

# GREEN SKILLS FOR CITIES

***Punta Vagno Regeneration Plan*** was developed by ***Étienne Lajoie-Asselin, Joshua Mingers, Kriti Bhavesh Nirmal, Maddalena Caviglia, Maria Augusta Kroetz, Marta Pianta, Noé Guérin,*** and ***Sophie Köcher-Schulz*** with the support of the Vienna University of Economics and Business, the Institute for Advanced Architecture of Catalonia, the University of Genoa and Alda European Association for Local Democracy. These materials cannot be used or reproduced without the authorization of the interested authors/institutions.

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# Punta Vagno

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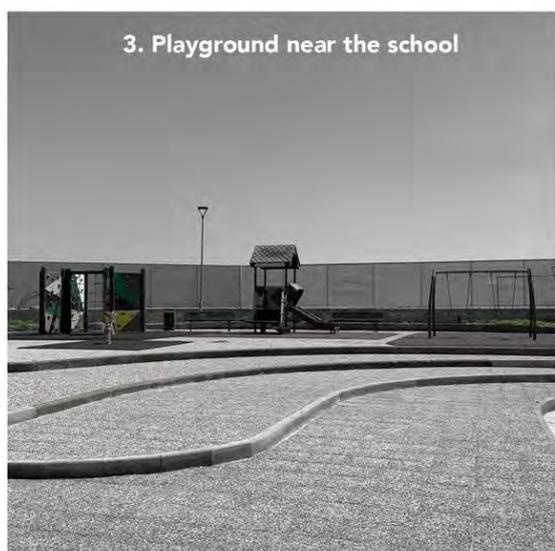
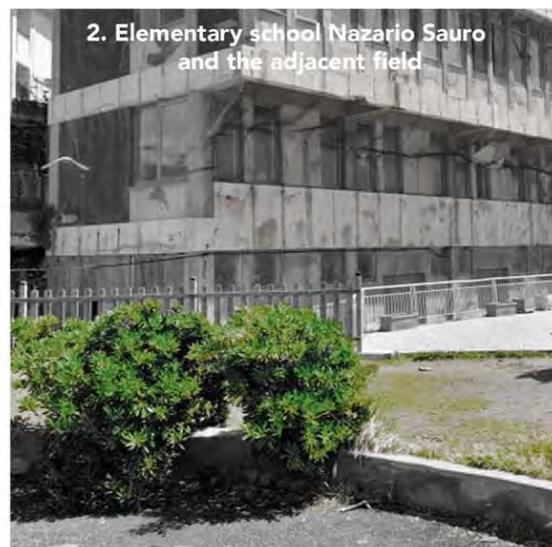
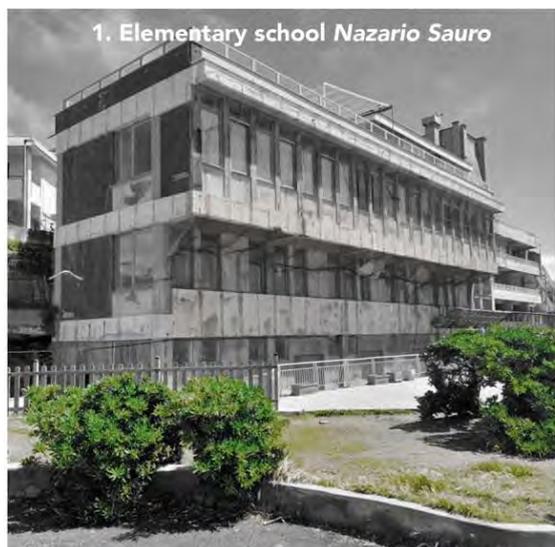
# 1. Site Analysis

## 1.1 Site plan of the current state



- |                            |  |
|----------------------------|--|
| 1 green inaccessible areas | 7 abandoned building                     |
| 2 skatepark                | 8 Nazario Sauro public elementary school |
| 3 roller-skating ring      | 9 Corso d'Italia (street and promenade)  |
| 4 children playground      | 10 public beach                          |
| 5 tennis court             | 11 scenic viewpoint                      |
| 6 restaurant Caribe Club   | 12 private beachclub                     |

## 1.2 Identification of issues related to the current state

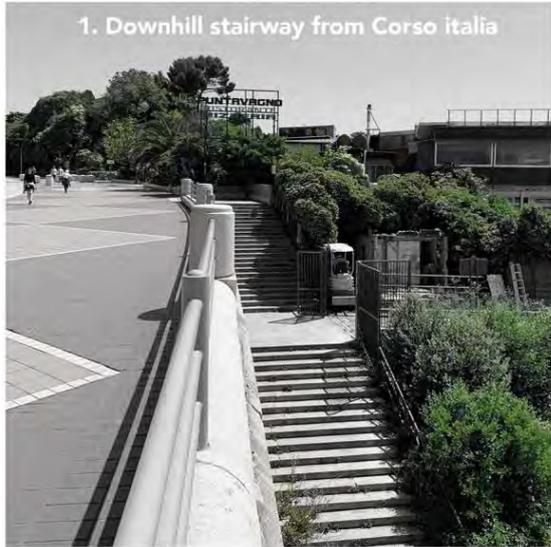


Punta Vagno is equipped with **numerous services for children** of nearby schools. However they are in a **dilapidated state** and **badly connected**.

There are **no shaded areas** where to stop in the warm months.

There is **no fountain** to drink from.





70% of Punta Vagno **surface** is covered in **concrete**, increasing the **heat island**.

It is connected to Corso Italia and the city center via a **long stairway** which makes the area **difficult to access**.

All **green spaces** are **inaccessible**.

There is an **abandoned building**.



### 1.3 Analysis of public spaces in the neighborhood



As seen in the mapping of the public spaces above, there is a concentration of common areas in the western area of Punta Vagno, especially close to the sea. Those contain, for instance, a large parking area (Piazzale John F. Kennedy) covered in asphalt that can be transformed into an amusement park or a fair at certain times during the year, but has no greenery at all. The public areas continue to the east with football fields and two public beaches up until Punta Vagno. Each of those areas contain little to no green spaces, neither trees or even park services, such as benches or drinkable water points.

The nearest water fountain is located in Piazza Raffaele Rossetti, on the other side of the street to Piazzale Kennedy. This area possesses at least some services, such as a central playground, numerous benches and large green spaces. However, the number of services is not efficient enough to attract a large number of people, neither a lot of different age groups. Finally, via Antonio Cecchi offers, between two one-way lanes, a pedestrian space, covered and shaded by trees, alongside with a small playground, which adds a pleasant space to walk and to bring kids to play in the neighbourhood. Nevertheless, a lack of "youth attractor" spaces is observed in the general area. In that sense, one of the objective of this project presented is to create (or give another life to) a space for a diverse age group and background, to give a sense of community and provide a lot of services and activities so that Punta Vagno becomes an attractor and a landmark to the neighbourhood.

