

THE POTENTIAL OF AN ELEVATED GREEN ROOF TO SUPPORT URBAN  
BIODIVERSITY: THE CASE OF TIRANA CITY

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## Approval sheet of the Thesis

This is to certify that we have read this thesis entitled “**The Potential of an Elevated Green Roof to Support Urban Biodiversity: the Case of Tirana City**” and that in our opinion it is fully adequate, in scope and quality, as a thesis for the degree of Master of Science.

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# ABSTRACT

## THE POTENTIAL OF AN ELEVATED GREEN ROOF TO SUPPORT URBAN BIODIVERSITY: THE CASE OF TIRANA CITY

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Biodiversity urbanism is an innovative concept that has been gaining traction in recent times. It aims to bring more nature into our cities and create healthier and more resilient living environments by promoting sustainable development in cities. The idea behind this protocol is to create a city that is both biodiverse and urban. To do this, green infrastructure is the key; it can provide habitats for wildlife, reduce air pollution, and absorb stormwater. In addition, green infrastructure also contributes to the aesthetics of the city and can provide recreational areas for people to enjoy.

This research communicates the concept of designing an elevated green roof in an urban context. It elaborates on a solution for those cities to be able to address the issue of communities with a severe lack of common and green space but sufficient space for building parks by greening the roofs of the existing buildings as the greatest solution to the urban biodiversity concept and giving them life. It is a design-based research project developed on one of the most prominent sites in Tirana City, "Rruga e Duresit" street.

**Keywords:** *urban biodiversity, green rooftops, green infrastructure, connectivity, parasite structure, common spaces, sustainability, social activities*

# ABSTRAKT

## POTENCIALI I KRIJIMIT TË NJË LINJE TË GJELBËR NË LARTËSI PËR TË MBËSHTETUR BIODIVERSITETIN URBAN:

### RASTI I QYTETIT TË TIRANËS

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Biodiversiteti urban është një koncept inovativ shumë i zëshëm kohët e fundit. Ai synon të sjellë më shumë natyrë nëpër qytete dhe të krijojë mjedise jetese më të shëndetshme dhe më elastike duke promovuar zhvillimin e qëndrueshëm në to. Ideja që qëndron pas këtij protokolli është krijimi i një qyteti që të qëndrojë i gjelbër dhe në të njëjten kohë në zhvillim të vazhdueshëm urban. Për ta bërë këtë, infrastruktura e gjelbër është çelësi. Ajo kontribuon në esteticitetin e qytetit dhe mund të sigurojë zona rekreative për qytetarët.

Kjo tezë komunikon konceptin e një projekt ideje të një linje të gjelbër të ngritur në nivel tarracash në një kontekst urban. Ajo shtjellon një zgjidhje për ato qytete që kanë mundësi të kenë parqe të gjelbra, por nuk kanë hapësië mjafteshëm në nivel toke duke propozuar që këto parqe të zhvillohen në nivelin e tarracave të banesave ekzistuese. Është një projekt kërkimor i bazuar në projekt ide, i zhvilluar në një nga vendet më të spikatura në qytetin e Tiranës, "Rruga e Durrësit".

***Fjalët kyçe:** biodiversiteti urban, tarraca te gjelbra, infrastrukture e gjelbër, strukturë parazite, zona rekreative, projektim universal*

*Dedicated to my parents*

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# CHAPTER 1

## INTRODUCTION

### 1.1 General introduction to the topic and its importance

Loss of biodiversity is a serious issue that affects humans and is caused by them. There is a need to comprehend how cities affect biodiversity and how urban biodiversity affects people because most people now live-in cities. It is urgent to find ways to incorporate biodiversity considerations into urban planning and architectural design.

Urban areas are home to more than 50% of the world's population, and as a result, have become a major contributor to the global loss of biodiversity. Biodiversity urbanism is a growing movement that seeks to restore the natural environment to cities and towns, allowing urban populations to benefit from the services and resources that nature provides. It focuses on improving the quantity, quality, and accessibility of green spaces, restoring, and protecting existing natural areas, and creating new ones.

The idea behind biodiversity urbanism is to create a city that is both biodiverse and urban. To do this, green infrastructure is the key. Green infrastructure such as green rooftops, green walls, and green corridors can provide habitats for wildlife, and they can also help to reduce air pollution and absorb stormwater. In addition, green infrastructure also contributes to the aesthetics of the city and can provide recreational areas for people to enjoy.

In Tirana, the capital of Albania, construction is developing with giant steps lately, and it is impossible to not recognize the rapid loss of natural landscapes in it. To this concern, this thesis will deal with a solution to support biodiversity while continuing with the constructions and future growth of the city. The project proposal is developed in one of the most predominant streets of Tirana, "Rruga e Durrësit".

## 1.2 Problem statement

The study addresses three main issues of Tirana:

- The loss of authentic biodiversity (flora and fauna) in the city.
- The nonfunctional socialist buildings terraces in the city.
- The lack of recreational areas and quality spaces for different social activities.

All together with them there are generated other benefits which directly improves the quality of human life.

## 1.3 The purpose of this study

Through taking in analysis “Rruga e Durrësit” street, this thesis gives a solution for the above-mentioned problems. The concept design of a structure that attaches to the terraces of the existing socialist buildings in the first line of both sides of “Rruga e Durrësit” street, accommodates solutions to three of the problems. It acts as a green terrace, where the vegetation will be chosen to be authentic of Tirana. The structure itself acts as a parasite so it transmits zero weight to the existing buildings. There are located different spots on the “pedestrian green line” dedicated to arts and social gathering activities.



*Figure 1.* Towards a healthier life (by author)

## 1.4 The context of the research

There are several reasons behind choosing this street as a study area. Firstly, the location prioritized this choice; one of the extremities of this street meets Skanderbeg Square. The fact that Tirana is losing a lot of authentic vegetation is becoming obvious day by day. Lately there is a tendency to take care of green spaces, extend them, many other plans of the municipality to plant more trees and many other more projects supporting greening concepts for the future development of this city, but what is recognized during this process is that not always is selected the proper, native, authentic vegetation. Unlike many others in the new project of Skanderbeg Square is noticed a very delicate vegetation selection respecting the authentic vegetation of Tirana. Therefore, starting from there, this project seeks to extend this vegetation even in “Rruga e Durrësit” street, by proposing another way of distribution, greening the existing buildings rooftops.

Secondly, the heights of the first line buildings of this street are almost the same, or very close to each other. On both sides of the street there exist Socialist-style apartment blocks being built in the years 1944-1991, whose terraces are left without a certain purpose. This makes the concept to connect them and give different functions more realistic.

Finally, and most importantly, this street is itself a continuation of one of the main, historical entrances to the city center, connecting the capital with the west, Adriatic Sea, and the port of Durrës city. The idea of designing an elevated green roof in this site, despite all the positive environmental aspects, increases the value of the existing buildings and at the same time transforms it into a very attractive landmark to the city.

## 1.5 The scope of the study

The topic of urban biodiversity is very broad, and it may open grounds to many different discussions, but this thesis will stay focused on very few of them.

Besides that, this paper focuses on four key points:

- Integrates biodiversity into an urbanized area which is in continuous development.
- Designs different functions to the existing nonfunctional buildings terraces.
- Increases the quality of the street line and the city itself in terms of visual appearance and most importantly in terms of a healthier life.
- Provide a relaxing, safe, quality space for the community members and more.

This study and the project proposal itself cover the whole segment of “Rruga e Durrësit” street. One of the applications of biodiversity urbanism, green rooftops, will be applied in the existing communist building terraces of this street, turning it by this means into a green corridor. The reason for choosing this street among all the others in Tirana is because of its important and strategic location, serving as one of the main entrances to the city and leading straight to the main square of the capital. There are selected only the communist buildings in the first line of the street. Because they all have almost the same height and are constructed near each other, they will be linked together through bridges to create in the end a single structure. This structure will act as a parasite for the existing buildings, which means, it will cover the rooftops by the mentioned greenery but will transmit them no weight at all.

The research for this project proposal is based on a literature review, which gives the necessary theoretical background for all the issues discussed. The categorization is as follows:

- Literature dedicated to livable cities and public spaces.
- Literature dedicated to urban biodiversity.
- Historical background of “Rruga e Durrësit” street, and the first line buildings.
- Future development plans for the site and the city itself, considering

biodiversity.

- Green rooftops applications in existing terraces.
- Parasite, elevated constructions.

## **1.6 Organization of the thesis**

This thesis is organized into two major parts. The first one deals with the introduction of the topic and its concerns, and it elaborates some solutions based on the theoretical background of different case studies related to this topic. This part also includes the historical background of the chosen site. While the second part of the thesis explains the project development, starting with the detailed site analysis and mappings and finishing with the views of the final proposal. Correspondingly, the thesis constitutes into the following chapters:

Chapter 1 introduces the research problem guided by the research questions, which are triggered by the motivation of this thesis. It sets the list of the purposes, and the goals this thesis aims to achieve. Gives a short introduction of the chosen location and a brief explanation of the scope of the study.

Chapter 2 elaborates through the literature review and different case studies, solutions, and functions to be applied in this project. The literature topics and the case studies selected are relevant to this study and they elaborate fundamental principles that should be taken into consideration in this case.

Chapter 3 explains the methodology used to develop the study and the project proposal. It is a mixed-method approach, where observations, material gathering from institutions, studies interpretation, comparisons of different case studies, and a lot of proposals are done.

Chapter 4 deals with the site analysis and explains the proposed project. It elaborates the design phase, showing all the potential and the benefits it provides.

Chapter 5 is a concluding part, reflecting on the work. It opens discussions for the future development of this proposal based on the legibility, (PDV), etc.

## CHAPTER 2

### LITERATURE REVIEW

#### 2.1 Skyrise Greenery and Biodiversity Urbanism

In order to improve sustainability, biodiversity, and human well-being, two concepts that aim to incorporate natural aspects into urban areas are biodiversity urbanism and skyscraper greenery. The practice of including gardens and vegetation into high-rise structures in metropolitan areas is known as "skyscraper greenery". This can include vertical vegetation such as green walls, rooftop gardens, and other types. Skyscraper vegetation can provide inhabitants with aesthetic and recreational benefits as well as assist in reducing the impact of the urban heat island and enhancing air quality. The term "skyrise greenery" which was first used in Singapore, covers both rooftop and vertical vegetation (Newman, 2014).

Under Singapore's City in Nature vision, a major tenet of the Singapore Green Plan 2030, increasing vegetation in urban areas is an important tactic. By adding greenery to facades, balconies, terraces, and roof areas, skyrise greenery expands the reach of vegetation in the built environment skyward (Skyrise Greenery, 2023).

On the other hand, biodiversity urbanism focuses on developing urban settings that support and enhance local biodiversity. This can involve the use of native plant species, the development of wildlife habitats, and the integration of green infrastructure like parks, gardens, and green roofs. Supporting pollinators and other beneficial species, stimulating biodiversity in urban environments, and creating opportunities for environmental education and involvement are all benefits of biodiversity urbanism (Holly Kirk, 2021).

**Table 1.** “Demonstration of how the five BSUD principles are linked to specific planning recommendations, through the relevant ecological knowledge.”

Taken from the book *Urban Forestry & Urban Greening*.

<b>BSUD Principle</b>	<b>Ecological requirements</b>	<b>Example planning &amp; design recommendations</b>	<b>References</b>
<b>Maintain &amp; introduce habitat</b>	<p>Growling grass frog</p> <ul style="list-style-type: none"> <li>wetlands/waterbodies</li> <li>water-side vegetation</li> <li>logs &amp; rocks for shelter</li> </ul>	<ul style="list-style-type: none"> <li>Permanent natural water bodies in parks</li> <li>Rain gardens/vegetated swales on streets</li> </ul>	<p>Heard et al., 2010, 2012; Hale et al., 2013</p>
<b>Facilitate dispersal</b>	<p>Superb fairy-wren</p> <ul style="list-style-type: none"> <li>dense native shrubs provide cover &amp; nest sites</li> <li>roads block movement between habitat patches</li> <li>habitat patches &lt; 750 m apart</li> </ul>	<ul style="list-style-type: none"> <li>Native garden beds with diverse &amp; dense vegetation structure in green spaces &amp; linear parks</li> <li>Vegetated “green bridge” structures for major roads</li> <li>Habitat “stepping-stones” or “corridors”</li> </ul>	<p>Parsons, 2008; Harrisson et al., 2013; Braschler et al., 2020.</p>
<b>Minimize threats &amp; disturbances</b>	<p>Blue-tongue lizard</p> <ul style="list-style-type: none"> <li>Cats &amp; dogs are predators</li> <li>Vehicle collision causes mortality</li> </ul>	<ul style="list-style-type: none"> <li>Legislate for responsible pet ownership</li> <li>Roadside boundaries &amp; crossing structures or underpasses to connect parks</li> </ul>	<p>Aresco, 2005; Barratt, 1997; Grilo et al., 2010; Woinarski et al., 2018.</p>
<b>Facilitate natural ecological processes</b>	<p>Blue-banded bee (pollinator)</p> <ul style="list-style-type: none"> <li>native flowering plants</li> <li>flower resources present though different seasons</li> <li>limit pesticide spraying</li> </ul>	<ul style="list-style-type: none"> <li>Provide many different plant species to supply flower food resources throughout the year</li> <li>Legislate garden management plans to reduce spraying</li> </ul>	<p>Brown et al., 2020; Gross, 2018; Koyama et al., 2018; Wood and Goulson, 2017.</p>
<b>Improve potential human-nature interactions</b>	<p>All species</p> <ul style="list-style-type: none"> <li>create “every day” ways to view local wildlife</li> <li>integrate nature &amp; people</li> </ul>	<ul style="list-style-type: none"> <li>Shared spaces such as native vegetation around sports grounds or active transport links</li> <li>Informative signs to promote connections &amp; dispel conflict</li> </ul>	<p>Ikin et al., 2015; Miller, 2005; Ryan et al., 1998</p>



As explained in this table by the author, referring to the ecological requirements some examples of the design recommendations are the green bridges and green roofs by native vegetation. This native vegetation should provide plant species that should supply flower food through all the year periods.

Together, biodiversity urbanism and skyscraper greenery may work to build more livable, sustainable cities that place the well-being of both people and the environment first. We can build more resilient, flexible cities that are better suited to handle the problems of urbanization and climate change by incorporating natural components into urban landscapes.

## **2.2 Green rooftops applications, concepts examples.**

A vegetative layer cultivated on a rooftop is known as a "green roof" or "rooftop garden". When moss, grass, and bark served as a crude form of insulation to keep the dwelling warm in the winter and cool in the summer, the use of vegetation on roofs may be traced back to the earliest constructions that have been uncovered. A well-known historical green roof is the Hanging Gardens of Babylon, one of the Seven Wonders of the Ancient World. These structures date back to around 500 B.C., when plants and trees were grown on top of a waterproof barrier made of tar and reeds (Clayton, 1990).

As human technology advanced, new roofing systems were developed, yet many roofs continued to be insulated with living plants, such as the customary sod roofs of Scandinavia. These were constructed from wooden planks that had been covered in sod and then laid on top of birch bark. We no longer need vegetation to insulate our homes in the present day because technology has gotten to that stage. As urban expansion engulfs much of the rural land, it is becoming more important than ever to try to maintain patches of natural vegetation and replace those lost in an ever-growing expanse of concrete and tarmac.

## 2.3 Green Rooftops

The expression "skyrise greenery", which was first used in Singapore, covers both rooftop and vertical vegetation. Under Singapore's City in Nature vision - a major tenet of the Singapore Green Plan 2030 - increasing vegetation in urban areas is an important tactic. By adding greenery to facades, balconies, terraces, and roof areas, skyscraper greenery expands the reach of vegetation in the built environment upward (Skyrise Greenery, 2023).

The definition "modern green roof" describes a roof with vegetation growing on it, either totally or partially, above a waterproof surface. As to create them, a substrate created for the purpose is stacked on top of a drainage system that can both hold water to assist plant growth and remove any extra to keep the roof from flooding. The vegetation is then positioned on top, settles into the substrate, and finally forms a mat that covers the top of the house.

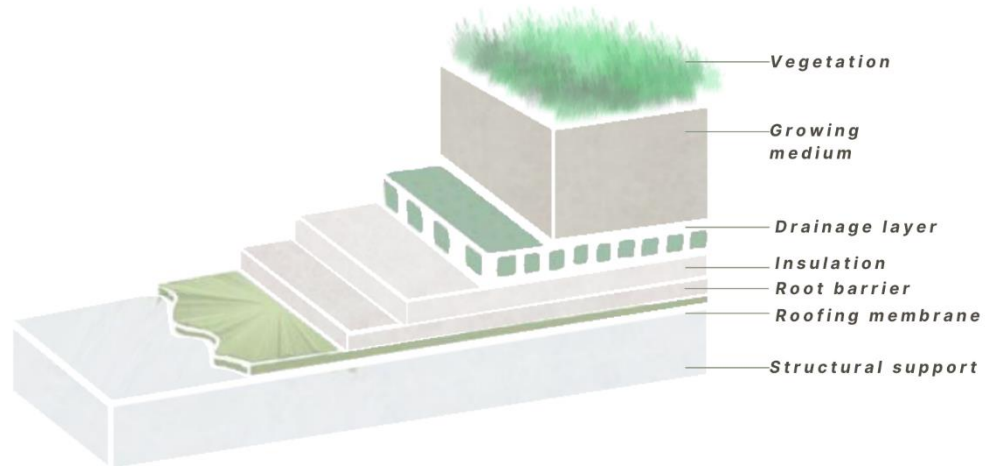
Green roof systems mix plants, soil, and other growing media to provide a living, vegetated surface on top of a building. The two main types are intensive green roofs and extensive green roofs. Intensive green roofs are designed to accommodate a range of plant species and can be used as rooftop gardens or parks. They require regular upkeep, including watering, fertilizing, and trimming, in addition to deeper growing media (Optima, n.d.).

In North America, the market for green roofs is expanding right now. Modern green roof technology has developed over the past thirty years in Europe. Green roof systems in North America are built on German laws. These requirements have made the installation of green roof systems in North America's much larger geography the best place to start. The use of green roofs dates back thousands of years and crosses numerous cultures.

The grasp of the historical reasons for the use of green roofs is broader than that of the contemporary applications. Once a green roof has been identified, the functions and advantages of the technology can be used to justify its use through a review of the literature. These advantages include the reduction of stormwater runoff, passive

cooling of buildings and even entire cities, improved biodiversity, ecological advantages, sociological advantages, and financial advantages (Magill, 2011).

The basic components of a green roof system are as sketched in the fig.2:



**Figure 2.** Green roof composition layer (by author)

In the John Magill’s Master Thesis paper of Department of Plant, Soil, and Agricultural Systems in the Graduate School Southern Illinois University Carbondale, he had done an interview with some specialists of the field in Chicago. (Skyrise Greenery, 2023) (Magill, 2011).

