ENHANCING THE ECOSYSTEM SERVICES WITHIN THE URBAN PUBLIC NODES IN SUPPORT OF REGENERATIVE URBAN BUILT ENVIRONMENTS IN TIRANA

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Approval sheet of the Thesis

This is to certify that we have read this thesis entitled **"Enhancing the Ecosystem Services within the Urban Public Areas in support of regenerative urban built environments in Tirana"** 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

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Ecosystem Service is a concept developed to expand our understanding of human use and the management of natural resources. ES are characterized as functions of ecosystems with importance for human well-being. Thus, the idea of ES, creates a relation between ES providers (the producers) and demanders for ES (the beneficiaries). These certain services always depend onto the extent of a problem they are linked to and the opportunity of transferring the service from where it is produced to the place where humans benefit from it.

The main goal of research is to highlight the importance of ES within urban areas. To identify the potential zones (nodes) and show how much of its natural resources are evident, the amount of green spaces, how can these nodes be more safer and less polluted as they are and provide a solution on how to provide enough space for people to walk and to minimize as much as posibble the problems that the node and people are facing there.

Some of the methods that were used on this research were case studies and two types of surveys, one online and the other one on the selected node (21 Dhjetori), conducting a site visit to provide then with a study area and other visual materials like photos from the area, CAD drawings and certain trusted webpages which provided with correct values of noise and air pollution on different areas in Tirana.

Key words: Ecosystem services, metropolitan area, urban area, green spaces, natural resources, nodes, air pollution, noise pollution.

ABSTRAKT

PËRMIRËSIMI I SHËRBIMEVE TË EKOSISTEMEVE NE ZONAT URBANE DUKE MBËSHTETUR MJEDISET RIGJENERUESE URBANE NË TIRANË

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Shërbimet e Ekosistemit është një koncept i cili sherben për të zgjeruar kuptimin tonë të përdorimit njerëzor dhe menaxhimin e burimeve natyrore. ES karakterizohen si funksione të ekosistemeve me shume rëndësi për mirëqenien e njeriut. Kështu ideja e ES krijon një lidhje midis ofruesve të ES (prodhuesit) dhe kërkuesve për ES (përfituesve). Këto shërbime varen gjithmonë nga definimi I një problemi me të cilin janë të lidhur dhe nga mundësia e transferimit të ktij shërbimi nga vendi ku prodhohet në vendin ku njerëzit mund përfitojnë prej tij.

Qëllimi kryesor i ketij kërkimi është të nxjerrë në pah rëndësinë e ES brenda zonave urbane. Për të identifikuar zonat (nyjet) me potencial dhe për të treguar se sa nga burimet e saj natyrore janë të dukshme, sasia e hapësirave të gjelbërta, si mund të jenë këto nyje më të sigurta dhe më pak të ndotura seç janë dhe të sigurojë një zgjidhje se si të sigurojë hapësirë të mjaftueshme për njerëzit për të ecur dhe për të minimizuar sa më shumë të jetë e mundur problemet me të cilat nyja dhe njerëzit po përballen atje.

Disa nga metodat që u përdorën në këtë hulumtim ishin case study dhe dy lloje sondazhesh, një në internet dhe tjetra në terren, ne nyjen e zgjedhur (21 Dhjetori), duke kryer një vizitë në terren për të siguruar më pas një studim te kesaj nyje dhe materiale të tjera vizuale si foto nga zona, vizatime CAD dhe faqe web-i të besuara të cilat siguronin vlera të sakta të ndotjes së zhurmës dhe ajrit në zona të ndryshme në Tiranë.

Fjalët kyçe: Shërbimet e ekosistemit, zona metropolitane, zona urbane, hapësirat e gjelbërta, burimet natyrore, nyjet, ndotja e ajrit, ndotja akustike.

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CHAPTER 1

INTRODUCTION

To begin with, what is an “Ecosystem”? An ecosystem is a geographic area where plants, animals, and other organisms, as well as weather and landscape, work together to form a bubble of life. And its services (nature resources), with its outputs, conditions or processes of natural resources that directly or indirectly benefit human beings or improve social welfare, by keeping in mind and using these values in practice (Economic values, Ecological values, Socio-cultural values, Health values, Insurance values) which sometimes are not frequently recognized in urban planning and decision-making, and therefore the effects of their loss remain invisible.

According to the Environmental research: “Urban natural environments as nature-based solutions for improved public health” there are a lot of impacts to human health from urbanization.

Exposed to these hazards are metropolitan environments. These environments not only are filled up with air pollution, noise etc. but air pollution let alone causes 600.000 death per year in Europe alongside with noise which can cause a lot of discomfort. Mitigating on the other hand can help to adapt to these changes and reduce these risks and to improve the adaptability.

The ability of the ecosystem to provide services for human well-being is closely related to the state of the ecosystem (its structure and processes). People impact ecosystem service provision or trade-offs between different services through increasing strain on ecosystems or changing land use type (and therefore fundamentally influencing or destroying the prior ecosystem).

People can gain arable land and hence important food products by draining a marsh, but they also lose flood protection, natural ecosystems and species variety, and opportunities for nature tourism. When all advantages are considered (in monetary or other valuation systems), the value of wetland is likely to be substantially larger than the value of arable land.

The monetary and health benefits that ecosystem services provide can be shown as follows: urban greenery moderates local temperature and acts as a sound barrier. Loss of urban vegetation can result in economic expenditures owing to increased energy consumption for heating and cooling buildings, health-care costs associated with respiratory illnesses, and the upkeep of costly infrastructure to reduce noise and pollution. The non-monetary values of ecosystem services include species diversity and richness, which serve as a source of inspiration for people. Among the sociocultural benefits are enhanced community cohesiveness and local ecological knowledge, while better physical and emotional well-being are considered health values.

1.1 Thesis Objective

Elaborating the thesis and to add more information about this topic, a case study would be a very good choice to demonstrate how certain services could be used as a tool or method to evaluate the performance of an existing built environment, and how it could reveal places to intervene in the built environment to create a more robust, adaptable and cohesive system.

One of the goals of this study is the enhancement of ecological resources within metropolitan environments. To detect the potential zones and to reveal how much of its natural resources are apparent, the sum of green spaces, how the variables, services suggest to the depletion of these natural resources in the region that will be taken under research.

And finally, to determine how these values of ecosystem can be applied in practice to urban and architectural design and to measure it with a case study.

1.2 Thesis structure

This thesis is divided in 6 chapters. The organization is done as follows:

In Chapter 1, the problem statement, introduction of the thesis objective and scope of works is presented. Chapter 2, includes the literature reviews. Meantime the Chapter 3, consists of the methodology followed in this study, materials and data as well as online and on-site questionnaire.

In Chapter 4 are mentioned the analysis phases, nodes and their characteristics, standard noise and air pollution values showed in graphs, results of the two questionnaires, which one of them was conducted online and the other one on the chosen node followed by the results of the first questionnaire, iconographics expressing different principles to be followed in the next chapters and site analysis about the selected node. In Chrapter 5, proposals and different design solutions are stated. And Chapter 6 concludes the whole work, conclusions and final results of the research.

CHAPTER 2

LITERATURE REVIEW

2.1 Urban natural environments as nature-based solutions for improved public health – A systematic review of reviews: M.van den Bosch

The recently coined concept of Nature-based Solutions (NBS) is one such approach relating to actions that are motivated by, supported by, or copied from nature, designed to solve a variety of environmental problems (Bosch, 2017) in an effective and adaptable way, while at the same time delivering economic, social and environmental benefits.

Now days, urban public spaces are facing mayor problems all around the world especially in big cities. Several of these problems are: pollution, noise, lack of soft scape, social issues, traffic etc. (Schneidemesse, 2019). The most evident problem of them all would have to be pollution. (AB) It is widely understood that urban green spaces have an ability to decrease pollution since in the 21st century, cities have gone through a roughly rapid economic and technological growth. That being said, this pollution may come from natural sources, but the most harmful are the emissions which are related to human activity. This human activity sources of pollution are factories, industries, transportation etc., which are typically worse in larger cities due to the local abundance of people who live there and their daily activities. (Elaine Carvalho da Paz, 2018)

Urban noise pollution on the other hand affects the human health indirectly. (Bhatia, Noise Pollution: Managing the Challenge of Urban Sounds, 2014) For example, with active pollutions like road traffic, industry, construction, the level of noise can cause serious health damage. Repetitive exposure to a sound at above 85 decibels can cause hearing loss. (Bhatia, Noise Pollution: Managing the Challenge of Urban Sounds, 2014)

Walking has always been one of the most important modes of transport all over the world and reviving or even providing more green spaces / softs cape would have to be an improvement of the quality of the environment. Offering some sort of notion to the landscaping, creating an aura, ambience, and reflect the sensibilities and needs of the inhabitants.

“Green spaces” contain trees, grass and shrubs in yards, parks, anywhere intermingled throughout the built environment. Green space is any piece of land covered with vegetation. (World Health organization, 2017)

Lack of green spaces (World Health organization, 2017) leads to higher air temperatures and more ground-level ozone, and much less trees and plants to clean up the air and supply oxygen. Without drainage from the soil and water filtering, the sewers get overloaded, creating issues with neighborhood floods, as well as problems with dirty water, which is dangerous to aquatic ecosystems.

It has health benefits: Green space has a positive impact on mental health. Citizens who live in areas with green spaces are less likely to have anxiety or depressive problems and are more likely to be physically involved, leading to decreases in lung conditions such as asthma, and upper respiratory infections.

The purpose of this research to take a serious look at the probability for each specified health result that has been established, studied and correlated with nature, discussing the degree of evidence between mechanisms and effects, for example stress and cardiovascular diseases.

Which will address the need for a review of the available information used to provide evidence-based decision-making resources for policy makers and local planners to improve public health with green planning and probably NBS planning, to determine which areas remain to be investigated and examined, as well as provide efficient solutions for protecting and improving health. (Providing economic and social benefits), providing access to green spaces which will have a large impact on a population level, based on the model of the hypothetical outcomes that it would be plausible to feature in systematic studies on the subject.

2.2 Green infrastructure for cities: The spatial dimension

This research provides important guidelines on how to plan and design a green urban infrastructure, mentioning some interesting case studies. To successfully apply these guidelines to landscaping or urban planning, which must be related to, and related to the planning rules that make "good landscape science" ecology to be practiced successfully in the service of sustainability. It is mentioned that articulating a spatial concept has to be one of the first and important steps to archive urban planning.

Spatial concepts are frequently described as metaphors that are highly conceivable and comprehensible by the general public eye but may also assist and motivate the planning process (Zonneveld, 1991). Green heart, ring city, and edge city are a few examples.

Another important guideline is to think strategically, employing a strategic approach, appropriate to the spatial context and planning goals, potentially including: protective, defensive, offensive or opportunistic strategies (Ahern, 1995). The definition of these techniques/guidelines also helps to position planning practices within a wider framework that is especially important as planning approaches are adapted or implemented for use in various areas, environments or implementations. Also having the greening of infrastructure, to achieve sustainability in urban landscapes, infrastructure must be conceived of, and understood as a genuinely possible means to improve, and contribute to sustainability. Landscape ecology has significant potential to accelerate and advise the application of green urban development at a variety of scales and in a variety of contexts.

Examples of green urban infrastructure over a number of scales are as follows: metropolitan/city, neighborhood/district, and site size. As mentioned in the text: Taizhou City China: Metropolitan green infrastructure, landscape planner has designed an ecological infrastructure plan by Kongian Yu of Turenscape and Bejing University are committed to promoting valuable abiotic, biotic and cultural capital while at the same time structuring future urban growth and avoid sprawl.

The Taizhou plan demonstrates the implementation of landscape ecology guidance, including a multi-scale approach to plan alternatives established at regional and district scales, a connection between trends and processes through protection

patterns, and a focus on connectivity, especially with regard to multipurpose water systems. The plan also illustrates the green infrastructure guidelines proposed before.

The Taizhou ecological infrastructure plan is an innovative and proactive response for a metropolitan region that is experiencing extreme pressure for urbanization. The definition is theoretically transferable in metropolitan environments where it occurs.

The impacts of projected demographic change will inspire decision-makers to consider and adopt new ideas, to addressing sustainable cities and sustainable urbanism, to introduce and explore the concept of urban green infrastructure as a means of spatially organizing urban environments to support a suite of ecological and cultural functions and to focus the role of spatial configuration of the urban environment in supporting key ecological functions through a “green infrastructure” in a sustainable manner.

2.3 Urban Ecological Systems: Linking Terrestrial Ecological, Physical, and Socioeconomic Components of Metropolitan Areas by S. T. A. Pickett

Ecological analyses of terrestrial urban systems have been discussed in a variety of different ways: ecology as opposed to urban ecology; biogeochemical as compared to organism perspectives; land use planning as opposed to biological and disciplinary as opposed to interdisciplinary. (Pickett, 2003)

In order to demonstrate if urban ecological studies are fit for major change, they look at the main aspects of these diverse literatures. They highlight the open concept of urban structures that account for transfers of material and power between cities and surrounding landscapes. Analysis on urban ecology highlights the nature of the physical world, including urban climate, hydrology and soils. Biotic science has researched flora, fauna and vegetation, including the trophic influence of plants and animals. Unusual interactions between soil chemistry, leaf litter composition, and exotic invertebrates demonstrate innovative methods of relations that may happen in urban systems. (Cadenasso, 2003)

This insight is linked to the focus in the literature on the ecological aspects of land use planning. The complementary method of urban ecology used a policy of biogeochemical budgets, biodiversity footprints, and city-wide species diversity summaries. Contemporary ecological interventions have begun to integrate organism, nutrient and energetic approaches and to highlight the need to consider the social aspects of urban ecology. (Cadenasso, 2003)

The social structure and the social distribution of natural and social resources are issues that are well known in the social sciences and that can be conveniently accommodated in metropolitan ecosystem models. (Grove, 2003)

The core paradigm for urban ecology in this article is that cities are evolving local-scale, complex relations between socio-economic and biophysical forces. These dynamic relationships give rise to a distinctive ecological character and a distinctive ecological strength feature.

Separately, both nature and social sciences have embraced complex system theory to research new phenomena, but efforts to combine natural and social sciences to explain human-dominated systems remain reductionist—these disciplines typically study human and biological mechanisms as distinct phenomena.

There they propose that if natural and social sciences exist within their respective realms, they cannot clarify how human-dominated ecosystems arise from relations between human beings and ecological processes. They propose an overarching method for the testing of systematic theories about how human-dominated environments develop from these interactions. Ecologists are paying increasing attention to the relation-ship between urbanization and ecosystems (Collins et al.2000, Grimm et al. 2000, Pickett et al. 2001).

Current analysis of urban environments uses such simplistic models of human-ecological relationships that their system complexities cannot be completely grasped and interpreted. Socioeconomic research, on the other hand, significantly simplify and scarcely distinguish between various and dynamic ecological and biophysical systems. (World Health organization, 2017)

2.4 Ecosystem Services Analysis: Mimicking Ecosystem Services for Regenerative Urban Design by Maibritt Pedersen Zari

This paper supports the use of an appreciation of environmental resources to determine measurable goals and objectives for urban regenerative design based on site-specific ecological reality. This is called the study of ecosystem services.

The usability of the definition of ecosystem services research is evaluated by a case study of an actual city. The case study (*Wellington, New Zealand*) illustrates how the idea could be used as a method to measure the efficiency of the current built environment, and how it could offer scope for action in the built environment to build a more stable, adaptable and coherent structure.