## 2. Stakeholder Analysis

### 2.1 Population data

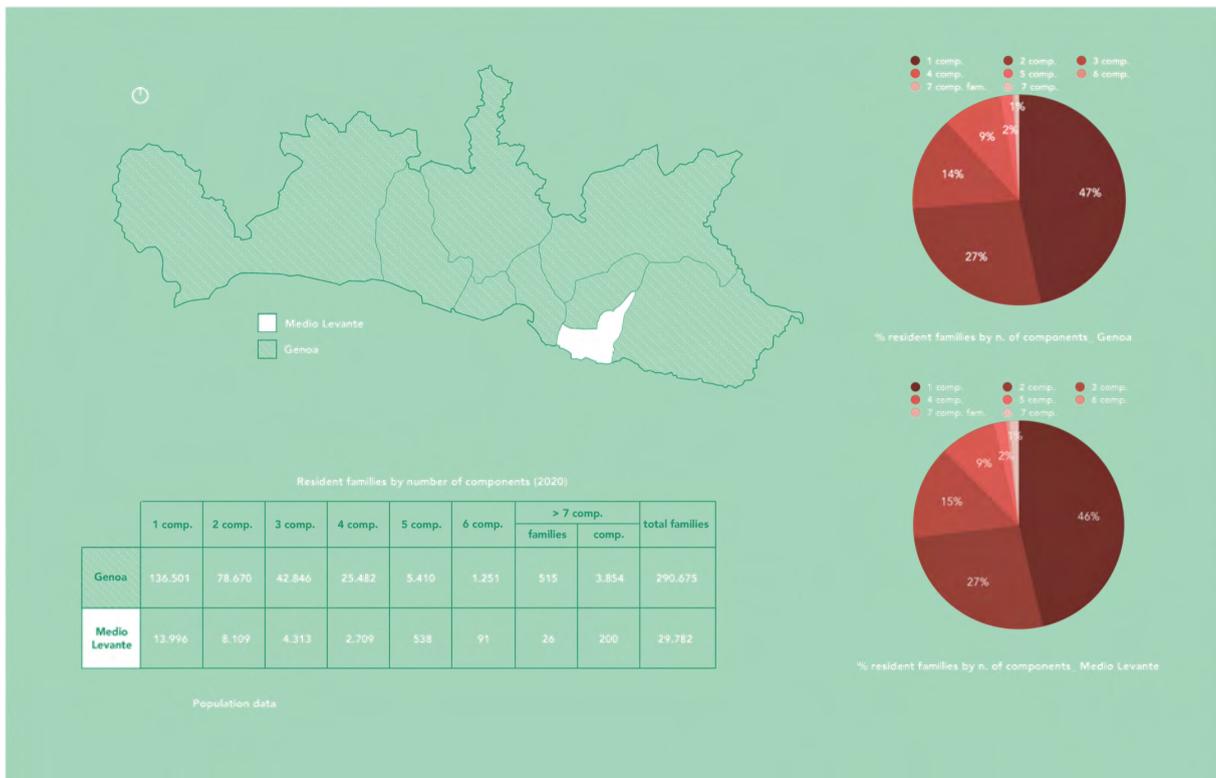
The analysis of Punta Vagno population was carried out using data provided by ISTAT. The municipality of the area is Medio Levante. Here the average age is 52.3, the highest figure of the municipalities of Genoa. However, the area is also attractive for the population of the center of Genoa, who often stroll along Corso Italia. In particular for children, families and young people there are various services such as playgrounds, soccer fields, shops and discos.



Average age, old age index, spare index



*Resident population by age group*



*Resident families by number of components*

## 2.2 Population services



### Children services

- 1 Elementary schools *Nazario Sauro*
- 2 Playground and skatepark
- 3 Mako Discoteque
- 4 Time Discoteque
- 5 Kindergarten *Boccadasse*

### Family services

- 6 Kindergarten *Foce*
- 7 State high school *Pertini*
- 8 *Esselunga* market
- 9 U.S.D. *Polis Genova 1993*
- 10 *Ekom* market

### Youth attractions

### 3. Proposal Drawings

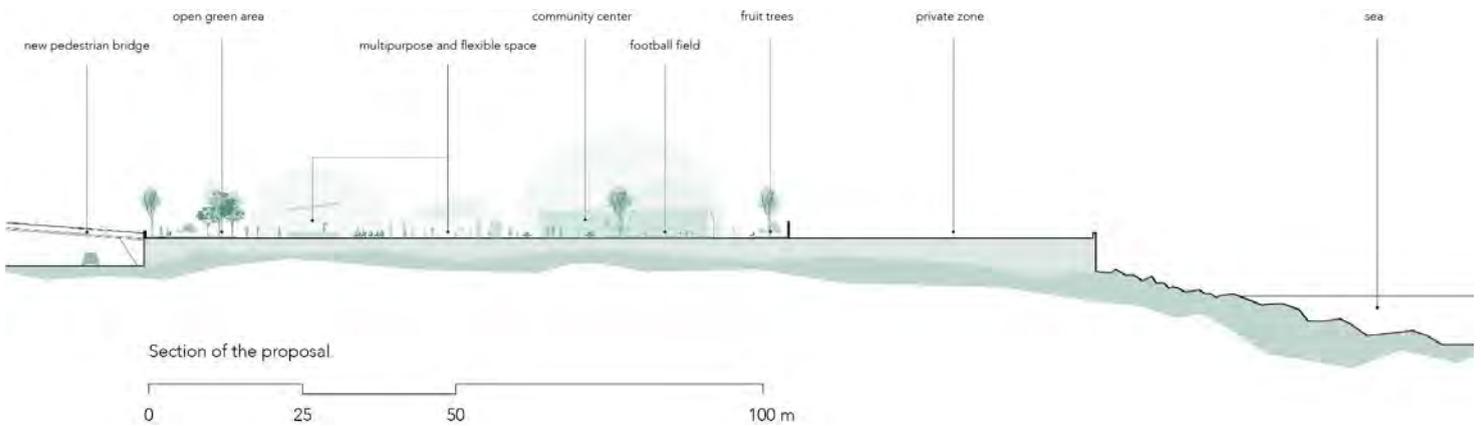
#### 3.1 Site plan of the proposal

As said previously, one of the main objectives of the project proposal is to give a new life to the Punta Vagno park so that it becomes a place where people from every generation can come to practice various activities and social gathering. In that sense, the abandoned building that currently sits in the park would be reused for a community center, offering various services for diverse age groups. The main piece of the project consists in a large, open flexible space that can be used for a large selection of events and happenings (see 3.3) without disrupting the rest of the park. Keeping the skatepark and the playground was also a fundamental part of the project, since they are actually used in the current state, meaning there's a demand for these services, then implementing various green strategies.

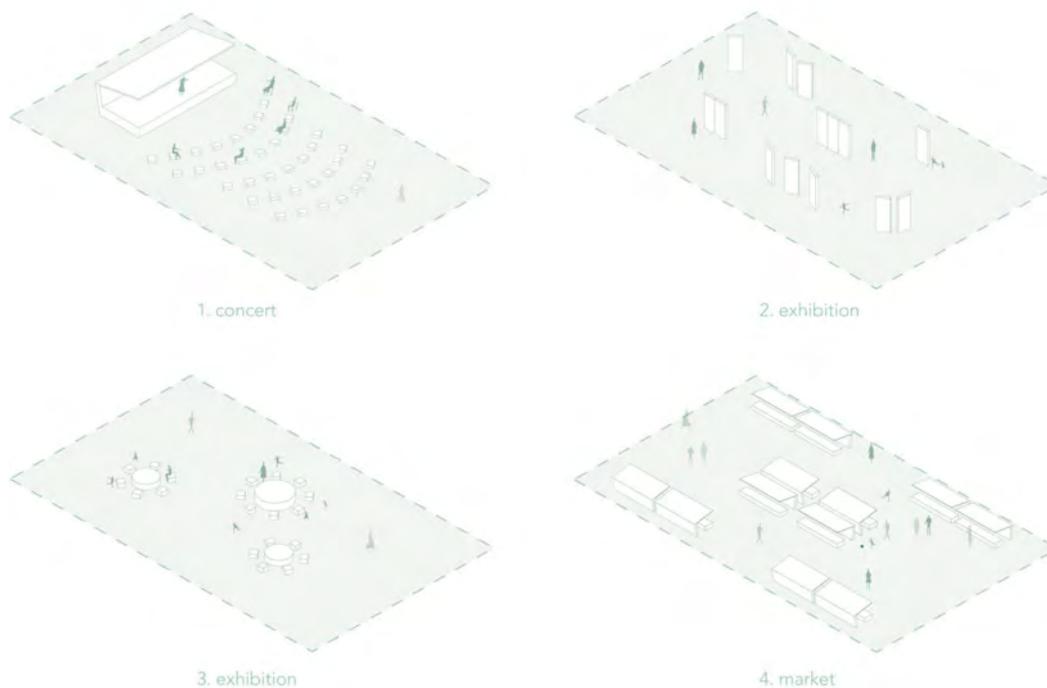


- |   |   |    |   |
|---|---|----|---|
| 1 | open green areas                        | 8  | Nazario Sauro public elementary school              |
| 2 | skatepark                               | 9  | spontaneous closed green spaces (wild biodiversity) |
| 3 | multipurpose space                      | 10 | shaded green roofs                                  |
| 4 | children playground                     | 11 | artificial ponds                                    |
| 5 | tennis court                            | 12 | scenic viewpoint                                    |
| 6 | football field                          | 13 | wind breaker/shade provider tree implementation     |
| 7 | refurbished and reused community center | 14 | new access points                                   |

### 3.2 Section of the proposal



### 3.3 Axonometric views of some uses of the flexible space



These axonometric views show some ideas of the various uses that could take place in the large flexible spaces. Some of those usages could also contribute economically to the project, such as a public market or fundraising events (see chapter 6).

