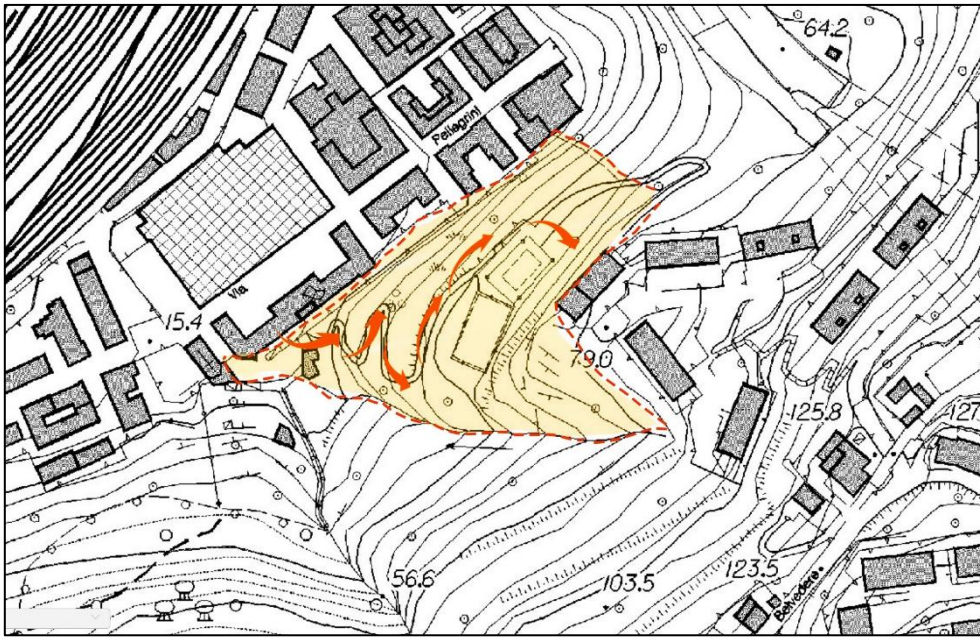


Fig. 18: Slope Analysis Diagram, source: geoportal.regione.liguria.it

4.8 Geological Site Analysis: The ROC Unit Formation

Based on the **CARG (Geological Map of Italy)**, the Parco della Nora site is situated entirely within the **ROC unit**. This formation is interpreted as a consistent **bedrock (lithoid)** base, providing a geological foundation that is inherently more stable than the loose sedimentary deposits typical of valley floors. From a geotechnical perspective, this translates to high load-bearing capacity and a lower risk of deep-seated structural failure.

Under these conditions, the project's primary constraint is not “soft soil” settlement, but rather the **slope stability** and the steepness of the terrain. On rocky hillsides like this, any potential instability is usually localized, manifesting as shallow surface slides or the movement of fine-grained debris over the impermeable bedrock interface.

Consequently, our design strategy prioritizes **surface runoff management** and erosion control over heavy structural interventions. By minimizing excavation and favoring a **lightweight terracing logic**, the project aligns its paths and platforms with the natural contours of the rock. This “minimal intervention” approach is essential to preserving the hillside's natural equilibrium while mitigating the risks associated with Slope Analysis Diagram, source: geoportal.regione.liguria.it

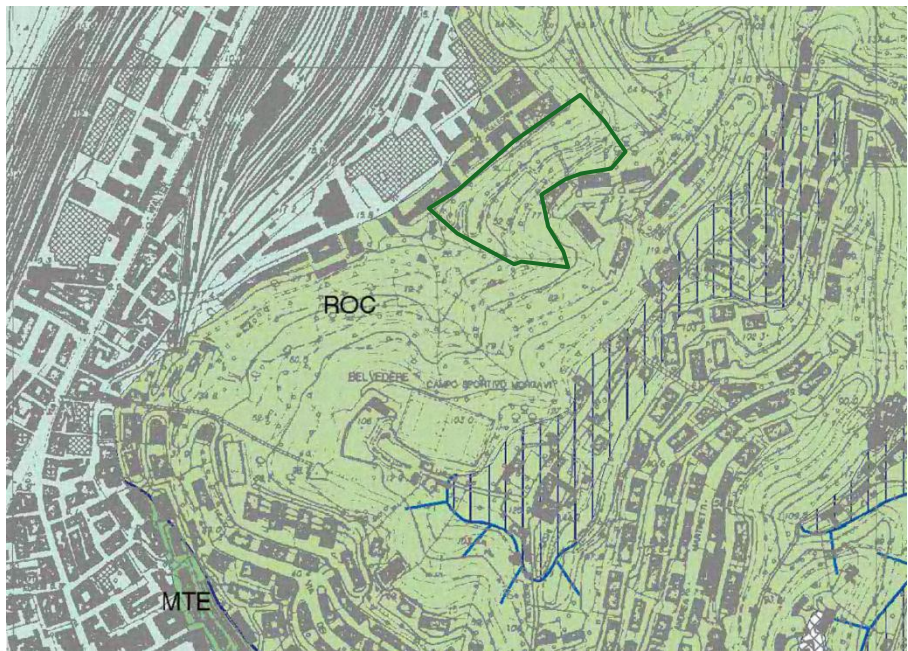
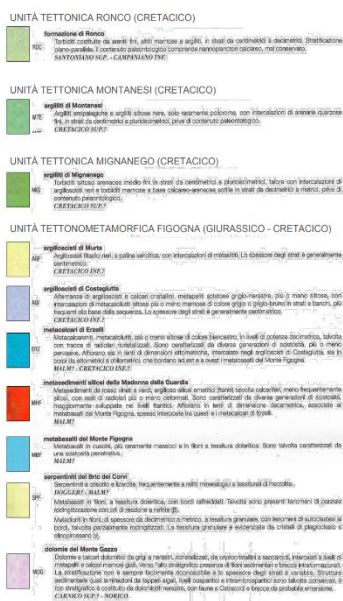