Wellington's case study confirms the result that other researchers with diverse approaches have come to consider that no conventional current metropolitan ecosystem can be viable on its own. (Zari, Ecosystem Services Analysis: Mimicking Ecosystem Services for Regenerative Urban Design, 2015) It is necessary to determine to what extent rural areas in land areas must be viewed in tandem with urban areas if regenerative goals are to be reached across a range of ecological services.This is very crucial because more than half of all people live in urban areas, cities have a significant negative effect on nature, humans rely on ecosystems for survival, and problems such as climate change and biodiversity (National geographic, 2021) loss are already having an impact on the developed environment and people, and are becoming more urgent. (Zari, Ecosystem Services Analysis: Mimicking Ecosystem Services for Regenerative Urban Design, 2015)

This indicates the need to understand ecosystem services on a larger scale (city, area, or ecosystem boundary). While the idea of urban regenerative habitats that add to ecological productivity (Marzluff, 2008) is philosophically convincing, making this a reality in terms of the developed urban landscape is likely to be very difficult in the near future.

The results of this study should be compared and assumptions made on how different cities could work together to provide ecosystem services. (Zari, Ecosystem Services Analysis: Mimicking Ecosystem Services for Regenerative Urban Design,

2015)Wellington could be able to provide energy to the greater metropolitan area in exchange for produce, provided, for example, that the ecosystem service is provided more conveniently by that location.

2.5 Biomimicry for Regenerative Built Environments: Mapping Design Strategies for Producing Ecosystem Services by: Maibritt Pedersen Zari

This paper discusses the initial development of an online collaborative tool called the urban ecosystem services diagram. The diagram can be used as a basic tool for architects and urban environment practitioners to incorporate ecosystem services into interdisciplinary built environment planning programs, and can be used in combination with other techniques and approaches for working towards a holistic regenerative design.

The dynamic diagram transforms environmental principles into realistic models of designed and validated designs. In this way, it aims to bridge the differences between ecological and design awareness that remain in many design activities. The developed diagram aims to become a detailed, open and usable list of ecosystem services based design techniques that are important to people employed in the field of architectural and urban architecture and planning. (Zari, Biomimicry for Regenerative Built Environments: Mapping Design Strategies for Producing Ecosystem Services , 2020)

The size of each factor in the 'Strategy for Planning Urban Ecosystem Services' diagram was calculated automatically by the Kumu software in relation to the number of direct connections to it. This means that the more the relationship the element has the greater the circle element appears on the diagram.

Through evaluating the scale of the components, it is possible to see which ecosystem services have a greater number of design strategies attached to them and which ecosystem services have less current design strategies associated with their development in a developed or urban environment. The diagram illustrates the possible relationships between the elements.

These connections may be direct or indirect, which means that those elements are linked to one or more other elements. For example, the 'soil building' ecosystem service is implicitly connected to the 'decomposition' ecosystem service. This can be clarified by linking 'soil construction' subcategory 'renewing soil fertility' and 'decomposition' subcategory 'biodegradation'.

Analyzing the diagram on the basis of the number of connections to each aspect reveals that the control of services has the largest number of connections to design techniques, principles and technology (143 connections) while the distribution of services has 112 connections.

The ecosystem service 'purification' showed the largest number of connections (93 connections) (Peng, 2017) to the design of policies, principles and technology among the regulatory services followed by 82 linkages to the ecosystem service climate control.

Mimicking (Zari, Mimicking Ecosystem Services for Regenerative Urban Design, 2015) aspects of living organisms can create inventions that resolve environmental problems in certain situations, but without knowing the biological sense of these organisms, these innovations can quickly become simplistic technical add-ons or substitute materials in traditional buildings.

Such solutions often miss the chance to explore the opportunities for structural socioecological change in the urban world and to re-evaluate the essence of the interaction between humans, their built environment and the ecologies in which they live.

2.6 Design with Nature for Multifunctional Landscapes: Environmental Benefits and Social Barriers in Community Development – Ian McHarg

Ian McHarg's book Design with Nature, hr synthesizes and generalizes his ecological wisdom to inform landscape planning and design. In this article it is proposed that its design phase contributes to the expression and application of its

ecological wisdom as an awareness. McHarg's design with nature idea is a guide to the approach of multifunctional landscape design. McHarg reflects on geological, social and cultural processes and sees nature as an iterative mechanism primarily influenced by encounters between humans and ecosystems. But mainly, design should allow nature to do the full amount of work. His environmental perspective and further improvement of the sustainability aspects of social, economic, aesthetics and public health are highly used nowdays.

Then, there it is demonstrated the McHarg's design method using The Woodlands, Texas, a town growth of 117 km2 that McHarg considered to be the most ecologically oriented in the United States in the 70s. Four decades of observational studies show the excellent success of The Woodlands, demonstrating the integrity of his ecological wisdom.

The results suggest that McHarg's method has benefits in terms of decreasing runoff and the urban heat island effect, but it has problems in terms of popular acceptability of groomed landscapes, resulting in a poor safety perception level when people interact with organically planned landscapes. Because of its inherent multidisciplinary approach, the authors claim that design-with-nature justifies multifunctionality. Furthermore, education and the distribution of successful examples may raise public awareness and encourage multifunctional design for landscape sustainability.

This research contrasts McHarg's approach to urban planning with the traditional approach seen in large-scale neighborhood developments. Using empirical evidence, the analysis demonstrated the numerous environmental benefits of stromwater management and UHI mitigation that McHarg's design-with-nature approach could offer. The study also showed that the sense of citizens' protection in wooded areas ex: city parks was impaired, ex, wooded areas diminished perceived safety.

2.7 A review of the social-ecological systems framework: applications, methods, modifications, and challenges - Stefan Partelow

The Social-Ecological Systems Framework (SESF) (Ostrom 2007, 2009, Poteete et al. 2010) is a conceptual framework offering a list of variables that can communicate and influence social-ecological systems outcomes (SES). The evolution of the system is characterised by a long history of academic studies on commons, structures and collective action (ex: Ostrom 1990, Agrawal 2001, Meinzen-Dick et al. 2002, Anderies et al. 2004, Wollenberg et al. 2007, Poteete et al. 2010).

Over the past 10 years, this transformation has resulted in increased participation and the framework's core literature. This article examines the SESF literature to help examine how and where it has been applied and addresses the methodological complexities of using the structure to guide those involved in important debates about future studies. Firstly, by analyzing developments in peer-reviewed literature and, secondly, by presenting a wide-ranging discussion of various approaches and methodological implications for the implementation of the methodology. The diversity of methods, contexts, and thematic areas under which the social-ecological systems framework is applied are shown with the relevant literature. The specific sectors in which the framework has been applied are well explained. Future research in the context of social-ecological frameworks offers insights into future research issues in light of the developments in literature. However, a few explicit points may serve as a more general collection of closing remarks for future studies relevant to the general goals of the system.

Ostrom (2007, 2009) proposed that the SESF could offer a range of advantages for researchers, including (1) a basic structure that could be generalized and extended to a variety of situations, (2) a central collection of variables and a shared vocabulary that would make it easier to compare and interact, and (3) a diagnostic method that would theoretically allow new hypotheses to be established through the study of interlinkages between variances.

2.8 Urban Growth Boundaries of the Hangzhou Metropolitan Area Based on Ecosystem Service - Haoying Han

According to the study purpose and scale size study area, we take the land use classification standard, which is published publicly by Ministry of Land and Resources as authoritative reference.

The GI resources are organically created by natural or preserved ecological spaces, and these ecological spaces still have a significant character in nature.

GI will also continue to offer a range of ecological services to residents (Benedict & McMahon, 2012). In this analysis, we assume that the GI resources are made up of two parts (Fu & Wu, 2009). In terms of the GI central area, the vegetation characteristics of the terrestrial patches that will provide habitats for certain large terrestrial animals and the plants are cliffs, forests and grasslands. Secondly, ponds, waterways and lakes are the landscape characteristics of marine patches that can provide environments for amphibious and aquatic animals. To identify GI core area accurately, it is essential to combine some same or similar GI core areas with a certain of heterogeneity that also can be feasible on the platform of ArcGIS.

The identification of UGBs (urban growth boundaries) as components of an ecologically viable city is critical in the management of urban space. However the appraisal of environmental services in the concept of UGBs as reactions to the preservation of open spaces and ecologically vulnerable areas is generally ignored. In addition, the lack of scenario research for population development dynamics has made it impossible to change planning.

2.9 Case Studies

Various methods are used to define, enhance and to provide ecosystem services within the public areas. These methods are: case studies, questionnaires ect. It is thought that by the help of these methods this research would have a very clear understanding of its main goals.

By applying and relating to the different solutions mentioned in the chosen case studies, the conduction of the solutions and the whole point of the research would be a lot understandable. The usability and the need of ecosystem services measured by a case study of an actual city followed by published data (literature review) doing questionnaires, will determine the potential inherent in the local area.

One of the chosen case studies is: **"Changli Garden"** located in Shanghai, China. It states a very crucial problem in this area, no parking space and not enough space for residents to attend their daily leisure.

To solve this problem, the architects provided an opportunity to rebuild and enhance the public environment of the city through regeneration and expansion of the sidewalks by providing pocket gardens.

The aim of this regeneration project is to turn a 6-to-8-meter-wide margin into the community's center garden.

Removing the sense of isolation brought by the fence around and making this wall & garden a central place where both residents in the inner community and tourists on the outer street can feel a sense of participation.

Providing a rest area for residents to go home to buy vegetables, some serve as a buffer zone for the community's entry, some serve as a reading courtyard for children after school, and others serve as a street gathering spot for older people to congregate and talk.

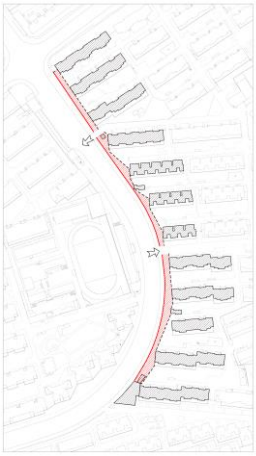


Figure 1. The demolition of the storefront

The removal of the storefront along the street generated a two-sided interface design task; the reshaped zigzag border connects the site with the interior communal area and the exterior street.

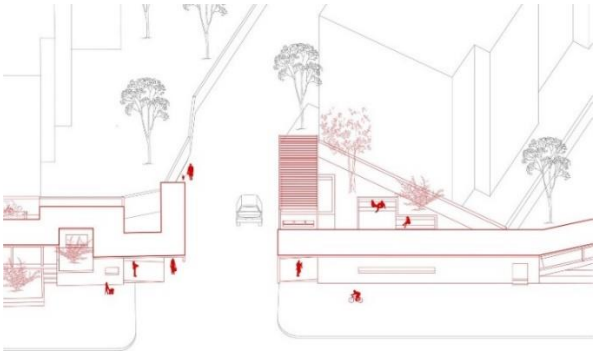


Figure 2. The exit entrance after renovation

To construct the courtyard border, include the guard booth and loggia into the new corridor; the turning corridor on the west side of the entry becomes a new pedestrian route.

Figure 3. South Park original scheme

Another chosen case study is: **Time Square / New York/ Testing Times (Interim projects secure long-term rewards).**

Its main goals were to: Increase pedestrian safety at this iconic public space for the city, decrease vehicle congestion to improve pedestrian amenity, increase public space, reduce pollution in the area, to create a platform for creative public art.

Designing for the pedestrians, maximizing and improving the pedestrian amenities. Designing for Context meaning evaluating how pedestrians respond to the conditions and context of Times Square and providing public spaces that act like an outdoor stage for them all.

Designing for connectivity, providing a thoroughfare (enough space for pedestrians) connections to commercial outlets (more space to move through, enhancing the permeability with storefronts and entrances, increase economic viability across the area.

Designing for safety, Pedestrian safety (reduced traffic related injuries by 33%. Vehicle safety (a clearer segregation between vehicle routes and pedestrian routes.

CHAPTER 3

METHODOLOGY

This study includes a descriptive survey method used to assess the problems thatpollution causes especially in metropolitan areas, Tirana (chosen site). Gatheringdata information on different trused websites provided me with valuable data aboutair and noise pollution in different areas in Tirana. Creating a table in Analysis Chapter, mentioning important nodes to be taken intoconsideration for study with their characteristics as follows: Area, Landscape type, Typology and its Function. Then the study is provided with two other tablescointaining the standard values of air and noise pollution on each area mentioned ondifferent time of the day. After that the study was provided with different graphs containing collected data, twoquestionnaires were provided with 13 questions, to help determine which of these proposed areas contains more problems and it's a thread to people who live there.

Conducting these methods, it would be easier to direct me into selecting one of the proposed areas to intervienne, creating, offering a solution to minimize as much aspossible the noise and air pollution.

Taking each proposed area and determine their characteristics alongside with the pollution values so it could contribute into chosing one site to go into further elaboration, to intervienne with solutions, ideas, proposals, to make it less polluted, dangerous to everyone.

3.1 Used methodology

Air and noise pollution are a major issue in today's research. This is a common issue in urban areas, particularly in metropolitan areas. Tirana has been classified one of the world's most polluted cities, placing 38th out of 294 entries. On a typical morning, the level of PM10s exceeds the World Health Organization guideline by more than ten times. (Urban Insight) Mentioning the proposed nodes, each of them

has a high level of pollutants, making the every day life not easy for the residents. Going through the absence of greenery, places to sit, to rest and to walk makes these nodes prone to accidents.

The primary data for the study were collected as follow: questionnaires about certain area, case studies which provide with ways on how to manage a certain space (intersection), valuable websites with data on noise/air pollution which were updated regulary.

Taking various case studies, on the regeneration and the resilience of a certain space, helped to determine the basis and the effects of the actions taken, were the right ones. And by applying those type of design solutions which were proposed in the case studies, the elaboration of the research would be understandable and valid.

By using (case studies) this kind of methodology, will help to understand how to evaluate the performance of an existing ecosystem in use, how it could reveal a way to intervene and change or maybe rebuild a more robust and adaptable cohesive ecosystem system. (McLeod, 2019).

Conducting two different questionnaires to gather information about which of the proposed nodes is more problematic and then to get into more depth of the daily struggles that people went through in the chosen site. (Debois, 2019) This type of method provides with valuable feedback, honest opinion from the locals on what to add into the node to make it as safer as possible for all.

Some measures involved in the creation of a survey questionnaire. One of them is to identify which subjects will be addressed by the survey. This means thinking about what's going on in our country and the environment and what's going to be important to the people, decision makers and the media. (Kabir, 2016) It also tracks views on a number of subjects over time to ensure that updating these patterns on a daily basis so that we can consider when people's opinions are shifting. People who are thought to take this questionnaire will be of all ages but mostly of middle aged and old adult since they are more sensitive to climate changes, pollution ect.

After creating an online questionnaire/survey with eleven questions based on the locals experience with noise/air pollution on their daily life the results showed that the most affected area with the most noise and air pollution was 21 Dhjetori conjunction.

The questionnaire/survey was shared on facabook and also via WhatsApp between friends and also asked them to share with the people they know. All the participants of this survey are from Tirana, people who used to live there, people who know the current situation. Most of the participants were between 20-25 years of age and then 30-40 years of age. (Spaan, 2018)

To get details on how much these nodes were prone of the pollutants, two very trusted websites were used, greenlungs.com and habitatmap.org/aircasting, which provided with data of air and noise pollution on different times of the day. After gathering all these values, graphs were added to the research, helping to distinguish the most problematic node.

3.2 Materials and Data

There are several materials which are used to help enhance and detect problems of ecosystem services.

Site analysis / study area was one of them. This helps to develop the project, so that the project in the making requires the best possible use of resources, such as connectivity, on-site views, enough green spaces etc. It should also help to predict any possible concerns that could create complications for the project.

Taking for example one of the proposes of areas to take under study for the research “21 Dhjetori”, finding out potential urban public spaces that need some changes or maybe incorporating an understanding of ecosystem services into built environment design: ecosystem services analysis in the theoretical part as well as in analysis and following some of the steps that were mentioned in the chosen case studies and also after getting a feedback from the locals , with the help of the questionnaires. (QuestionPro.com, 2021)

The combination of information which is provided by the site visits allows a variety of issues to be discussed, including the importance of local areas (park, suburban neighborhoods, etc.) (McLeod, 2019) and how to enhance the current ecosystem services and why not provide new ones.