### 3.4 Sketches of the project perspective



*view of the shaded green roofs and wind-breaker tree implement*



*view of the open flexible space*



*view of the pedestrian bridge connecting Punta Vagno to Corso Italia*

*view of the spontaneous green space (wild biodiversity)*



## 4. Nature Based Solutions Specifications

### 4.1 Selection of NBS for Punta Vagno

This technical description focuses on the nature-based solutions (NBS) implemented in the Punta Vagno regeneration project in Genoa. The NBS interventions aim to address various planetary urgencies while promoting sustainable development within the urban context. The selected NBS for this project include urban gardens, a group of trees, smart roofs, green façades, retention/detention ponds, rain gardens, permeable paving systems, biofilters (water purification), and free-standing living walls. The specifications and technical requirements for these NBS can be found in the UNaLab NBS Technical Handbook Factsheets (UNaLab, 2022).

#### 1. Urban Gardens:

Urban gardens are an essential component of the Punta Vagno regeneration project. These green spaces provide multiple benefits, including cooling services, water balance and purification, natural hazard mitigation, improved air quality, enhanced biodiversity services, public health improvements, and food production. The urban gardens incorporate various plant species, including edible plants, which contribute to the project's goals of food energy and materials production.

#### 2. Group of Trees:

A carefully selected group of trees is integrated into the project to provide cooling services, regulate water balance and purification, mitigate natural hazards, improve air quality, enhance biodiversity, promote public health, and contribute to carbon sequestration. These trees and shrubs are strategically placed to provide shade, reduce heat island effect, and create a welcoming and green environment.

#### 3. Smart Roofs:

Smart roofs are employed in the Punta Vagno regeneration project to address cooling services, water balance and purification, natural hazard mitigation, air quality improvement, biodiversity conservation, public health enhancement, food production, and carbon sequestration. These green built environment features incorporate vegetation, innovative technologies, and intelligent design to optimize energy efficiency, regulate temperature, and reduce stormwater runoff.

#### 4. Green Façades:

Green façades are integrated into the project to provide cooling services, regulate water balance and purification, mitigate natural hazards, improve air quality, enhance biodiversity, promote public health, and contribute to carbon sequestration. These vegetated vertical surfaces are designed to reduce heat absorption, enhance insulation, and provide habitat for flora and fauna.

#### 5. Retention/Detention Ponds:

Retention/detention ponds are natural and semi-natural water storage and transport structures that play a crucial role in the Punta Vagno regeneration project. These ponds address cooling services, water balance and purification, natural hazard mitigation, air quality improvement, biodiversity services, public health improvements, food production, and carbon sequestration. They help manage stormwater runoff, improve water quality, reduce flood risks, and provide habitats for aquatic species.

#### 6. Rain Gardens:

Rain gardens are infiltration, filtration, and biofiltration structures that contribute to cooling services, water balance and purification, natural hazard mitigation, air quality improvement, biodiversity services, public health improvements, food production, and carbon sequestration. These gardens help manage stormwater runoff, filter pollutants, recharge groundwater, and support the growth of vegetation.

#### 7. Permeable Paving Systems:

Permeable paving systems are employed to address cooling services, water balance and purification, natural hazard mitigation, air quality improvement, biodiversity services, public health improvements, food production, and carbon sequestration. These systems allow the infiltration of rainwater, reducing stormwater runoff, preventing flooding, and improving water quality.

#### 8. Biofilters (Water Purification):

Biofilters, specifically designed for water purification, are incorporated into the Punta Vagno regeneration project. These infiltration, filtration, and biofiltration structures contribute to cooling services, water balance and purification, natural hazard mitigation, air quality improvement, biodiversity services, public health improvements, food production, and carbon sequestration. They remove pollutants, sediment, and excess nutrients from water, enhancing its quality.

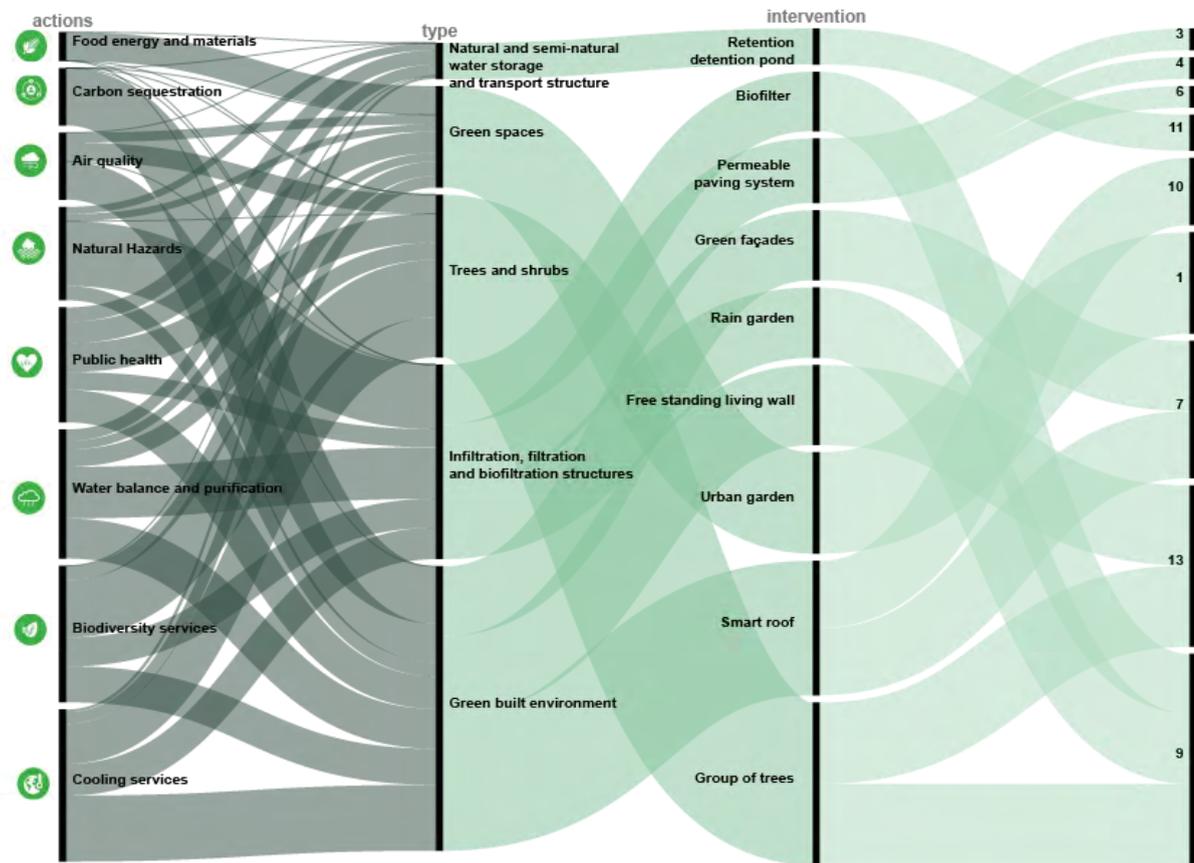
#### 9. Free-Standing Living Walls:

Free-standing living walls are integrated into the project to provide cooling services, regulate water balance and purification, mitigate natural hazards, improve air quality, enhance biodiversity, promote public health, and contribute to carbon sequestration. These vertical structures covered with vegetation enhance aesthetics, provide thermal insulation, and contribute to the overall well-being of the urban environment.