Fig. 19: Geologic map, source: geoportal.regione.liguria.it

4.9 Biodiversity Patterns and Ecological Character

The floral composition of the site identifies it as a **Mediterranean rocky shrubland**, defined by a resilient maquis ecosystem. The presence of species such as *Pistacia lentiscus*, *Myrtus communis*, *Cistus salvifolius*, and *Erica arborea* confirms a specialized adaptation to the shallow soils and rocky substrates characteristic of Ligurian slopes, as well as a high tolerance for seasonal drought.

However, this natural baseline is overlaid by clear signs of **anthropogenic influence**. The prevalence of ruderal and highly opportunistic species—most notably *Parietaria judaica* and the invasive *Ailanthus altissima*, reflects the sustained urban pressure and disturbance history of the Campasso district.

From a faunal perspective, the recorded presence of avifauna, ranging from generalists like *Turdus merula* to specialized predators such as *Falco peregrinus*, points to a significant degree of **structural habitat diversity**. This suggests that despite its urban edge location, the site maintains critical ecological connectivity with the broader green corridors of the Polcevera Valley.

Ultimately, the site functions as a complex **ecological ecotone**. It exists in a transitional state between the dense urban fabric and the semi-natural Mediterranean systems of the hills. This position grants the area a moderate but strategic biodiversity potential, characterized by a unique resilience to the environmental stresses of the surrounding metropolitan landscape.

Category	Species (Scientific Name)	Ecological Role	Habitat Indication
Trees / Shrubs	<i>Pistacia lentiscus</i>	Mediterranean shrub	Dry rocky slopes
	<i>Myrtus communis</i>	Evergreen shrub	Mediterranean maquis
	<i>Olea europaea</i>	Native tree	Xeric environments
	<i>Erica arborea</i>	Heath shrub	Acidic rocky soils
	<i>Rhamnus alaternus</i>	Evergreen shrub	Coastal scrubland

Category	Species (Scientific Name)	Ecological Role	Habitat Indication
	<i>Fraxinus ornus</i>	Small tree	Semi-natural woodland
	<i>Celtis australis</i>	Deciduous tree	Urban-natural interface
	<i>Ailanthus altissima</i>	Invasive tree	Disturbed urban soils

Category	Species (Scientific Name)	Ecological Role	Habitat Indication
Herbaceous / Flowering Plants	<i>Cistus salvifolius</i>	Mediterranean shrub-flower	Dry rocky habitat
	<i>Euphorbia helioscopia</i>	Ruderal herb	Disturbed soils
	<i>Geranium sanguineum</i>	Flowering perennial	Semi-natural slopes
	<i>Centranthus ruber</i>	Rock colonizer	Stone walls & cliffs
	<i>Parietaria judaica</i>	Wall vegetation	Urban rocky edges
	<i>Sedum dasyphyllum</i>	Succulent	Thin soil / rock crevices
	<i>Ruta graveolens</i>	Aromatic shrub	Dry Mediterranean soils

Category	Species (Scientific Name)	Ecological Role	Habitat Indication
Birds	<i>Turdus merula</i>	Generalist bird	Urban & woodland
	<i>Pica pica</i>	Urban opportunist	Edge habitat
	<i>Falco peregrinus</i>	Predator	Cliff / high structures
	<i>Egretta garzetta</i>	Wetland bird	Nearby water corridor
	<i>Motacilla alba</i>	Ground feeder	Open spaces

Category	Species (Scientific Name)	Ecological Role	Habitat Indication
Mammals	<i>Sus scrofa</i>	Large omnivore	Woodland / peri-urban
	<i>Canis lupus italicus</i> (regional record)	Apex predator	Wider ecological network

The site's rocky substrate (ROC unit) and Mediterranean shrubland character suggest suitability for micro-habitat enhancement strategies. Proposed gabion retaining edges can function as artificial rock-crevice environments, providing thermal refuges and shelter for small reptiles and invertebrates. Complementary planting of drought-tolerant Mediterranean aromatic species (e.g., *Salvia rosmarinus*, *Lavandula* spp.) may enhance nectar availability and support pollinator communities. These