The usage of visual materials such as photographs, videos, drawings, CAD drawings, providing the plan etc, designer with a good quality work, provides documentation for the design. Documentation and data provided includes everything from the materials to be used to components and specifications.

AutoCAD as a commercial software framework for computer-aided design (CAD) and design, is commonly used graphic design app which has powerful features that would help for highlighting the zones in which will be taken to be studied.

Figure 4. Screenshot of the greenlungs webpage

On the other hand, the aircasting is an application gathers and transmits measurements from HabitatMap's AirBeam and other health and environmental tracking systems to the maps by documenting and using health and environmental data to inform personal decision-making and public policy.

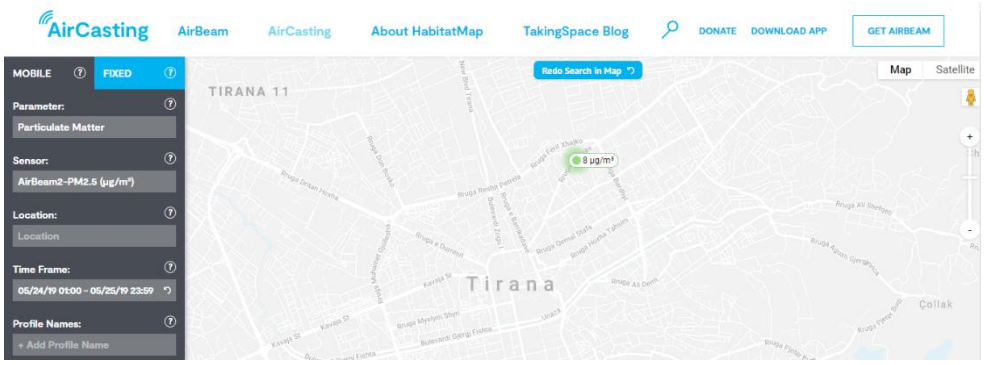


Figure 5. Screenshot of the AirCasting webpage

3.3 Online Questionnaire on all proposed nodes

Questionnaires are the most popular method of collecting data from a group of people. A questionnaire is a collection of questions with a variety of responses. It is also a format that allows for the compilation of standardised, reasonably standardized data about each of a wide number of instances. (Ross, 2010)

Approximately 100 participants would be asked to complete this questionnaire in this study, which will ask questions regarding the pollution in Tirana, mainly about air and noise pollution, in some certain areas that are thought to have a high level of pollution. The results then will lead into choosing one of the zones proposed below.

3.4 On site questionnaire (21 Dhjetori Node)

The second questionnaire takes place on the site, (21 Dhjetori Node). On this questionnaire it is thought to ask people face to face about certain problems, stating the current situation and exploiting people's perception and their own values or what renovations should be made in this certain node.

Different from the other questionnaire, this one it's more detailed and it is more about getting this node to be safer and more functionable for all.

Some online conducted questionnaire questions

1. In which of proposed nodes do you find a lot of noise pollution?
2. At what time during the day do you find these noises more concerning?
3. What solutions do you suggest to be made for noise pollution?
4. What solutions do you suggest to be made for air pollution?

Some on site questionnaire questions (21 Dhjetori Node)

1. Do people have a choice of places to sit, either in the sun or shade?

2. Are there enough accessible spaces for all (Wheel Chair Users, hearing impairment, visually impaired, and people)?

CHAPTER 4

ANALYSIS

Choosing these five important nodes according their significance in Tirana and their pollution status which is in high rates, absence of places to rest, and not enough space for pedestrian walk. Then comparing each node values of pollution, air and noise pollution values and also two questionnaires, to determine which of the nodes is more problematic.

Table 1. Nodes and characteristics of the porposed sites

Nodes	Area	Landscape type	Typology	Function
21 Dhjetori	3085.78 m2	Hardscape	Traffic-open	Conjunction
Sheshi Nene Tereza	14036.87 m2	Hardscape	Urban square	Cultural
9 kateshet	3214.58 m2	Softscape/hardscape	Traffic-open	Conjunction
Sheshi Zogu i zi	19789.5 m2	Hardscape/Softscape	Traffic-open	Conjunction
Sheshi Skenderbej	40.000 m2	Hardscape	Urban square	Cultural

Mentioning five important nodes to take in consideration for the study and then choosing which on is more fit to go into more detailed analysis and to provide design solutions depending on the specific characteristics mentioned at the table above.

4.1 Selected Nodes

4.1.1 21 Dhjetori

21 Dhjetori conjunction is considered to be one of the most polluted areas in Tirana according to Air Quality index. It is characterized by a lack of sofscape and a lack of places to rest or not enough space for the pedestrians to walk. Being an intersection makes it prone to eccesive air and noise pollution, which after seeing the graphs below, it is facuated that this node's noise pollution values reach the maximum

in the afternoon with 75 dB. Air pollutants like: NO2, O3, VOC, PM10, CO2 reach high levels as shown in the graphs below.

4.1.2 Sheshi Nene Tereza

Sheshi Nene Tereza is the second largest square in Tirana. It has cultural values as it is named after the Albanian Roman Catholic nun, Mother Teresa. Like the previous node, it is characterized by a lack of softscape. Taking in consideration the pollutants values below, this square, noise pollution values reach the max in the morning with 70dB. On the other hand, the pollutants with the highest vlues in this square are NO2 (nitrogen dioxide) with 110 mg/m, O3 (ozone) with 100 mg/m and CO (carbon monoxide) with 2.5 mg/m.

4.1.3 9 Kateshet

9 Kateshet is another conjunction which different from the other proposed nodes is characterized by softscape and hardscape. Since it is a traffic open area it is classified a polluted zone with noise and air pollution. Reaching its maximum values in the morning with 75 dB and air pollution with its pollutants: NO2 (nitrogen dioxide) 45 mg/m, O3 (ozone) 48 mg/m, PM10 (particulate matter) 13 mg/m , CO2 (carbon dioxide) 400 ppm.

4.1.4 Sheshi Zogu i Zi

Sheshi Zogu I Zi is an open traffic space, conjunction which is partly by softscape and hardscape. It is characterized by high rates of pollution, air and noise pollution, especially in the afternoon with noise pollution values being at 60dB and air pollutants with eccesive high values like: NO2 (nitrogen dioxide) 130mg/m, O3 (ozone) 73mg/m, VOC (volatile organic compounds) 0.77mg/m, PM10 (particulate matter) 25 mg/m, CO2 (carbon dioxide) 400 ppm.

4.1.5 Sheshi Skenderbej

Sheshi Skenderbej is the main urban square in the center of Tirana. The total area is 40.000 m2. It has a cultural function and its landscape type is hardscape. Like any other square it has its pollution values noise and air pollution.Noise pollution reaching its maximum values in the afternoon with 60dB and air pollution values variating: NO2 (90 mg/m), O3 (74 mg/m), PM10 (23 mg/m).

After conducting two questionnaires, one of them was an online which helped to differ the proposed nodes and to chosing one of them which is 21 Dhjetori conjunction. The second questionnaire was on site, which helped a lot into detecting the problems and to offer some design approaches wich will make this node safer, sustainable and accessible for all. Also mentioning the values of noise and air pollution which made it clearer the ideas and how to interviene into this particular node.

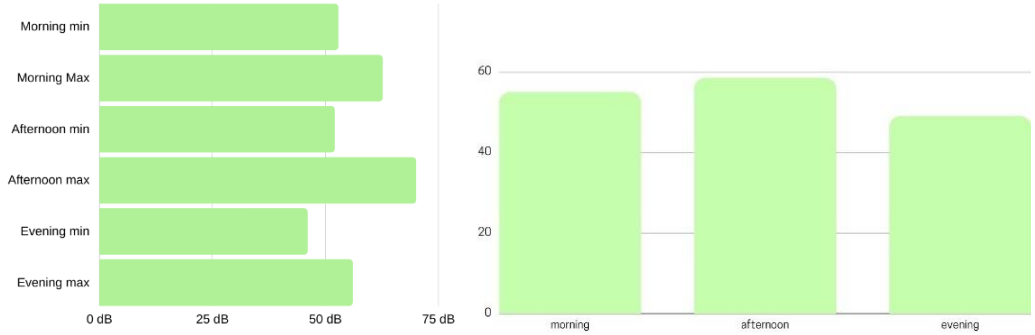
Table 2. Standards according to greenlungs webpage

Air pollution	
Parameters	Albanian
Pm 2.5 (mg/m3)	0.025
Pm 10 (mg/m3)	0.060
CO2 (ppm)	350
CO (mg/m3)	2.000
SO2 (mg/m3)	0.060
NO2 (mg/m3)	0.060
VOC (mg/m3)	0.500
O3 (mg/m3)	0.065

Noise Pollution	
Time of observation	Albanian
Day (dB)	55
Night (dB)	45

This table represents the standard values of noise and air pollution in Albania. All the pollutants with their particular parameters and time of observation.

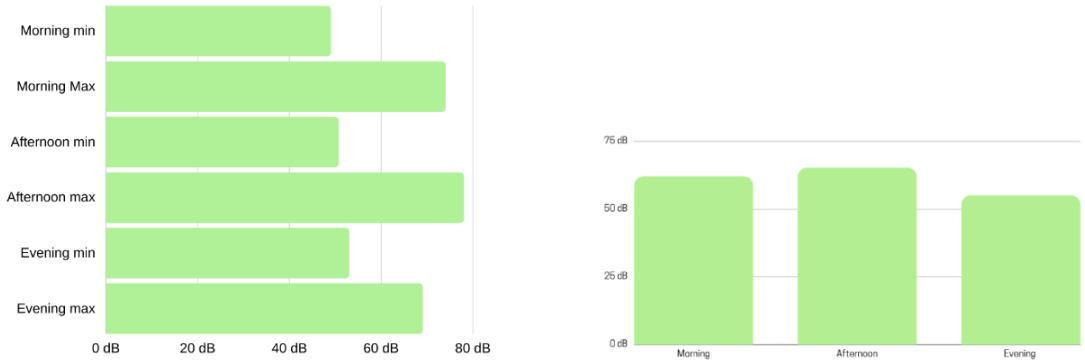
4.2 Noise pollution minimum and maximum values throughout the day.



a) b)

Figure 6. Skanderbeg square min/max values (a) and average values of noise pollution throughout the day in Skanderbeg square (b)

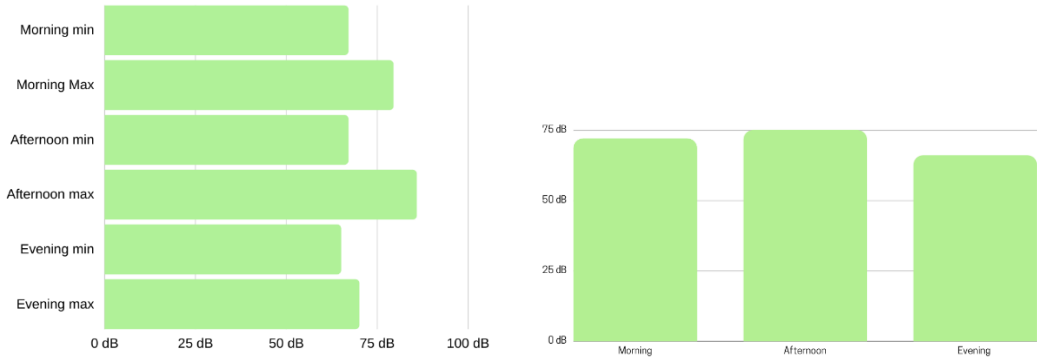
These graphs represent the max and minimum values of pollution throughout the day in Skanderbeg square and stating that the most problematic part of the day is in the afternoon.



a) b)

Figure 7. Min/Max values values of Nene Tereza Square (a) and average values for noise pollution on Nene Tereza Square (b)

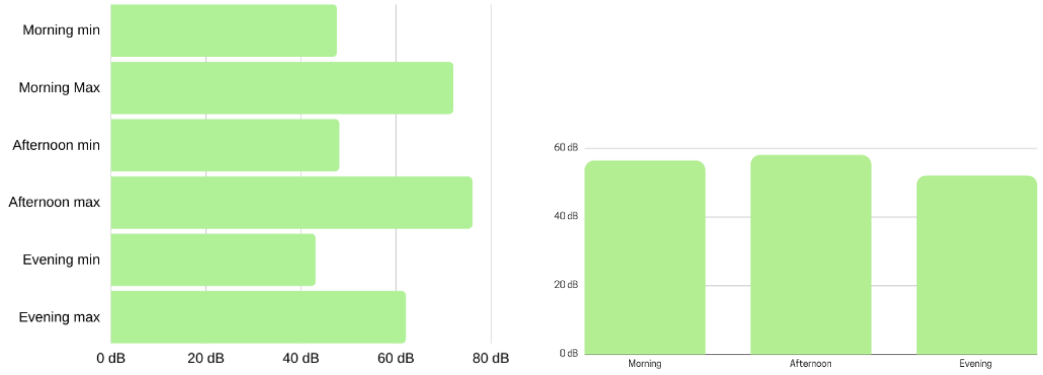
These graphs show as well the minimum and maximum values of pollution in Nene Tereza Square and detecting that this square is more prone of the noise pollution in the morning and in the afternoon.



a) b)

Figure 8. Min/Max values of noise pollution on 21 Dhjetori conjunction (a) and average values throughout the day (b) on this conjunction.

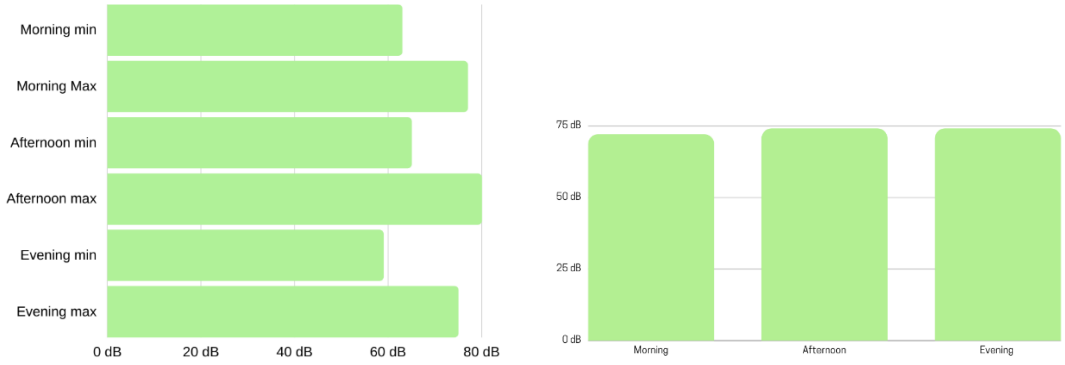
These two other graphs show as well the minimum and maximum values throughout the day in 21 Dhjetori conjunction and stating that the most problematic part of the day is in the afternoon.



a) b)

Figure 9. Min/Max values of noise pollution on Sheshi Zogu i Zi conjunction graph (a) and average values throught the day (b).

Graph (a) and (b) show the minimum and maximum values of pollution in Sheshi Zogu I zi and providing with the fact that this node is more prone to this problem in the morning and in the afternoon.



a) b)

Figure 10. Min/Max values of noise pollution on 9 Kateshet conjunction graph (a) and average values throughout the day of noise pollution on 9 Kateshet conjunction graph (b).