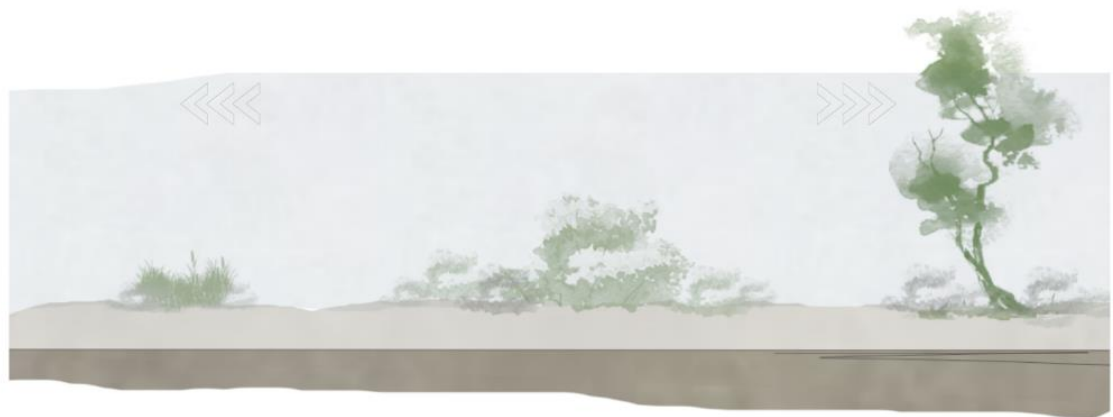
*“What do you expect the green roof industry to do in the next ten years?”*, was one of the interview questions. The answers were as below:

Tom Cooper predicted a 150% increase in the sector's growth. Mike Curry anticipated that the industry would continue to grow after the recession, much like the German model. The benefits of a green roof will require that we keep working on it until it is visible to the public. Jason Barrett anticipated that the sector would continue. Companies with insufficient research in their systems will disappear. He anticipated that people would be motivated to shorten the period until a cost-benefit analysis is completed, that property owners would want green roofs to increase the value of their

properties, and that the rooftop would turn into a relaxing space. He replied that requirements will resemble the European model of the green roof business and that biodiversity will continue to be a driving force.

Two types of rooftop greenery as sketched in fig.3:

- Green roofs (extensive)
- Roof gardens (intensive)

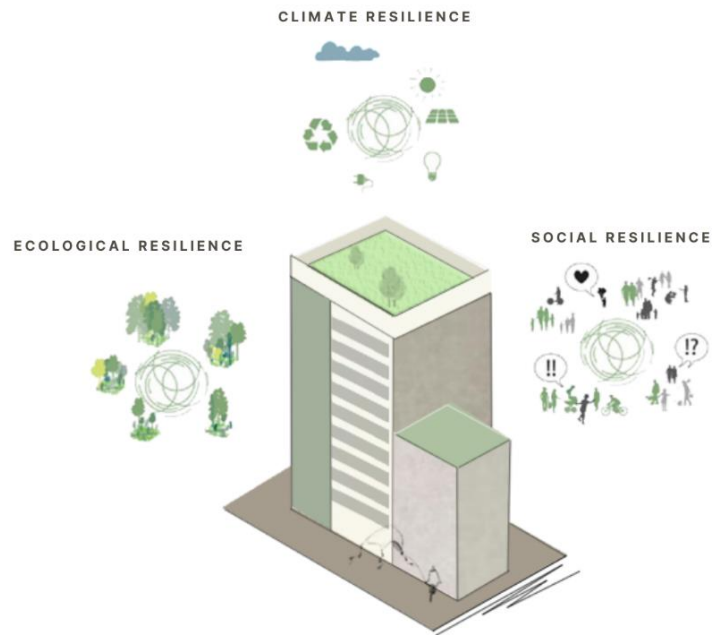


	<i>EXTENSIVE GREEN ROOF</i>	<i>INTENSIVE GREEN ROOF GARDEN</i>
<i>Plant Choice:</i>	<i>Groundcover and low shrubs</i>	<i>Groundcover, shrubs and trees</i>
<i>System build-up height:</i>	<i>up to 150 mm</i>	<i>up to 1500 mm</i>
<i>System build-up weight:</i>	<i>&lt; = 150 kg/m<sup>2</sup></i>	<i>&lt; = 300 kg/m<sup>2</sup></i>
<i>Maintenance:</i>	<i>Low to medium</i>	<i>High</i>
<i>Depth:</i>	<i>up to 150 mm</i>	<i>more than 250 mm</i>

**Figure 3.** Extensive and intensive green roof garden

### 2.3.1 High performance green roofs for sustainable architecture

High-performance green roofs are a component of sustainable architecture that embrace the selection of plants and planting systems on rooftops. Numerous environmental, economic, and social advantages are provided by these green roofs.



**Figure 4.** Green roof benefits: environmental, economic, and social

Environmental Benefits:

- Stormwater management: green roofs may collect rainwater, easing the strain on stormwater systems and preventing runoff, which can lead to water contamination.
- Heat island mitigation: the flora and soil on green roofs help absorb and dissipate heat, lowering the urban heat island effect and improving regional microclimates.
- Air quality improvement: plants on green roofs may filter air pollutants, which contributes to lowering air pollution and raising air quality in general.
- Support for biodiversity: by providing homes for a variety of plants, insects, birds, and other animals, green roofs help improve urban biodiversity.

Economic benefits:

- Energy efficiency: green roofs add to the insulation in buildings, requiring less energy for heating and cooling, which lowers energy costs.
- Increased roof lifespan: the vegetation cover on green roofs helps shield the underlying roof membrane from damaging weather conditions, extending the life of the roof and lowering maintenance expenses.
- Increased property value: due to their sustainability advantages, buildings with green roofs frequently have greater market values and appeal.

Social advantages:

- Enhanced aesthetics: green roofs make buildings seem better and can make cities more attractive places to live.
- Reduction of noise: plant life and soil layers on green roofs can absorb and lessen noise pollution, making a home or office more peaceful.
- Accessible green roofs can be used as recreational spaces, providing locations for unwinding, mingling with others, and urban farming.

Considerations for designing high-performance green roofs include plant selection, soil composition, drainage systems, and upkeep requirements. To guarantee the feasibility and endurance of green roof installations, it is also necessary to evaluate the local climate, building structure, and load-bearing capacity (Breinneisen, 2003).

Harpo Verdepensile is a well-known company in Trieste, Italy, established in 1897. Harpo collaborates with the top technical and botanical universities in Italy to create high-performance green roofing systems. Harpo Verdepensile provides cutting-edge solutions with high performance results in terms of economic and environmental benefits because of ongoing research and technical support provided to architects, designers, and professional installers. These solutions were created to provide the best growth conditions for vegetation while also saving irrigation water, fertilizers, and

maintenance procedures (Harpo Verdepensile, n.d.).

### 2.3.2 Green roofs policies through the world

Green roof policies and future plans vary across different regions and countries. What is worth mentioning is that many countries around the world have agreed to include biodiversity into their further growing of the city and they pay special attention to the proper adoption of it. Below there are explained two different successful examples, one for the green roof applications in Copenhagen and the other for bringing back biodiversity in New York City, by the High Line project.

#### 1. Green roofs in Copenhagen



**Figure 5.** Copenhill Ski-Green Roof, project by BIG, Copenhagen

*“Green roofs are on the agenda worldwide as part of a growing effort to meet the challenges that we face, including climate change, denser cities and the need for healthier neighborhoods. Green roofs are unique as a green infrastructure element. They can bring about a multitude of benefits in a single location without reducing development space. Green roofs cool our cities, enhance biodiversity and reduce rainwater runoff. They also bring beauty to what otherwise can be very gray places.”*, are the words of the mayor of the technical and environmental administration, Ayfer Baykal, in the book *Green Roofs Copenhagen* (B, 2008).

Copenhagen has since 2008 focused on integrating green roofs as part of urban development after taking inspiration from the world's top cities. It has been a practice of the big cities to include in their municipal plans the consideration of enhancing biodiversity into an urbanized area with very sensitive attention. For example, since 2010, the City of Copenhagen has required green roofs in the majority of new municipal plans. A key component of the city's plan to deal with climate change, increase biodiversity, and make the city greener is the use of green roofs. As you stroll across Copenhagen, you will see green roofs of all sizes, covering everything from cycle shelters to schools, multi-use buildings, and landscapes over underground parking garages.

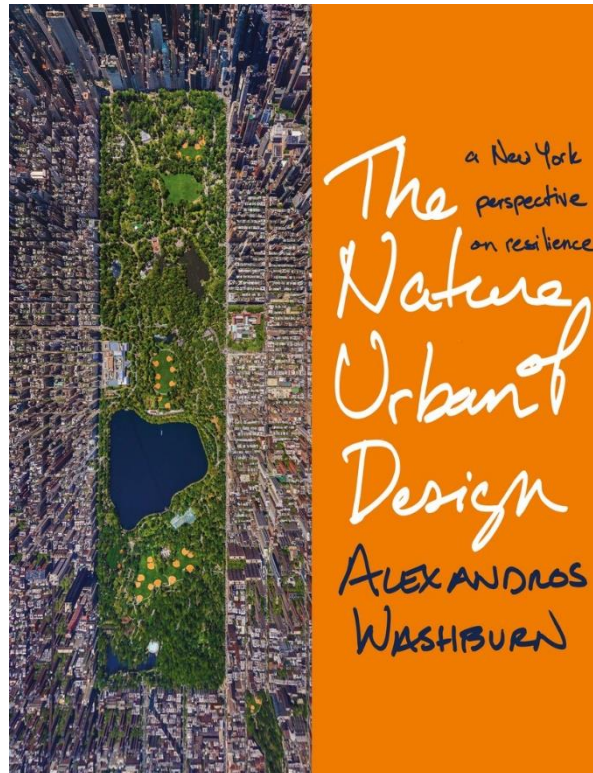
2. The High Line of New York City, according to the book “The Nature of Urban Design, a New York Perspective on Resilience”



**Figure 6.** High Line NYC, picture taken from dwell, posted by Melissa Dalton



Another great example of bringing back the biodiversity in the city is the High Line of New York City. It is a 1.45-mile-long elevated linear park located in the Chelsea neighborhood. It was initially constructed in the 1930s as a transportation railway path, but in the 1980s it was abandoned and started to deteriorate. Friends of the High Line is a non-profit organization that was established in the early 2000s by a group of neighborhood residents who supported turning the abandoned train line into a park (Washburn, *The Nature of Urban Design*, 2013).



**Figure 7.** *The Nature of Urban Design*, book cover

In the book "The Nature of Urban Design: A New York Perspective on Resilience," the High Line is cited as a model of how urban design may produce resilient and sustainable public areas that benefit both people and the environment. The High Line, according to the authors, epitomizes a modern urban planning paradigm that places social and ecological sustainability above traditional economic and functionalist principles. The emphasis on biodiversity in the High Line's architecture is one of its most important features. More than 500 different plant types may be found in the park, which also draws a variety of animals like birds, butterflies,

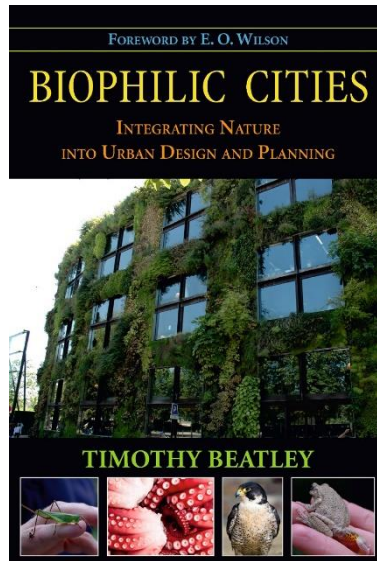
and other insects. The authors of "The Nature of Urban Design" contend that putting biodiversity front and center is essential for developing resilient urban ecosystems that can adapt and flourish in the face of environmental problems like climate change. The High Line's architecture places a strong emphasis on social sustainability and community involvement. The Park has grown into a well-liked destination for meeting for individuals of all ages and socioeconomic backgrounds and has contributed to the neighborhood's revitalization. According to the authors, this kind of community involvement is essential for developing resilient and sustainable urban settings that can accommodate the requirements of all inhabitants. The High Line is an example of a new approach to urban planning that can make cities more resilient and livable by placing a priority on biodiversity, community involvement, and social sustainability.

## **2.4 Biophilic Cities and Livable Cities**

### **2.4.1 Biophilic Cities**

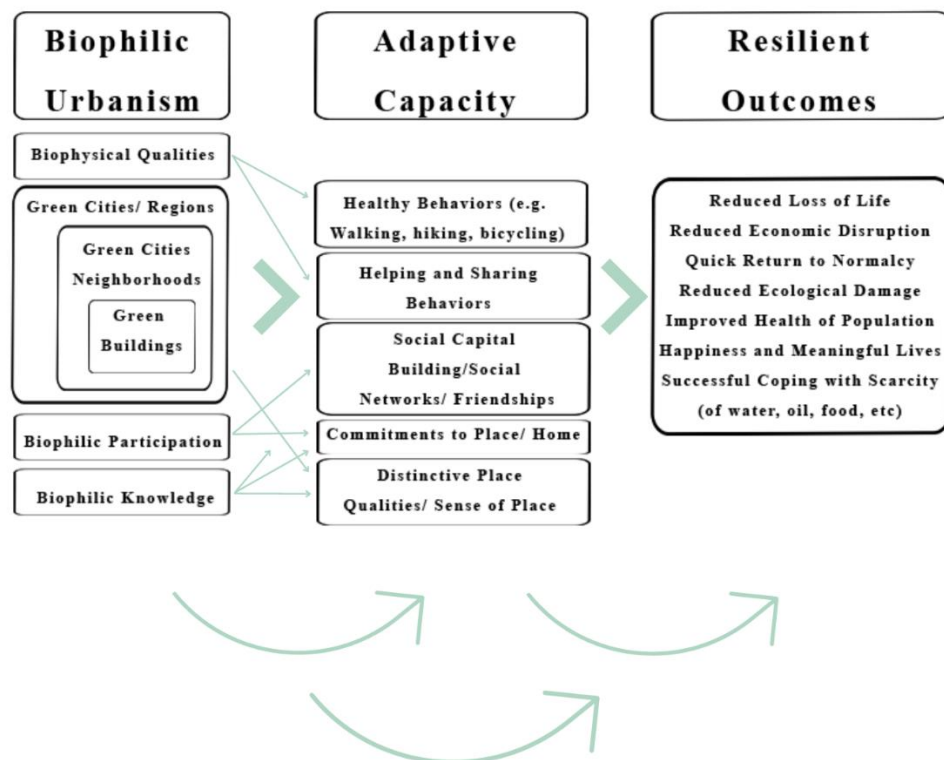
"Biophilic cities" are defined as urban regions that value and celebrate nature in their planning, architecture, and policy. The major objectives of biophilic interventions and projects in urban contexts are ecological systems and human activities. The main goals of biophilic urbanism are to promote daily natural encounters as an integral part of urban living and to strengthen the relationship between urban dwellers and urban nature. Urbanization and biophilic design consciously create opportunities for city inhabitants to regularly appreciate nature in this way (Agata Cabanek, 08 July 2020).

Professor of sustainable communities at the University of Virginia Tim Beatley first used the phrase in his book "Biophilic Cities: Integrating Nature into Urban Design and Planning." (Beatley, 2011)



**Figure 8.** Timothy Beatley Book Cover

Below is the analysis of Biophilic Urbanism Beatley explains in his book:



**Figure 9.** Biophilic pathways to urban resilience. According to the book “Biophilic Cities”

## 2.4.2 Jan Gehl, Cities for People

Public places in urban settings that seek to improve the quality of life for locals and visitors are known as livable cities. A city that is planned to suit the needs of its citizens and offer a safe and friendly atmosphere is considered to be livable. Parks, plazas, and pathways are examples of public spaces that are open to anyone. These places are essential for fostering social connection and a feeling of community, as well as for boosting both physical and mental health.

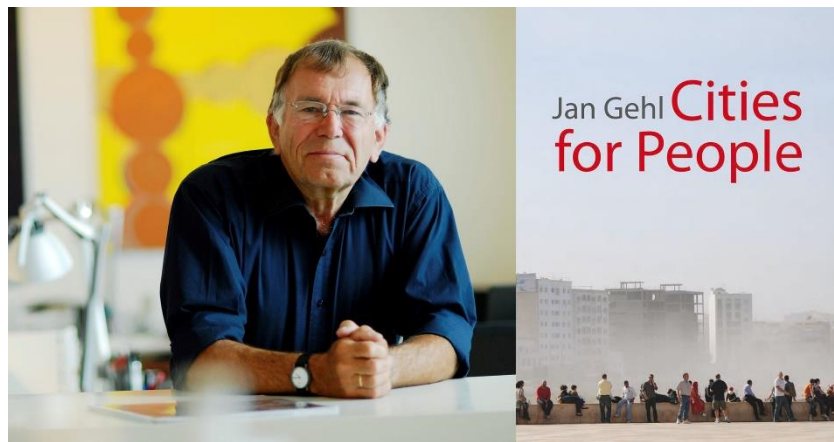
The livability of a city depends on a variety of factors, such as:

- **Accessibility:** cities with strong mobility alternatives, such as public transportation, bike lanes, and walkways that are favorable to pedestrians, are more livable.
- **Security:** a city that is safe for walkers and bicycles and has a low crime rate is more livable.
- **Amenities:** a city becomes more livable when its residents have access to resources like parks, libraries, community centers, and open areas.
- **Sustainability:** urban areas with more green space, renewable energy, and environmentally friendly transportation are more livable.
- **Diversity:** a city is more livable when it accepts diversity and provides chances for social and cultural interaction.

Cities considered livable have public areas because they promote socializing and recreational activities. Public spaces can be created to meet a range of purposes, such as offering venues for leisure, physical activity, and cultural events. A well-planned public area can boost a city's economy by attracting tourists and encouraging small businesses there.