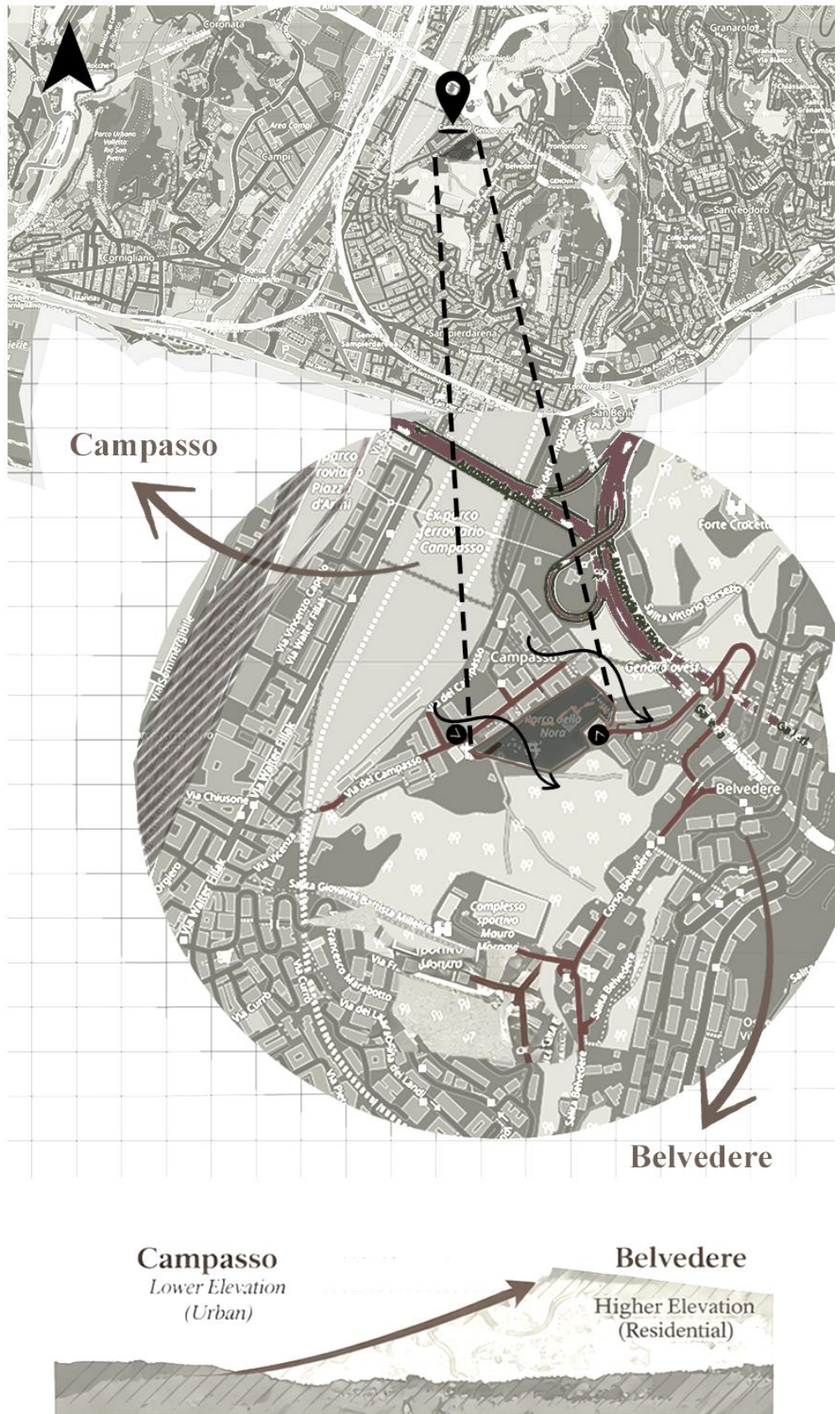
interventions aim to strengthen local ecological functionality without altering the site's underlying habitat identity.

Legend

-  Highway
-  Main access roads
-  Site Territory
-  Internal path
-  Slope Direction
-  Railway
-  Entrances

Accessibility

The site is accessed from two distinct elevation levels: a lower urban-industrial edge at Campasso and an upper residential edge at Belvedere. The steep slope between them defines movement patterns and limits transversal permeability.



Chapter 5: Design Strategy

5.1 Integrated Ecological System

The project is not conceived as a single architectural object, but as a system of interconnected elements including a tower, pavilions, and landscape interventions. Together, these components form an ecological network that supports both human activities and biodiversity.

Instead of imposing a new object onto the site, the project follows the existing topography and works with its natural conditions. The steep slope and the presence of separated platforms were understood not as limitations, but as opportunities to structure the spatial experience of the park.

Each platform is activated through a specific program, transforming vertical movement into a sequence of meaningful spaces. The pavilion is placed on the lower level as an accessible social and educational space, while the tower is positioned at the highest point to take advantage of panoramic views and create a clear spatial hierarchy across the site.



Fig. 20: Image source: Author

5.2 Reversible and Lightweight Construction

The structural system is based on a modular scaffolding framework combined with recycled polycarbonate panels. The choice of scaffolding was driven by the intention to create a reversible and low-impact structure, avoiding permanent intervention in the site.

The lightweight nature of the structure allows it to sit lightly on the terrain, minimizing excavation and preserving the existing ground conditions. This approach reflects a strategy of minimal intervention, where construction does not dominate the landscape.

The use of recycled polycarbonate panels further supports this approach. The material is lightweight, widely accessible, and allows natural light to pass through, creating bright and usable interior spaces with minimal thickness. As a semi-transparent skin, it establishes a soft boundary between interior and exterior conditions.