In conclusion, the Punta Vagno regeneration project in Genoa incorporates a range of nature-based solutions that address multiple planetary urgencies. The combination of urban gardens, groups of trees, smart roofs, green façades, retention/detention ponds, rain gardens, permeable paving systems, biofilters, and free-standing living walls creates a sustainable and resilient urban environment. These nature-based solutions provide a multitude of ecological, social, and economic benefits while contributing to the overall sustainability of the project.

## 4.2 Technical Specifications

In the Sankey diagram presented below, the relationship between each nature-based solution (NBS) and the planetary challenges is illustrated. Each NBS contributes to addressing multiple planetary urgencies, and the technical requirements for each NBS are outlined based on the information provided in the UNaLab NBS Technical Handbook Factsheets (UNaLab, 2022).



Retention detention pond



Green façades



Urban garden



Biofilter



Rain garden



Smart roof



Permeable paving system



Free standing living wall



Group of trees

### 1. Urban Gardens:

#### Technical Requirements:

- Adequate sunlight exposure for plant growth
- Proper soil quality and drainage
- Irrigation system for watering plants
- Selection of appropriate plant species, including edible plants
- Maintenance and regular care to ensure healthy plant growth

### 2. Group of Trees:

#### Technical Requirements:

- Selection of tree species suitable for the local climate and environment
- Sufficient space for tree growth and root expansion
- Proper soil conditions and drainage
- Irrigation system, especially during establishment phase
- Regular pruning and maintenance for healthy tree growth

### 3. Smart Roofs:

#### Technical Requirements:

- Structural analysis and design considerations to support the weight of vegetation and associated systems
- Waterproofing and insulation materials for roof protection and energy efficiency
- Plant selection based on local conditions and maintenance requirements
- Monitoring and control systems for irrigation and moisture management
- Integration of smart technologies for energy optimization and data collection

### 4. Green Façades:

#### Technical Requirements:

- Analysis of building structure and façade capacity to support vegetation growth
- Selection of suitable climbing plants or vertical gardening systems
- Adequate irrigation and moisture management system
- Proper attachment mechanisms and support structures for plant growth
- Regular maintenance and pruning to control plant growth and ensure safety

### 5. Retention/Detention Ponds:

#### Technical Requirements:

- Design and construction of ponds with appropriate dimensions and storage capacity
- Proper selection and installation of liners and geomembranes for water retention
- Integration of natural filtration and purification systems within the pond structure
- Consideration of water flow dynamics and hydraulic control mechanisms
- Monitoring and maintenance of water quality and sedimentation levels

### 6. Rain Gardens:

#### Technical Requirements:

- Proper design and construction of infiltration basins to capture and absorb stormwater
- Selection of suitable plants and vegetation for rain garden resilience
- Consideration of soil composition and drainage for optimal water infiltration

- Regular maintenance to prevent clogging and ensure vegetation health
- Integration of overflow mechanisms for excessive rainfall events

#### 7. Permeable Paving Systems:

##### Technical Requirements:

- Selection of permeable paving materials with appropriate load-bearing capacity
- Proper sub-base design to facilitate water infiltration and drainage
- Maintenance of permeable surfaces to prevent clogging and ensure functionality
- Regular inspection and cleaning to maintain permeability
- Consideration of local climate and freeze-thaw conditions for durability

#### 8. Biofilters (Water Purification):

##### Technical Requirements:

- Design and construction of biofilter systems with appropriate dimensions and filter media
- Integration of vegetation and microbial communities for water purification
- Consideration of hydraulic control and water flow dynamics
- Regular monitoring of water quality parameters
- Maintenance and replacement of filter media as needed

#### 9. Free-Standing Living Walls:

##### Technical Requirements:

- Selection of suitable plant species based on light requirements and maintenance considerations
- Structural analysis and design of living wall systems
- Proper irrigation and nutrient supply systems for plant growth
- Integration of appropriate support structures and anchoring mechanisms
- Regular maintenance, pruning, and monitoring for plant health and stability

In conclusion, the Sankey diagram visually represents the relationship between each nature-based solution and the planetary challenges addressed in the Punta Vagno regeneration project. The technical requirements for each NBS are crucial in ensuring their successful implementation and functionality in mitigating environmental issues and promoting sustainability.

## 5. Catalog of Plants Specific Solutions

### 5.1 Selection of Plants for each Green portion

Plant species have been selected according to the peculiarities and the purposes of each of the planned NBS, taking into account the environmental characteristics of the site. All the selected plants are native species of the Ligurian region that can be easily found in different habitats of the Mediterranean area: maquis, grassland and wood. Since Punta Vagno stands on a sewage treatment plant, the only feasible green strategy consists of a hanging green system in which soil scarcity represents one of the main limiting factors.

Moreover, the site's close proximity to the sea causes high salinity of the air that, in turn, affects the salt concentration in the soil. Therefore, the substrate thickness and the salinity have been the two main factors that led the plant selection: all the species identified are herbaceous or shrubby plants adapted to these environmental conditions or able to withstand these types of stress.

Another relevant criteria for the choice of plants is the request for human management: all the selected plants must require low maintenance practices, mainly in terms of irrigation, pruning and fertilization. To this purpose we selected plants of the Mediterranean flora that are adapted to summer drought and direct solar radiation, and that are characterized by a low rate of growth. Moreover, all the identified species play a key role in enhancing the local biodiversity, thanks to their interactions with other organisms, in particular animals (Arthropods, Birds, Reptiles and small Mammals) and Bacteria (e.g, Nitrogen-fixing bacteria). Therefore, 1. the ability to live in shallow substrate, 2. the resistance to air and soil salinity, 3. the low water requirement and the resistance to drought, 4. the low human maintenance requirement, and 5. the ability to establish multi-trophic interactions, are the overarching ecological objectives that led the identification of suitable plant species in all the planned green areas.

Thereafter, for each green area we applied a second set of selection criteria according to its specific purposes, its technical and environmental characteristics, and the stakeholders (human and non-human).

In a more detailed way:

1. For the open green areas we selected shrub species of the Mediterranean maquis that have no toxicity or other dangerous vegetal structures (e.g, thorns) to allow contact with people, and that have a low rate of growth, to limit the pruning treatments. Moreover, we plan to distribute a layer of a few centimeters of mulch between the bushes in order to counteract colonization by invasive species, to limit the loss of water from the soil by evaporation and to maintain a more constant temperature of the substrate avoiding strong thermal fluctuations.

2. For the spontaneous closed green spaces we selected shrub and herbaceous plant species that will be left free to grow and to complete their vegetative cycle. The main objectives of this green area are 1. promoting the self-propagation of plants, mowing them only after the seed dispersion, and 2. favoring the multi-trophic interactions with non-human organisms (mainly plant-insect-bird interactions). By doing so we will obtain a system closed to the public able to spontaneously self-maintaining and self-perpetuating over time, and that requires a very low human management. This is also allowed by the selection of plant species of the Poaceae and the Fabaceae families. In fact, the firsts are able to counteract the colonization and the spread of invasive plant species thanks to the barrier created by their dense system of leaves bases, while the seconds contribute to the soil fertilization thanks to the nitrogen-fixing bacteria of the roots. Moreover, given the close proximity to the coast, for this green system we planned to create two vegetation belts: 1. a shrub edge in the south portion (more sea-facing) made by typical Mediterranean Maquis shrubs that are very resistant to salinity, 2. a wildflowers system made by herbaceous species, less adapted to salinity. In this way the shrub belt is able to prevent the herbaceous species from direct marine aerosol exposition.

3. For the shaded green roofs, given the little amount of soil, we selected small shrub species, characterized by superficially widespread root systems, and herbaceous hardy species. The latter also included species of the Fabaceae family to improve the soil fertility, and species of the Poaceae family, to counteract invasive plant species with their dense system of leaves bases. This system plays a relevant role also in preventing the water evaporation from soil. All the selected species are very resistant to drought and to salinity. Moreover, shrub species are characterized by light-colored leaves able to reflect much of the solar radiation (high level of albedo), that limit water loss due to evapotranspiration and, at the same time, limit air heating of the below and surrounding green roofs areas.

4. For the wind breaker/shade provider "tree" implement, we selected Mediterranean shrubs able to achieve 2 or 3 meters of height even if in a small amount of soil. Because of this plant structure, these species provide a first barrier against wind marine aerosols and a source of shade for people.