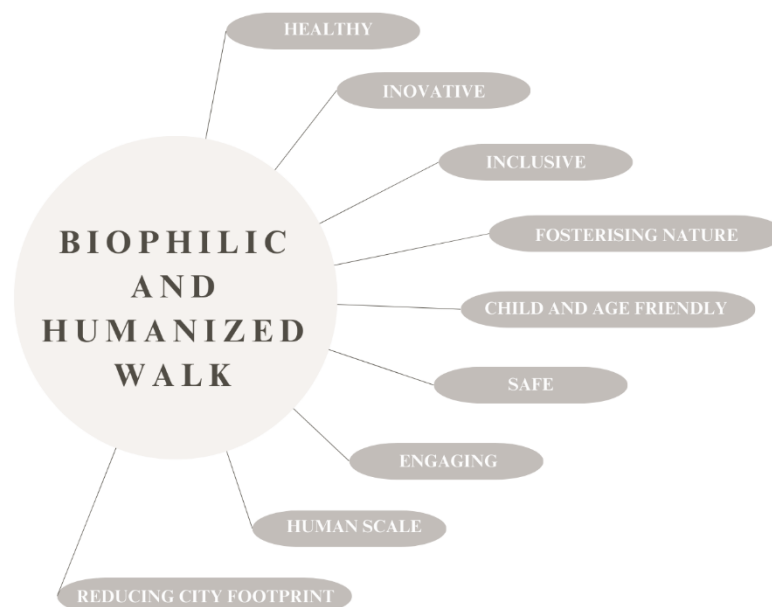
In conclusion, livable cities and public areas are essential to the development of growing, healthy, and sustainable urban settings. In his book, "Cities for People", Jan Gehl explains how cities are more likely to encourage social connection, improve

physical and mental health, and support economic growth if they put the needs of their citizens first and offer accessible and enjoyable public areas (Gehl, 2010).



**Figure 10.** Jan Gehl's Book Cities for People

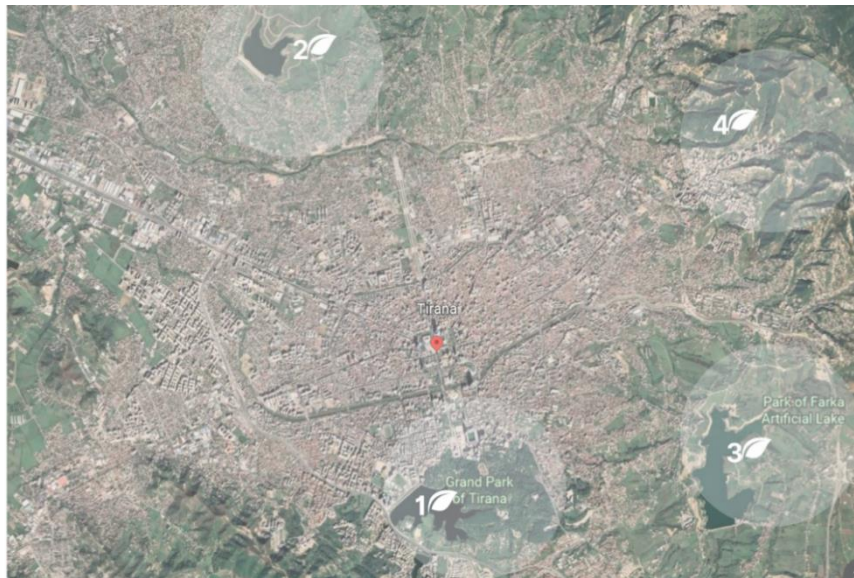
The multiple urban benefits of Biophilic Street, according to the research of “Biophilic streets: a design framework for creating multiple urban benefits” (Agata Cabanek, 08 July 2020) are as follow:



**Figure 11.** Biophilic and humanized street characteristics

## 2.5 The current situation of Green and Public Spaces in Tirana, Site Context

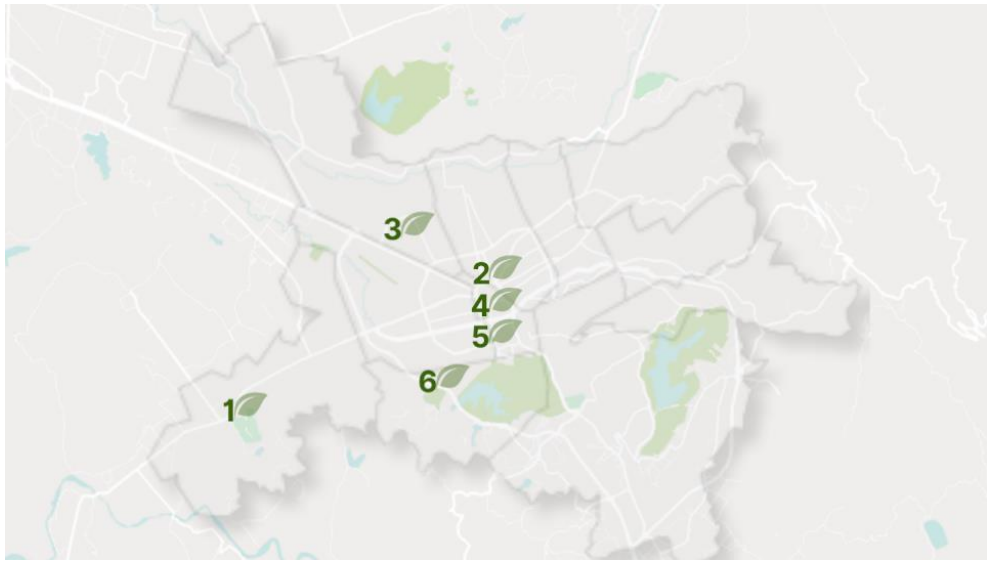
### 2.5.1 Grand Parks of Tirana



*Figure 12.* Orthographic picture from Google Earth, mapping Grand Parks of Tirana

1. Grand Park of Artificial Lake
2. Grand Park of Paskuqan
3. Park of Farka Artificial Lake
4. National Dajti Park

Existing grand parks are crucial to the improvement of citizens' quality of life and the growth of their communities. With a variety of advantages that support people's physical, mental, and social well-being, these parks serve as important community hubs. They offer a refuge from the concrete jungle and a chance for individuals to re-establish their connection to nature. A tranquil atmosphere is created by the rich vegetation, trees, and flowers, which encourage rest and stress relief.



**Figure 13.** Graphical map representing green spaces in relation with the city, generated in Map Box

1. Lulishtja
2. Kombinat
3. Europa Park
4. Fusha e Aviacionit
5. Rinia Park
6. Dog Park
7. Lulishtja Komuna e Parisit

Parks in neighborhoods act as gathering places for locals, providing a sense of belonging. They offer areas where neighbors can gather, mingle, and form bonds, enhancing the social fabric of the neighborhood. Families and friends can congregate on picnic grounds and shelters for shared meals, gatherings, and celebrations. These parks also frequently hold neighborhood events and activities, such as concerts, movie nights, and cultural festivals, which promote cross-cultural interaction and civic engagement. Well-kept parks raise the neighborhood's attractiveness, making it more appealing to locals and prospective purchasers.

## 2.5.2 Biodiversity of Tirana

Despite being a populated location, Tirana, the capital of Albania, is renowned for its extensive biodiversity. Tirana is home to a variety of species, both flora and fauna, even though urbanization and human activities have undoubtedly had an impact on the natural environment. Here are some important details about Tirana, Albania's biodiversity:

**Biodiversity of Plants:** Tirana is home to a wide variety of plant species. Numerous trees, bushes, and flowers can be found in the city's parks, green areas, and neighboring areas. Plane trees, cypresses, pines, oaks, and poplars are a few of the most common tree species in Tirana. You can experience many plant species in parks like Rinia Park and the Grand Park of Tirana.

Tirana provides a habitat for a variety of bird species. A variety of birds are drawn to the city's green spaces, such as its parks and gardens. In and around the city, it's possible to see species including sparrows, pigeons, blackbirds, swallows, and other ducks.

Various species of insects and invertebrates, including beetles, bees, ants, spiders, and snails, can also be found throughout the city. In order to keep the environment in balance, these species are crucial.

Although Tirana is a busy urban area, it is not unusual to come with urban animals. Green spaces and parks in the city are home to animals like hedgehogs, foxes, and sometimes small mammals like rabbits and squirrels.

**Protecting Biodiversity:** Albania, notably Tirana, has made efforts to preserve biodiversity and put conservation measures in place. Several initiatives in such a direction consist of:

- National parks and wildlife reserves: there are only a few of the protected sites that Albania has created throughout the nation. These zones are intended to protect vital habitats and species.
- Reforestation, to restore and increase forested areas and provide habitats for a variety of flora and wildlife, reforestation activities have been made in and around Tirana.



- People of all ages are encouraged to become aware of the value of biodiversity protection and sustainable practices through several organizations, NGOs, and government agencies in Tirana.
- Green spaces and parks: Tirana have boosted the creation and upkeep of green spaces and parks, supplying wildlife with habitats and enhancing the general environmental condition of the city.

It's important to note that metropolitan areas confront continual difficulties maintaining biodiversity because of things like habitat fragmentation and pollution. However, Tirana and Albania are making efforts to safeguard and improve their natural surroundings, promoting biodiversity within and around the city.

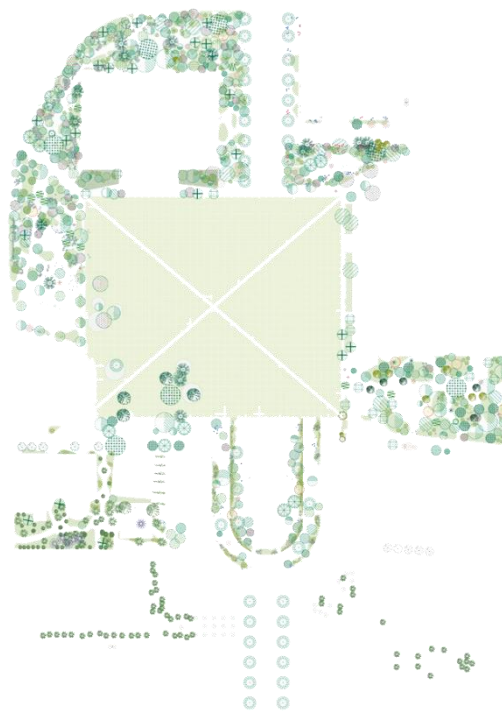
### 2.5.3 “Urban Forest” of Skanderbeg Square



*Figure 14.* Images from the Skanderbeg Square vegetation

The green space surrounding the square was considered as the beginning of an urban forest and the starting point for a reflection on the entire city as an urban ecosystem. To ensure adaptability and minimize maintenance needs, all the vegetation is native. In reality, this forest-like mass may serve as the foundation for more greening of the city's core in the future. The square is designed by 51N4E architects (Belgium), iRI (Albania) and Anri Sala (Albanian artist).

The design of the green belt challenges the usual perception of urban green, particularly the green in Tirana, which is characterized by a layer of trees floating over barren grass lawns, a very flat and monotonous model. The choice to create a system with various biotopes enables the utilization of nature to create a challenging environment that is more diversified in content and experience. To achieve this variation, the city's core is filled with color, texture, softness, fragrances, beauty, seasonal appeal, and sounds, all of which collectively soften and naturalize urban living surroundings and have positive effects on people's welfare. The biotopes produced are derived from many natural environments.



**Figure 15.** Skanderbeg Square vegetation map

In order to create new biotopes that are inspired by nature but modified to respond to the urban environment and human presence, the forest, the garrigue, the maquis, etc. are used as starting points. As a result, the plaza serves as a testing ground for urban biotopes, which let people and nature connect by establishing a valued and functional ecosystem. By doing this, we can increase biodiversity and establish a natural setting that, over time, will expand beyond the square and properly fill the enormous emptiness.

To continue with this plan, this project intends to extend this choice of vegetation in the whole proposed elevated structure.

#### **2.5.4 Public and social spaces of Tirana**

Tirana has made tremendous efforts to make its public and social spaces lively and interesting places for locals and tourists. These prominent Tirana public and social areas are only a few examples:

- (a) Skanderbeg Square: Skanderbeg Square serves as Tirana's central square and focal point. It underwent a significant overhaul in recent years, becoming a pedestrian-friendly area with benches, fountains, and greenery. The square serves as a vibrant community gathering area by hosting concerts, festivals, and cultural events.



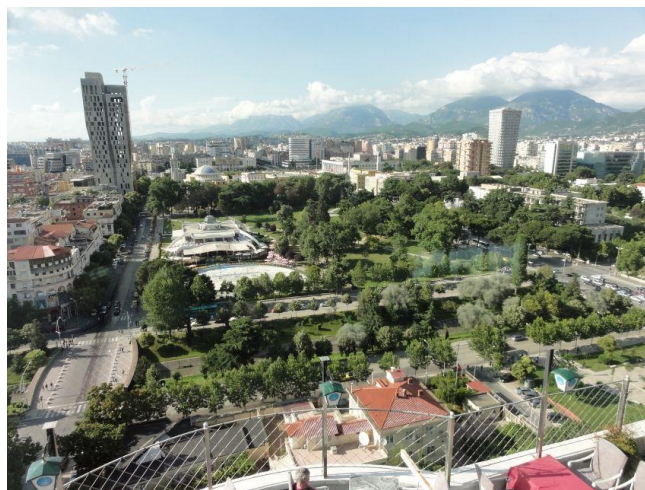
**Figure 16.** Skanderbeg Square, Tirana

- (b) The Grand Park of Tirana, a sizable green place where people can unwind, exercise, and engage in leisure activities, is close to the city center. Playgrounds, sports facilities, a lake, and walking and cycling pathways may all be found in the park. It is a well-liked location for outdoor activities, including picnics.



*Figure 17.* Grand Park, Tirana Artificial Lake

- (c) Rinia Park: this urban park offers a haven of greenery right in the middle of the metropolis. It provides leisure amenities like a Ferris wheel, skateboarding spots, and sports courts. The Park draws visitors of all ages with its year-round events and activities.



*Figure 18.* Rinia Park

- (d) The Castle of Tirana: in 1973, Tirana Castle was designated a first-category cultural monument. 2008 saw the designation of the new walls' preserved rails as cultural monuments. Now that it has been reconstructed, it is a place where people may eat and drink. It continues to be one of the most popular tourist destinations.



*Figure 19.* The Tirana Castle

- (e) The Pyramid of Tirana is the newest addition in the list of the public spaces of Tirana. The project also complies with a number of the UN's Sustainable Development Goals. Thus, it is anticipated that the Pyramid will serve as a new cultural center and a platform for the next generation in Tirana.



*Figure 20.* The Pyramid of Tirana

These public and communal areas in Tirana demonstrate the city's dedication to providing livable and pleasurable surroundings for its citizens. They offer chances for recreation, socialization, cultural encounters, and community building. The redevelopment of these areas has improved the urban fabric of Tirana and raised the city's general quality of life.

This project proposal can be a great addition to the list of the public spaces in Tirana and at the same time a notable tourist attraction.

## **2.6 Future development plans for the site and the city itself, considering biodiversity.**

Regarding green spaces and parks, Tirana has boosted the creation and upkeep of green spaces and parks, supplying wildlife with habitats and enhancing the general environmental condition of the city.

It is important to note that metropolitan areas confront continual difficulties maintaining biodiversity because of things like habitat fragmentation and pollution. However, Tirana and Albania are making efforts to safeguard and improve their natural surroundings, promoting biodiversity within and around the city.

By doing so, Tirana can become a model city that exemplifies the peaceful coexistence of urban development and environmental conservation by giving biodiversity a high priority in future development plans. Along with preserving and enhancing the city's natural heritage, these initiatives will support Tirana's sustainability and general well-being.

### **2.6.1 Tirana Municipality Plan of greening the existing socialist buildings terraces**

In order to accommodate the rapidly expanding urban population, the communist government adopted a strategy of mass home development during this time. As a result, many residential structures were constructed employing a uniform architectural design that placed an emphasis on practicality and affordability over beauty. These structures resembled blocks, and their uniform façade and repeated patterns were common characteristics of these buildings.

Through years there have been many efforts by the rulers of Tirana municipality to improve the image of these buildings. Edi Rama, the Mayer of those years ((2000–2011), breathed new life into the massive communist structures that characterize Albania's capital city of Tirana by viewing his vocation as a painter as "the supreme form of conceptual art" and as a promise of a better and more colorful future after the gloomy years symbolized by the country's history.



*Figure 21.* Socialist building in Tirana, before and after by Edi Rama

The boredom of these buildings could not disappear just by adding color to their façade. Another attempt was done by the next Mayer of Tirana, Erion Veliaj, years after this one. He decided to apply green roofs above all the existing communist buildings, but apparently, for some reasons, the plan ended just by greening the Municipality terrace itself. When the first garden on the terrace was created in the Municipality of Tirana, many people thought that this would be extended as a project to all the buildings of the institutions. This is because private apartments have many problems, starting from dirt, damaged stairs, the facade of buildings, etc. Later, with the success of placing administrators in the palace, the situation has changed.



*Figure 22.* Tirana Municipality Green Rooftop

### **2.6.2 Stefano Boeri's Plan**

The concept of reclaiming nature in Tirana's urban environment is expressed through a variety of operational tools, such as a continuous orbital forest system around the city with two million trees, parks, and protected nature reserves to safeguard and promote the region's biodiversity, new ecological corridors along the Lana, Tirana, and Erzeni rivers, and a green ring road, the "4th Ring," which would triple the city's green space. The resulting system is in fact what it purports to be: a true ecological corridor that may encourage the use of renewable energy sources in the generation of energy (Architeti, 2015 - 2017).