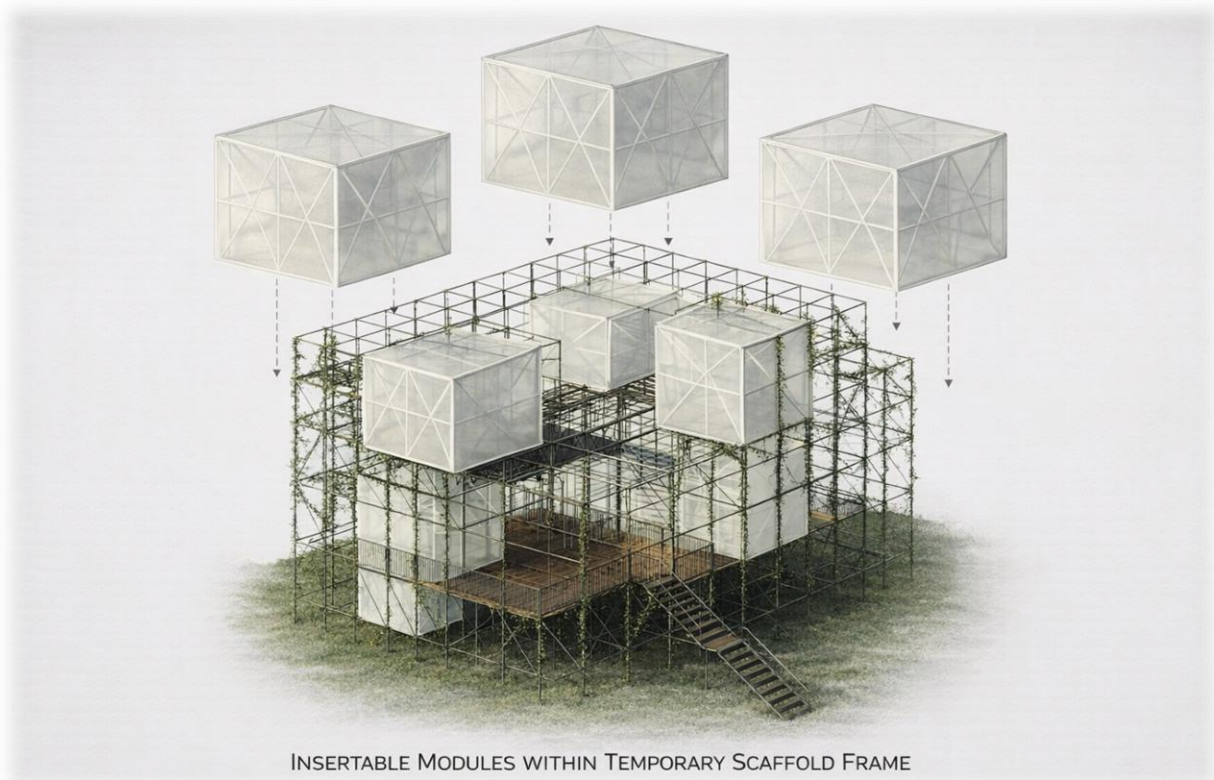


Fig. 21: Image source: Author

5.3 Pavilion as Social and Educational Space

The pavilion is conceived as an open and flexible space for study, workshops, and community-based activities. It responds to the lack of informal learning environments within the neighborhood and provides a platform for environmental awareness and social interaction.

The spatial organization remains adaptable, allowing different uses over time without requiring structural changes. Its openness reinforces the connection between users and the surrounding landscape.

5.4 Tower as Observation and Vertical Experience

The tower acts as a vertical extension of the landscape, offering a layered spatial experience through ascending platforms. It marks the highest point of the project and provides visual connections to the broader urban and ecological context.

Rather than functioning as a closed object, the structure remains permeable and lightweight, allowing natural elements such as light, air, and vegetation to interact with it over time.

5.5 Gabion System as Ecological Infrastructure

Gabion walls are introduced as both structural and ecological elements. Filled with locally available stone, they stabilize the terrain while also functioning as micro-habitats for insects, small animals, and native plant species.

These structures support species that are adapted to dry and rocky environments typical of the Genoa region, contributing to the enhancement of local biodiversity.

At the same time, gabions serve as landscape elements, defining edges and platforms while maintaining a natural and integrated appearance within the site.

5.6 Biodiversity and Minimal Intervention

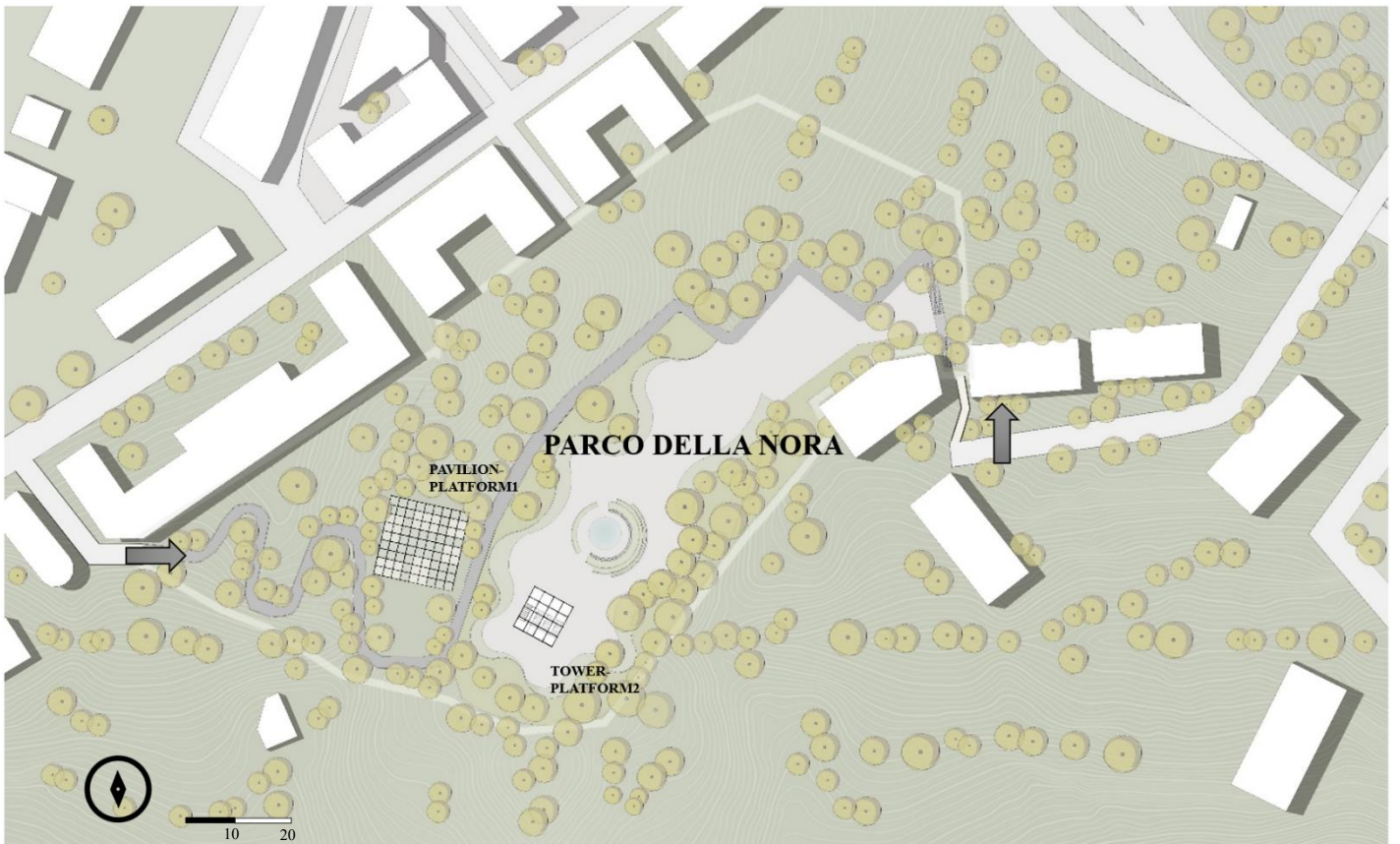
The project prioritizes minimal disturbance of the existing site by working with its natural topography and ecological characteristics.