5. For the children's playground, the selection of the species has been carried out according to an educational and sensory purpose. For this reason, all the identified species are aromatic and officinal species able to stimulate various senses (mainly touch and smell). During the selection we took care to avoid plants that may be hazardous to children due to the presence of poisons, allergenic or irritating substances, or dangerous structures such as thorns. Moreover, the attraction and the interaction of the selected plants with animals, could be an opportunity to observe the ecological processes and educate children to respect nature and biodiversity.

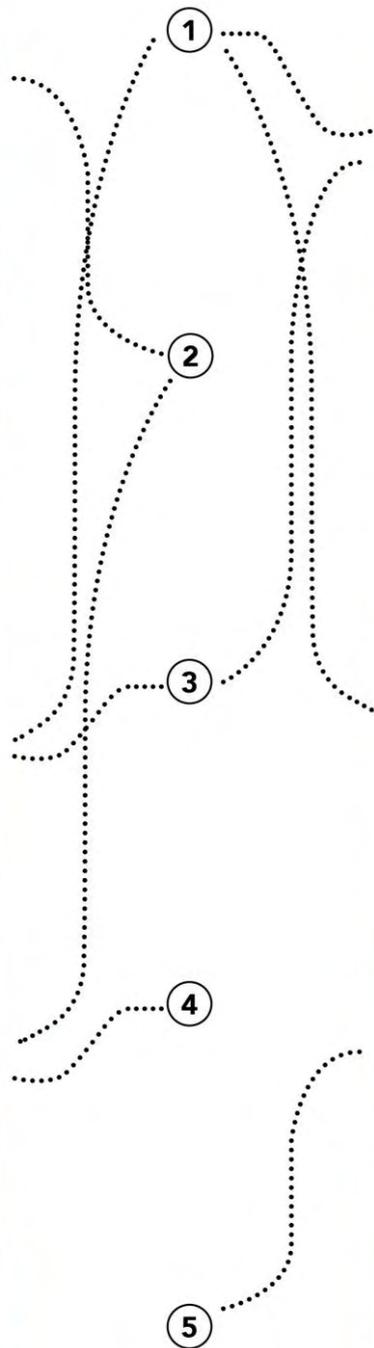
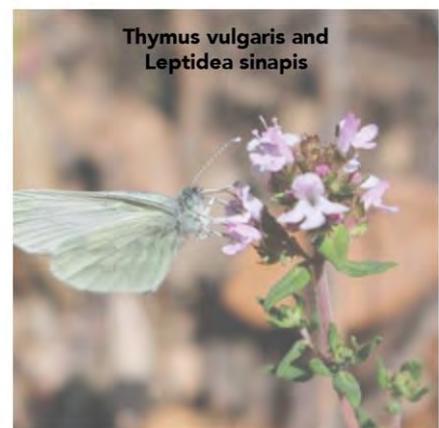
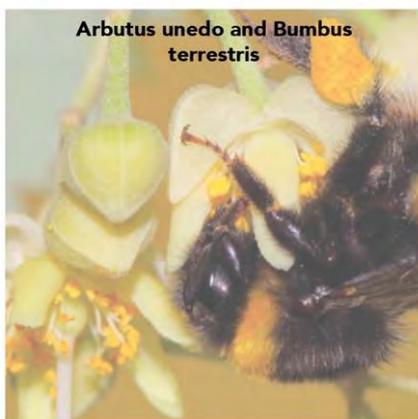
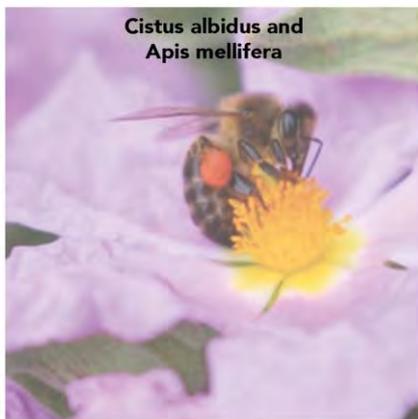
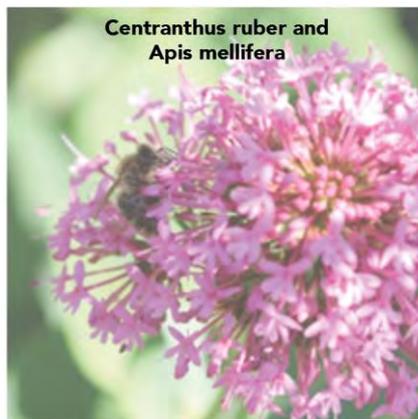
Below is a table with the list of all species according to their use in the different green strategies of the project. The fourth column of the table is relevant as it lists the main animal species that interact with each of the plant species and that play a pivotal role in promoting and maintaining ecosystem functions and processes. In the last column can be found some plant peculiarities relevant for their employment in urban green spaces.

Green portion	Species	Life form	Trophic interactions	Peculiarities
Open green areas	<i>Cistus albidus</i> L.	Small shrub	Pollen and nectar for Hymenoptera (Apidae family, e.g., <i>Apis mellifera</i> ), Coleoptera (e.g., <i>Oxythyrea funesta</i> ) and Diptera.	Evergreen with light-colored leaves due to trichomes
	<i>Cistus salviifolius</i> L.	Small shrub	Pollen and nectar for Hymenoptera (Apidae family, e.g., <i>Apis</i> spp.; Vespidae family), Coleoptera (Dasytidae family), Diptera. Nectar for ants.	Evergreen
	<i>Euphorbia dendroides</i> L.	Small shrub	Pollen for Hymenoptera (Apidae family, e.g., <i>Apis</i> spp.); Vespidae family), Diptera and Reptilia (Lacertidae family)	Summer leaf loss (aestivation). Yellow green leaves in winter/spring and red leaves in late spring
	<i>Jacobaea maritima</i> (L.) Pels & Meijden	Small shrub	Pollen for Hymenoptera	Light-colored leaves due to trichomes and creeping surface rhizomes
	<i>Myrtus communis</i> L.	Small shrub	Pollen and nectar for Hymenoptera (Anthophoridae family, Megachilidae family). Fruits for frugivorous birds (e.g., <i>Erithacus rubecula</i> , <i>Sylvia atricapilla</i> , <i>S. melanocephala</i> , <i>Phoenicurus ochruros</i> , <i>Parus major</i> , <i>Turdus merula</i> , <i>Fringilla coelebs</i> and <i>Ficedula hypoleuca</i> )	Evergreen aromatic plant, with scented flowers and berries
	<i>Pistacia lentiscus</i> L.	Shrub	Seeds and fruits as a food source for Hymenoptera (Chalcidoidea family), Lepidoptera larvae (moths of Gelechiidae family) and frugivorous birds (Fringillidae family; Sylviidae family e.g., <i>Sylvia atricapilla</i> ; Turdidae family e.g., <i>Erithacus rubecula</i> )	Evergreen wind pollinated plant
	<i>Salvia rosmarinus</i> Spenn.	Small shrub	Pollen and nectar for Hymenoptera (Andrenidae family; Halictidae family; <i>Apis</i> spp.)	Evergreen aromatic plant, with leathery tight leaves
	<i>Tanacetum vulgare</i> L.	Small shrub	Pollen for Hymenoptera (e.g., <i>Apis</i> spp.), Coleoptera (Phalacridae family, mainly <i>Olibrus</i> spp.) and Diptera	Aromatic plant with surface rhizome
	<i>Teucrium fruticans</i> L.	Small shrub	Pollen for Hymenoptera (e.g. <i>Apis</i> spp. and <i>Xylocopa violacea</i> )	Dense shrub with light-colored leaves
Spontaneous closed green spaces (wildflower + shrub edge)	<i>Achillea millefolium</i> L.	Erbaceous	Pollen and nectar for Hymenoptera (Andreninae family e.g., <i>Andrena</i> spp., Megachilidae family, and Halictidae family). Caterpillar (Lepidoptera) feed plant (e.g., Moths)	Aromatic plant
	<i>Arbutus unedo</i> L.	Shrub	Pollen and nectar for Hymenoptera (Apidae family, e.g., <i>Bombus terrestris</i> and <i>Apis mellifera</i> ). Fruits for frugivorous birds (Turdidae family)	Evergreen plant with red edible fruits. In spring it bears fruit (red), flowers (white) and leaves (green) simultaneously; for this reason it represents the Italian flag
	<i>Centranthus ruber</i> (L.) DC	Erbaceous	Pollen for Lepidoptera (including moths), Hymenoptera (Apidae family, e.g., <i>Bombus</i> spp. and <i>Apis mellifera</i> ) and Diptera (Syrphidae family)	Very resistant plant to stress condition
	<i>Dactylis glomerata</i> L.	Erbaceous	Caterpillar food plant (Satyriinae family e.g., <i>Pyronia tithonus</i> ). Seeds for insects and nest for Hymenoptera (e.g., <i>Bombus</i> spp.)	Dense leaves basis able to counteract soil erosion and invasive species colonization
	<i>Daucus carota</i> L.	Erbaceous	Pollen and nectar for Hymenoptera (Sphécidae family; Apidae family e.g., <i>Apis</i> spp.), Diptera (Calliphoridae family, Stratiomyidae family and Syrphidae family), Coleoptera (Cerambycidae family), Lepidoptera (including moths). Caterpillar (Lepidoptera) food plant	
	<i>Euphorbia dendroides</i> L.	Shrub	Pollen for Hymenoptera (Apidae family, e.g., <i>Apis</i> spp.; Vespidae family), Diptera and Reptilia (Lacertidae family)	Summer leaf loss (aestivation). Yellow green leaves in winter/spring and red leaves in late spring
	<i>Limonium avei</i> (De Not.) Brullo & Erben	Erbaceous	Pollen for Hymenoptera (Formicidae family e.g., <i>Tapinoma</i> spp.) and Lepidoptera (Tortricidae family)	
	<i>Malva sylvestris</i> L.	Erbaceous	Pollen and nectar for Hymenoptera (Apidae family, e.g. <i>Apis mellifera</i> , <i>Bombus</i> spp.), Lepidoptera and Diptera (Syrphidae family). Caterpillar (Lepidoptera) food plant (including moths)	
	<i>Phillyrea angustifolia</i> L.	Shrub	Fruits for frugivorous birds (Paridae family e.g. <i>Parus</i> spp.; Fringillidae family; Turdidae family e.g., <i>Turdus</i> spp., Sylviidae family e.g., <i>Sylvia</i> spp.)	Evergreen wind pollinated plant with berries fruits