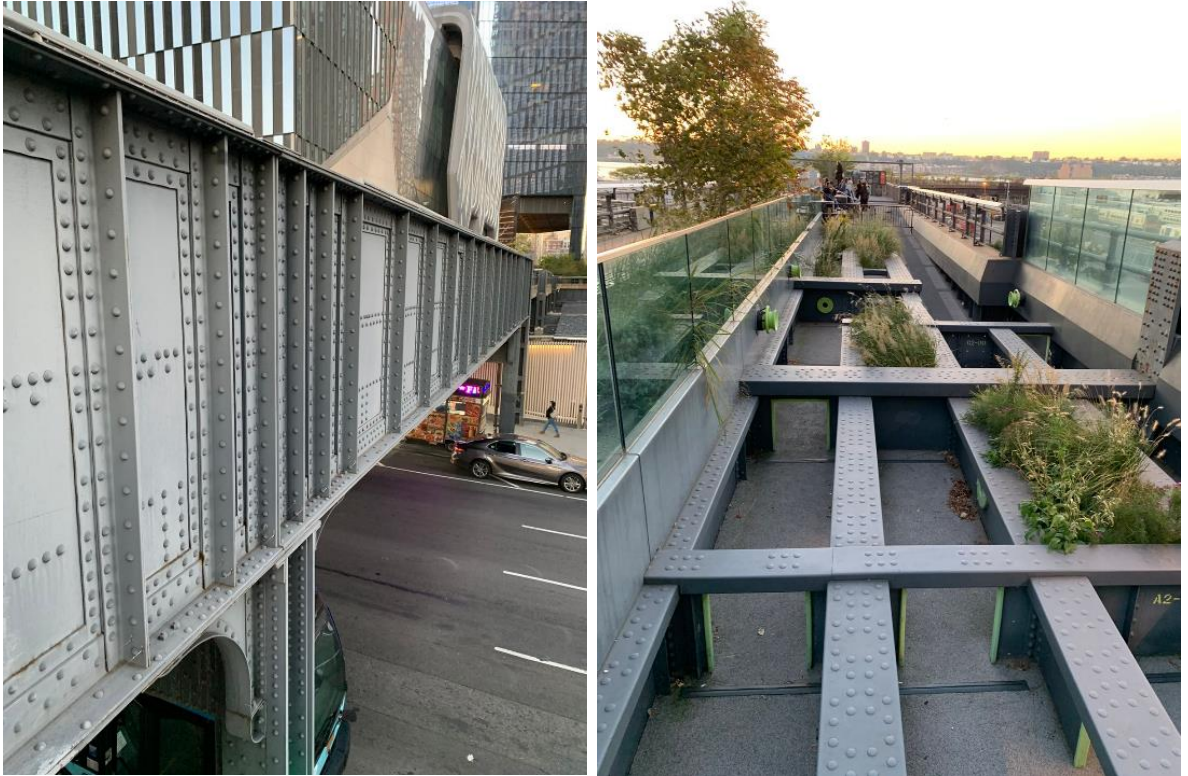
*Figure 23.* Stefano Boeri Plan



*Figure 24.* Tirana 2030 Boeri's Plan

## 2.7 Parasite, elevated constructions, case studies

### 2.7.1 The High Line, New York



*Figure 25.* High Line NYC, steel construction  
(Pictures taken by author)

The High Line fulfills a number of purposes that enhance the overall enjoyment and advantages of the park. It serves the following major purposes:

- **Recreational area:** both locals and tourists can enjoy the distinctive and beautiful recreational area offered by The High Line. People can take leisurely strolls, unwind, and interact with nature and art in an urban setting thanks to the walking routes, seating places, gardens, and art pieces it has to offer.
- **Urban green space:** the High Line, an elevated park, provides a sizeable green area in the middle of a heavily crowded urban environment. It has planted

gardens, plants, trees, and flora, making it a cool and aesthetically pleasing sanctuary in the middle of the metropolis.

- Promenade and viewing platform: the park acts as a promenade and provides breathtaking views of the neighborhood, including the Hudson River, Manhattan's skyline, and Chelsea's busy streets. It serves as a vantage point for people to observe the cityscape from a different angle.
- Cultural and artistic center: the High Line is covered in a variety of sculptures and installations that support artistic expression and give both national and international artists a platform. The area's cultural vibrancy is enhanced by the temporary and ongoing exhibitions, performances, and events that are hosted there.
- Community gathering place: the High Line serves as a venue for social events like festivals, markets, concerts, and other get-togethers. It offers chances for social interaction, establishing a sense of community and enriching the social fabric of the neighborhood.
- The High Line is a historical and educational site that provides visitors with information about its past, its transformation from a railway to a park, and the development of the neighborhood around it through educational events, guided tours, and interpretive signage.
- Urban revitalization & economic boost: the High Line's presence has energized the neighborhood by luring companies, eateries, cafes, and shops. It has grown to be a popular tourist destination, promoting travel, and boosting the local economy.

In terms of the structure construction materials, the High Line of New York is done using heavy steel material and concrete reinforcements. Steel beams and concrete were used in the construction of the first rail system, which was erected in the 1930s. In order to meet current safety regulations and accept the new design, the High Line's original structure was strengthened and restored when it was converted into a public park in the early 2000s.

To produce a level surface for the park, the rail tracks and gravel ballast were taken out, and a new concrete deck was laid over the already existing structure.

During the renovation, the steel beams that support the High Line were cleaned and repainted. To ensure that the building could withstand the weight of the park, which includes landscaping, dining places, water features, and other amenities, the beams were also strengthened with additional steel when necessary. Along the length of the park, a number of supports and columns were built, adding to the steel framework of the High Line. These columns and supports add to the structure's stability and support while also assisting in the even distribution of the structure's weight.

In order to convert an abandoned rail line into a thriving public park that has become a treasured feature of New York City's urban landscape, the creation of the High Line required a combination of creative design and rigorous engineering (Washburn, 2013).



**Figure 26.** The High Line NYC, steel structure cut detail  
(Picture taken by John Kleske)

## 2.7.2 Qunli Stormwater Wetland Park/ Turenscape, China



*Figure 27.* © Turenscape (picture taken from Arch Daily)



*Figure 28.* © Turenscape (picture taken from Arch Daily)

Large public park in Harbin, China called Qunli Stormwater Wetland Park was created by famous landscape architectural company Turenscape. The Park is intended to serve as a stormwater management system, filtering and storing extra stormwater runoff utilizing a network of wetlands and other water management elements (Yu, 2021).

Turenscape created Qunli Stormwater Wetland Park, a cutting-edge and environmentally friendly landscaping project in Qunli New Town, Harbin, China. It performs a variety of tasks that improve community wellbeing, stormwater management, and environmental preservation. Following are some of the Qunli Stormwater Wetland Park's main purposes:

- Stormwater management: the park's ability to successfully manage stormwater runoff is one of its main goals. It collects, filters, and stores stormwater using a network of artificial wetlands, ponds, and green spaces. By eliminating pollutants and sediments, these natural structures assist decrease flooding, manage erosion, and improve water quality.
- The wetland park serves as a natural water purifying system. By filtering and treating stormwater runoff through a variety of ecological processes, including as sedimentation, biological filtration, and nutrient absorption, it improves the quality of the water. This function supports sustainable water management and contributes to the protection of water bodies downstream.
- Recreational and educational possibilities are available to the community at the Qunli Stormwater Wetland Park. Visitors can enjoy the outdoors and participate in outdoor activities on the walking pathways, bicycle trails, and seating places that are available. Wetland habitats, water conservation, and sustainable practices are all topics that are brought up in instructional materials, guided tours, and interpretive signage.
- Cultural integration: the park's layout incorporates aspects of Chinese heritage and culture, reflecting the area's identity and encouraging respect for all cultures. Within the park, traditional architectural elements, artistic installations, and cultural activities foster a sense of place and community.
- Conservation of biodiversity: the park's layout supports and enhances

biodiversity. It has a diversity of indigenous plant species, wetland habitats, and ecological pathways that serve as homes, food sources, and breeding sites for a variety of plant and animal species. The park's layout encourages natural harmony and aids in the preservation of regional ecosystems.

- Climate resilience: by lessening the effects of climate change, the wetland park supports climate resilience. A greenhouse gas that contributes to global warming, carbon dioxide, can be effectively absorbed and stored by wetlands. The park's greenery also contributes to a more comfortable and sustainable urban environment by lowering heat island effects and enhancing air quality.
- Urban green space: it provides an important green space in the city as an urban wetland park. The Park offers locals chances for recreation, physical activity, and social connection. The presence of vegetation and water elements improves the area's aesthetic appeal and adds to the general wellbeing of the neighborhood.

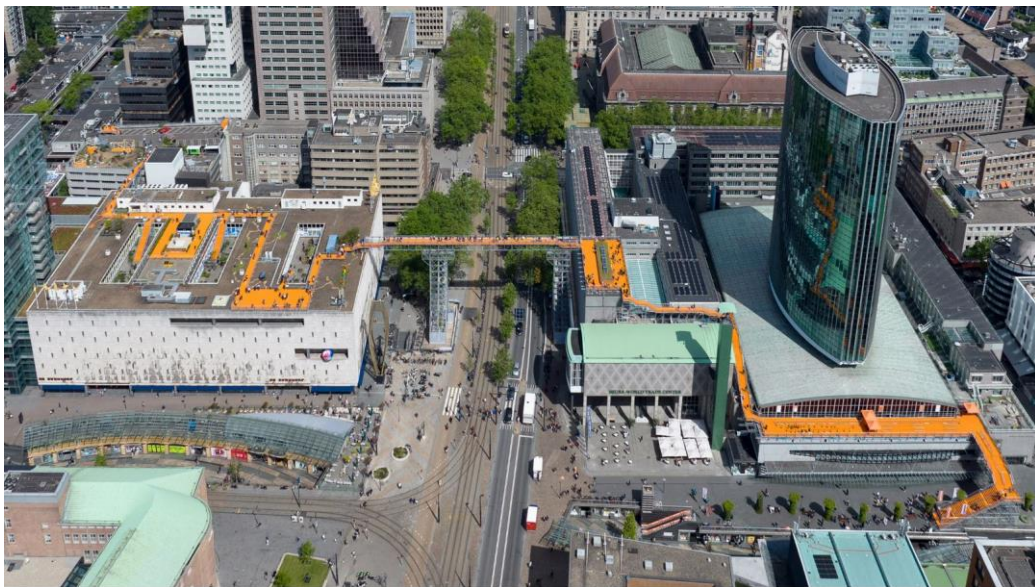
The pedestrian bridges in Qunli Stormwater Wetland Park in China are made of a range of materials that are both practical and aesthetically pleasing.

- Steel: the steel used in the bridge's construction gives it strength and stability to accommodate foot traffic. Usually, the steel is painted or coated to prevent rust and weathering.
- Wood: wood lends a natural, warm look and feel to the decking or walking surface of the bridge. To make the wood more enduring and weatherproof, it may be treated or coated.
- Concrete: support columns and abutments for some of the bridges at Qunli Stormwater Wetland Park are made of concrete. Concrete may be shaped into a variety of forms and sizes and offers strength and durability.
- Stone: natural stone components, such as pavers or veneers, may occasionally be used in the bridges. To cut down on transportation emissions, stone may

be found locally and has a timeless, natural look.

- Utilizing recycled materials in their designs, Turenscape is renowned for its dedication to sustainability. It's probable that some of the Qunli Stormwater Wetland Park's bridges contain recycled components, including steel or wood.

### 2.7.3 Rotterdam Rooftop Walk by MVRDV



*Figure 29.* Rotterdam Rooftop Walk, picture taken from Dezeen

The architectural firm MVRDV created the urban project known as the Rotterdam Rooftop Walk. It aspires to turn the city's rooftops into usable public spaces and provide both locals and visitors with a distinctive experience. The Rotterdam Rooftop Walk is a system of elevated walkways and platforms that connects different city skyscrapers. These walkways are constructed above the city's rooftops, giving visitors a completely new way to view Rotterdam. The walk's design is distinguished by its recognizable orange color, which makes it stand out against the metropolitan skyline. (Dezeen, n.d.)



**The functions of this project can be listed as below:**

- **Public space activation:** the rotterdam Rooftop Walk's primary goal is to turn unused rooftop spaces into lively public places. The walk invites people to visit the city's roofs and take use of the distinctive vistas and experiences they provide by offering accessible pathways and gathering areas.
- **Connectivity:** the path connects several Rotterdam structures and neighborhoods. It establishes a continuous network that gives pedestrians another option than ground-level routes for getting around the city. This connectedness improves the city's walkability, lowering dependency on cars and fostering environmentally friendly transportation.
- **Leisure and recreation:** there are opportunities for leisure and recreation on the Rotterdam Rooftop Walk. The elevated walkways can be used for cycling, walking, or running while providing panoramic city views and fresh air. Visitors can unwind and take in the urban environment thanks to the walk's resting spots, viewing decks, and green areas.
- **Exhibitions and cultural activities:** the rooftop walk is a location for cultural activities. A vibrant cultural environment may be created in the city by using the raised platforms to hold outdoor concerts, shows, and art installations. This enhances the urban environment's liveliness and promotes community involvement.
- **The Rotterdam Rooftop Walk serves as a demonstration of cutting-edge urban construction techniques.** The idea shows how cities may make the most of their potential and add value to the already existing urban fabric by making use of the frequently underutilized rooftop spaces. It serves as an example for other towns and designers who want to repurpose neglected spaces.

The Rotterdam Rooftop Walk by MVRDV, in its entirety, mixes urban planning, architecture, and public space activation to produce a unique and interesting experience for locals and guests. By converting the city's rooftops into open spaces and accessible pathways, it improves connectivity, leisure, cultural events, and urban development (Parkes, 2022 ).

**The materials used for this project structure:**

The material used in this elevated structure is steel. Elevated walkways frequently have their structural framework made of steel. It offers durability and stability while enabling a variety of design options. The paths and platforms are supported by steel columns, beams, and trusses.



*Figure 30.* Rooftop Walk, picture taken from Dezeen

### 2.7.4 Sky walking Stockholm: bridged green-roof parks to span downtown



**Figure 31.** Project render taken from Web Urbanist

*“The design makes larger parts of the area accessible to the public since both courtyards and roof terraces is crossed by public paths. The sky walk on the roof terraces will be one of the longest parks in Stockholm with best view in town. The new city area will host about approximately 5800 apartments, 8000 work places and about 300 shops.”* – from the architects (Urbanis).

This ambitious urban Sky Walk concept intends to transform the roofs of downtown buildings into a substantial network of connected green-roof parks connected by aerial walkways. It combines height, light, density, and greenery with regional vernacular architecture.

The task of creating a plan to handle Stockholm's expanding population and related housing needs, fell to Anders Berensson Architects, but both figuratively and otherwise, their response goes beyond traditional urban planning. Their plan makes use of already-built infrastructure and densely populated buildings to create green communal areas practically out of thin air while adhering to zoning laws and construction requirements that specify heights and uses. Residential units are oriented with natural daylight in mind while also taking views and light orientations into

account.

**It is still a conceptual design, but the functions are expected to be as below:**

- **Urban connectivity:** bridged green-roof parks can cross over downtown areas, roadways, or other barriers to connect various parts of a city. They offer a different route for pedestrians that encourages walkability and lessens dependency on automobiles.
- **Public space activation:** within crowded metropolitan settings, these parks add more public space. They provide locations for unwinding, playing, and socializing, improving both the quality of life for locals and tourists. Additionally, green spaces help to increase urban biodiversity and air quality.
- **Urban agricultural:** the bridging green-roof parks may include urban agricultural components like hydroponic systems or rooftop gardens. These attributes promote food production opportunities and local sustainability and self-sufficiency.
- **Recreational amenities:** the parks may provide a range of recreational amenities, including trails for walking and bicycling, playgrounds, fitness centers, or sporting venues. These facilities encourage urban residents to be active, healthy, and happy.
- **Bridged green-roof parks** can be used as venues for cultural events, exhibits, or art installations. They can serve as venues for creative expression, civic involvement, and cross-cultural interaction.

**The materials used for this project structure:**

- Parks are sustained by bridge-like constructions that enable them to cross over roads, buildings, and other obstructions. These buildings need to be built safely and securely while supporting the weight of the park, the surrounding vegetation, and the visitors.

- Green roofs: the park's surfaces are made up of green roofs that are covered in plants and other vegetation. These green roofs serve the environment by controlling temperature, managing runoff, and fostering urban biodiversity.
- Routes and platforms: the parks have routes and platforms for activities like walking and running. Depending on the design specifications, these elements may be built from materials like concrete, steel, or wood.
- Trees, bushes, flowerbeds, and grassy areas are all included in the parks' design and plantings. These features give the park its aesthetic appeal, shade, and recreational areas.
- Safety precautions, such as guardrails, lighting, and appropriate signs, are crucial. These make sure that safety rules are followed and that park visitors are safe.
- The perforated-metal Sky Walk structures' narrow profiles will reduce any shade caused by these elements as well.



*Figure 32.* Street crossed bridges; picture taken from Web Urbanist

### 2.7.5 Zhaoshang Yichang Evian town landscape design (river valley part) by BW-landscape planning and design



*Figure 33.* Masterplan of Zhaoshang Yichang Evian town landscape design

#### **The functions behind the design are as below:**

The project is situated on the outskirts of Yichang, also known as "the pearl of the Gorge", a city in Hubei Province. The area was unspoiled but devoid of many useful resources, save for a deserted river valley that is 500 meters long and 60 meters wide on average. They set out to restore and restructure the entire valley space, employing various landscape features to transmit and extend human feelings, with an undertaking for natural restoration and emotional reconstruction. (moool, n.d.)

The natural river path serves as the primary guiding principle for the architecture of the environment, with traffic lanes and activity areas positioned in accordance. The goal has been to minimize harm to the environment while maximizing the integration of new building with the existing landform. The ideal method is to gather building supplies from the surrounding area. Local topsoil, recycled ceramic shards, and wood chips are extracted and stored alongside them.

This plan places a strong emphasis on preserving locally useful plants. Coniferous and evergreen broadleaf mixed forests were planted in order to balance out the growth of fast-growing and slow-growing plants throughout time. To reduce PM 2.5 levels and enhance air quality, plants were chosen that had a higher unit leaf area capacity for airborne particle absorption. The estimates showed that the valley's green coverage ratio increased from its initial 30% to 95%, that future PM 2.5 levels would be reduced by around 40%, and that the typical July temperature would decrease by 2-3°C.

A bridge is both a point of connection and an idea. The concept of a "bridge" is not limited to the practical building that crosses barriers to connect two locations in Western and Chinese civilizations. A bridge is a representation of harmony, interaction, and communication between humans and other living things, as well as between humans and the natural world. "Make neighbors with water" is considered the ideal neighborhood in traditional Chinese culture. A bridge is built over water, and a dwelling establishes itself on the link. Bridges can be thought of as ideal connections and expansions of emotional spaces.



**Figure 34.** Zhaoshang Yichang Evian town landscape design, picture taken from “moool”

**The materials used for this project structure:**

- Wood for the flooring and wooden bars for creating the safety guardrail.
- Steel for the construction of the elevated bridges.



*Figure 35.* Zhaoshang Yichang Evian town landscape design, picture shows material choice for the structure



## 2.7.6 Conclusions

The functions this project proposal will provide will be based on these 3 main concepts:



*Figure 36.* Project Drivers (by author)

Firstly this “green skyline” will bring back the lost biodiversity to the city, with all the wildlife and habitants. It will provide spaces to promote food production and enhance urban agricultural by the locals. The impacts it would have to the environment are countless, starting from the air quality improvement, climate mitigation, stormwater management and noise reduction.

The elevated structure will provide space for the community members to enjoy spending time together. Safe playgrounds for the children, quiet and peaceful space for the eldest to rest and recreational area for young to perform different social, cultural and artistic activities.

Furthermore, it will improve building aesthetics and give the urban area a sense of natural beauty. It also will have psychological advantages and health effects, including a reduction in stress, an improvement in mental health, and a rise in productivity.

To conclude this section, the material choice for this project proposal will be: steel for the parasite structural construction, wood for the guiderails and natural crushed stones for the finishing together with the chosen green carpet and authentic plant selection. Considering all the elements used in the previous case studies this are considered the most proper elements to be used in an urban context such as “Ruga e Duresit” street.