Rather than replacing the landscape, the design enhances it through the introduction of lightweight structures and habitat-supporting elements. The combination of scaffolding, polycarbonate, and gabion systems allows architecture to operate as part of the ecosystem.

In this way, the project establishes a balanced relationship between human activity and natural processes, supporting both environmental regeneration and social use.

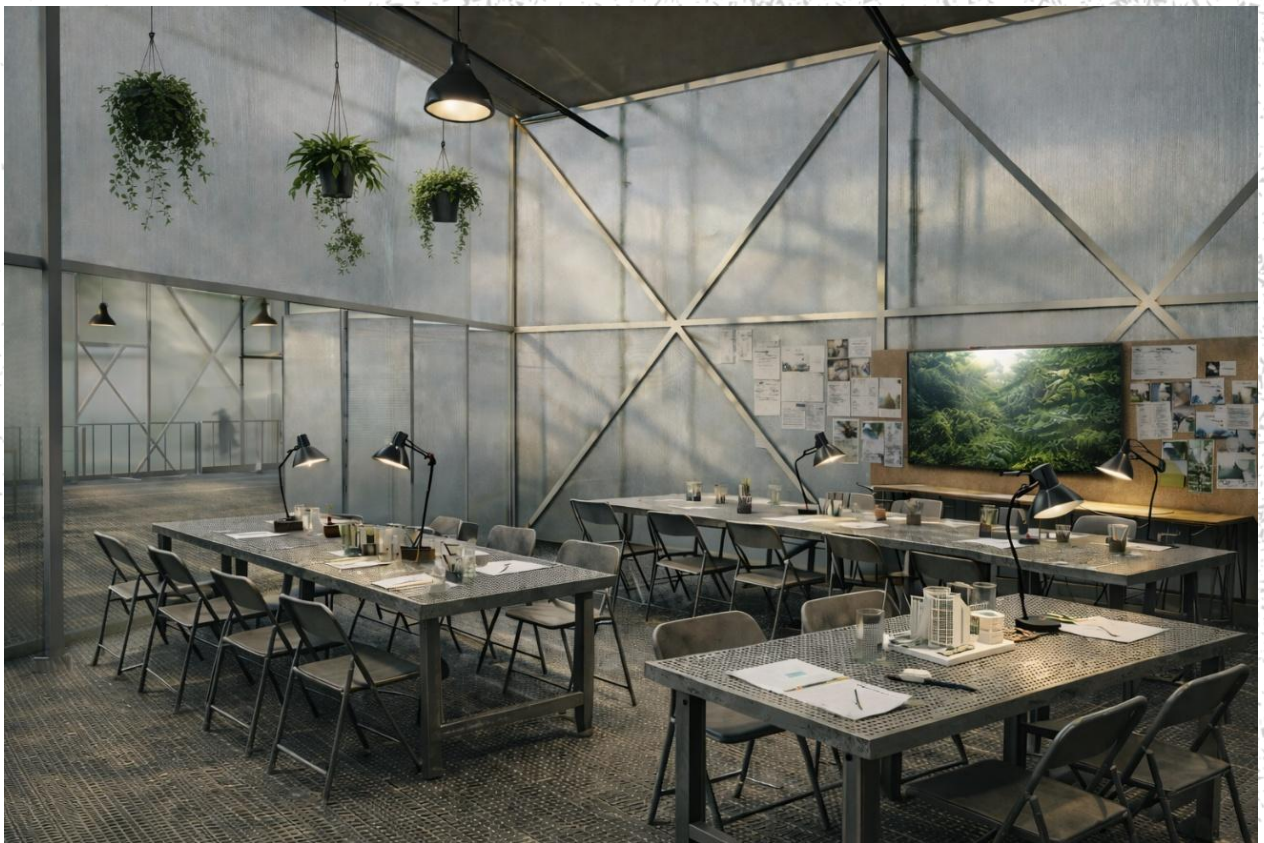
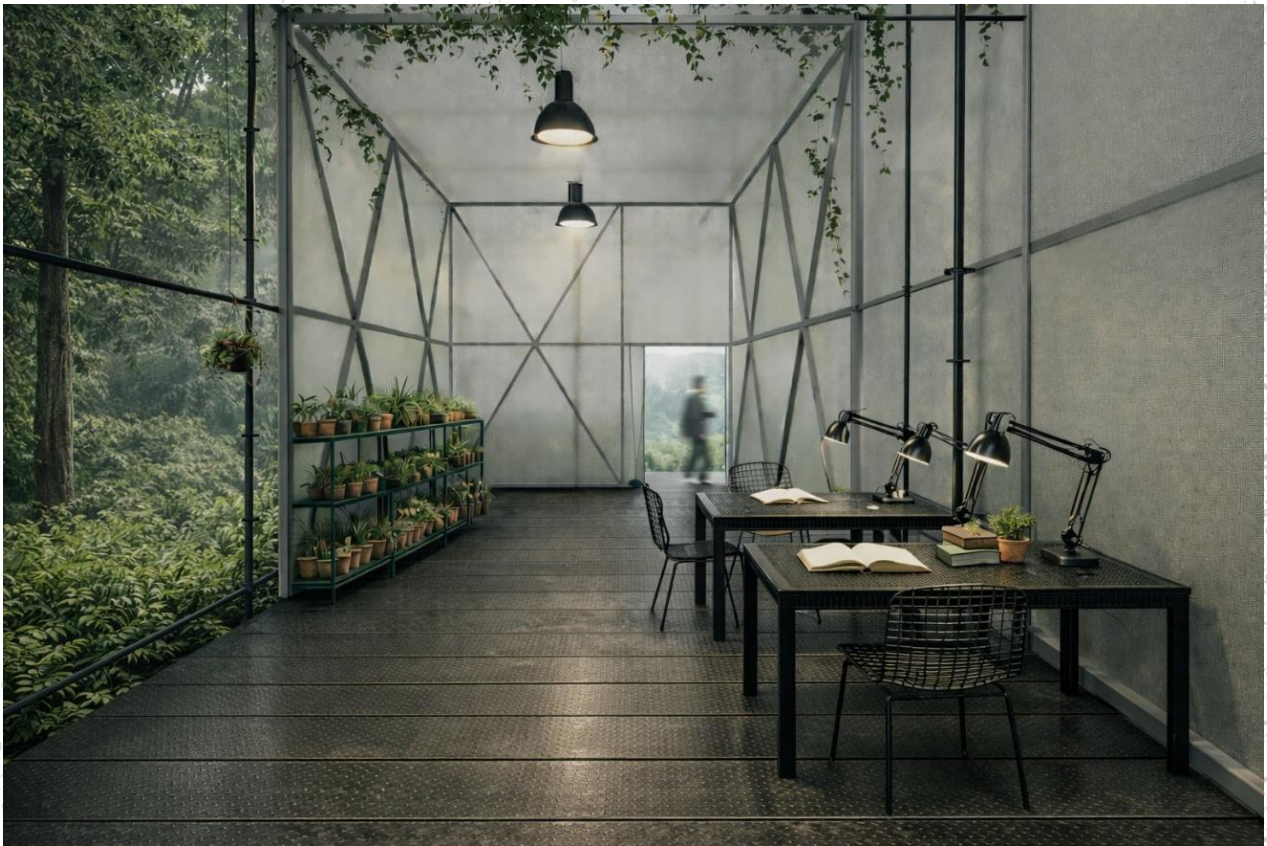
Chapter 6: Final Design Proposal