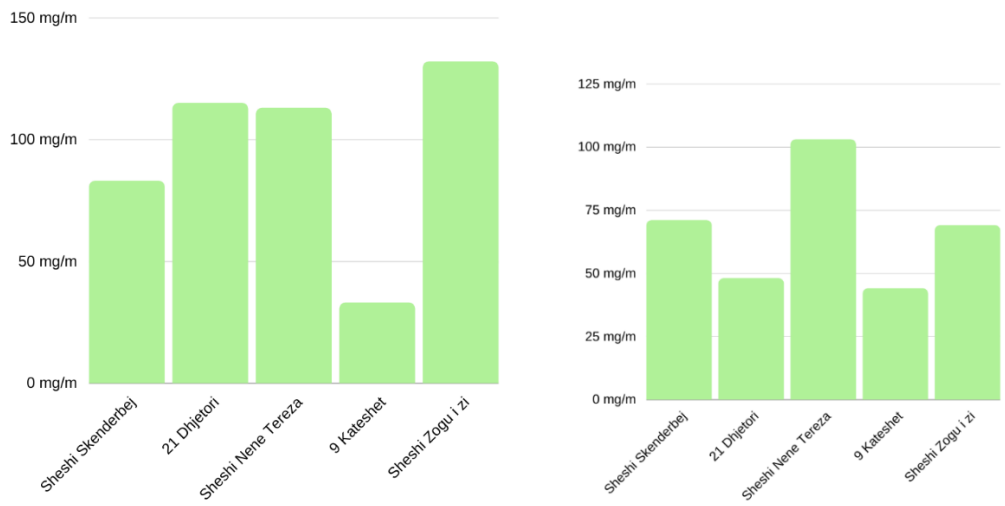
These two graphs (a) and (b) detect the minimum and maximum values of pollution in different times of the day showing that in the afternoon is the most problematic time of the day for this node 9 kateshet.

4.3 Air pollution values throughout the day.

Table 3. Standard air pollution values of the proposed nodes

Nodes	**No2**	**O3**	**VOC**	**PM10**	**PM2,5**	**CO2**	**CO**
Sheshi Skenderbej	83.00mg/ m3	71mg/m3	0.22mg/ m3	23.00mg/ m3	16.00mg/ m3	420.0 0 ppm	1.4 mg/ m3
21 Dhjetori	115.00mg/ m3	48.00mg/ m3	1.16mg/ m3	28.00mg/ m3	22.00mg/ m3	572.0 0 ppm	-
Sheshi Nene Tereza	109.00mg/ m3	103.00mg/ m3	0.20mg/ m3	14.00mg/ m3	10.00mg/ m3	395 ppm	2.20 mg/ m3
9 Kateshet	33.00 mg/m3	0.07 mg/m3	0.15mg/ m3	14.00mg/ m3	12.00mg/ m3	421.0 0 ppm	1.30 mg/ m3
Sheshi Zogu i zi	132.00mg/ m3	69.00 mg/m3	0.77mg/ m3	24.00mg/ m3	17.00mg/ m3	446.0 00 ppm	1.10 mg/ m3

These pollution values were taken from a very trusted source (page) which is updated regularly. Which then helped to provide with the more detailed graphs below.



a) b)

Figure 11. Average values of NO2 (Nitrogen dioxide) on each site (a) and average values of O3 (Ozone) on each site (b).

These two graphs show the level of NO2 and O3 on each site. Showing that the highest level of these two components are in 21 Dhjetori,Sheshi Nene Tereza aand Sheshi Zogu I zi.

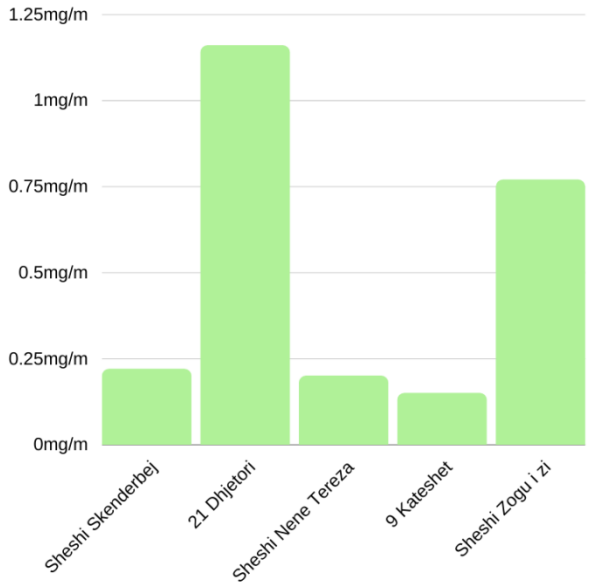
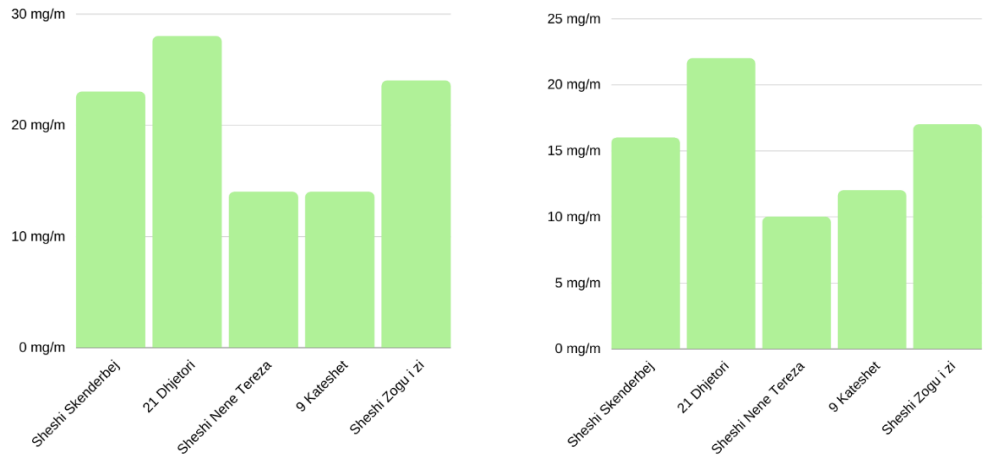


Figure 12. Average values of VOC (Volatile organic compounds) on each site.

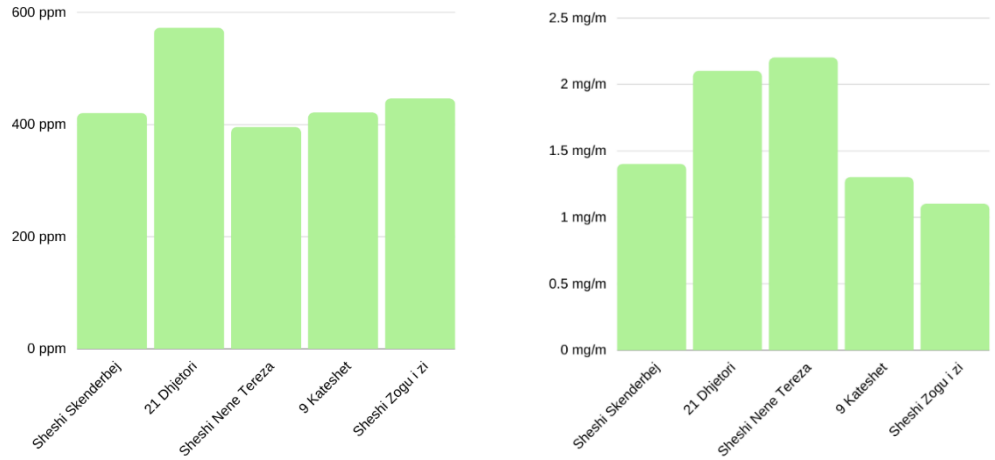
This graph shows the levels of VOC (Volatile organic compounds), which is in high levels in 21 Dhjetori conjunction.



a) b)

Figure 13. Average values of PM10 (Particulate matter) on each site (a) and average values of PM2.5 (Particulate matter) on each site (b)

These two graphs show the values of PM10 and PM2.5 in each site. Showing that 21 Dhjetori and Sheshi Zogu I zi has the highest levels of these compounds.



a) b)

Figure 14. Average values of CO2 (Carbon dioxide) (a) and average values of CO (Carbon monoxide) on each site on each site (b)

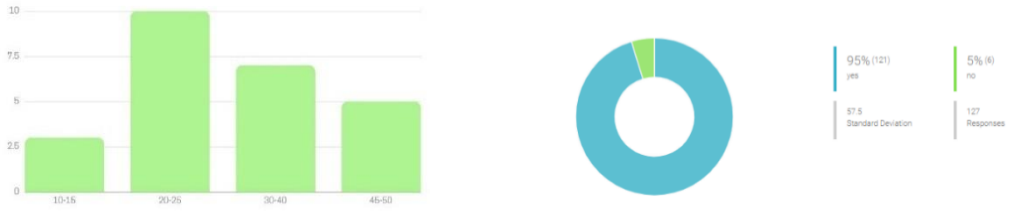
The last two graphs show the levels of CO2 and CO in each selected site, which results in highest levels in 21 Dhjetori and Sheshi Nene Tereza

Table 4. SWOT Analysis of 21 Dhjetori Node

Strength	Weakness	Opportunities	Threads
Small area (menageable)	High rates of pollution (air & noise pollution)	Increasing of green spaces (pocket gardens)	Conjunction (bad traffic)
Public access	Overcrowded	Proposing solutions (ex air samplers)	Accidents
Holistic approach	High rates of motor vehicle usage	Proposing different scenarios to what/how the proposed site might turn out.	Loss of public space
Surrounded by facilities	Not enough green spaces	Providing enough space for pedestrians	Pollutants harmful to human health

Providing a strategic planning for this node in perticular to detect its strengths, where and how to interviene in the node , to see and avoid it's weaknesses and threads. To add more opportunities and give more meaning to the node.

4.4 Online conducted questionnaire results



a) b)

Figure 15. The number and age of the participants of the survey (a) and the awareness of noise pollution by all participants (b)

These are the results of the survey, showing that the majority of people who took ths survey are of the age of 20-25. The other graph stated that the majority of the participants of this survey were very aware of the pollution the city is in.

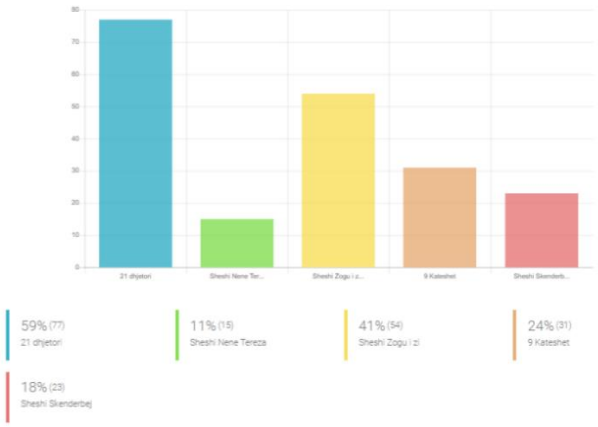
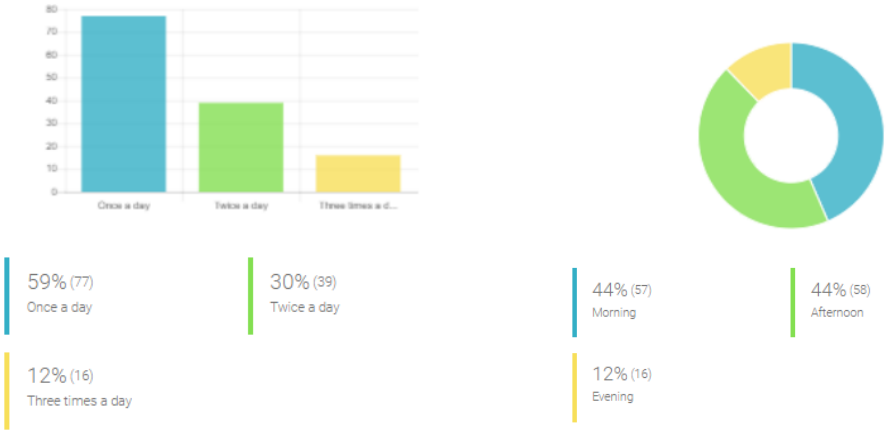


Figure 16. The results of the most polluted areas (proposed)

According to the chart, 21 dhjetori and Sheshi Zogu i Zi have the highest noise pollution followed by Sheshi Nene Tereza, Sheshi Skenderbej and 9 Kateshet being less polluted.



a) b)

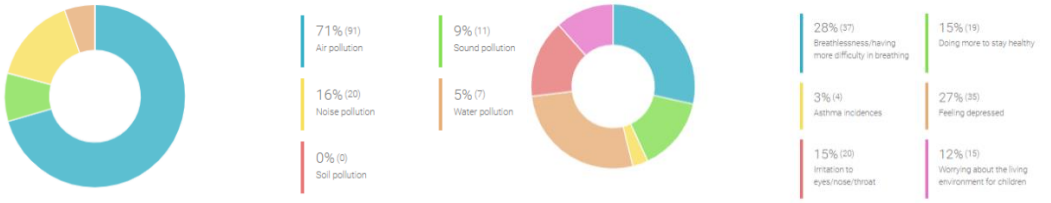
Figure 17. These are the results of how many times you pass through the particular areas (a) and the results of what time of the day, these areas are more prone to noise pollution (b)

Most of the participants (59% of them) answered with passing through the mentioned area only once a day. As shown in the graph there is an equal percentage of pollution in the morning and afternoon, where the second option (afternoon) passes with one is evident in the moring and afternoon.

a) b)

Figure 18. Causes of air/noise pollution in the metioned nodes (a) and the results of how much the noise/air pollution is bothering/affecting people in any way (b)

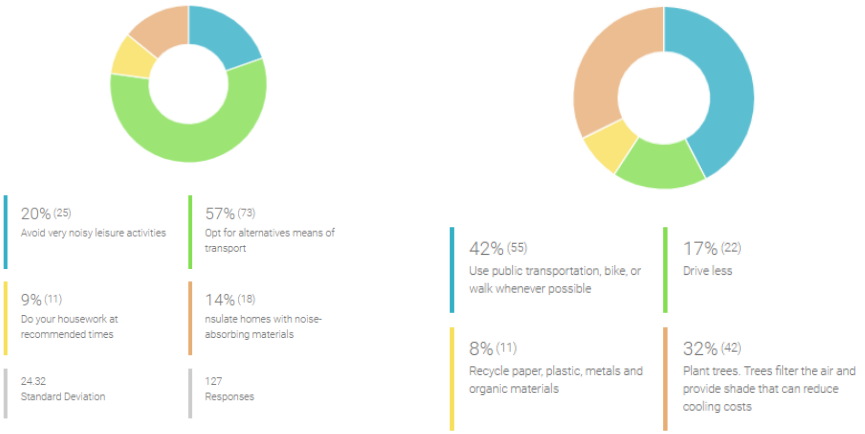
The participants are asked to choose which one they think it's more accurate based on their daily life routine. And the results show that motor vehicles are a major factor/cause of air and noise pollution.



a) b)

Figure 19. This graph shows which of the pollutants has more affect on the participants (a) and the other graph shows the results of how you may get affected by pollution (b)

Here are the results of which of the pollutants mentions has more affect on participants life. As the graph shows, air pollution has much more effect than other pollutants mentioned. Most of the results show that majority of the participants (27%) feel depressed going through their daily life no the presence of air pollution.