# CHAPTER 3

## METHODOLOGY



Figure 37. Methodology analysis scheme

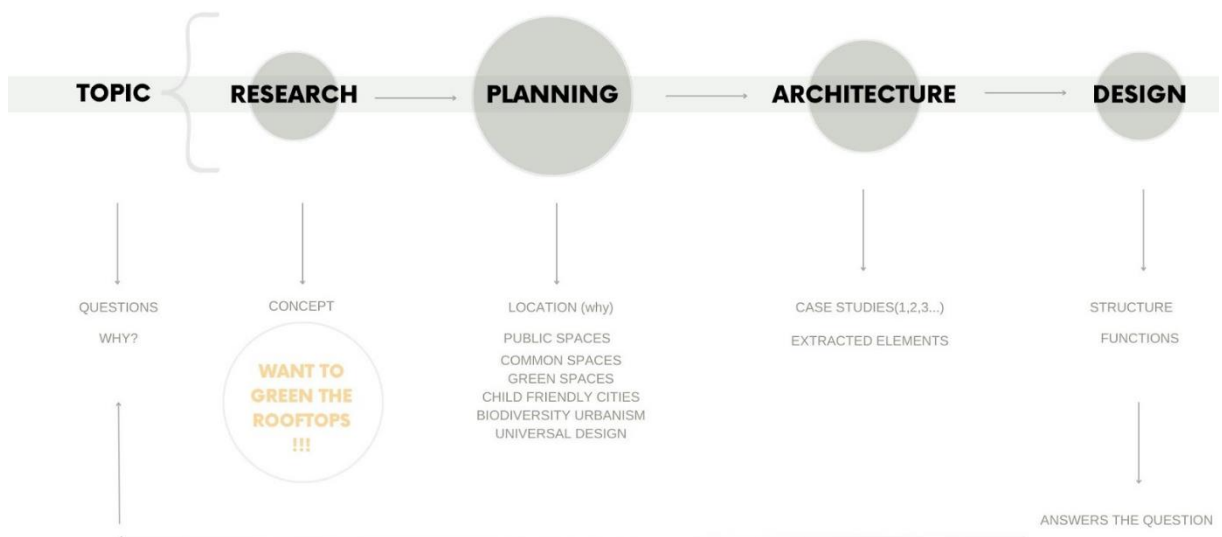


Figure 38. Methodology scheme representation

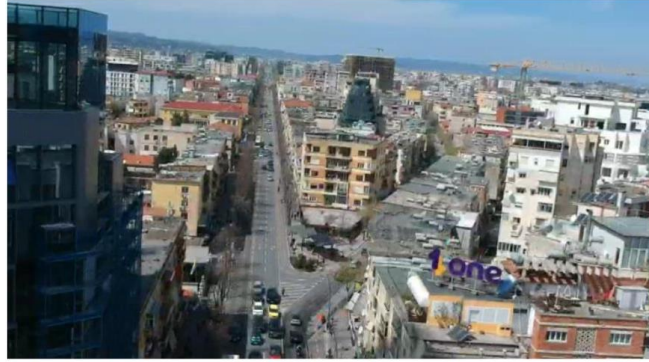
It is a mixed-method approach, where observations, material gathering from institutions, studies interpretation, comparisons of different case studies, and a lot of proposals are considered. To begin with, after listing my concerns, I started to develop some background ideas on how I could solve these problems. That is the starting point of these thesis development.

After choosing the topic, a wide range of research is done related to it which is followed by a concept generation. Prior to the concept, after finishing with the research and the gathering of all the needed materials from different online sites, websites, books, similar papers meeting my concepts and concerns etc., I got prepared for the planning phase. Planning is the part when the decisions are made. The location, the functions, attributions, structure, principles, and everything related to the project was decided. And a lot of case studies were considered to extract what fits best my project concept.

The following phase is related to architectural solutions. Here there were taken in consideration other papers and project examples in terms of integrating architecture to solve greenery and biodiversity loss problems. Specific analysis of the chosen site is done; the street segment itself, buildings in the first line, greenery, public places etc. The last phase is related to the design of the project, where the form is generated, the functions are distributed in their proper places in the line and there are generated images and collages showing all the mentioned aspects of design.

At the site, some analyses are done, considering the first line building typology, the functions they have, demographic analysis etc. From all the buildings in the first line of the street there are chosen some of them over whom the project design will develop. The selection criteria are all the socialist buildings with non-functional terraces.

The observations and the photo gathering from the site are done from the top, with drone, and from ground floor while walking through the street. Below there are presented some of these materials.



**Figure 39.** Fragments from videos with drone to observe the existing rooftops of socialist buildings in “Rruga e Duresit”  
(Captured by author)



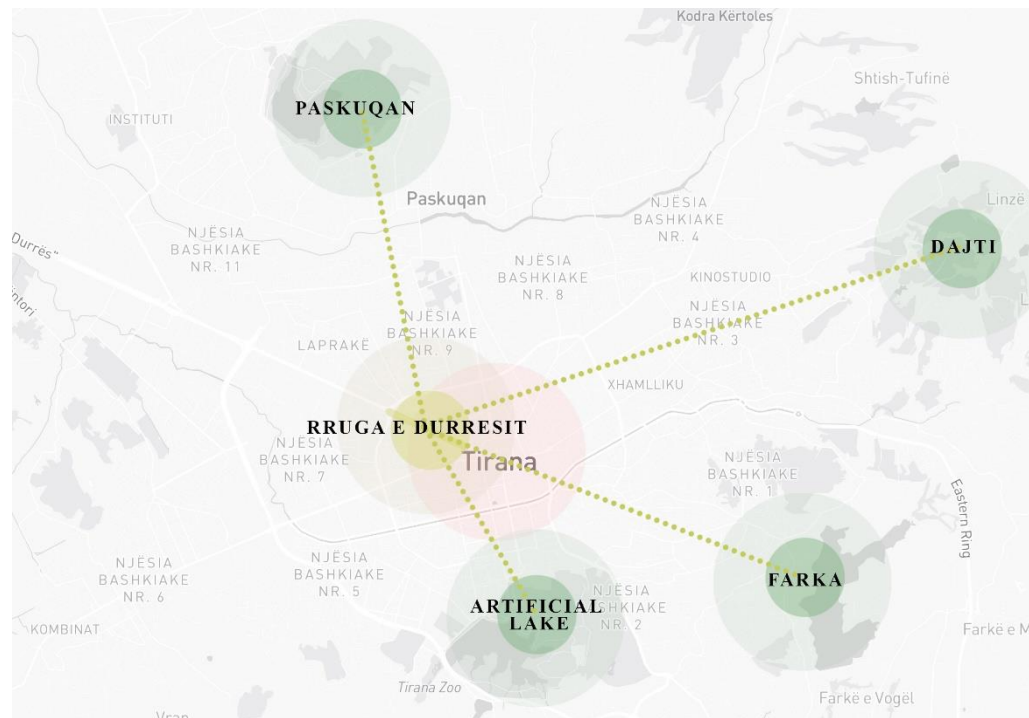
*Figure 40.* Socialist building of Rruga e Durrësit (captured by author)

# CHAPTER 4

## PROJECT DEVELOPMENT

### 4.1 Site Analysis

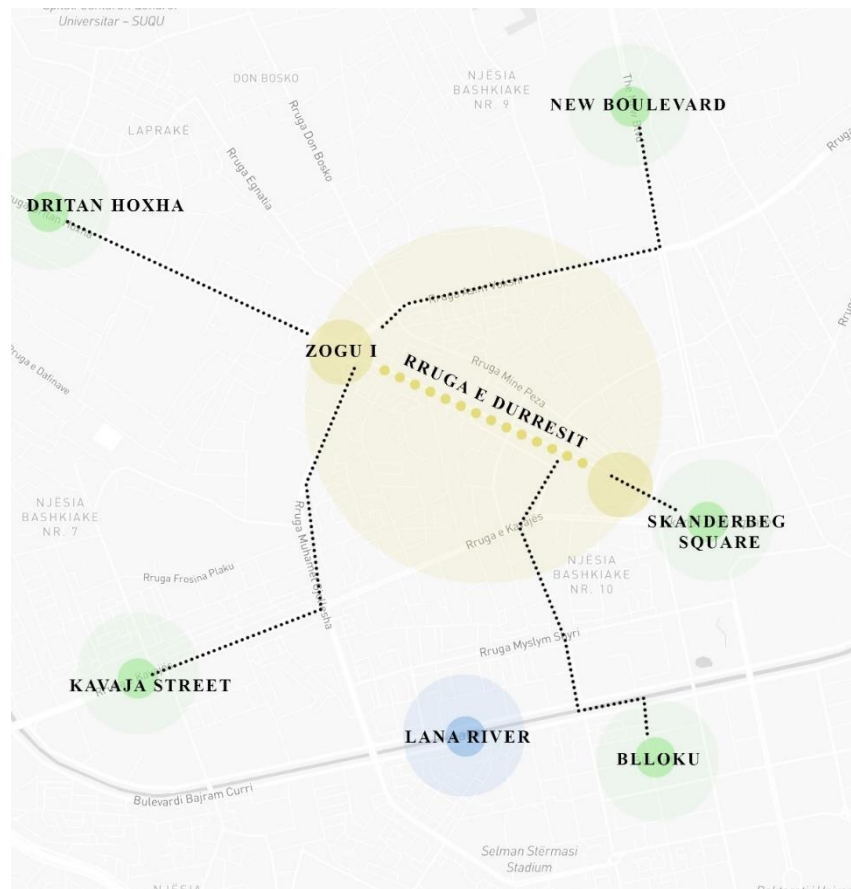
As mentioned in the methodology, the first part of the project development is based on the site analysis. This section elaborates the developments of “Rruga e Durrësit” street, through years in terms of greenery and Socialist-era Buildings. It deals with the street analysis, taking in consideration the existing green volume, building use and ground floor activities.



**Figure 41.** Rruga e Durrësit in relation with the parks of Tirana (by author)

Rruga e Durrësit is a significant roadway that runs through the center of Tirana, Albania's capital and largest city. It connects several areas and acts as a key transit route as it travels from the city's center to the eastern region. Due to its strategic position and function as a thoroughfare linking various parts of the city, the roadway is of utmost significance.

#### 4.1.1 "Rruga e Dureshit" Street presentation



**Figure 42.** Location of "Rruga e Dureshit" in relation with the other important streets and locations in Tirana (by author)

The street segment locates in between “Zogu i Zi” and “Skaderbeg Square”. The continuation of the street towards Durres is followed by “Dritan Hoxha”. And there are located some other known streets on both sides such as “Rruga e Kavajes” street and the “New Boulevard” segment. “Rruga e Dureshit” is known as a busy line with several shops and businesses.

Numerous stores, boutiques, eateries, cafés, and other enterprises can be found along the route. It is a well-liked location for dining, shopping, and entertainment that draws both residents and visitors. Although “Rruga e Dureshit” is mostly renowned for its business activities, there are also homes and flats there. Due to its convenient location, close access to amenities, and availability of several services and facilities,

many people decide to call this neighborhood home.

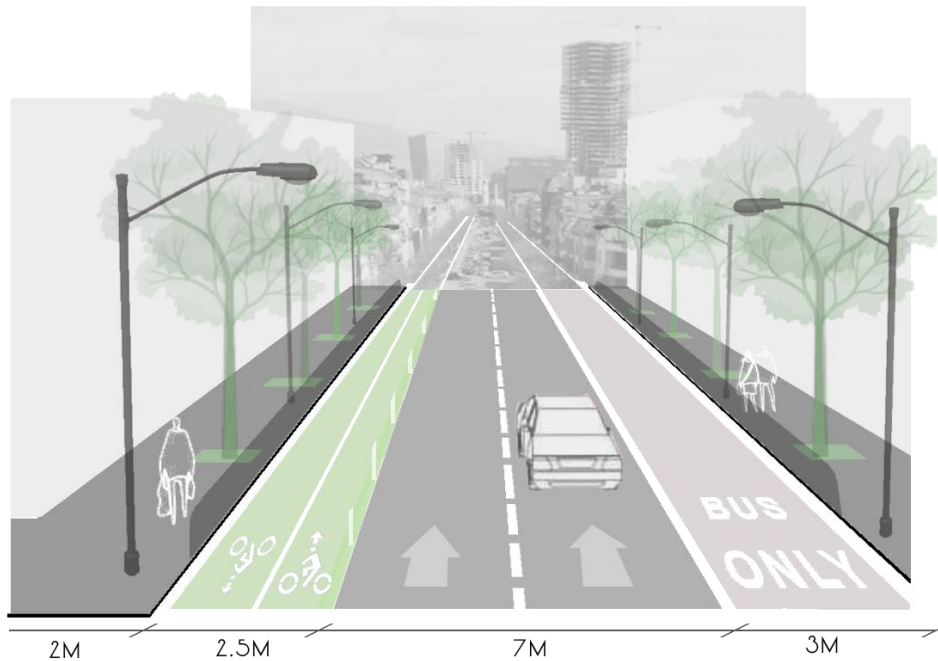
In Tirana, “Rruga e Durrësit” is a crucial route for transportation. It is easily accessible by both private automobiles and public transit because of its good connections to other important highways and streets while offering easy transit alternatives for commuters and locals, the roadway also functions as a center for bus routes, with several bus stations located throughout its length.

This street has witnessed substantial growth and development throughout time. Infrastructure improvements have been made to the roadway, including wider walkways, better lighting, and improved road conditions. These upgrades have made the roadway more attractive and useful overall, improving both walkers' and drivers' quality of life.

As this very important line of the capital city has so much potential to grow in terms of facilities it provides, it seemed to be the best location to develop this project concept. Considering the fact that it is well used at its fullest potential as a linking medium to tourists and visitors, as mentioned above, at the same time it is considered a residential area to 27731 people, according to Tirana Administrative Unit no. 10 of whom it belongs (Bashkia Tirane, n.d.).

In this regard the neighborhood must provide its residents with spaces that belong to them. A good neighborhood provides access to green spaces, playgrounds, and parks. These places offer space for leisure, exercise, and recreation, all of which support leading an active and healthy lifestyle. “Rruga e Durrësit” lacks this kind of space, it is very dense in terms of construction that it is almost impossible to find free space on the ground floor to design such activities. This was the first trigger to think of an elevated structure that would be able to accommodate this kind of space on the rooftop level.





**Figure 43.** Rruga e Durrës street section, current situation  
(by author)

The character of this street is as presented in the figure 43. It consists of three car lanes with one sense of direction, (towards the city center), two dedicated to traffic vehicles movement and one for public transportation. On the other side there exist two bicycle lines, with two senses of direction. On both sides the street is provided with pedestrian paths embellished with trees street barriers and street lightings.

#### **4.1.2 Developments of “Rruga e Durrës” street, through years in terms of greenery and Socialist-era buildings.**

Rruga e Durrës, an important roadway in Tirana, Albania, has undergone noticeable changes in terms of vegetation over the years. Here is a quick rundown of some of the significant adjustments: The roadway had trees lining it before the 1990s, adding some greenery to the neighborhood. However, during Albania's years under Communist administration, many of these trees were cut down. The street underwent

a significant reconstruction effort in the early 2000s, which involved the planting of new trees and the building of green spaces.

The area's aesthetic attractiveness and pedestrian friendly were to be improved by the reconstruction. The "Park of Durres Street" (*Parku i rruges se Durrësit*) was a brand-new park established in the middle of the street in 2005. There are benches and green areas in this park, as well as a large fountain and various sculptures. The city began a new program in 2015 called "Green Tirana" with the goal of increasing the amount of greenery there. "Rruga e Durrësit" got more trees and bushes planted as part of this program, along with new flower beds and landscaping elements (Bakiu, 2019).

The amount of vegetation in the "Rruga e Durrësit" in Tirana has significantly increased during the past few years. The city has made a determined effort to expand its public spaces and parks as well as to include green elements in the planning of its streets. These initiatives have contributed to making the neighborhood more livable, appealing, and fun to live in and visit.



**Figure 46.** "Rruga e Durrësit" Street (unknown)

The Socialist-era buildings in Tirana's "Ruga e Dureshit" street are well-known for having been built under Albania's communist rule from 1944 to 1991. The government's initiatives to quickly industrialize the country and build new dwellings for its residents included the construction of these structures. These structures are notable for their size, angular shapes, and straightforward, practical layouts. Typically built from prefabricated concrete panels, they frequently have balconies or terraces for occupants to use. While many of these structures have aged over time, several have undergone renovation and restoration, frequently receiving new facades and other upgrades (Ruga e Mimosave, n.d.).



*Figure 47.* Coffee "Flora", "Ruga e Dureshit" street and "Mine Peza" street, Tirane year 1960.

But there has been some debate regarding the preservation of these structures, with some arguing that they serve as a bitter reminder of Albania's communist history and ought to be torn down. Others contend that these structures should be preserved as a part of Albania's cultural heritage because of its historical and architectural value (Prifti, 2017).



Olivierp

[www.delcampe.net](http://www.delcampe.net)

**Figure 48.** “Rruga e Durrësit” sketch (unknown)

### 4.1.3 Building use



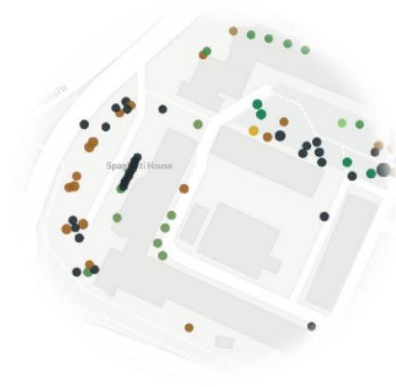
*Figure 47.* First line building use of "Rruga e Durrës" (by author)

#### 4.1.4 Green volume



**Figure 48.** Green volume, masterplan of “Rruga e Durrësit” zoning (by author)

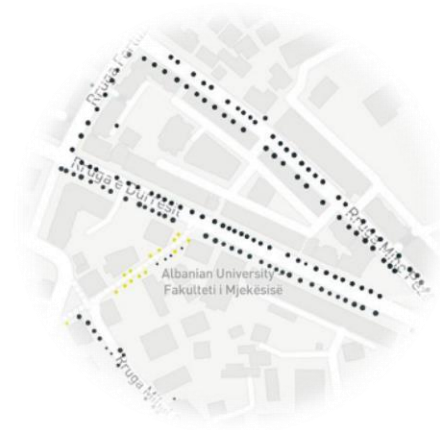
In these maps there are represented all the green spaces found in “Rruga e Durrësit”. The front-line segment itself is greened by trees on both sides of the street. Then, the two restrictions of the site “Zogu i Zi” and “Skanderbeg Square” both have a good amount of decorative vegetation. And after that we can as well count some small neighborhood gardens, three near “Zogu i Zi” circle and two near the Museum in the city center. These parks are small, and they offer nothing but some old benches to sit on and some random grass with no special maintenance.