Green portion	Species	Life form	Trophic interactions	Peculiarities	
Spontaneous closed green spaces (wildflower + shrub edge)	<i>Poa annua</i> L., <i>P. pratensis</i> L., <i>P. trivialis</i> L.	Erbaceous	Caterpillar (Lepidoptera) food plant (Satyriinae family e.g., <i>Pyronia tithonus</i> ). Seeds for arthropoda (e.g. <i>Lumbricus terrestris</i> ) and for granivorous birds	Dense leaves basis able to counteract soil erosion and invasive species colonization	
	<i>Salvia pratensis</i> L.	Erbaceous	Pollen and nectar for Hymenoptera (Apoidea family e.g., <i>Apis mellifera</i> ) and Lepidoptera. Attractor of Diptera (e.g., Syrphid family)		
	<i>Silene latifolia</i> Poir.	Erbaceous	Pollen for Lepidoptera (moth e.g., <i>Hadena bicurris</i> )		
	<i>Torilis arvensis</i> (Huds.) Link	Erbaceous	Pollen and nectar for Hymenoptera (Apidea family, e.g., <i>Apis</i> spp. and Vespidae family), Coleoptera and Diptera. Caterpillar (Lepidoptera) food plant. Seeds for granivorous birds		
	<i>Trifolium arvense</i> L.	Erbaceous	Pollen for Hymenoptera (Apidae family e.g., <i>Bombus terrestris</i> , <i>Bombus pascuorum</i> , <i>Bombus hortorum</i> , <i>Apis mellifera</i> ) and Lepidoptera	Soil fertilizer thanks to nitrogen-fixing root bacteria	
	<i>Trifolium pratense</i> L.	Erbaceous	Pollen for Hymenoptera (Apidae family e.g., <i>Bombus terrestris</i> , <i>Bombus pascuorum</i> , <i>Bombus hortorum</i> , <i>Apis mellifera</i> ) and Lepidoptera	Soil fertilizer thanks to nitrogen-fixing root bacteria	
Shaded green roofs	<i>Achillea millefolium</i> L.	Erbaceous	Pollen and nectar for Hymenoptera (Andreninae family, mainly <i>Andrena</i> spp., Megachilidae family; Halictidae family). Caterpillar (Lepidoptera) food plant (e.g. moths)	Aromatic plant	
	<i>Artemisia arborescens</i> (Vaill.) L.	Small shrub	Pollen and nectar for Hymenoptera (Apidea family e.g., <i>Apis</i> spp.; Vespidae family), Coleoptera and Diptera. Caterpillar (Lepidoptera) food plant	Light-colored leaves	
	<i>Artemisia vulgaris</i> L.	Erbaceous	Caterpillar (Lepidoptera) food plant	Wind pollinated plant	
	<i>Cistus albidus</i> L.	Small shrub	Pollen and nectar for Hymenoptera (Apidae family, e.g., <i>Apis mellifera</i> ), Coleoptera (e.g., <i>Oxythya funesta</i> ) and Diptera	Evergreen with light-colored leaves due to trichomes	
	<i>Dactylis glomerata</i> L.	Erbaceous	Caterpillar food plant (Satyriinae family e.g., <i>Pyronia tithonus</i> ). Seeds for insects and nest for Hymenoptera (e.g., <i>Bombus</i> spp.)	Dense leaves basis able to counteract soil erosion and invasive species colonization	
		<i>Lavandula angustifolia</i> Mill.	Small shrub	Pollen and nectar for Hymenoptera (Apidae family, e.g., <i>Bombus terrestris</i> , <i>B. pascuorum</i> , <i>Apis</i> spp.; Megachilidae family), Lepidoptera (Sphingidae family; Lycaenidae family; Pieridae family e.g., <i>Pieris rapae</i> ; Papilionidae family; Nymphalidae family), Diptera ( <i>Bombylius</i> spp.) and Coleoptera (Cantharidae family)	Evergreen aromatic plant with light-colored tight leaves
		<i>Lotus corniculatus</i> L.	Erbaceous	Pollen for Hymenoptera (Apidae family, mostly <i>Bombus</i> spp.)	Soil fertilizer thanks to nitrogen-fixing root bacteria
		<i>Poa annua</i> L., <i>P. pratensis</i> L., <i>P. trivialis</i> L.	Erbaceous	Caterpillar (Lepidoptera) food plant (Satyriinae family e.g., <i>Pyronia tithonus</i> ). Seeds for arthropoda (e.g. <i>Lumbricus terrestris</i> ) and for granivorous birds	Dense leaves basis able to counteract soil erosion and invasive species colonization
		<i>Teucrium fruticans</i> L.	Small shrub	Pollen for Hymenoptera (e.g. <i>Apis</i> spp. and <i>Xylocopa violacea</i> )	Dense shrub with light-colored leaves
		<i>Trifolium arvense</i> L.	Erbaceous	Pollen for Hymenoptera (Apidae family e.g., <i>Bombus terrestris</i> , <i>Bombus pascuorum</i> , <i>Bombus hortorum</i> , <i>Apis mellifera</i> ) and Lepidoptera	Soil fertilizer thanks to nitrogen-fixing root bacteria
	<i>Trifolium pratense</i> L.	Erbaceous	Pollen for Hymenoptera (Apidae family e.g., <i>Bombus terrestris</i> , <i>Bombus pascuorum</i> , <i>Bombus hortorum</i> , <i>Apis mellifera</i> ) and Lepidoptera	Soil fertilizer thanks to nitrogen-fixing root bacteria	
Wind beaker/ shade provider tree implement	<i>Chamaerops humilis</i> L.	Small tree	Pollinated by a specific coleoptera ( <i>Derelomus chamaeropsis</i> ) and nurse plant of it	Autochthonous palm	
	<i>Arbutus unedo</i> L.	High shrub	Pollen and nectar for Hymenoptera (Apidae family e.g., <i>Bombus terrestris</i> and <i>Apis mellifera</i> ). Fruits for frugivorous birds (Turdidae family)	Evergreen plant with red edible fruits. In spring it bears fruit (red), flowers (white) and leaves (green) simultaneously; for this reason it represents the Italian flag	
	<i>Pistacia lentiscus</i> L.	Shrub	Seeds and fruits as a food source for Hymenoptera (Chalcidoidea family), Lepidoptera larvae (moths of Gelechioidea family) and frugivorous birds (Fringillidae family; Sylviidae family e.g., <i>Sylvia atricapilla</i> ; Turdidae family e.g., <i>Erithacus rubecula</i> )	Evergreen wind pollinated plant	
	<i>Phillyrea latifolia</i> L.	High shrub	Fruits for frugivorous birds (Paridae family e.g. <i>parus</i> spp.; Fringillidae family; Turdidae family e.g., <i>Turdus</i> spp., Sylviidae family e.g., <i>Sylvia</i> spp.)	Evergreen wind pollinated plant with berries fruits	
Children playground	<i>Calendula arvensis</i> (Vaill.) L.	Erbaceous	Pollen for Hymenoptera (Halictidae family), Diptera, Heteroptera and Coleoptera	Official plant with tomentose leaves	
	<i>Crithmum maritimum</i> L.	Erbaceous	Pollen for Hymenoptera (Vespidae family) and Diptera (Syrphidae family)	Official plant with semi-succulent leaves	
		<i>Lavandula angustifolia</i> Mill.	Small shrub	Pollen and nectar for Hymenoptera (Apidae family, e.g., <i>Bombus terrestris</i> , <i>B. pascuorum</i> , <i>Apis</i> spp.; Megachilidae family), Lepidoptera (Sphingidae family; Lycaenidae family; Pieridae family e.g., <i>Pieris rapae</i> ; Papilionidae family; Nymphalidae family), Diptera ( <i>Bombylius</i> spp.) and Coleoptera (Cantharidae family)	Evergreen aromatic plant with light-colored tight leaves
		<i>Lavandula stoechas</i> L.	Small shrub	Pollen and nectar for Hymenoptera (Apidae family e.g., <i>Apis</i> spp. and <i>Bombus</i> spp., mostly <i>Bombus terrestris</i> )	Evergreen aromatic plant
		<i>Myrtus communis</i> L.	Small shrub	Pollen and nectar for Hymenoptera (Apoidea family; Anthophoridae family; Megachilidae family). Fruits for frugivorous birds (e.g., <i>Erithacus rubecula</i> , <i>Sylvia atricapilla</i> , <i>S. melanocephala</i> , <i>Phoenicurus ochruros</i> , <i>Parus major</i> , <i>Turdus merula</i> , <i>Fringilla coelebs</i> and <i>Ficedula hypoleuca</i> )	Evergreen aromatic plant, with scented flowers and berries fruits
		<i>Salvia rosmarinus</i> Spenn.	Small shrub	Pollen and nectar for Hymenoptera (Andrenidae family, Apidea family e.g., <i>Apis</i> spp. and Halictidae family)	Evergreen aromatic plant with tight leaves
		<i>Tanacetum vulgare</i> L.	Small shrub	Pollen for Hymenoptera (Apidea family e.g., <i>Apis</i> spp.), Coleoptera (Phalacridae family, mainly <i>Olibrus</i> spp.) and Diptera	Official plant
		<i>Thymus vulgaris</i> L.	Small shrub	Pollen and nectar for Hymenoptera (Apidae family e.g., <i>Apis</i> spp. and Vespidae family) and Lepidoptera (e.g., <i>Leptidea sinapis</i> )	Official evergreen plant