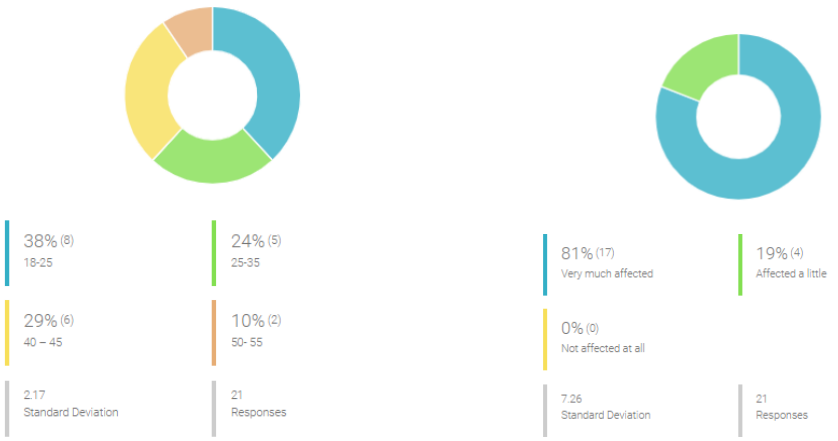


a) b)

Figure 20. Solutions for air pollution (a) and some solutions for noise pollution (b).

In this section are mentioned some different solutions for air pollution acording the level of pollution of the specific zone and the participants have chosen to use public transportation and to plant more trees. In the last section are mentioned some solutions for minimization of noise pollution and the highest percentage is evident in the second solution which is to opt for alternative means of transport.

4.5 On site Questionnaire results



a) b)

Figure 21. The age of the participants of the questionnaire (a) and how much affected are the particiants by the pollution around this node (b)

These are the results of the survey, showing that the majority of people who took ths survey are of the age of 40-45.

After conducting the on-site questionnaire, it shows that everyone no matter the age was affected by the pollution.

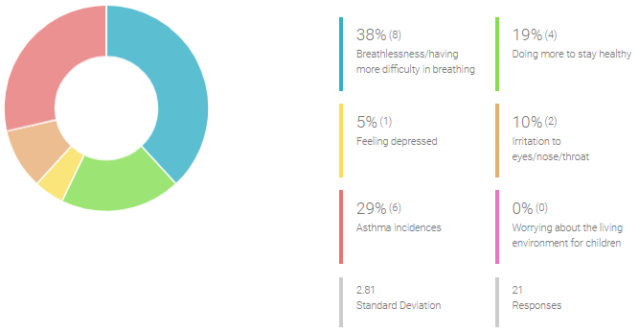
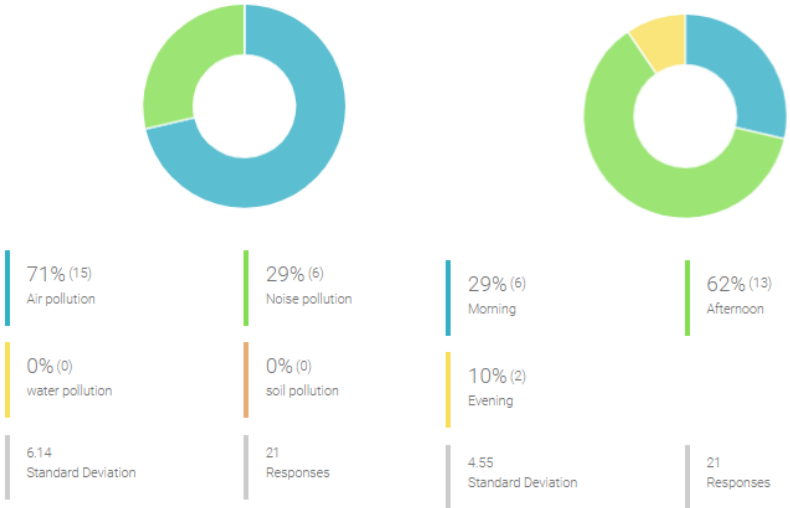


Figure 22. The difficulties that are caused by the pollution

During the questionnaire the participants noted that they have/had difficulties especially in breathing in this node.



a) b)

Figure 23. The most evident pollution in this node (a) and the results of what time of the day this node is accessed by the participants (b).

Participants stated that air pollution is more evident in the node (21 Dhjetori)

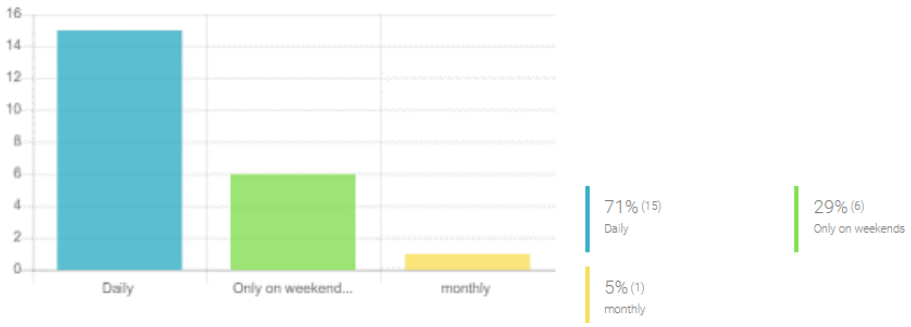
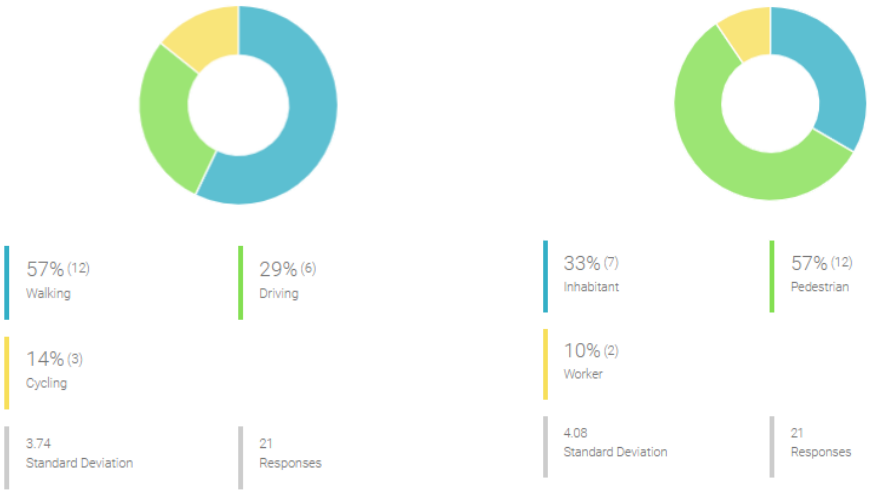


Figure 24. The frequency of visitation on this node

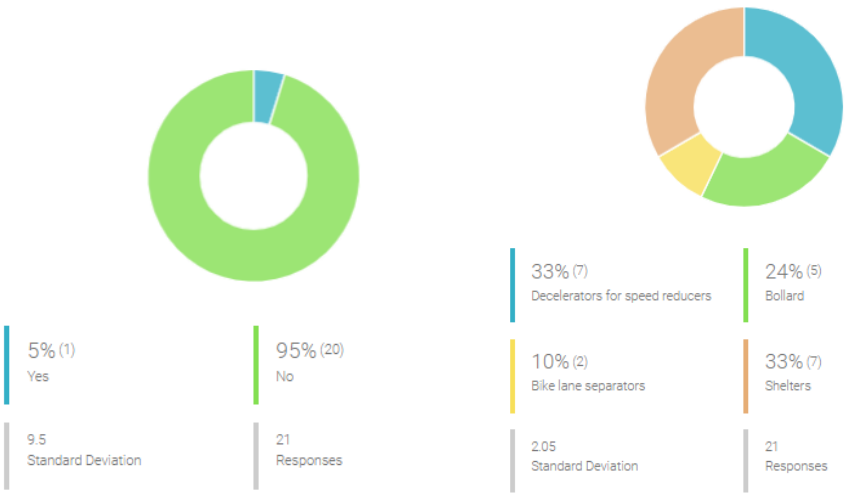
Participants where ask about the how many times they pass this node and it resulted that most of them pass this node on a daily basis.



a) b)

Figure 25 The way how this node is accessed (a) and the activity relation of the questionnaire participants (b).

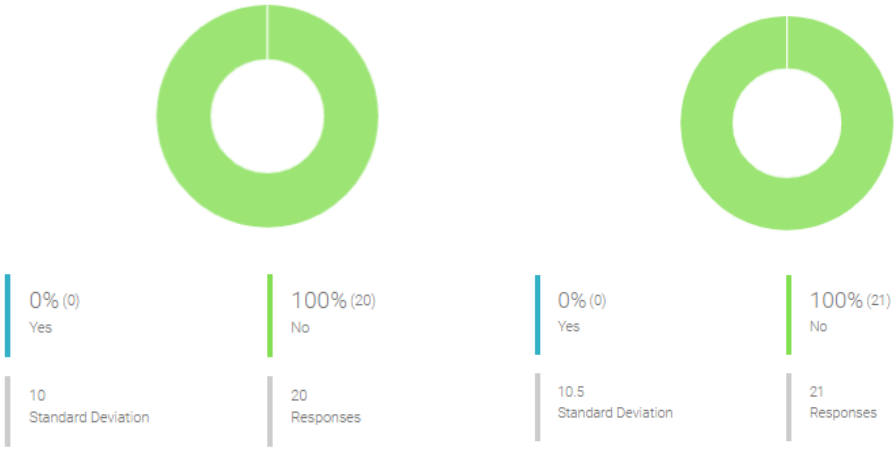
a) This question had in focus to see the way this node was approached.
b) This question had in focus to reveal the nature of the participant's accesing this node. 57% were pedestrians



a) b)

Figure 26. General opinion wheather this node feels safe or not (a) and options to make the node safer (b).

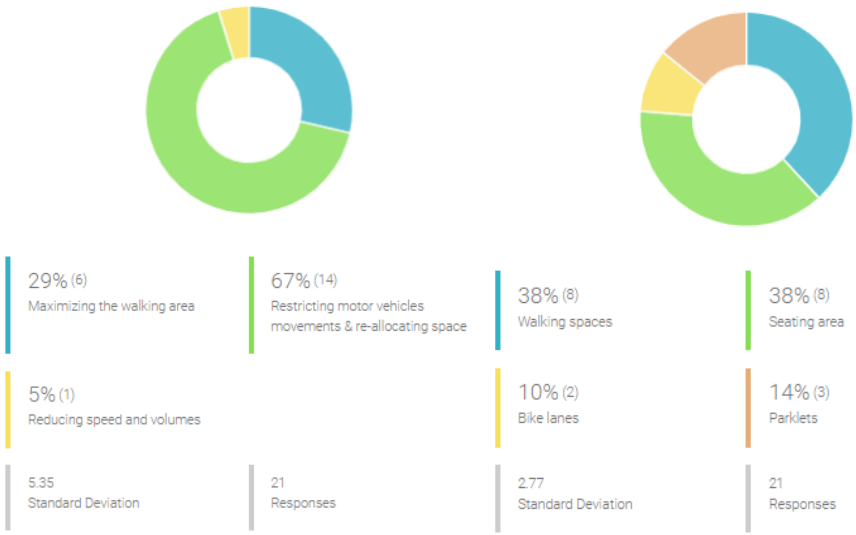
This question had in focus to get the particiants point of view on how to make this node better.



a) b)

Figure 27. Absence of places to sit (a) and stating the absence of accessible spaces for all (Wheel Chair Users, hearing impairment, visually impaired, people) (b)

This question had in focus to reveal the absence of seating areas and absence of accessible places for all people.



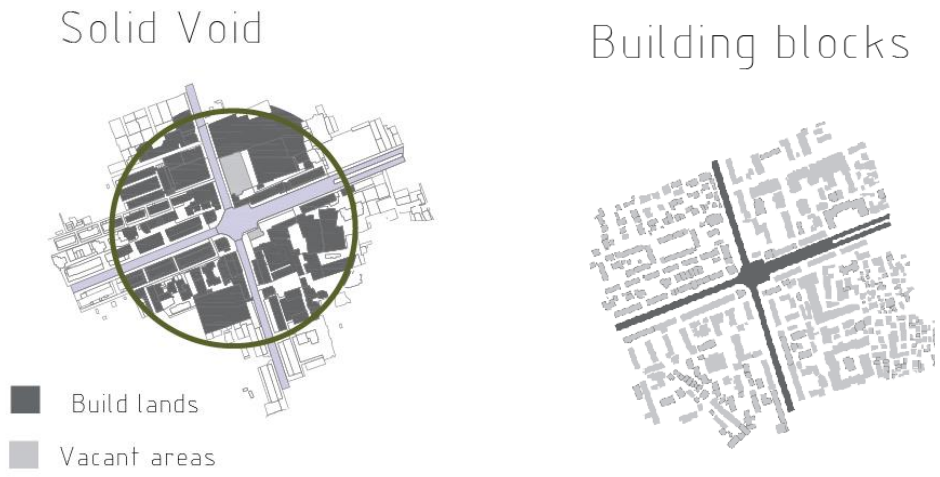
a) b)

Figure 28. Suggestions to minimize the accessibility difficulties (a) and some suggestions to make this node safer (b).

Participant's chosing the proposed solution to make this area safer. 67% of them chose the restriction of moter vehicles movement and allocating space.

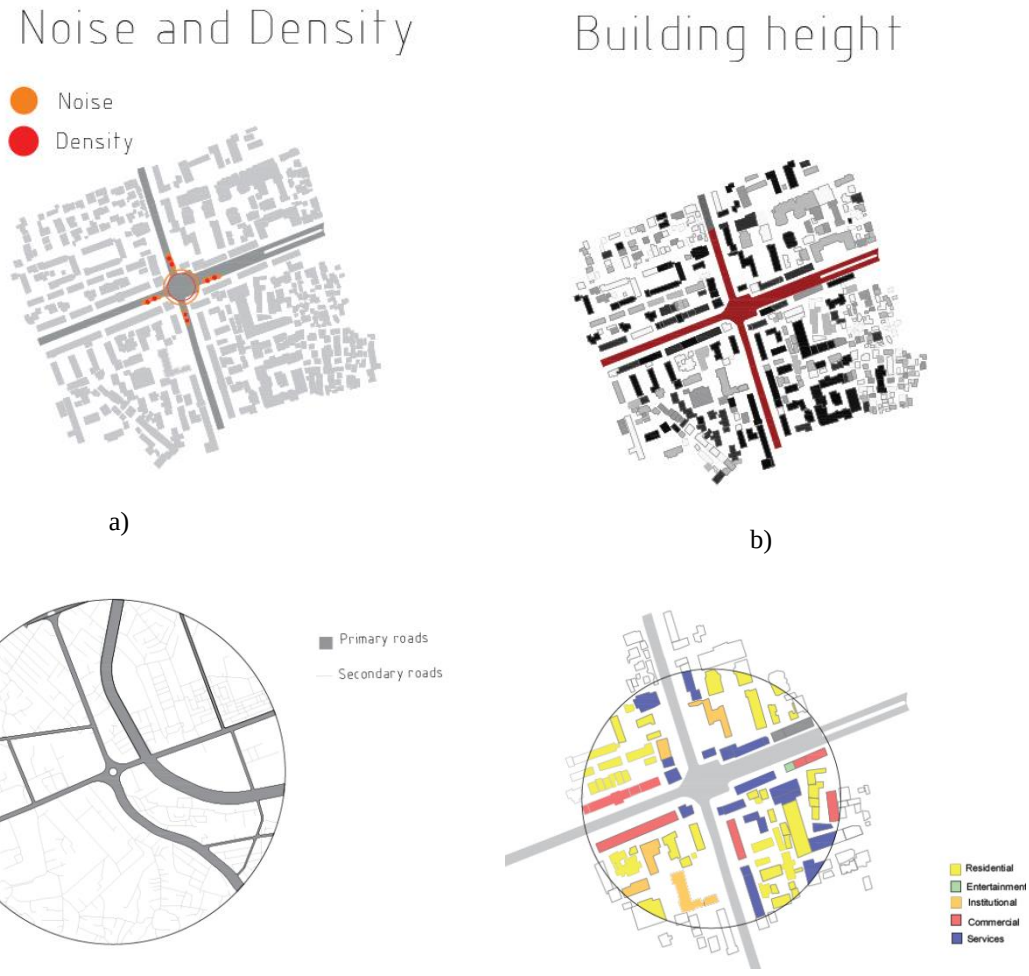
4.6 Site analysis

It is very important to understand the characteristics of a site before deciding for an intervention, design or planning. Physical traits like site area, boundary configuration, solid/void relation, bulding block surrounding this area, building height which has its effects on pollution like: inceasing air pollution dua in wind changes and its direction and conjunction of tall builddings as a pollution source. Detecting the direction of the pollution in the intersection and the traffic density in different times of the day.



a) b)

Figure 29. First map shows that there are more built lands (a) and in the second map it is shown the building blocks around the node area (b).



a) b)

c) d)

Figure 30. Noise and density of the node (a) and in the second map are shown the buildings height through gradient (b). Figure (c) showing the primary and secondary roads and (d) showing the ground floor nature of the surrounding buildings.