6.1 Masterplan

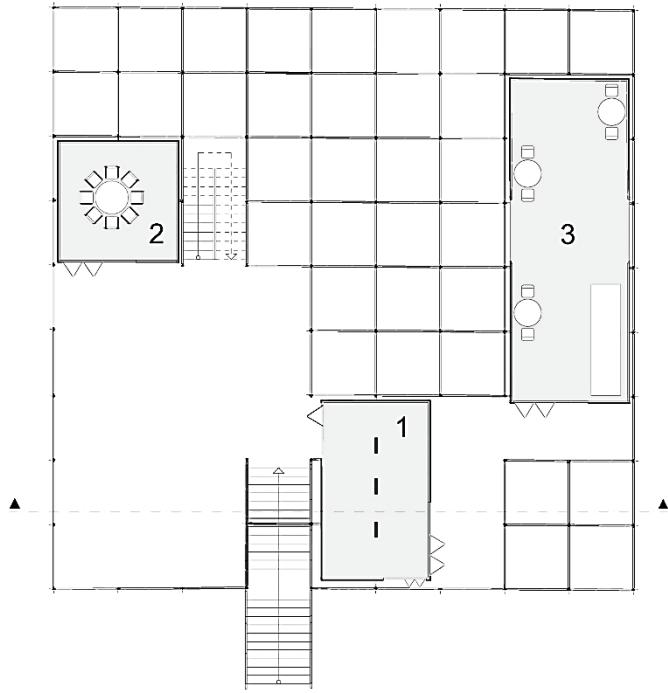


6.2 Pavilion – Platform One

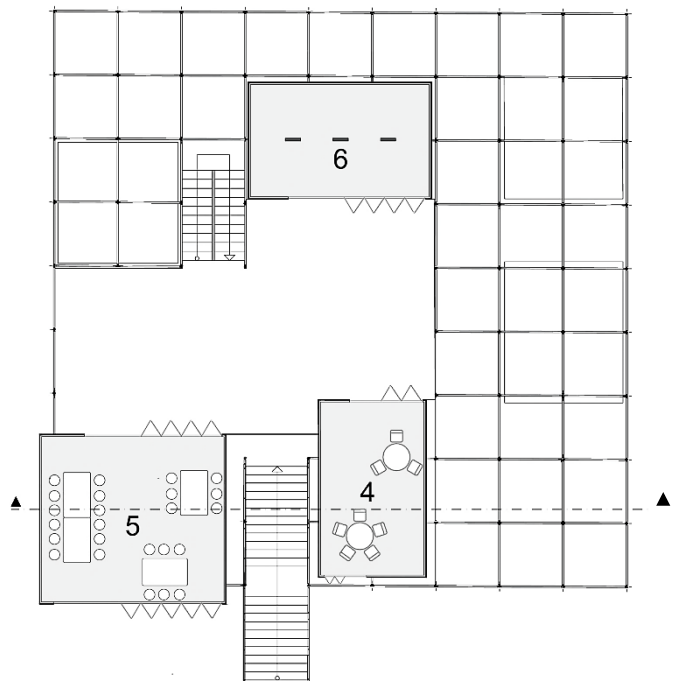




- 1. Awareness Area
- 2. Meeting
- 3. Reading Area
- 4. Conversation Room
- 5. Classroom
- 6. Exhibition