## 5.2 Plants and pollinators

- 1 - Open green areas
- 2 - Spontaneous closed green spaces (wildflower + shrub edge)
- 3 - Shaded green roofs
- 4 - Windbreak/shade provider tree implement
- 5 - Children playground



## 6. Potential Stakeholder Engagement Strategies

We have come up with multiple strategies to include the various stakeholder groups in the Punta Vagno area. To target each group effectively, different actions will be taken at different times in the construction process.

Early construction phase:

The first part of the site that will be finished during the construction is the multi-usage space for cultural and economic activities. We want to work with various cultural centers throughout the city and invite them to host activities and showcase their work to a wider audience.

Local producers of small brands will be invited to promote and sell their products at various fairs and flea markets. In this setting, also local farmers and people with small companies working in food processing will be able to hold a market where vegetables, cheese, ham and other ingredients and even small dishes typical to Genovese cuisine can be bought.

Artists and artist collectives will be invited to fill the space with exhibitions or performances to attract local population and establish Punta Vagno as a new space where people get together, enjoy arts and catch some fresh sea air.

Apart from opening the space to performative arts and exhibitions, we also want to enable residents to realize their own projects and host workshops, teach what they're good at, give a reading or initiate any kind of space for encounter between people and people and people and nature.

Finally, we want to mention the on-site restaurant as an important partner in this project. The multi-usage space could serve as an extended guest garden at certain times. To host big food evenings and events, the local knowledge and infrastructure of the restaurant and its staff will be a great asset.

Later construction phases:

As the other parts of Punta Vagno take on form and the more secluded areas dedicated to recreational activities next to the sea side get closer to being finished, we start the next phase of our stakeholder engagement strategy.

The surrounding schools will be invited to bring their classrooms and explore the numerous opportunities and discoveries that the new Punta Vagno has to offer. Parts of Punta Vagno could be made accessible at certain times to facilitate physical education classes of the students. This needs to happen in close cooperation with the other user groups to ensure smooth co-usage of the space.

To expand the educational potential of the new Punta Vagno, the cultural center could also organize various workshops and teachings related to the local plant and pollinator species. Children could learn playfully which kind of plants and animals they share the space with and what it means to co-exist in harmony.

Locals from the skateboarding scene will be invited to make use of the new Punta Vagno park to discover a new spot where they can film unique contents and simply enjoy riding next to the sea. Events for newcomers and aspiring young enthusiasts could be held to expand the popularity of this sport as well as the visibility of Punta Vagno as a suitable spot to meet up and practice.

Through the ongoing and active involvement of the different stakeholder groups we hope to establish Punta Vagno as a new meeting point in the city. By the time constructions are finished, many people will have contributed to the creation of this new area and feel a sense of identity connected to it. This is the main aim of the community-building focus of Punta Vagno and will be a big contribution to the ongoing and active involvement of the people.