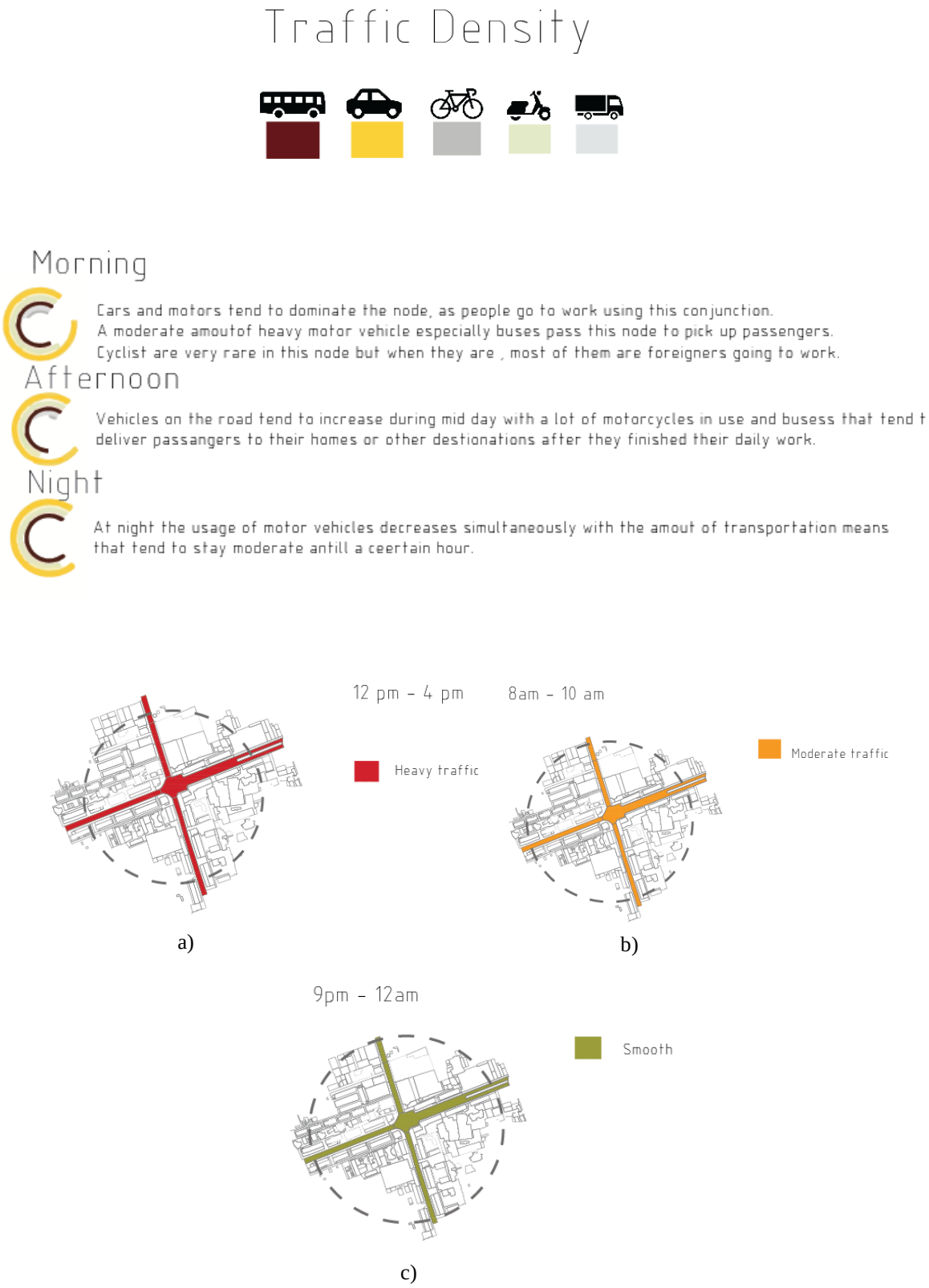


Figure 31. Through these diagrams are shown the traffic density in different time of the day and also road direction (a), (b) , (c).

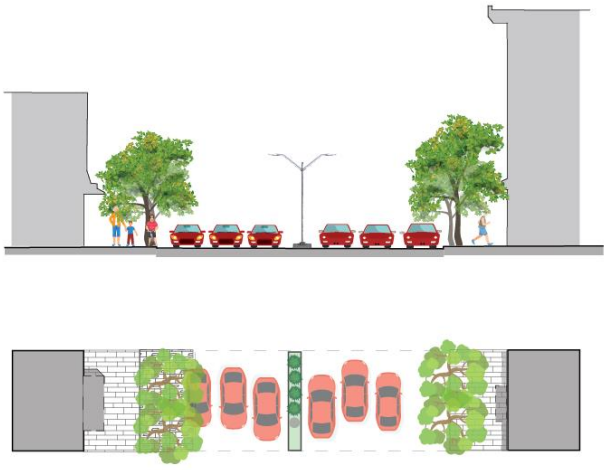
a) b)

Figure 32. Site sections (a) and (b)

a) b)

Figure 33. Reference Map for section (a) and (b) below.

a)



b)

Figure 34. Detailed section (a) and (b)

These two sections are taken from the upper site of the conjunction and the side as shown as at the small map above.

CHAPTER 5

5.1 Proposals and Design solution

Highlighting the importance of the changes that have to be done in this node, starting in interventions to reduce traffic conjunction, providing areas for multi use purposes and to make this node more secure and comfortable for all the residents.

Figure 34. Principles expressed as iconographics.

This iconographic expression of these principles has in focus to highlight the changes and the gratifying this certain node. Proposing some changes to 21 Dhjetori conjunction to make it safer, to prioritize people, and reducing as much as possible the pollution.

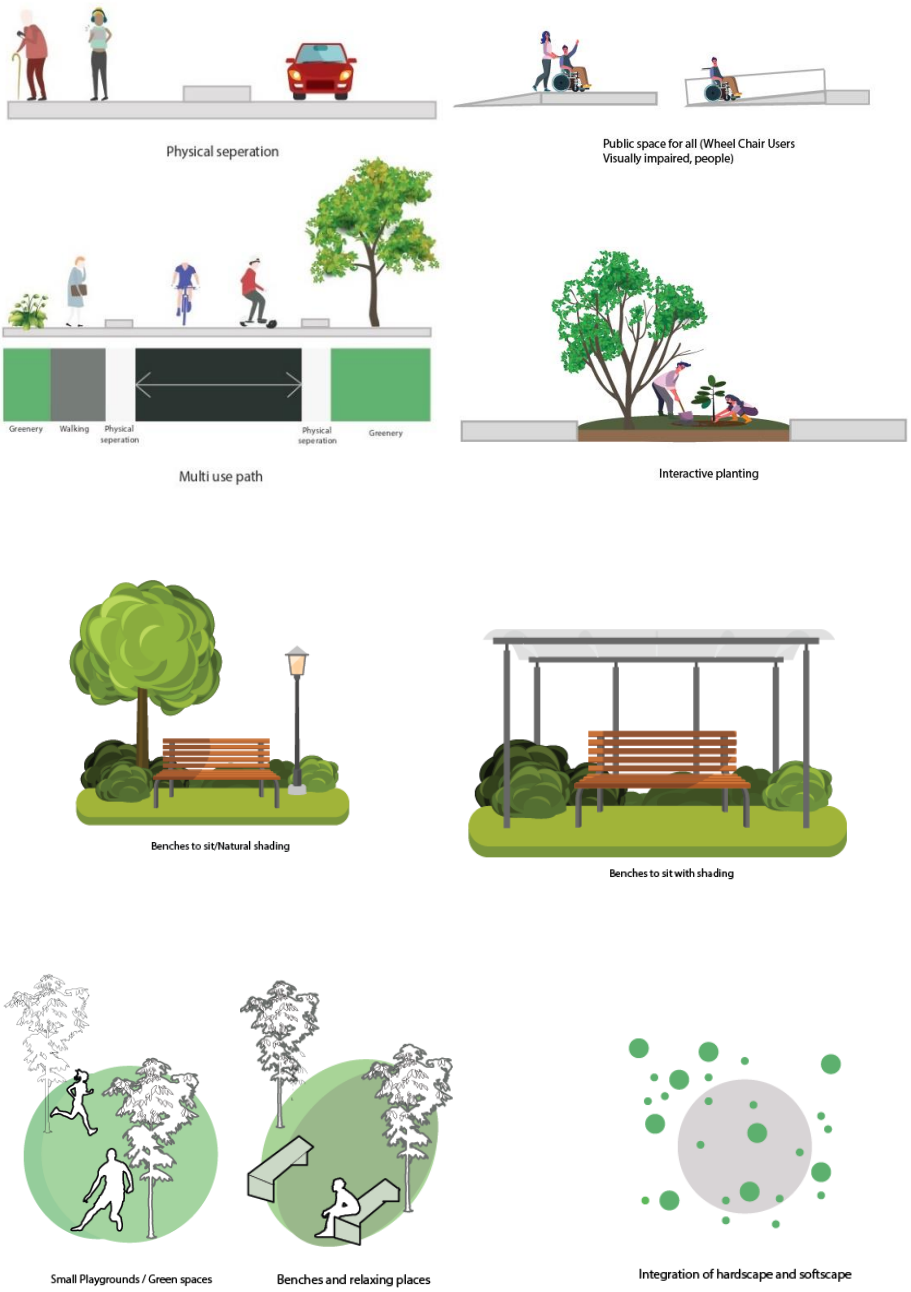


Figure 35. Schematic interventions to be made according to the principles above

Table 5. Interventions to reduce traffic conjunction

Sources / **Proposals**	Site analysis	Questionnaire	Case studies	Feedback from people	Brainstorm	Literature review
Planting trees	✖	✖		✖		
Maximize pedestrian area	✖		✖	✖	✖	
Sitting area	✖					
Water features					✖	
Food/drink areas	✖			✖		
Interactive planting	✖	✖			✖	✖
Pedestrian ramp			✖	✖	✖	
Ground level traffic lights			✖	✖	✖	
Pedestrian Crossing	✖					

This table consists of different action to be taken in order to reduce traffic congestion which is an evident problem in this node. These certain actions were taken from different sources like site analysis, questionnaires, case studies, feedback from people and from literature review mentioned on chapter 2.

Protection

Table 6. Protection related interventions to be made

Protection for pedestrians	**Overlapping functions**	**Protection against sensory**
Decelerators for speed reducers	Ecological functions	Pocket gardens
Bollards	Cultural functions	LPI (lead pedestrian interval)
Bike lane separators	Interactive functions (such as planting) , chess playing , relaxing , reading, eating.	Public space multi-function shelter

This table consists of the interventions which has in focus protecting, making this node safe for people and overlapping functions such as ecological functions, cultural functions or maybe even interactive functions such as planting ect.

Comfort

Table 7. Comfort related interventions

Enough space to walk	**Opportunities for staying/standing**	**Opportunities to sit**	**Opportunities to see**	**Opportunities to talk and listen**
Maximizing the walking area	Parklets	Benches to sit	Open green spaces with unhindered views	Street furniture
Restricting motor vehicles movements	Open spaces with interactive planting	Seat walls	Low-rise/Medium rise	Talkscape

& re-allocating space			greenery/bushes	
Reducing speed and volumes	Integrated entaintanment areas with resting areas.	Movable tables and chairs		

This table consists of the comfort interventions, making this node accessible for all, provide enough space to walk, sit, talk and listen more clearly.

Gratifying the node

Table 8. Relation to the context / Sense of place

Spaces provided to human scale	**Opportunities to enjoy the positive aspects of climate**	**Good design and material**	**Public place for all**	**Relation to the place**
Bike lanes	Bus shelter	Sustainable materials	Wheel Chair Users	Public art
Walking spaces	Seating area	Economical friendly	Visually impaired, people	Community Kiosks
Physical separation	Physical activities, chess ect.	Aesthetically pleasing	Learning disability or hearing impairment	
Ramps	Pervious pavement	Steel, Reinforced concrete, stone wood ect	Ground level traffic lights	

This table expresess the interventions that will help to gratify the node, to create a sense of space by providing all the actions mentioned above.

Table 9. Interventions on a recreation to a small plaza

Small Plaza / Safety Interventions
No parking allowed
Extra attention to sight impaired individuals
Low cost durable materials
Tables and seating movable due to flexibility
Using bollards
Relaxing spot
Entertainment/Art installations
Small greenery to seperate the plaza from the street

This table represents some changes and some actions taken to this small place shown in the map below, adding art instalations so it can improve the quality, using low-cost durable materials and identification of a public place. And to make this space as safe possible for all individuals.

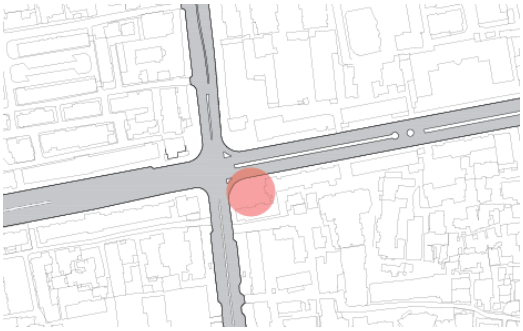


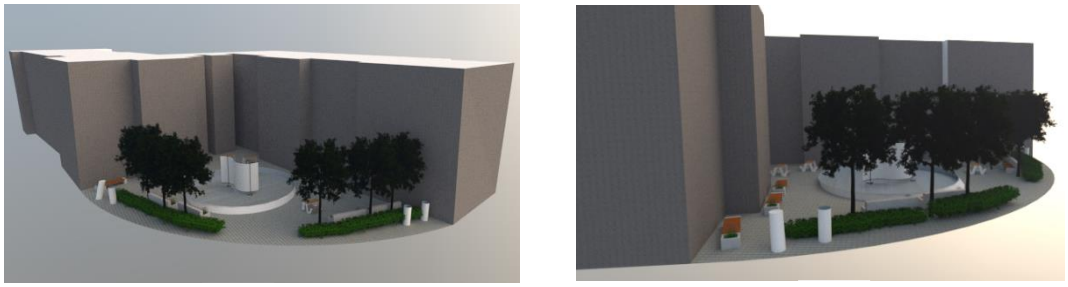
Figure 36. The location of the small proposed plaza

Figure 37. Plan of the small proposed plaza

Having a public plaza has its benefits when it is close to an intersection, because it makes intersections safer, more compact and easier to cross for the pedestrians. As mentioned in the table above this public plaza contains low-cost materials, entertainment and art instalations in the centre rounded by a seat wall. And has its low-rise and high-rise greenery around to act as a protective bandaid from the pollution and cars around.