**Figure 49.** Zone 1 existing vegetation type  
(generated by greenlungs.al)





**Table 1.** Existing vegetation in Zone 1 of "Rruga e Durrësit" (by author)

	<p><b>Magnolia (manjola)</b></p> <p>Diameter: 16 cm Age: 21 Years Height: 7 m CO2 capture: 7.62035064 CO2 emission: 20.32093504 Capacity: 12643.473525</p>	
	<p><b>Loquat (nespull)</b></p> <p>Diameter: 7 cm Age: 12 Years Height: 4 m CO2 capture: 2.44939842 CO2 emission: 6.53172912 Capacity: 3146.002035</p>	
	<p><b>Voshter e ndritshme</b></p> <p>Diameter: 11 cm Age: 24 Years Height: 8 m CO2 capture: 4.67200069 CO2 emission: 12.4586685066667 Capacity: 5697.35022</p>	
	<p><b>Cypress (selvi)</b></p> <p>Diameter: 26 cm Age: 37 Years Height: 10 m CO2 capture: 6.98532142 CO2 emission: 18.6275237866667 Capacity: 6456.2418</p>	
	<p><b>Tuje e lindjes</b></p> <p>Diameter: 4 cm Age: 12 Years Height: 4 m CO2 capture: 1.45149536 CO2 emission: 3.87065429333333 Capacity: 2109.605325</p>	



**Figure 50.** Zone 2 existing vegetation type  
(generated by greenlungs.al)

**Table 3.** Existing vegetation in Zone 2 of "Rruga e Durrësit" (by author)









	<p><b>Tilia platyphyllos</b></p> <p>Diameter: 15 cm Age: 20 Years Height: 8 m CO2 capture:379 CO2 emission: 7.25 Capacity:...</p>	
	<p><b>Acacia dealbata (mimoza)</b></p> <p>Diameter: 8 cm Age: 8 Years Height: 15 m CO2 capture:91 CO2 emission: 6.04 Capacity:...</p>	





**Figure 51.** Zone 3 existing vegetation type (generated by greenlungs.al)

**Table 5.** Existing vegetation in Zone 3 of "Rruga e Durrësit" (by author)

	<p><b>Tilia platyphyllos</b></p> <p>Diameter: 15 cm            Age: 20 Years            Height: 8 m            CO2 capture:379            CO2 emission: 7.25            Capacity:...</p>	
	<p><b>Leafy Conifer (blir)</b></p> <p>Diameter: 35 cm            Age: 28 Years            Height: 9 m            CO2 capture:70            CO2 emission: 8.7            Capacity: 6537</p>	
	<p><b>Evergreen oak (ilqe)</b></p> <p>Diameter: 16 cm            Age: Years            Height: 6 m</p>	
	<p><b>Pine (pisha)</b></p> <p>Diameter: 8 cm            Moshë: 13 Vite            Lartësia: 3 m            Kapja e CO2:6.8 kg            Emetimi i CO2:7.25 kg</p>	

### 4.1.5 Selected rooftops



**Figure 52.** 4 and 5 floors Communist building extraction (by author)

#### 4.1.6 First line buildings elevations (current situation)



*Figure 53.* First segment of elevations of the selected buildings from Zogu i Zi towards the Skanderbeg Square (by author)



*Figure 54.* Second segment of elevations of the selected buildings (by author)



*Figure 55.* Third segment of elevations of the selected buildings (by author)



*Figure 56.* Forth segment of elevations of the selected buildings (by author)



*Figure 57.* Fifth segment of elevations of the selected buildings (by author)

## 4.2 Project Design



*Figure 58.* “Green Rooftops”, conceptual drawing, Caffee Flora Rruga e Durrësit, (by author)

The idea of creating an elevated green roof to connect existing ineffective terraces gives underused spaces new life. The idea offers a wide range of advantages by seamlessly combining these terraces into a coherent elevated green area, including greater usefulness, environmental sustainability, social interaction, and aesthetic enhancement. It offers a rare chance to change the urban landscape by bringing people closer to nature and fostering a sense of community in a lively and welcoming atmosphere.

## 4.2.1 Concept explanation



*Figure 59.* Community integration (by author)

An intriguing chance to convert underused spaces into colorful, eco-friendly places is presented by the idea of creating an elevated green roof to connect existing nonfunctional terraces and give them life and use. With this novel strategy, adjacent non-functional terraces are connected seamlessly and combined into a single elevated green area. Here is how this idea might work:

The terraces can be connected to create a continuous raised green roof by adding bridges, walkways, and elevated platforms. This seamless integration increases the amount of usable space and enables fluid mobility between various surfaces.

The nonfunctional terraces are then transformed into green roofs, featuring a variety of vegetation, including grasses, shrubs, flowers, and small trees. Native plant species can be selected to support local biodiversity and reduce water requirements. The green roof design should consider factors such as drainage systems, substrate depth, and structural support to ensure the longevity and stability of the vegetated areas.

The high green roof offers a wide range of functional options. For example, outdoor lounging places, neighborhood gardens, entertainment areas, or even modest event spaces can all be marked in different parts. Each terrace can be created with a specific purpose in mind, addressing the needs and preferences of the neighborhood.



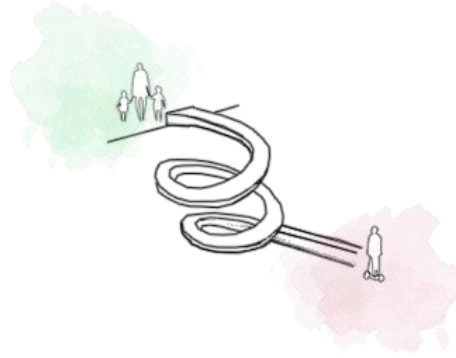
**Figure 60.** Agricultural spaces (by author)

The interconnected terraces offer plenty of room for gatherings and leisure activities. The green roof can be equipped with seating areas that can be put in strategic locations to offer areas for picnics, relaxation, and panoramic views. Playgrounds, exercise areas, and sports facilities can encourage physical activity and wellness. The elevated green roof can also be used as a location for community activities like performances, art exhibitions, or training sessions.

Numerous environmental advantages result from the construction of an elevated green roof. By providing cooling through evapotranspiration and shade, it helps reduce the urban heat island effect. Rainwater is absorbed by the green roof, which lessens stormwater runoff and eases strain on drainage systems. By removing carbon dioxide and other pollutants, it also improves air quality. By supporting local ecosystems and fostering ecological balance, the incorporation of native plants and habitats increases urban biodiversity.

The ineffective terraces are converted into aesthetically pleasing and lively areas by the elevated green roof. The area's overall ambiance is improved by the rich greenery, colors, and textures that create an artistically pleasant environment. In order to add creative flair and engage visitors, the green roof can also be constructed with art exhibits, sculptures, or interactive features.

The construction of an elevated green roof makes places more accessible and connected. It is possible to include walkways, ramps, and elevators to allow easy access between the terraces, making the area accessible and friendly to individuals of all abilities. The connectedness encourages a sense of coherence and togetherness, fostering social cohesiveness and participation in society.



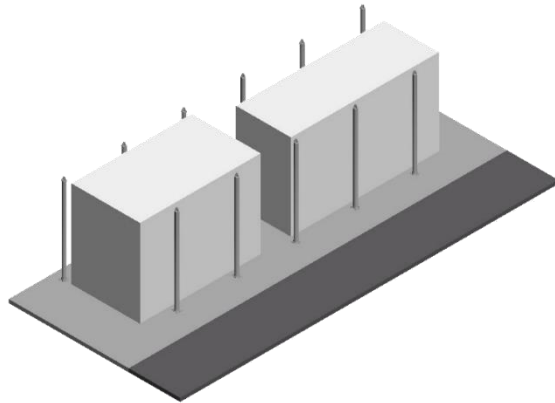
**Figure 61.** Spiral vertical access (by author)

Incorporating public walking spiral ramps into a designated public place prioritizes user experience, accessibility, and pedestrian flow. The project seeks to create a visually appealing and inclusive workplace by embracing design principles including accessibility, effective space utilization, safety, aesthetics, and social interaction. The public walking spiral ramps offer an enjoyable and useful way to go vertically, promoting connectivity and improving the overall pedestrian experience in

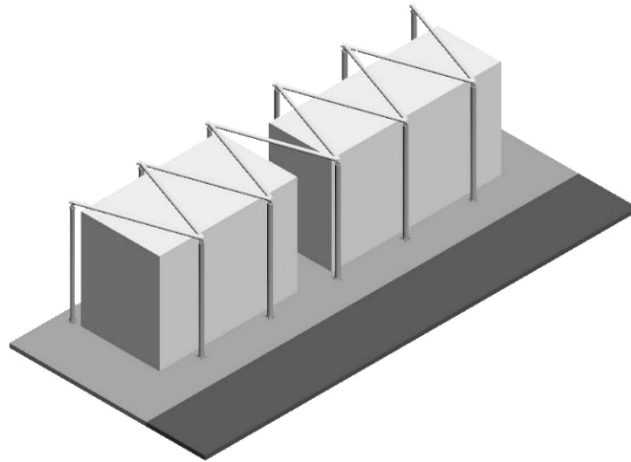


**Figure 62.** The structure itinerary, approximate distance 1367 m

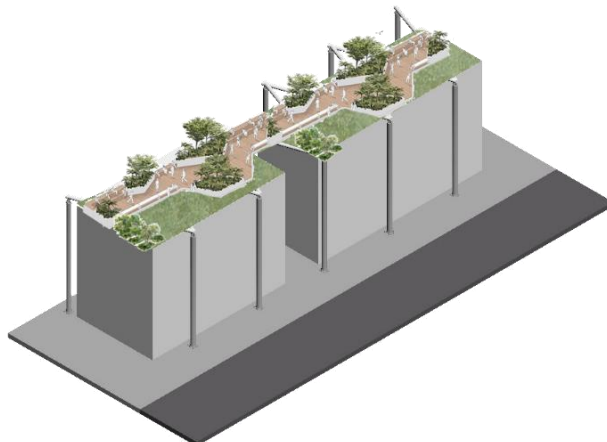
#### 4.2.2 Structural system, parasite model



*Figure 63.* 2 Socialist buildings in the existing condition (by author)



*Figure 64.* Addition of structural steel columns (by author)



*Figure 65.* Addition of the greenery and pedestrian walk (by author)



There are various advantages and benefits to using a parasite system to create elevated green rooftops over preexisting terraces. The parasite system integrates the green rooftop structure with the already-existing terrace infrastructure. It is motivated by the idea of symbiosis in nature. Here are some benefits of the parasite system:

The parasite system guarantees a seamless transition between the patio and the green rooftop structure. The design eliminates the need for substantial alterations or additional building work by making use of the terrace's support structure. This method maintains the original terrace's integrity while maximizing resource use and lowering costs. The parasite system encourages a mutually beneficial relationship between the patio and the green rooftop. The terrace is shielded from intense heat and energy-intensive climate control by the vegetation on the high green rooftop, which also serves as insulation and a source of shade. The terrace structure's solidity and support are advantageous to the green rooftop as a result. An atmosphere of harmony and mutual benefit is produced by this interaction.

It provides a chance to design aesthetically pleasing and pleasant green areas. The current terrace is transformed into a lush, natural setting by the elevated green rooftop design, adding beauty and enriching the building's and the neighborhood's aesthetics. Both locals and guests can enjoy its calming and revitalizing ambience.

In the figures 55-56-57, there are explained in a modest schematic way the implementation of the structure. The material of the structural construction is proposed to be steel. According to the case studies analyzed at the previous chapter, steel has all the potential to form a parasite structure and carry all the weight of the pedestrian walk plus the added greenery, transmitting zero weight to the existing residential buildings. It can also form bridges and span over 20 m.



**Figure 66.** Green roof addition, conceptual drawing (by author)



**Figure 67.** Section of the bridge structure connecting 2 roofs (by author)



**Figure 68.** The parasite structure attachment to the buildings with different heights  
(by author)

The chosen terraces are of buildings by 4 or 5 floors. This level difference has such a small effect on the horizontal elevated line, because as far as it is proposed to be a parasite structure, it does not affect the existing buildings at all.

## 4.2.2 Circulation system, vertical circulation

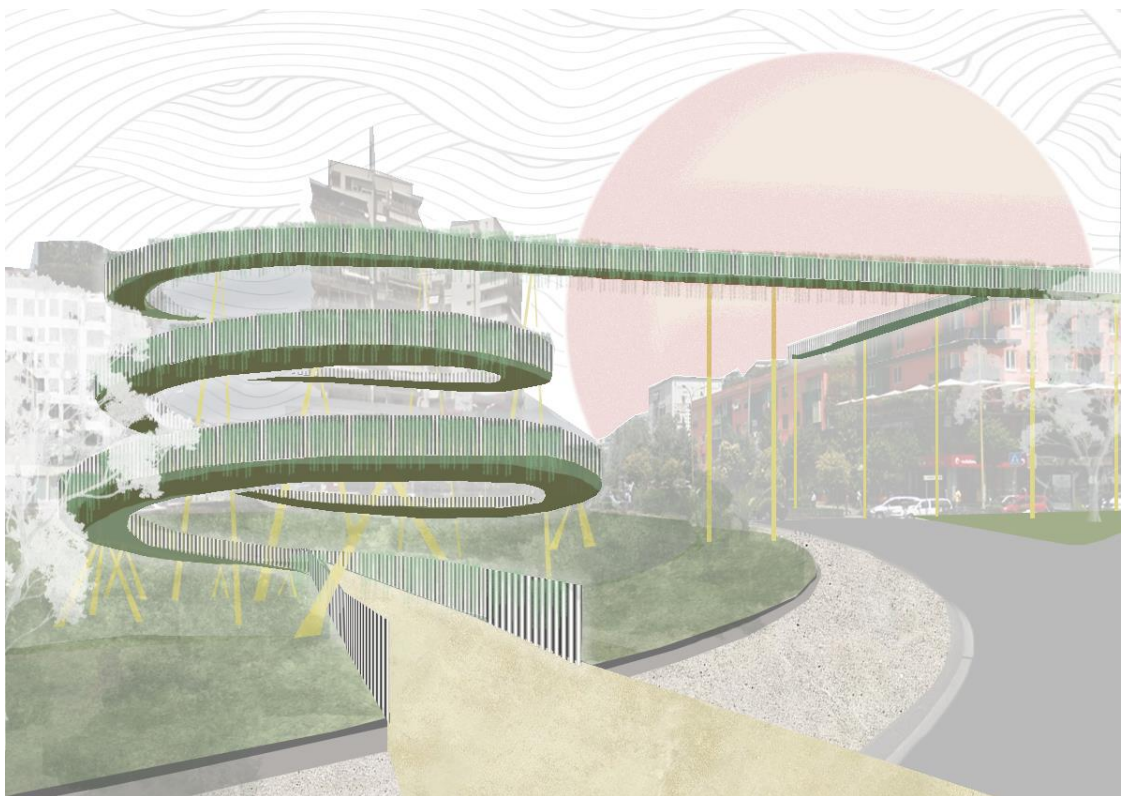
The universal spiral ramp design extends beyond the fundamental factors of space efficiency, gentle ascent, safety features, and aesthetic integration to provide access to public green rooftops. To ensure inclusivity and accessibility for all, it includes a comprehensive approach that considers the various needs and capacities of people. Spiral ramps are appropriate for places with limited space because of their compact design, which maximizes the available space. In this project these ramps are proposed to be placed in the main entrances of the elevated structure, in “Zogu I Zi” rotunda and in “Piazza” near the city center as mapped in the masterplan.



**Figure 69.** The main entrance’s locations (by author)

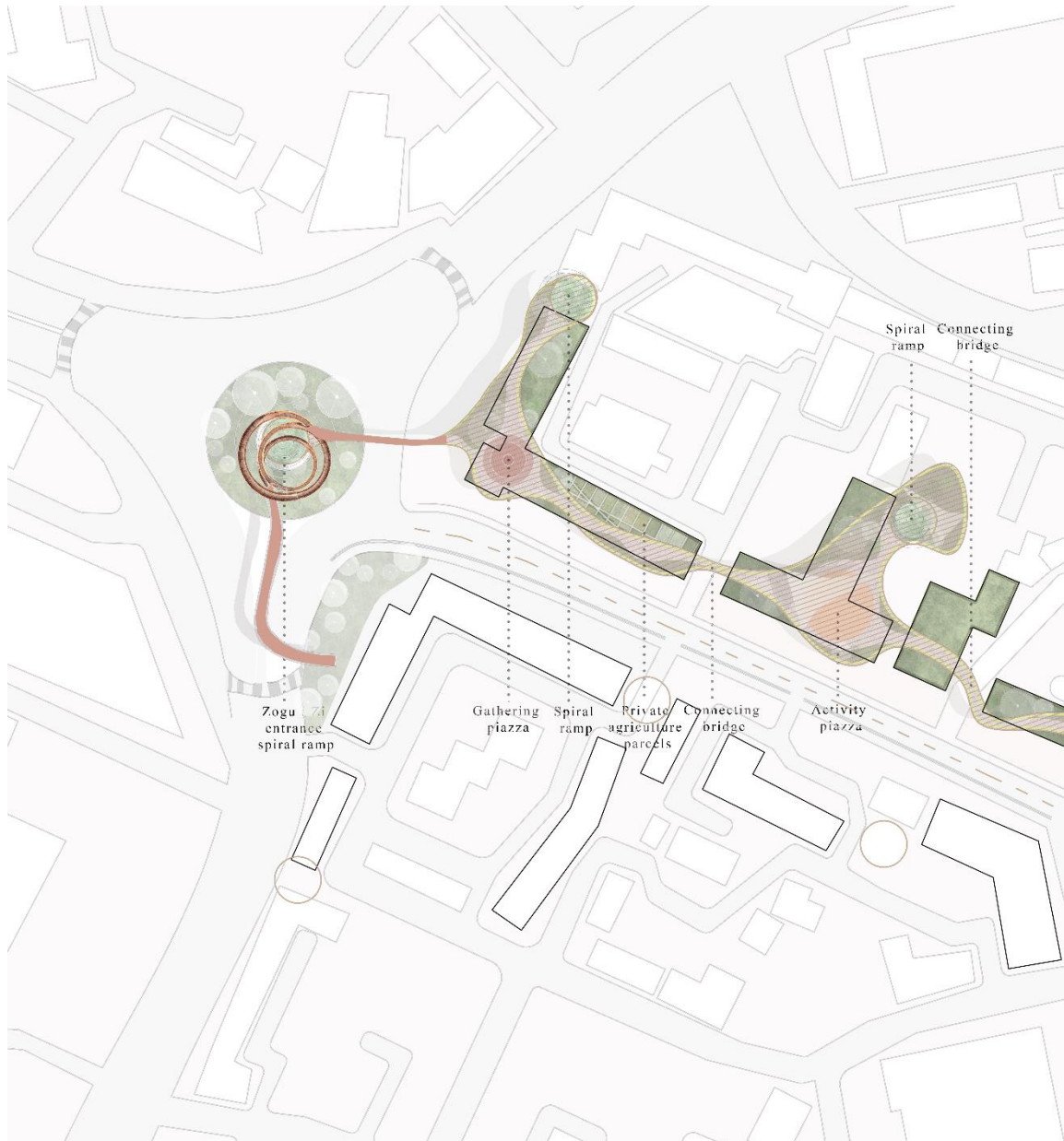
For promoting diversity, accessibility, and seamless connectedness in urban contexts, the use of ramps in pedestrian green lines to access rooftop levels is crucial. Ramps remove the obstacles created by steps and allow for easy and independent mobility, giving people of all abilities equal access to rooftop areas. Ramps guarantee that pedestrians, especially those with mobility issues or using mobility aids, can navigate with ease by giving priority to universal design principles.