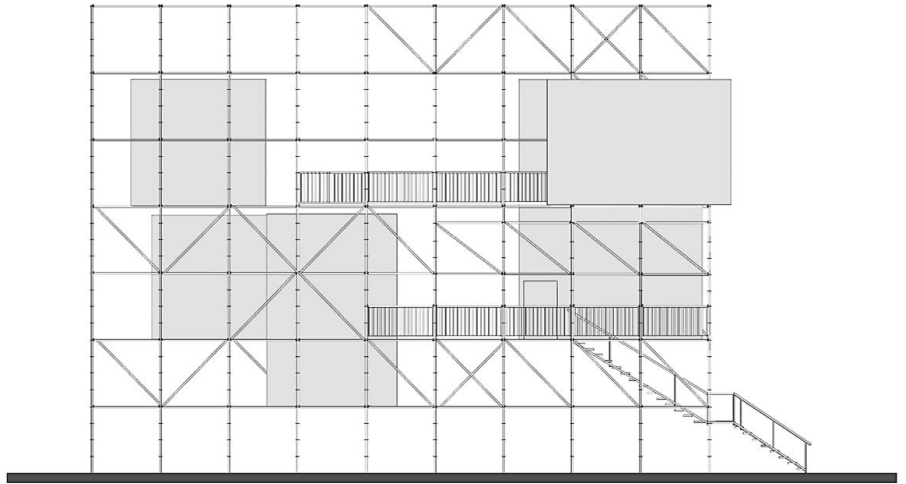


First Floor Plan

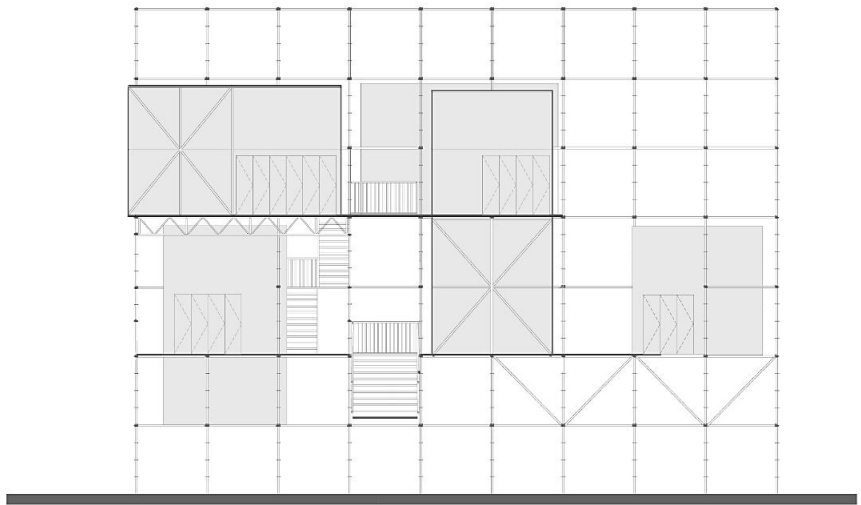


Second Floor Plan





North Elevation

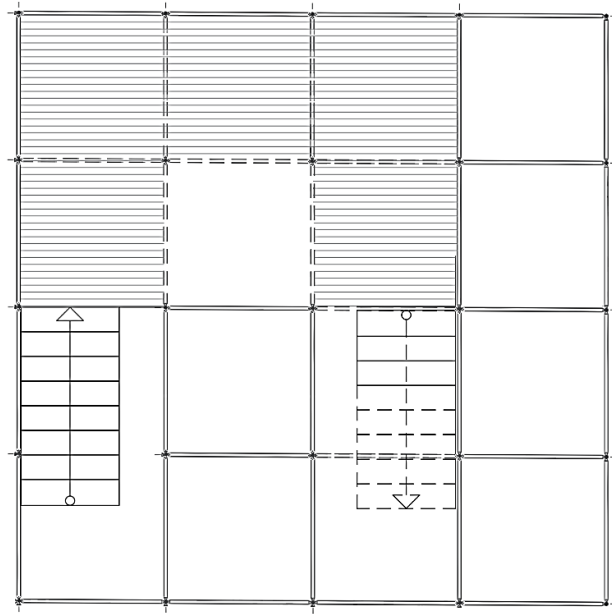


Section A-A

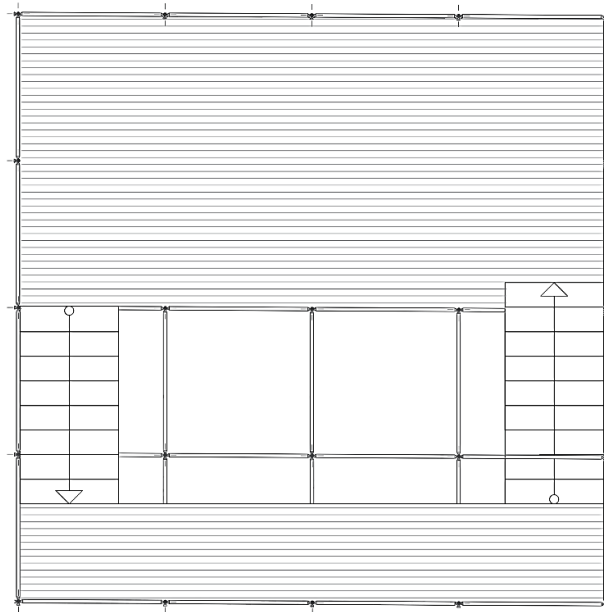


6.2 The Tower – Platform Two



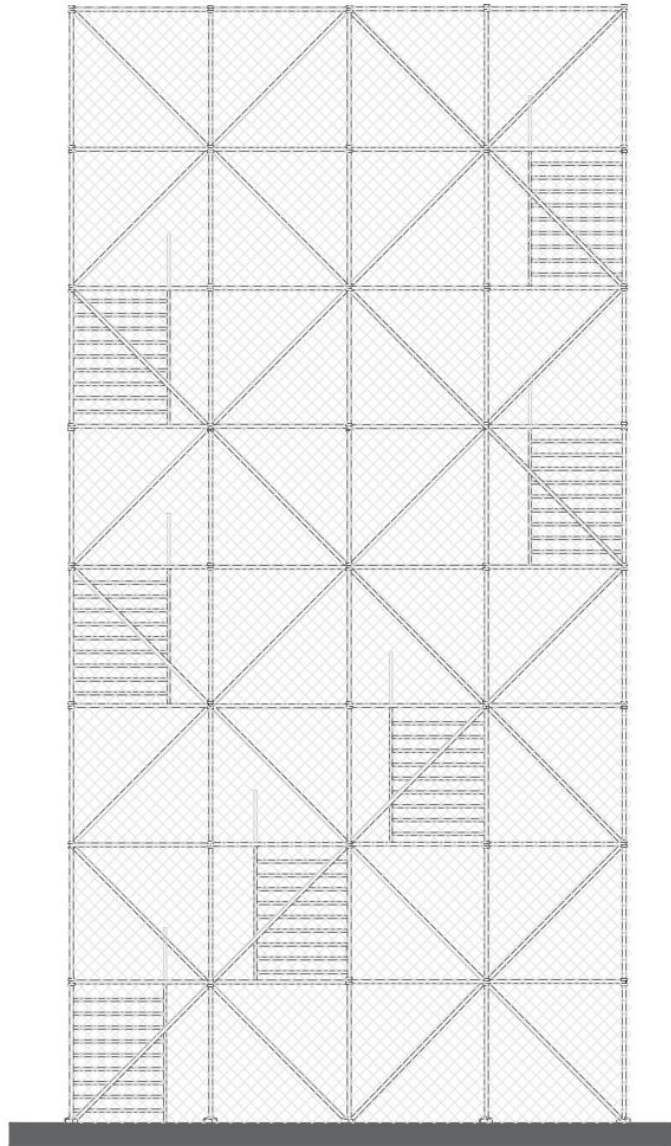


First Floor Plan



Top Floor Plan





Typical Elevation

References

Beatley, Timothy. 2011. *Biophilic Cities: Integrating Nature into Urban Design and Planning*. Washington, DC: Island Press.

Beatley, Timothy. 2016. *Handbook of Biophilic City Planning and Design*. Washington, DC: Island Press.

Beatley, Timothy, and Peter Newman. 2013. “Biophilic Cities Are Sustainable, Resilient Cities.” *Sustainability* 5 (8): 3328–3345.

Mariotti, Mauro Giorgio. n.d. *Atlante degli Habitat: Natura 2000 in Liguria*. Regione Liguria.

Comune di Genova. n.d. *Piano Urbanistico Comunale: Progetto Preliminare*. Genova: Comune di Genova.

Comune di Genova. n.d. *Piano del Verde: Linee guida per la realizzazione degli spazi aperti*. Genova: Comune di Genova.

Comune di Genova. n.d. *Agenda 2030 – Biodiversità*. Genova: Comune di Genova.

ArchDaily. n.d. “Projects and Articles on Architecture and Urban Design.” Accessed March 23, 2026. <https://www.archdaily.com>

Google. n.d. “Google Maps.” Accessed March 23, 2026. <https://www.google.com/maps>

Comune di Genova. n.d. “Comune di Genova – Official Website.” Accessed March 23, 2026. <https://www.comune.genova.it>

Comune di Genova. n.d. “Geoportal of the Municipality of Genoa.” Accessed March 23, 2026. <https://geoportal.comune.genova.it>

European Environment Agency (EEA). n.d. “Biodiversity and Ecosystems.” Accessed March 23, 2026. <https://www.eea.europa.eu>

IUCN. n.d. “The IUCN Red List of Threatened Species.” Accessed March 23, 2026. <https://www.iucnredlist.org>

ISPRA. n.d. “Italian Institute for Environmental Protection and Research.” Accessed March 23, 2026. <https://www.isprambiente.gov.it>