5.1.1 Renders of the Small plaza

Providing 3D renders so the proposal can be viewed more clearly throughout different angles and aspects. Seeing a more detailed perspective of the proposal and seeing which materials ar used more clearly.



a) b)

Figure 38. Front view (a) and side view (b) of the small plaza

a) b)

Figure 39. Human eye view render (a) and top view of the plaza (b)

Figure 40. Render of the small plaza

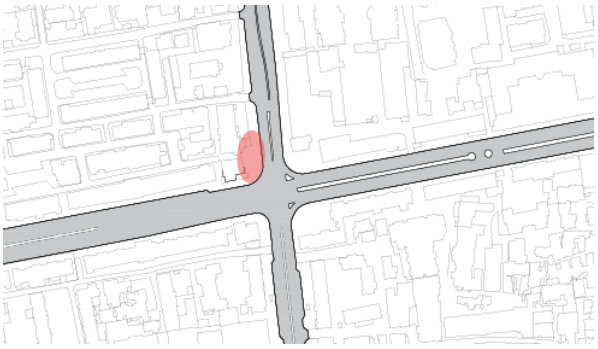


Figure 41. Location of the landscape proposal

Figure 42. Landscape proposal

This landscape proposal main feature are the wooden benches shaded with the trees near them. In the corner of this strip shaped landscape is placed a small gathering space with movable chairs and tables. This whole proposal serves as a resting space at this point.

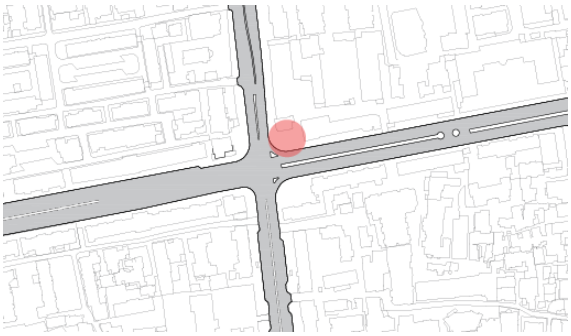


Figure 43. Location of the third landscape proposal

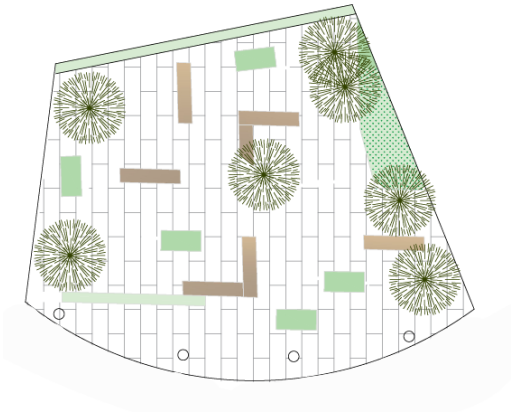


Figure 44. Third landscape proposal

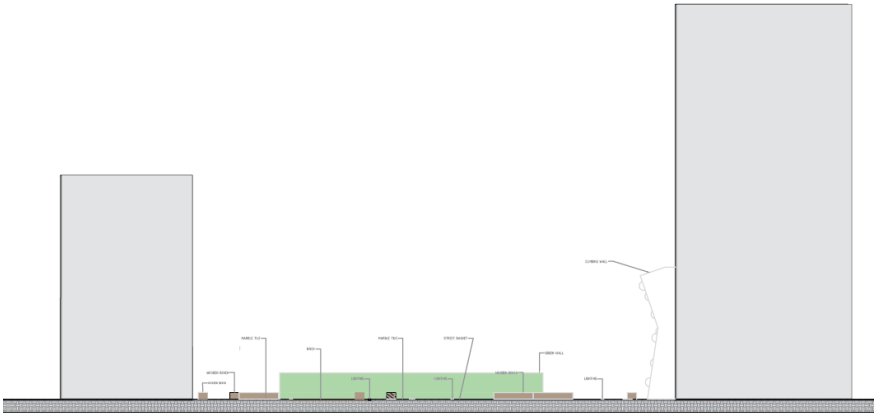


Figure 45. Section of the landscape proposal

The landscape proposal here contains wooden benches, ground lights, bollards, a green wall and a climbing wall. This one had in focus the entertainment factor in this certain space.

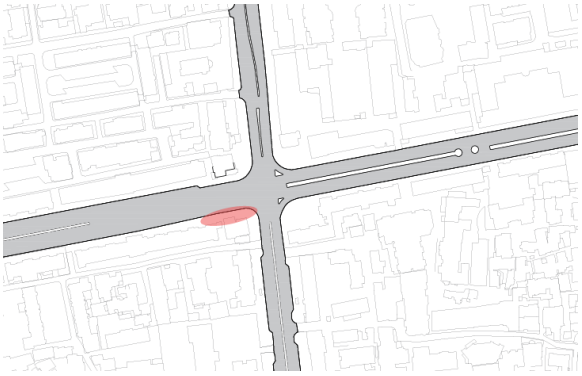


Figure 46. Location of the landscape proposal

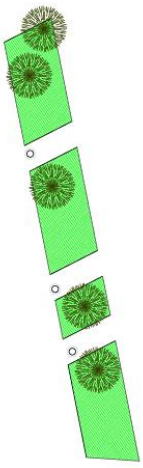


Figure 47. Landscape proposal

Different from the other sides of the node here wsent enough space to provide with certainproposals like the correspondant landscape of the other three sides. Instead, here were added small strips of greenery in between the buildings and bollards.

5.1.2 Gratifying the Node

Street itself is an ecosystem therefore it shoud be designed as an ecosystem, where man made systems are interacting with the natural systems.

Intersections on a bigger scale, should be designed to be more compact and analyzing them as a part of a network not as an isolation and integrating time and space for example: LPI (lead pedestrian interval) which gives the pedestrians a short time of 3-7 second headstart before entering to an intersection, alongside a green signal in the same direction to walk.

To make this node more approachable and safer were added these interventions:

- Buffer bike lanes for safety variating to 0.5 m width.
- Bike lane variating to: 1.8 m
- Sidewalk with physical separator (trees) variating to: 2.5 m
- Parking zone parameter variating to: 3m

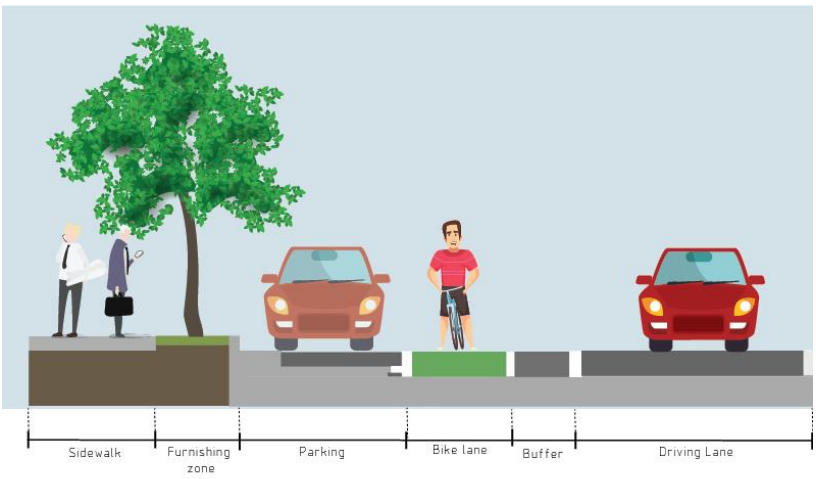
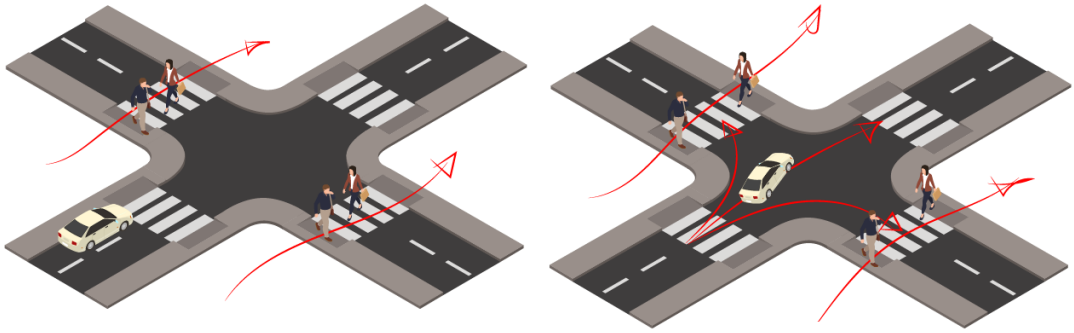


Figure 48. Close up section of the street.



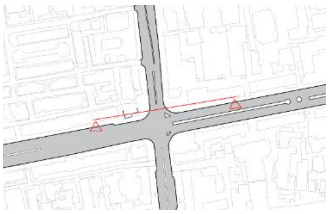
a) b)

Figure 49. LPI (Lead Pedestrian interval) first picture (a) showing pedestrians crossing the street and (b) pedestrian and cars crossing the street.

LPI (a) provides with 3-7 second head start entering the intersection and second picture (b) concludes both movements, pedestrian and cars with the help of the green light ensuring the safety.

Figure 50. Render of the node

Figure 51. Render of the node, perspective view



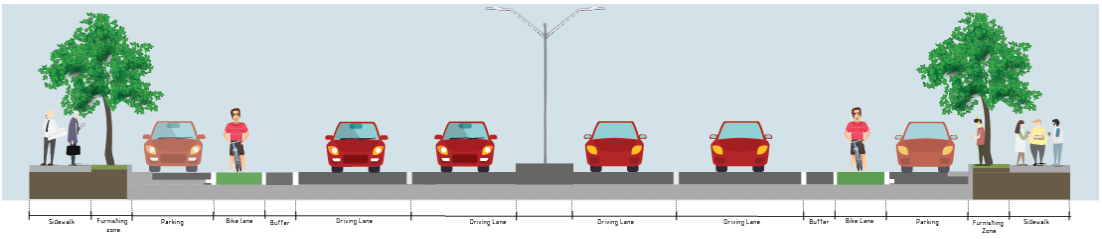


Figure 52. Street Section A-A

5.1.3 Used Urban Furniture

Urban furnitures create a setting for sitting, resting, eating and social encounters with people. These kinds of settings may be to great value to the elderly, to those with limited mobility, for kids. But also mentioning their functional aspect, urban furniture like: benches, tables, entertainment places in squares ect can be socially important as they all give to a certain space a comforting and appealing air and gathers people together.

This small get together space not only provides with a safety solution but it has to be considered as an enhancement of the public life near a node.

Figure 53. Concrete and wood benches

Figure 54. Art instalation rounded by a seat wall

Figure 55. Movable tables and seatings

Figure 56. Bollards placed at the two cornners for safety and physical separator

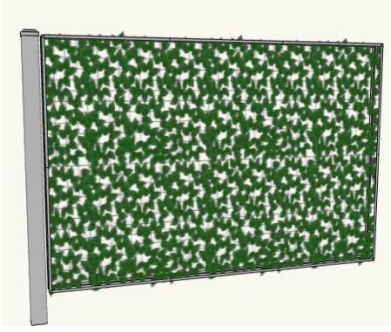


Figure 57. Green wall placed in the entertainmet side of the node

Figure 58 Climbing wall placed in the entrtainment side of the node

5.2 Maximizing the pedestrian surfaces by separating circulation routes

In order to minimize traffic and pollution, an underground circulation would solve the pollution related problem, noise and air pollution.

Designng two entrances through the tunnel, for the underground 6-lane dual carriageway to provide enough space for cars to pass through.

Existing transportation networks take up vital real estate in cities where resources are limited. Tunnels use less surface space and have the potential to relocate whole transportation networks below. Providing an underground transportation allows to reuse roadways and transform them into community-enhancing areas, as well as to improve the city.

Using this type of solution for the pollution and traffic conjunction on this node, this tynnel will minimize the use of valuable surface land. It also provides a weatherproof operation meaning it offers protection from wind, rain, snow ect and all of this do not affect the tunnel notsoever.

5.2.1 Concept

Figure 59. Shape of a sound wave decrasing its mass as it connects to the underground level.

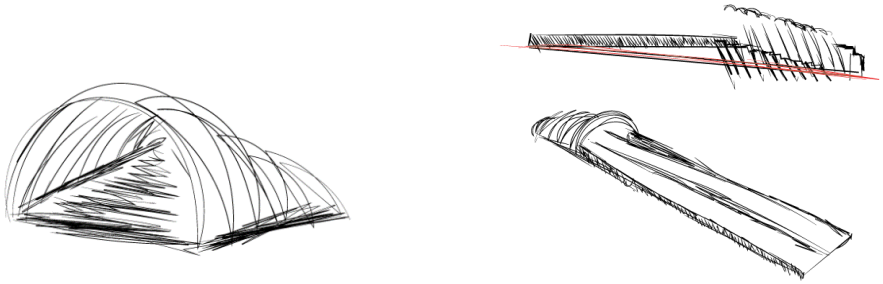


Figure 60. Shape ideas of underground circulation entrance

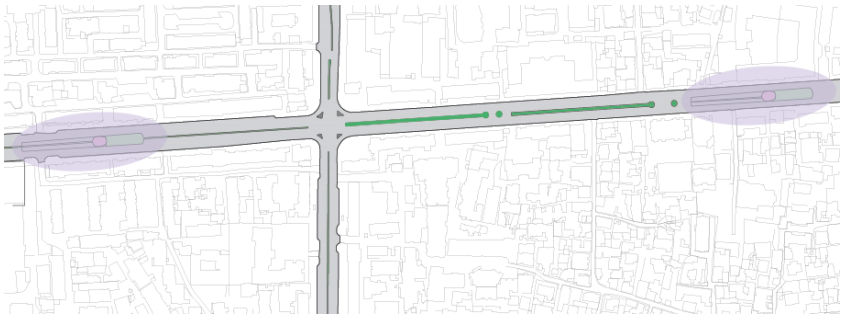


Figure 61. Entrance placement of the underground circulation

Figure 62. Section of the tunnel entrances

Figure 63. Partial section of the entrance

5.2.2 Model Proposal

The entrance of the underground tunnel is thought to have a soundwave shape with glazed aluminum panels providing durability and decreasing its mass as it goes underground. With a 410m distance from the intersection it offers some minimization of the valuable surface land use and solving the air pollution and noise pollution problem.

In the back of the entrance, it is thought to have a small greenery space to make a smooth transition from the shape of the entrance to the street.

Figure 64. Render of the model proposal

Figure 65. Top view of the proposed model

This picture shows more clearly the transition to the road between the enrance with the greenery behind it.