Additionally, ramps contribute to a safe and enjoyable walking experience by providing firm surfaces and supporting handrails. Ramps stimulate continuous movement and inspire people to explore and interact with rooftop spaces by effortlessly bridging various levels, improving overall connectedness and usefulness. The addition of ramps to pedestrian green lines demonstrates a dedication to accessibility, sustainability, and the creation of aesthetically pleasing and usable urban places.



**Figure 70.** The entrance from “Zogu i Zi” (by author)

The circular ramps are also a solution for restricted areas because they enhance both the aesthetics and the view. These ramps effectively utilize the available space in small places by exploiting the vertical dimension. Their curved design permits a small footprint while still adding an eye-catching feature to the surroundings. “Zogu i Zi” rotunda is not small in terms of meter square, but the ramp help to reach the terrace level of 5 floor height, and it allows occupants to take in panoramic vistas.



**Figure 71.** The entrance from Zogu i Zi, in plan (by author)

The entrance from Zogu i Zi is proposed to be generated from the left side pavement of the street. Currently there exist a green area, and has sufficient space to gradually grow a path, which is later elevated to reach the center of the rotunda. The reason behind designing an elevated entrance from the pavement, is to not interrupt the existing circulation of the vehicles and at the same time to offer a safe entrance for the pedestrians. In this way the pedestrian movement and the vehicle movement are kept apart from each other.



*Figure 72.* The entrance from " Piazza", circular ramp (by author)



*Figure 73.* Picture taken from site, the back entrance of a socialist residential building (by author)



**Figure 74.** The addition of the vertical stair to access the terrace (by author)

There are many advantages to using outdoor circulating staircases to access green rooftops. First, they provide an accessible access point for maintenance, recreation, and gardening tasks on the rooftop garden or green space. Homeowners or building inhabitants can easily go between the internal living area and the rooftop garden thanks to these steps. Second, outdoor steps offer a secure way to climb and descend, ensuring the safety of anyone using the rooftop. For increased safety and to reduce accidents, they might be provided with suitable handrails and non-slip surfaces.

Circulated stairs enhance the aesthetic attractiveness of the building's overall design, acting as a welcoming element. They emphasize the connection between interior and outdoor environments by forming a lovely transition between various levels. Finally, the addition of circulation staircases makes green rooftops more usable and accessible, promoting the use of these areas for horticulture, rest, and entertainment. In turn, this encourages sustainability and the incorporation of wildlife into urban settings, bringing with it a variety of ecological advantages like better air



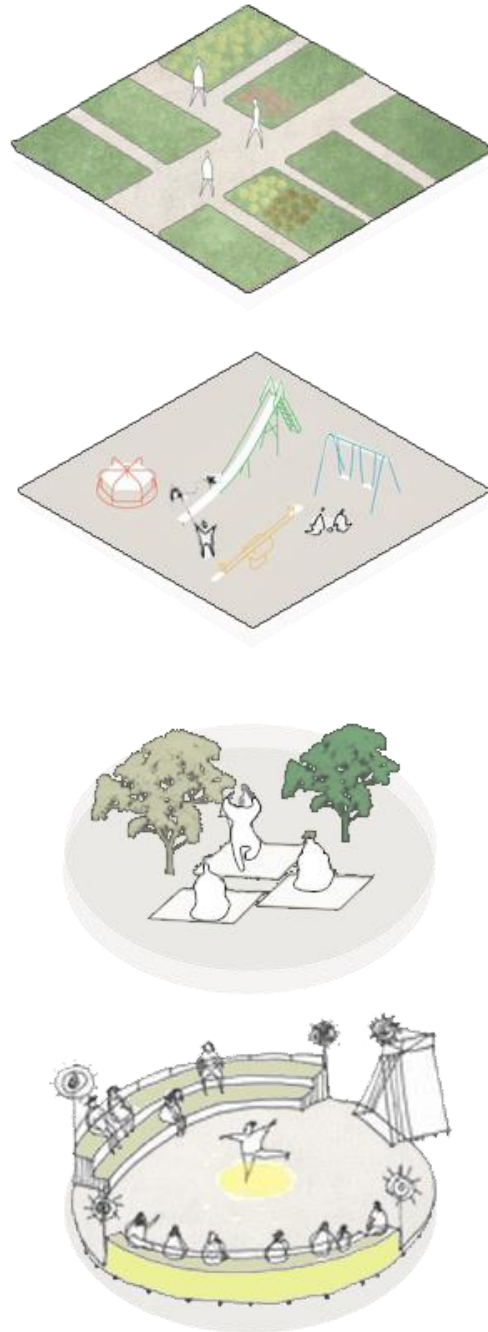
quality, insulation, and stormwater management.

In the following map, there are pointed with red dots all the location which are proper to be designed the circulated stair.



**Figure 75.** External elevators mapping, for vertical access (by author)

### 4.2.3 Functions distributions



**Figure 76.** Functions of the elevated rooftop, from top to the bottom: agricultural parcels, playgrounds for the children, relaxing zones, gathering points for cultural activities (by author)



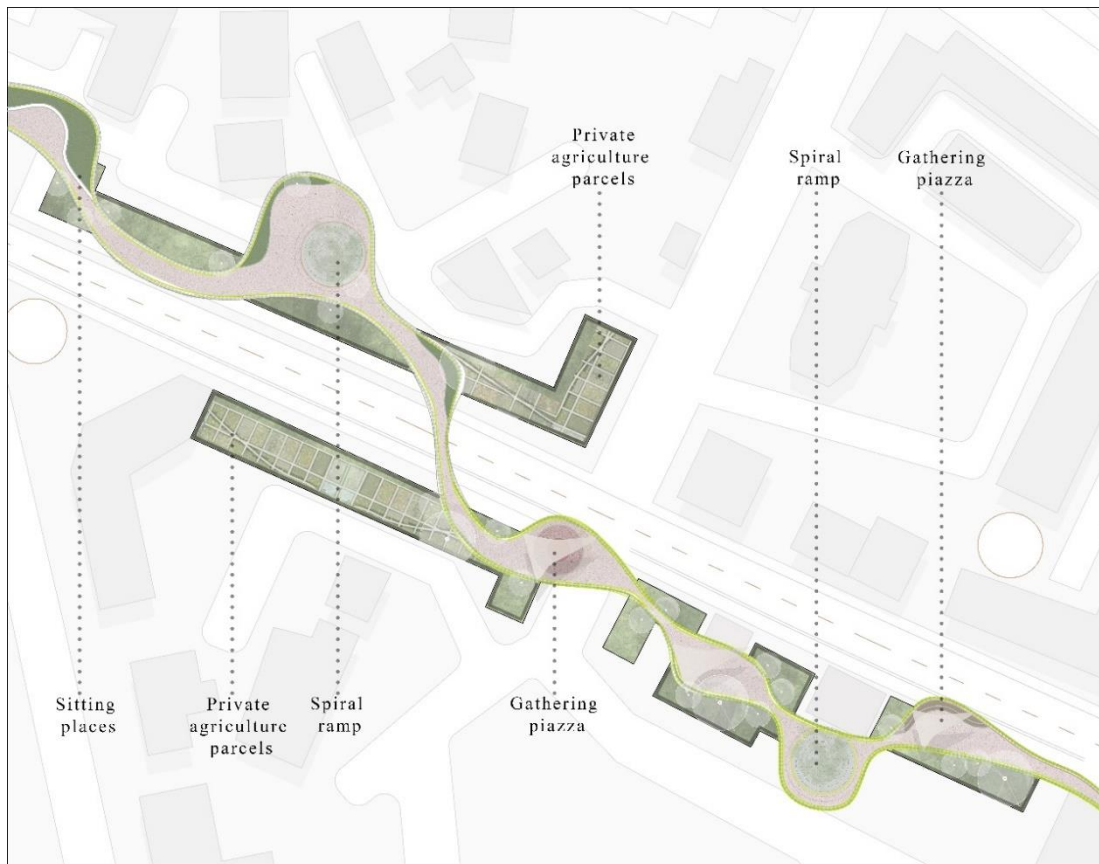
**Figure 77.** Plan of the elevated structure (by author)

The project includes several functions as mentioned in the previous chapters. So, beside the green aspects, it accommodates socializing and gathering zones for the community member and more.

The parts 1,2,3 and 4 are put in chronological order starting from “Zogu i Zi” towards the “Skanderbeg Square”.



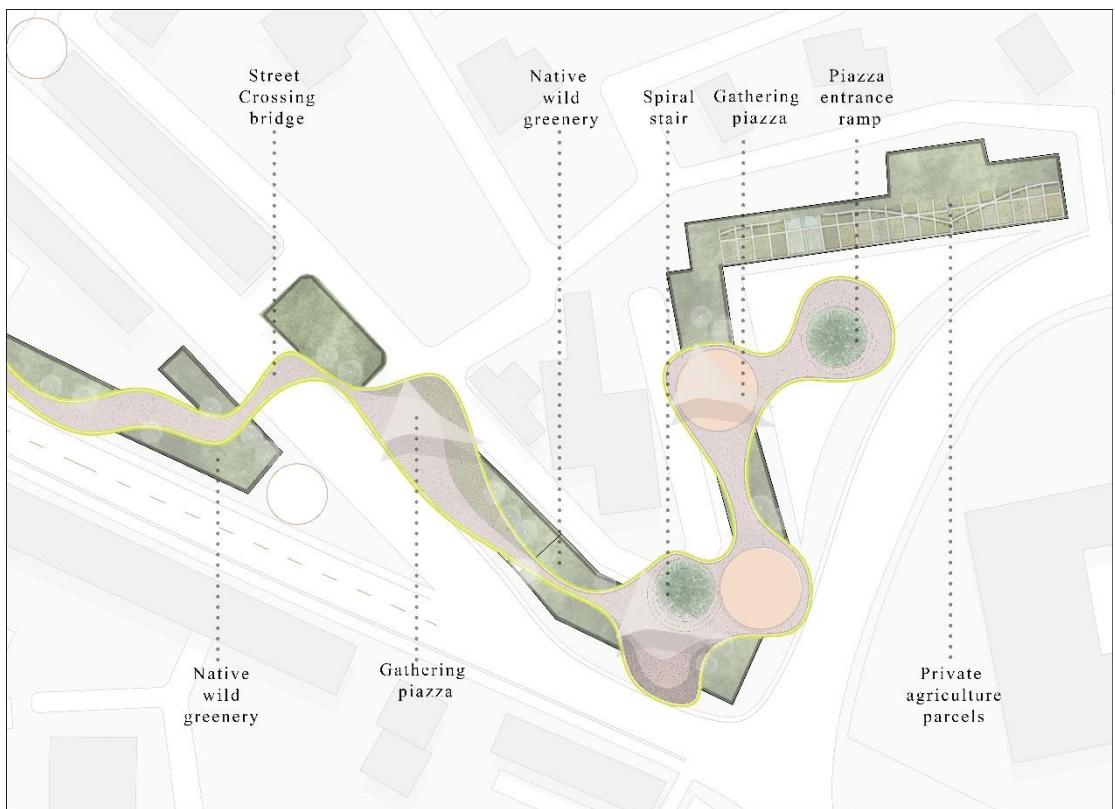
**Figure 78.** Plan detailing of the elevated roof, part 1 (by author)



**Figure 79.** Plan detailing of the elevated roof, part 2 (by author)

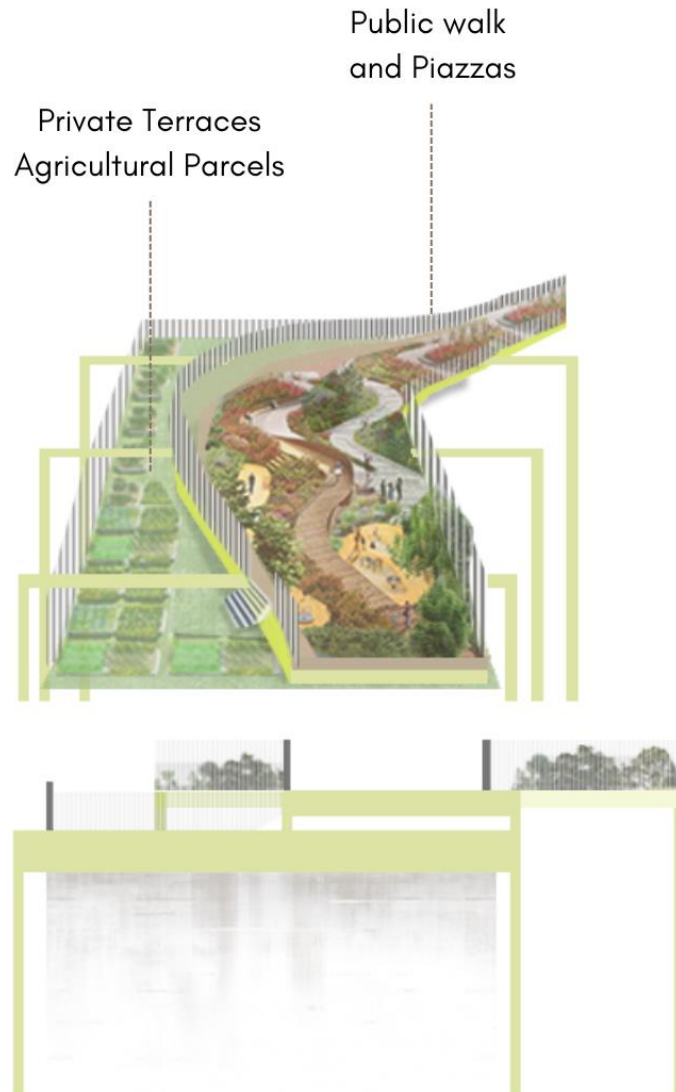


**Figure 80.** Plan detailing of the elevated roof, part 3 (by author)



**Figure 81.** Plan detailing of the elevated roof, part 4 (by author)

#### 4.2.4 The public and private terraces organization, connection of the elevated structure with the existing terraces.



**Figure 82.** Illustration of the public and private terraces, the connection of the parasite pedestrian walk with the terrace of the existing building (by author)

Currently most of the terraces are private property. To avoid the debate of turning the whole surface into a public walk, this project proposes to separate the public and private spaces by greenery. The entrance to the private terrace is left accessible only from the owner. A suggested use of these kind of terraces is to be turned into agricultural parcels, but they might have other different functions as well.

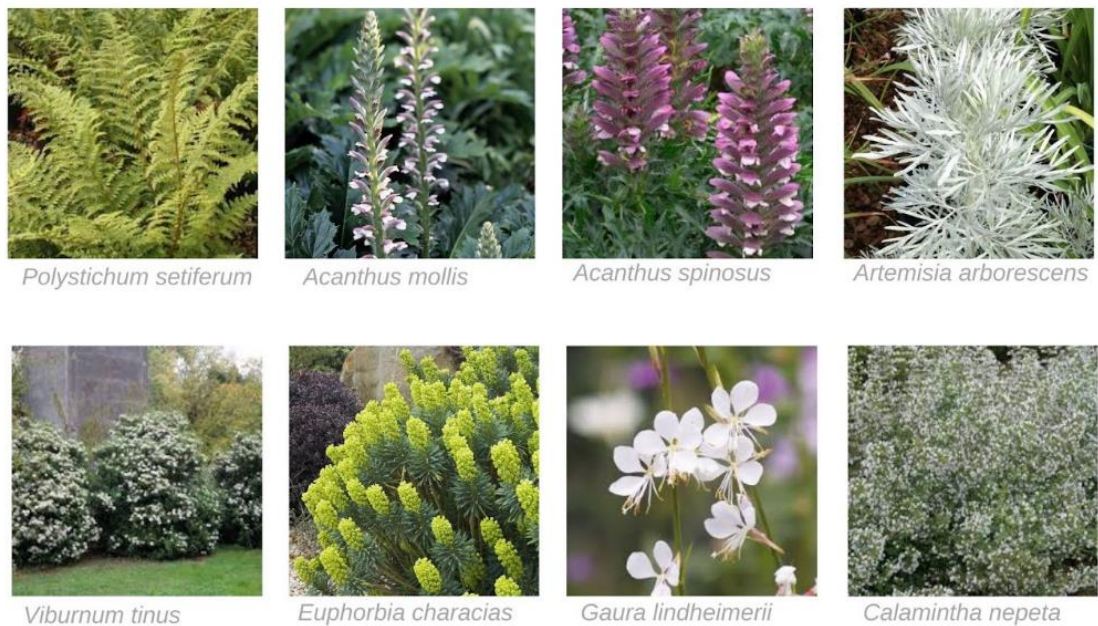
#### 4.2.5 Vegetation choice

The common requirements for plants to be used as rooftop greenery are their ability to grow in dry rooftop conditions, to endure harsh sunshine, and to tolerate low soil moisture.