## 7. Business Model Canvas for NBS

<p><b>Key Activities:</b></p> <ul style="list-style-type: none"> <li>● remove concrete</li> <li>● rebuild designated spaces</li> <li>● plant trees and native plants</li> <li>● revive community center</li> <li>● partner with Nazario Sauro public elementary school and universities: educational learning and safekeeping from bees</li> <li>● maintenance training/workshop for the community</li> <li>● Ensuring safety at night</li> <li>● Provide sanitary installations and drinking fountains</li> </ul>	<p><b>Key Resources</b></p> <ul style="list-style-type: none"> <li>● plants</li> <li>● building materials</li> <li>● insect hotels</li> <li>● playground facilities</li> <li>● benches</li> <li>● rentable equipment for fairs and games</li> <li>● budget</li> <li>● expertise</li> </ul>	<p><b>Value proposition</b></p> <p><u>Environmental:</u></p> <ul style="list-style-type: none"> <li>● biodiversity enhancement</li> <li>● provision of shade</li> <li>● battling the heat island effect</li> <li>● climate change adaptation and mitigation</li> </ul> <p><u>Social:</u></p> <ul style="list-style-type: none"> <li>● space for social cohesion</li> <li>● improved access to health promoting leisure activities for all age groups</li> <li>● easy and inclusive access through two new accesses</li> </ul> <p><u>Economic:</u></p> <ul style="list-style-type: none"> <li>● event/multipurpose space for community</li> <li>● enhancing the attractiveness of surrounding living area</li> <li>● economic stimulus for local businesses and adjacent restaurant</li> </ul> <p><u>Other:</u></p> <ul style="list-style-type: none"> <li>● green connection of the promenade and Purta Magno to the rest of the city</li> </ul> <p><u>Trade-offs:</u></p> <ul style="list-style-type: none"> <li>● higher noise pollution</li> <li>● safety concerns</li> </ul>	<p><b>Key Partners</b></p> <ul style="list-style-type: none"> <li>● community</li> <li>● construction firm</li> <li>● gardeners</li> <li>● municipality</li> <li>● Nazario Sauro public elementary school</li> <li>● local universities</li> <li>● residents</li> </ul>	<p><b>Key Beneficiaries</b></p> <ul style="list-style-type: none"> <li>● community</li> <li>● municipality</li> <li>● surrounding residents and businesses</li> <li>● Nazario Sauro public elementary school</li> </ul>
<p><b>Governance</b></p> <p>Societal Resilience</p>		<p><b>Cost Reduction</b></p> <ul style="list-style-type: none"> <li>● long-term lower health care costs for the government (better air quality)</li> <li>● low maintenance costs due to native plant species and care taking by the community</li> </ul>	<p><b>Capturing Value</b></p> <p>Revenue of use of multipurpose space</p> <ul style="list-style-type: none"> <li>● concerts</li> <li>● sports events</li> <li>● fairs</li> <li>● markets</li> <li>● cultural activities</li> </ul>	
<p><b>Cost Structure</b></p> <ol style="list-style-type: none"> <li>1. Upfront implementation costs for the building of greenery and social spaces by EU programs and municipality</li> <li>2. Maintenance by the community</li> </ol>				

The value proposition of Punta Vagno's Nature based Solution responds to four main categories.

Environmentally, in order to mitigate and adapt to the climate change we aspire to enhance biodiversity by implementing insect hotels and assuring the inclusion of pollinator species by incorporating native plant species. Further, addressing the heat island effect, shade will be provided through trees, green roofs and artificial ponds.

Socially, situated close to a residential area as well as Nazario Sauro public elementary school, Punta Vagno can live up to its full potential as a space for social and socio-economic cohesion. By providing access to health promoting leisure activities, all age groups will be engaged and tempted to interact. Two new disabled-friendly entrances will allow for Punta Vagno to be an inclusive space.

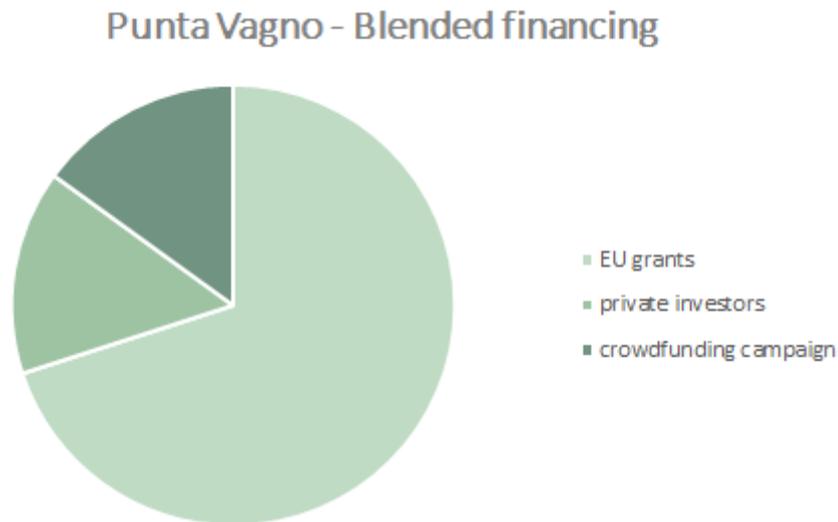
Thirdly, economically, the heightened activities at Punta Vagno will enhance the attractiveness of the surrounding living area and, with its multipurpose event space, serve as an economic stimulus for local businesses, the community center and the adjacent restaurant. Additionally, long-term health costs for the municipality will potentially be lower on account of better residential health due to improved air quality and physical exercise.

Lastly, this project at Punta Vagno aligns with Genova's agenda regarding the connection of the promenade with nature and different green projects within the city.

To include potential trade-offs, frequent events and social activities might result in a higher noise pollution for Punta Vagno's neighborhood that can be partially mitigated through the greenery's semi sound-absorbing ability. Furthermore, safety concerns at night might arise due to a high amount of non-transparent plants. This issue can be addressed in various ways, for example by establishing a proper street light system to illuminate potential obscure or secluded spots.

## 8. Funding Strategies

The restructuring of Punta Vagno will be financed using a Blended Finance model based on three different sources of capital.



The biggest part of the necessary investment will be obtained from EU grants. Currently the European Union runs multiple funding programmes which aim to meet environmental and city planning goals that are in the main impact sphere of this project. The following table provides an overview of the main objectives of the different funding programmes that are supported by the restructuring of Punta Vagno.

The [Life](#) Programme is the EU's funding instrument for the environment and climate action. Our project supports its objectives through the enhancement of biodiversity and quality of life of local citizens. More green areas in coastal areas planted with local species are an important contribution to the habitat quality of pollinators and other insects. Especially in the Ligurian area where drought becomes an increasing issue, such contributions to the health of the local ecosystem are crucial. Through the rewilding of the Punta Vagno area and its newly realized cultural and recreational opportunities, this project also has a large impact on the livability of the city.

As a third and last source of capital we propose the use of a crowdfunding campaign. As this project has a large community-building focus, a crowdfunding campaign can already help facilitate the involvement of different kinds of stakeholders early on. In the crowdfunding, the investors will be granted usage rights for the multi-usage space. This way, the people of Genova can directly benefit from the new Punta Vagno and realize their own projects in this new space that they helped to build. By giving people a platform to showcase their own work and creation, Punta Vagno provides a stimulus to the local economy and helps people

find new ways of employment. The project is thus contributing to the growth of the important business sector of small and medium-sized enterprises.

Finally, we want to mention one last stakeholder group which will be crucial in the creation and operation of the community center. To kickstart Punta Vagno as a new community hub we want to introduce collaborations with other community areas from the cities. Stemming from their experience and reach in the population, it will be easier to have a successful launch and attract maximum interest. Potential partner organizations include [Maia Group](#), [Associazioni Culturali](#) and [GenovaFa](#). After the successful launch, local residents, participants of the crowdfunding and other population group will gradually take over more and more activities in the community center until the space is fully run by its own community.

Another relevant funding programme is [Horizon Europe](#). It is the EU's key funding programme for research and innovation. Punta Vagno can serve as an example for the implementation of an NbS with a strong community-building element. Through its community center and multi-usable space, Punta Vagno is set to become home not only to many new local plant and animal species but also to a wide range of local community members. The rewilding of this section of the Genovese coastline will go hand in hand with a revitalization of the availability of public space and universally accessible recreation activities. Through workshops and other forms of active engagement with nature, this area could serve as a pilot example where people in the city learn to live in harmony with nature.

Under the topic of Smart Cities and Communities Nature-based Solutions, Horizon Europe already funded the construction of Gavoglio Park. Building on this positive experience of collaboration with UNaLab and the municipality of Genova as project partners, we are optimistic that a future collaboration with this funding programme can be just as fruitful.

Lastly, we want to mention [Next Generation EU](#) – a recovery and resilience plan which aims to promote projects which help the EU to become climate-neutral by 2050. Its objectives are to improve water quality of rivers and seas, plant billions of trees and bring back the bees and create more green spaces in cities. The funding programme supports the EU's post-pandemic transition towards a new era of socially inclusive and environmentally friendly cities - objectives that the new Punta Vagno could greatly contribute to.

The biggest part of the necessary capital will be needed during the construction phase of the project. We are optimistic that our applications to aforementioned EU grants will suffice to finance the major part of this cost factor. Additional capital will come from private investors who are going to be paid back from the revenue generated by our multi-usage community and commercial space. In order to assure early revenue inflow we want to make sure that this section of the construction gets finished first and is accessible and fully functional from early on. This will help to pay back loans to private investors and crowdfunding participants.