Figure 66. Render of the proposed model

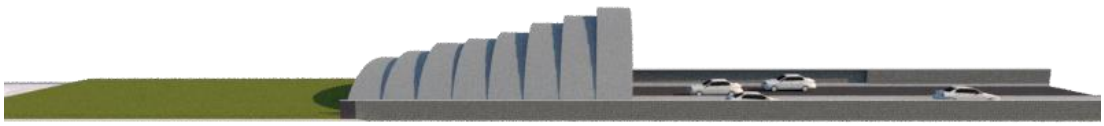


Figure 67. Side view of the model

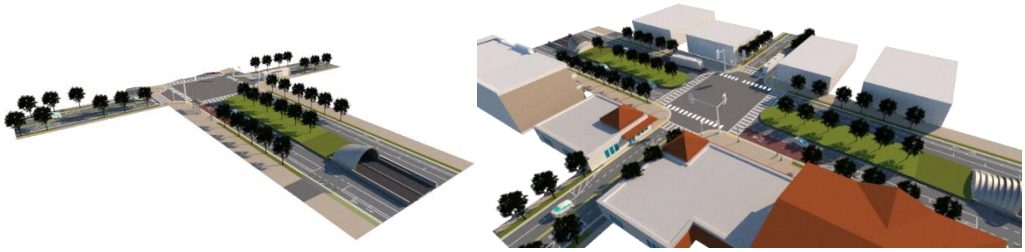


Figure 68. Rendered node with the proposal

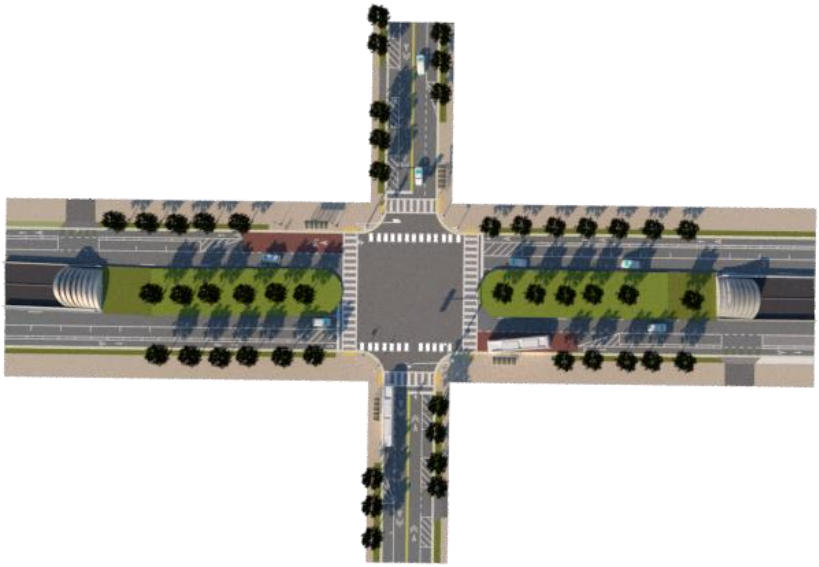


Figure 69. Render of the node, with both tunnel entrances

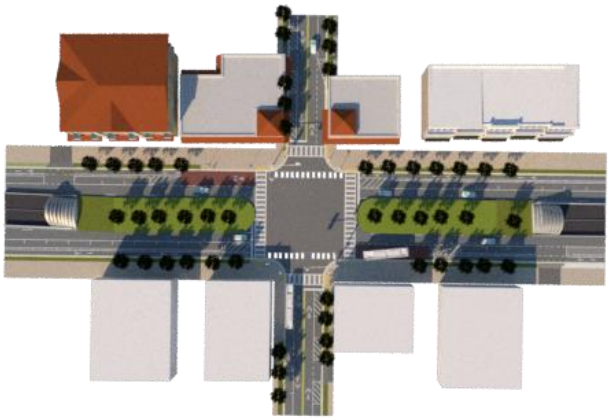


Figure 70. Render of the node, with both tunnel entrances

After this adjustment, underground circulation, the surface above is used used as a green strip with vegetation to seperate the course of action of the cars in both sides. Here pedestrians are safer than before to pass the street and also safer from the respiratory deseases since the majority of the circulation in underground.

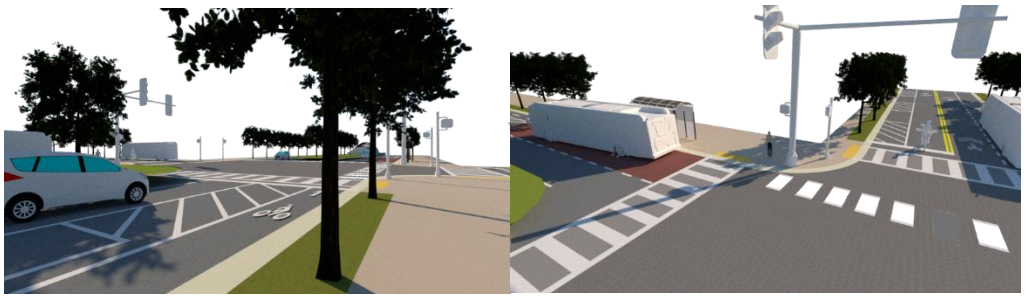


Figure 71. Up-close renders showing landscape and bus stop.

5.2.3 Solving turn around issues of vehicular circulation

Turn around issues of vehicular circulation are caused by the usage of the underground tunnels. In order to minimize there should be a circulation scheme which will help to reallocate the space, cycle infrastructure, or even sidewalks. While integrating intersection with the surrounding buildings and the proposed plazas.

Traffic intersections are knows to be very complex spaces and when there is an intervention such as underground tunnels, a slot based system might solve the problems which might be evident in the surface area. This system moves the focus from the traffic flow level to vehicle level.

Like the underground tunnel, this system (scheme) would dramatically reduce the amount of pollution emitted by the waiting vehicles and would make the circulation on the surface level easier. Also, bending streets so that they meet at as close to the right angle as possible, to provide clarity of the users.

Providing turn lanes by introducing a recesed central median on the street. Turn lanes provide protected turns across oncoming traffic in the intersection.

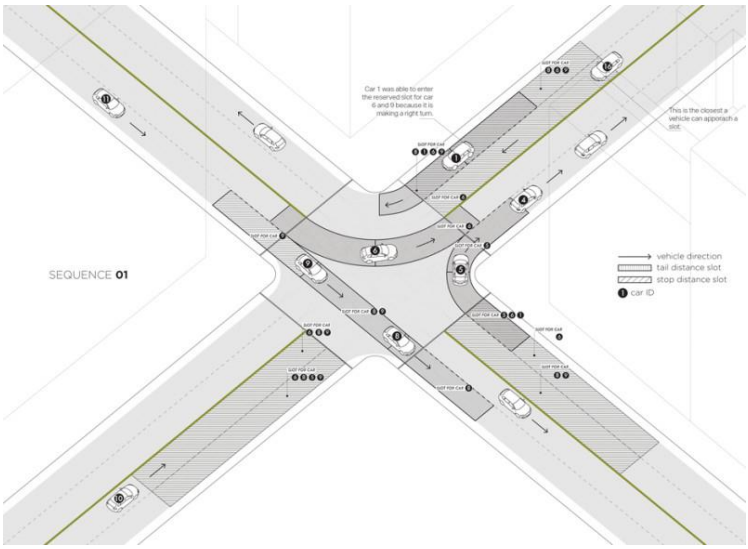


Figure 72. Method proposed by Massachusetts researchers, first scheme

This type of system provides with sensors to keep driverless cars at a safe distance from each other and to allocate every car with crossing slots as it arrives at the intersection.

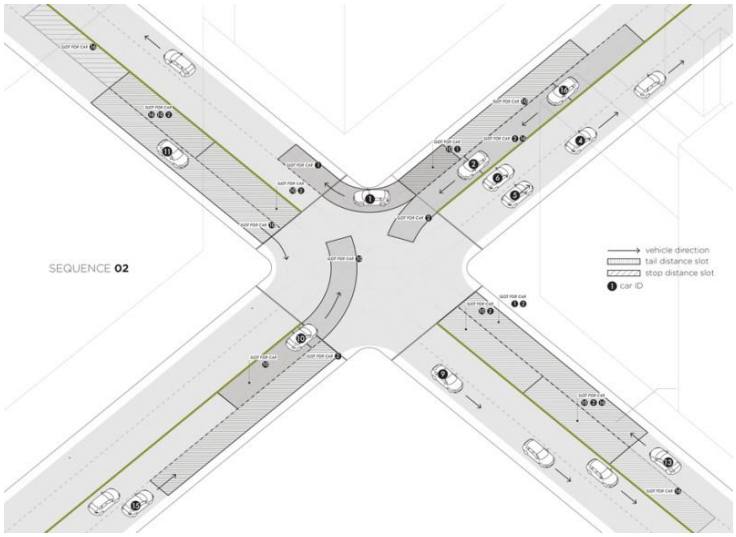


Figure 73. Method proposed by Massachusetts researchers, second scheme

The speed of the vehicles woud be automatically adjusted on approach to make sure the approach of the vehicles is safe and easier, so they take it in turns to pass across without having to stop or having difficulties, now that there is a underground tunnel.

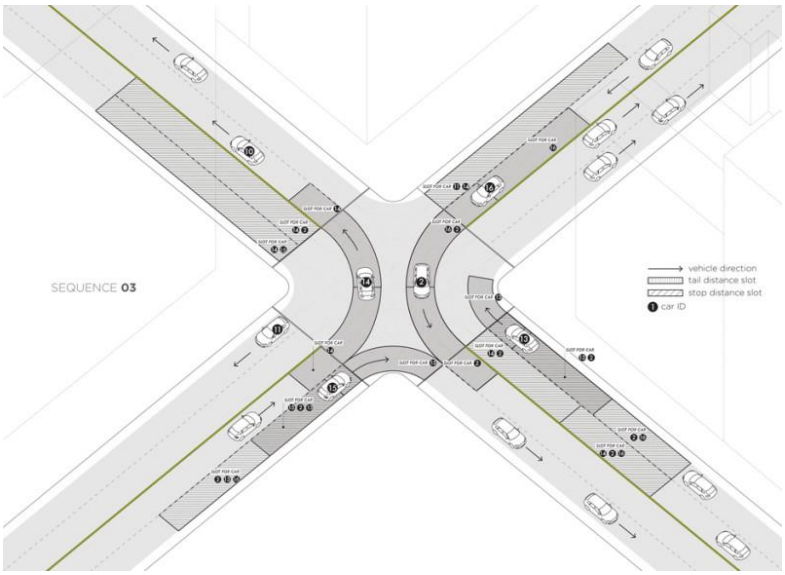


Figure 74. Method proposed by Massachusetts researchers, third scheme

This would help to diminish the congestion, extend the lifespan of the current infrastructure and reduce the need for new roads.

CHAPTER 6

CONCLUSIONS

6.1 Conclusions

In this thesis, it was investigated the types of problems that public spaces in Tirana are facing in daily basis.

Tirana being one of the most polluted city in Albania is facing major problems relating in air and noise ppollution especially. These being a big factor which indicates in causing human respiratory diseases and health in general.

The combination of the information taken from different case studies, site visit, questionnaires, talking to the residents of the area (21 Dhjetori) helped to evaluate the performace of an exisiting ecosystem in use, how it could reveal a way to intervienne and change or maybe rebuild a more adaptable for all ecosystem to live in.

Providing with a strategic planning of the node, while detecting its problems to design a node which it can be used by all. With the help of SWOT analysis, it was very clear of what the node needed to be done and threads to avoid while making the design decisions.

Site analysis made an important differentiation of the node itself. Showing which part of the node had more noise and density, building height which has its effects on pollution like: increasing air pollution due wind changes and its direction and conjunction of tall buildings as a pollution source.

The design of a node should be sensitive to how streets operate at different times of a day for all users. Key points were the maximization of the pedestrian space adding benches and places to rest, coordinating with entertainment spaces and art implementations with unhindered views using materials which are low cost and durable.

A small space near the street was a good use for the creation of a small plaza (public space. Integrating this type of approach provided with safety improvements and an enhancement of the public life.

The uses, needs, and activities on a street alter throughout the day. A street acts differently during rush hour than during lunch hour, just as a street late on a Saturday night is utilized differently on Sunday morning. Street design should consider how streets function at all hours of the day and for all users. While identifying peak periods of intensity is useful, the design of a street or corridor analysis should always aim to balance the requirements and functions of different time periods.

When strong turning traffic collides with crossing pedestrians during the acceptable phase of the signal cycle, LPIs cn provide safety to pedestrians. LPIs are commonly used when both pedestrian and turning volumes are large enough to warrant a dedicated pedestrian-only period.

The final proposal has to do with an underground tunnel. Having in focus the minimization of the high values of noise and air pollution. Tunnels itself take less surface space and have a great potential to relocate the whole transportation network below. Using this type of approach, it would be very benecitial to people and the node itself, making people less affected to respiratory deseases and the node to be able to function harmonically.

Traffic junctions are known to be extremely complicated places, and when an intervention is made, such as underground tunnels, a slot-based system may be able to handle the difficulties that are visible on the surface. This method shifts the focus from traffic flow to individual vehicles.

This method (scheme), like the underground tunnel, would drastically minimize the amount of pollution generated by waiting cars while also making surface-level traffic easier. Also, streets should be bent such that they intersect at as close to a straight angle as feasible to offer users with clarity.

Adding turn lanes to the street by recessing the center median. In the junction, turn lanes allow protected turns across oncoming traffic.

6.2 Recommendations for future research

The weaknesses and limits of each of the three tools and approaches established in the research study have led to the following recommendations for further work.

- Extending the scope of methodology by considering other case studies and using different programs such as Qgis.
- Collect quantitative and qualitative data about each of the feature types of ways to analyze a node.

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APPENDIX

First Questionnaire (online questionnaire)

1. **How old are you?**

2. **Do you know what noise pollution is?**
   a) Yes b) No

3. **What places would you find a lot of noise pollution?**
   a) 21 dhjetori
   b) Sheshi Nene Tereza
   c) Sheshi Zogu I Zi
   d) 9 Kateshet
   e) Sheshi Skenderbej

4. **How many times a day do you visit this zone?**
a) Once a day
b) Twice a day
c) Three times a day

5. **At what time during the day do you find these noises more concerning?**
   a) morning b) afternoon c) evening

6. **What do you think are the main causes of air/noise pollution in your city?**
a) Construction
b) Industrial sources
c) Motor vehicles
d) Population growth

e) Waste disposal

f) Burning of Waste

7. To what extent is the air/noise pollution affecting you?

a) Very much affected b) Affected a little c) Not affected at all

8. Which of the following do you think affect you the most?

a) Air pollution

b) Sound pollution

c) Noise pollution

d) Water pollution

e) Soil pollution

9. In which of the following ways are you affected?

a) Breathlessness/having more difficulty in breathing

b) Doing more to stay healthy

c) Feeling depressed

d) Irritation to eyes/nose/throat

e) Asthma incidences

f) Worrying about the living environment for children

10. What solutions do you suggest to be made for noise pollution?

a) Avoid very noisy leisure activities

b) Opt for alternatives means of transport

c) Do your housework at recommended times

d) Insulate homes with noise-absorbing materials

11. What solutions do you suggest to be made for air pollution?

a) Use public transportation, bike, or walk whenever possible

a) Drive less

b) Recycle paper, plastic, metals and organic materials
c) Plant trees. Trees filter the air and provide shade that can reduce cooling costs

On site questionnaire (21 Dhjetori Node)

1- How old are you?

a) 18-25 b) 25-35 c) 40 – 45 d) 50- 55

2- To what extent is the air/noise pollution affecting you?

a) Very much affected b) Affected a little c) Not affected at all

3- Which of the following do you think are more prominent on this node?

a) Air pollution

b) Sound pollution

c) Noise pollution

d) Water pollution

e) Soil pollution

4- In which of the following ways does this node's pollution affect you?

a) Breathlessness/having more difficulty in breathing

b) Doing more to stay healthy

c) Feeling depressed

d) Irritation to eyes/nose/throat

e) Asthma incidences

f) Worrying about the living environment for children

5- What time of the day do you find yourself accessing this area?

a) Morning b) afternoon c) Evening

6- How many times do you visit this area?

a) Daily b) only on weekends c) monthly

7- How do you access this area?

a) Walking b) driving c) cycling

8- What activity relation do you have with this area?

a) Inhabitant b) pedestrian c) worker

9- Does this area feel safe?

a) Yes b) No

10- If not, what do you propose to make this area safe?

a) Decelerators for speed reducers b) Bollard c) Bike Lane separators

d) shelters

11- Do people have a choice of places to sit, either in the sun or shade?

a) Yes b) No

b) Are there enough accessible spaces for all (Wheel Chair Users, hearing impairment, visually impaired, people)?

a) Yes b) No

b) Do vehicles dominate pedestrian use of the space, or prevent them from easily getting to the space? What do you suggest to minimize this problem?

a) Maximizing the walking area

b) Restricting motor vehicles movements & re-allocating space

c) Reducing speed and volumes

c) Does the place make a good first impression? If not, what do you suggest?

a) Walking spaces b) Seating area c) bike lanes d) parklets

Surname, Name (first letter only)	Tittle of the thesis	2018