The following factors will affect the plant selection:

- Design objectives (attracting biodiversity, providing medicinal benefits, encouraging native flora, enhancing aesthetics, etc.)
- Environmental aspects
- The substrate's depth
- Expected level of maintenance

Some of the selected plants are as below:



**Figure 83.** Vegetation selections first group (by author)



*Knautia macedonica*



*Verbena bonariensis*



*Helleborus cyclophyllus*



*Helleborus orientalis*



*Verbascum thapsus*



*Rhamnus alaternus*



*Cotynus coggygria*



*Laurus nobilis*

**Figure 84.** Vegetation selection second group (by author)



## 4.2.6 Visualizations



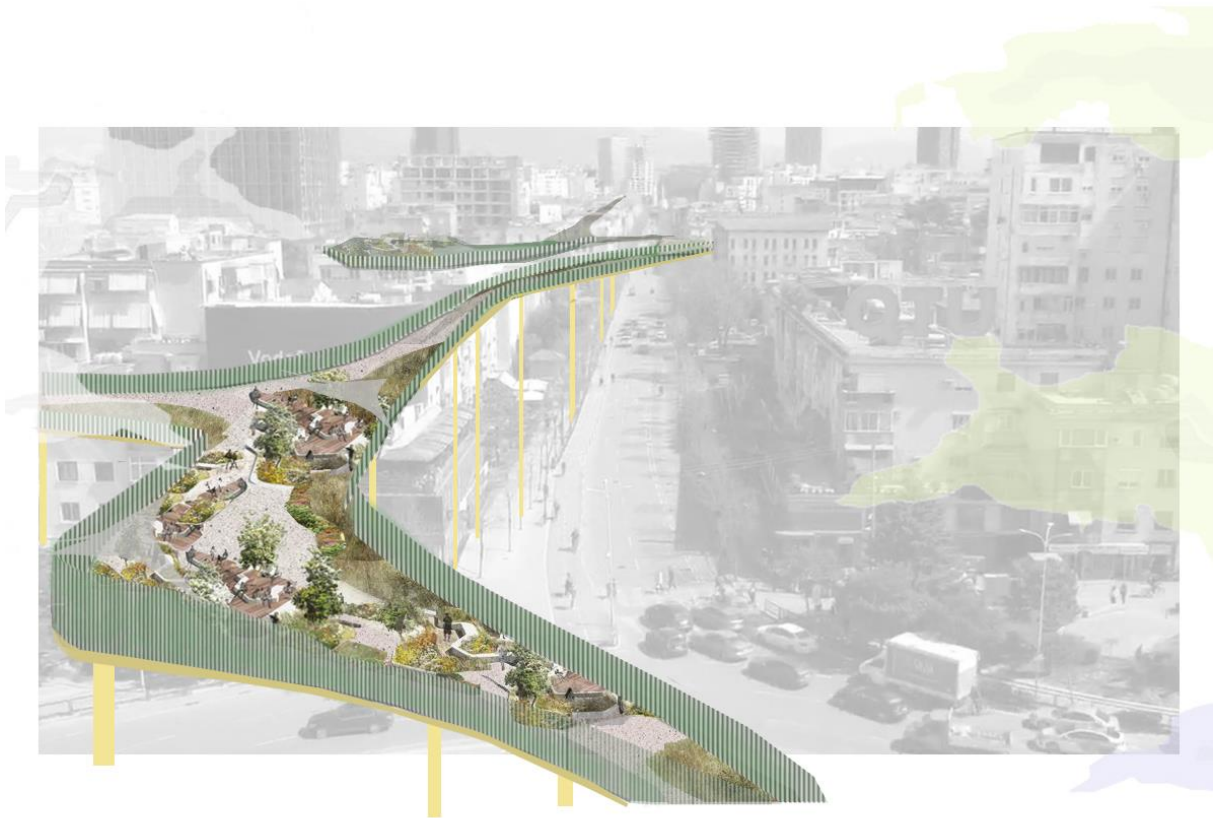
*Figure 85.* Existing condition “Rruga e Durrësit” (photo by author)



*Figure 86.* Proposed street bridge (by author)



**Figure 87.** Existing Rruga e Durrësit, view from Zogu i Zi (photo by author)



**Figure 88.** Proposed “Green Line Walk”, view from Zogu i Zi (by author)



*Figure 89.* Over the elevated roof, city center view (by author)

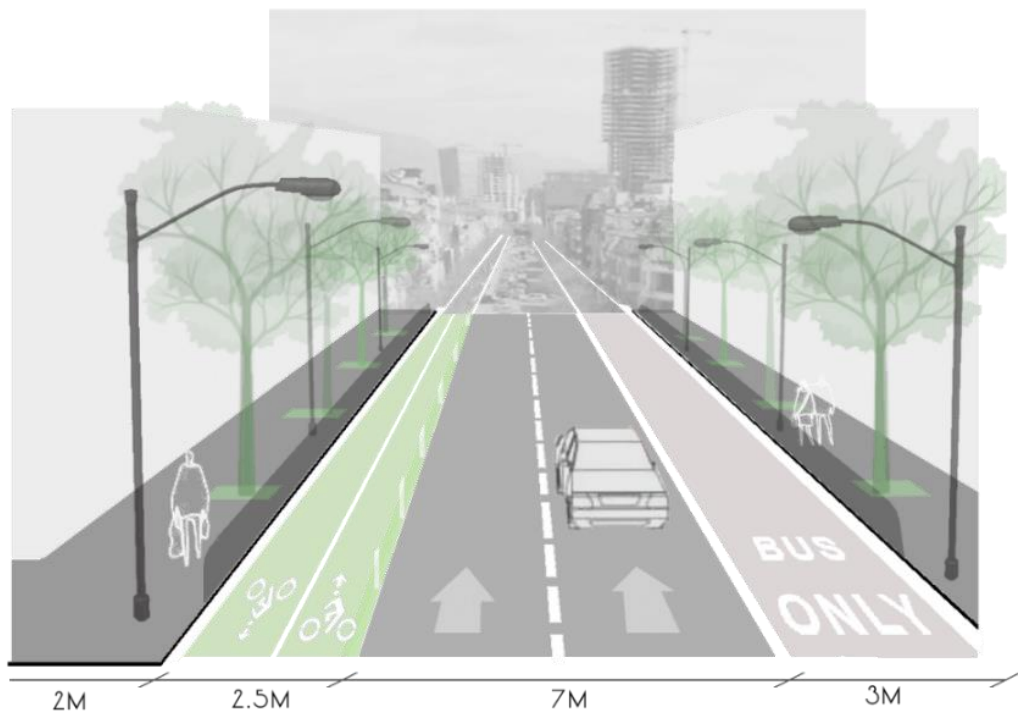


**Figure 90.** Existing condition “Rruga e Dureshit”, view from “Skanderbeg Square”  
(photo by author)



**Figure 91.** Moment from the "Skanderbeg Square" (by author)

#### 4.2.7 The effects of the elevated roof on the ground floor



**Figure 92.** The current situation of “Rruga e Durrësit” (by author)



**Figure 93.** The effect of the steel structure in the ground floor (by author)

The structure is proposed to accommodate several functions above it, but at the same time it provides facilities for the ground floor as well. Some of the benefits are as follow:

Temperature and solar heat gain: depending on the bridges' direction and construction, their shadows may offer protection from direct sunlight and lessen solar heat gain on the pavement and ground level. This can help create shaded zones that keep the ground surface and surrounding area cooler in hot regions or during peak sunlight hours.

Visual comfort: shadows cast by rooftop bridges can improve pedestrians' ground-level visual comfort. In regions with harsh sunlight or reflecting surfaces, they offer relief from the sun's glare and increase visibility. Walking or spending time on the bottom floor may be more fun as a result.

Reduced pedestrian congestion: rooftop bridges can help relieve congestion on the ground and pavements by providing an elevated channel for walkers. The separation of ground-level pedestrians from those utilizing the bridges promotes easier pedestrian movement and lessens congestion on the sidewalks.

Increased safety at ground level: as pedestrians ascend, there is less foot traffic on the pavement and ground floor. By lowering the possibility of accidents and crashes, this can result in increased safety for people on the ground. Furthermore, walkers using the bridges are less likely to encounter dangers like vehicle traffic or uneven ground.

#### 4.2.7 The shade impact



*Figure 94.* The current state of the street (by author)



*Figure 95.* The elevated structure shade effect on the ground floor (by author)

#### 4.2.8 Elevations of the street facades before and after.



*Figure 96.* Before and after impact of the first segment elevation (by author)



*Figure 97.* Before and after impact of the second segment elevation (by author)



*Figure 98.* Before and after impact of the third segment elevation (by author)





**Figure 99.** Before and after impact of the fourth segment elevation (by author)

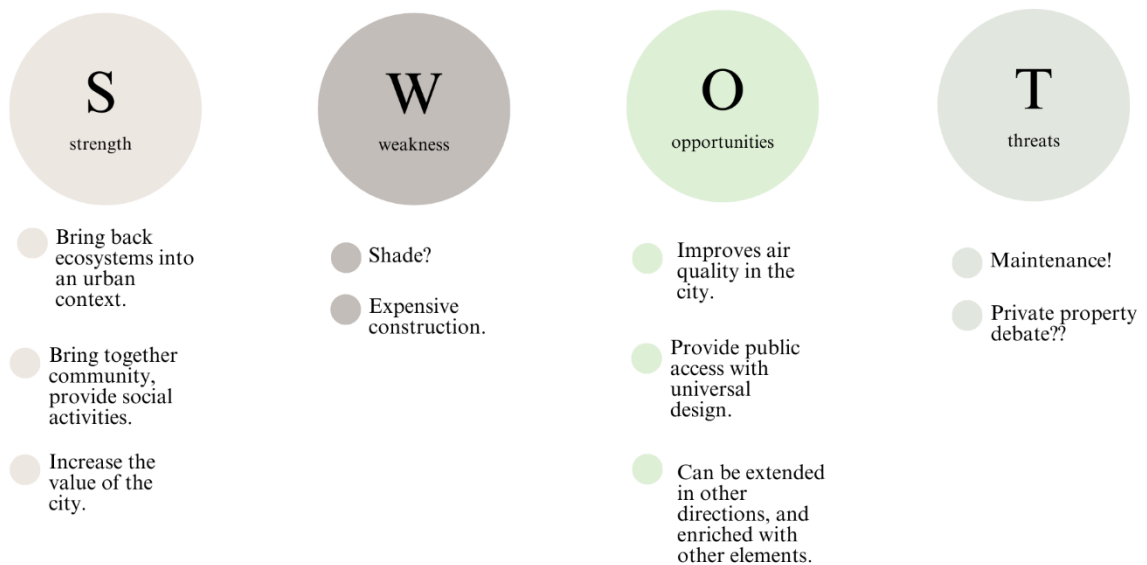


**Figure 100.** Before and after impact of the fifth segment elevation (by author)

# CHAPTER 5

## CONCLUSIONS

### 5.1 Conclusions



*Figure 101.* SWOT Analyze (by author)

There are benefits and drawbacks to elevated green roofs in urban settings when it comes to promoting urban biodiversity.

On the plus side, this elevated green roof offers several advantages. It provides more room for vegetation, fostering habitats for animals including plants, insects, and birds that could otherwise be hard to find in cities. This can support regional ecosystems and enhance biodiversity. It can help wildlife move more easily across urban areas by acting as stepping-stones and corridors. Additionally, this proposal can

lessen the impact of the urban heat island by enhancing microclimates and fostering a more suitable environment for biodiversity.

Another aspect is that the elevated green roofs, in an urban context such as Tirana, has the ability to promote urban biodiversity by adding more green space and habitat, it also provides more space for the community to connect and offers them a wide area to perform different social and cultural activities.

To continue, the aesthetic impact, it will give the city is incomparable. The citizens will have the opportunity to experience a 360-degree view of the capital right from the city center. Consequently, it will serve as the newest tourist attractions of Tirana and will boost in this way the value of the city.

This structure, however, could also pose some difficulties. The limited planting area and weight constraints placed on rooftop constructions are downsides.

The range of plant species that can be established may be constrained by these restrictions, which could influence the ecosystem diversity of the green roof. Additionally, heightened green roof care and watering requirements could be difficult, particularly in places with limited access to water sources or during dry spells. For the support of urban biodiversity, it is essential to ensure the long-term survival and vitality of green roof plants.

Even though the structure is designed to act as a parasite to the existing buildings, transmitting them no weight at all, it has a great impact in the street by causing shadow down the street. The steel columns impact the facades of the buildings, and it is a challenge to point the proper placement of them.

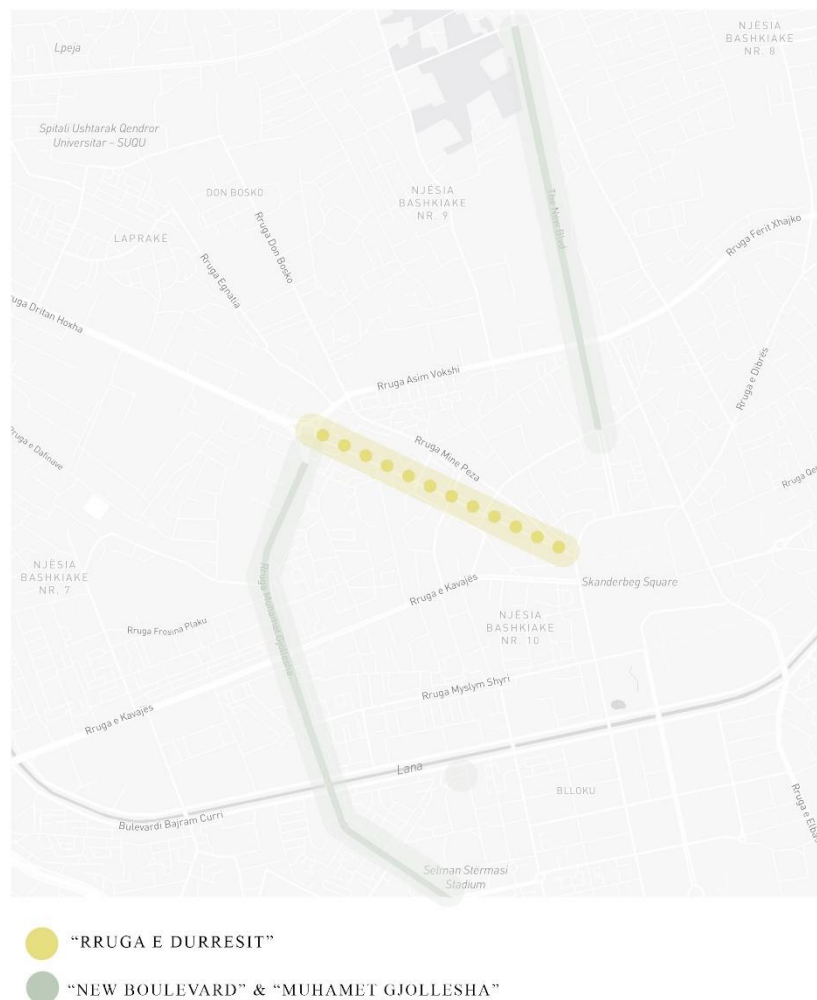
Some of the terraces are private, and the other difficulty in the process would be to remain them private while integrating this public, pedestrian walk near them.

Careful planning and design are required to increase the benefits and reduce the negatives. It is crucial to choose plant species that support biodiversity and are suitable for rooftop environments, that is why this proposal pays a great attention to include in the project only the authentic vegetation of Tirana.

## 5.2 Recommendations for future research

Ecological interconnection can be enhanced and promoted by creating connections between green roofs and other green areas in the city. Urban designers, architects, landscape architects, and local communities must work together to successfully install and maintain high-quality green roofs that promote urban biodiversity. Also, this project may come to life by checking and respecting the conditions of the PDV of the city and the site.

Some other locations with a similar potential to develop the same approach might be as below:



**Figure 102.** With yellow, "Rruga e Durresit", the analyzed site. With green "New Boulevard" and "Muhamet Gjollesha" street, the future development proposed sites (by author)

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## APPENDIX

Some additional sources that are not included in the references list, but are closely related to the topic of concern.

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[2] Miller, N. R., & Jones, K. L. (2020). *Urban Biodiversity: Challenges and Opportunities for Conservation*. Springer.

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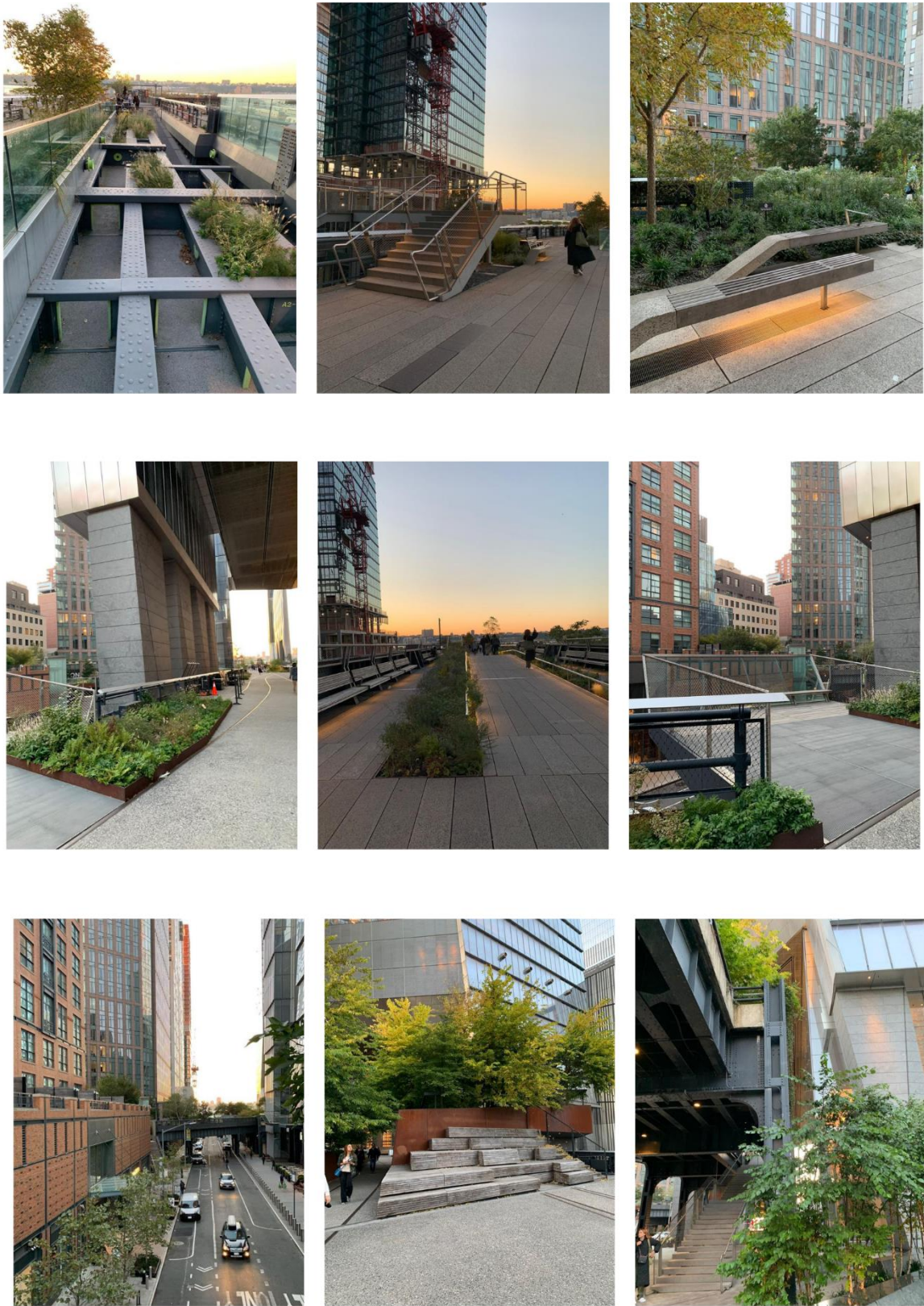
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[5] United Nations Environment Programme. (2019). *Cities and biodiversity outlook: Action and policy*.





**Figure 103.** Images from the High Line New York, used as a case study (by author)

