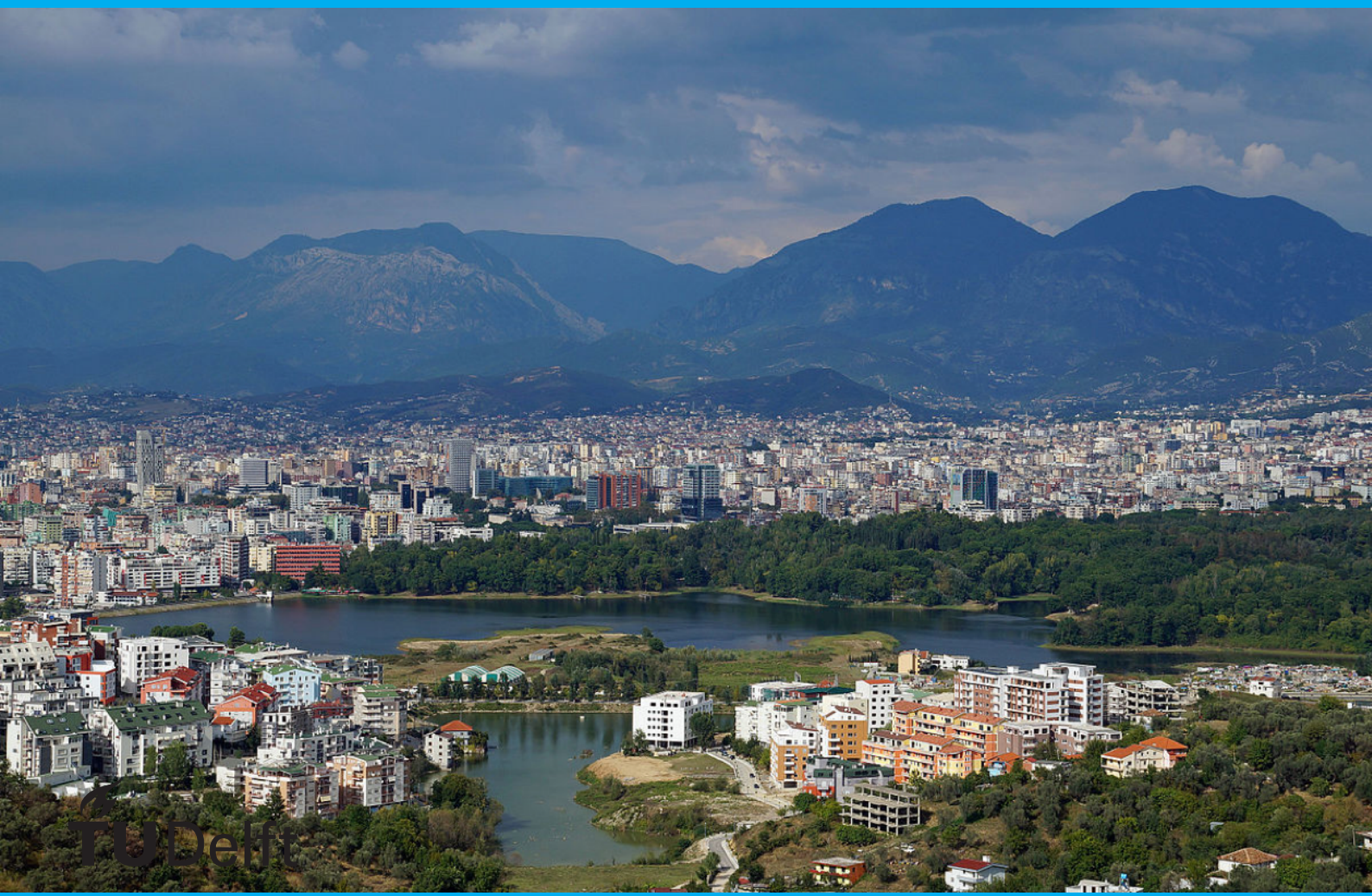
Tirana

policy guidelines

Workshop Group 2



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by

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Contents

1 Introduction

"The Ministry of Interior said that all authorities – civil defence, emergency services, police and military – are working to manage the situation on the ground and require the understanding of the citizens and their cooperation."

"100 people were rescued from a flooded shopping centre in Kashar, Tirana County".

"More heavy rain and thunderstorms are forecast for Albania over the coming days and the country's Ministry of Interior has called on people to avoid unnecessary travel and to heed all flood warnings." (Davies, R., 2017)

Floods are common in Tirana. Experts state that last years flood of 2017 was even as bad as the worst flood years in Tirana's history. Although floods are a known part of Tirana's history, there is still an ongoing debate on how to cope with the floods and how to prevent them. It is important to not only seek for an appropriate vision and conforming solutions, but to also emphasize on the feasibility and viability of these solutions.

This paper aims to provide a vision and solutions to overcome Tirana's flood-, design-, environmental- and transport problems. A focus has been putted on three specific areas, which have been specified below.

- Location 1. Urban area (Teodor Keto Street)
  Teodor Keto Street is 4.2 km away from center of Tirana, but still very urban. The area has not changed a lot since 2005. The street contains many small private business and restaurants/cafés, multifunctional buildings and 2-3 floors private houses.
- Location 2. Industrial area (7 Nentori Street - Pavarsia Street)
  The industrial area is 5 km away from the center of Tirana and is not densely populated and highly urbanised. There are mostly industrial companies operating such as .... There is still a lot of open space.
- Location 3. Suburb area (Lunxheri Street)
  Lunxheri street is a suburban area 9.4 km away from the center of Tirana. The area has a growing population.

This paper will focus on policy guidelines that can be used to improve the city. First of all, an overview of existing theories on flood vulnerability in cities has been given in the Theory Overview in chapter 2. The objectives to achieve have been presented in the Vision in chapter 4. The three areas need a different approach due to their different characteristics. The solutions for each area have been described in the Spatial Strategy in chapter 5. The flyer on the front page of this paper gives an overview and the conclusion could be found in chapter 6.

2

Problems

2.1. Flood vulnerability of cities

Vulnerability is a widely used definition in studies on natural hazards and risks and has been defined in multiple ways in science. It could be framed as the sensitivity of a system to the exposure to stresses, disturbances and shocks and the degree to which a system is susceptible to adverse effects. (White, 1974) Vulnerability is also often defined as the degree to which a system or unit is likely to experience harm from perturbations or stress. (Schiller *et al.*, 2001) The concept can be approached from several (scientific) perspectives, e.g. social and political dimensions. (De Graaf, 2008) De Graaf (2008) states that vulnerability of regions and communities exists out of four components:

1. Threshold capacity
2. Coping capacity
3. Recovery capacity
4. Adaptive capacity

In flood risk management, the threshold capacity is the ability of a society to prevent damage of floods. An example of a measure to increase the threshold capacity is building dikes and locks. The coping capacity is the ability of a society to reduce damage in case of floods. Examples of a coping measures are an alarm system and creating risk awareness among citizens. The technical, social, institutional and technical abilities and responsibilities of a society determines the ability to build, operate and maintain threshold capacity and coping capacity.

Recovery capacity refers to the ability of a society to recover to at least the same state as before the flood. Recovery capacity largely depends on the economic capacity of a society to finance reconstruction. It is again important to determine who is responsible for flood damage compensations.

Adaptive capacity is the ability to anticipate on floods by coping with uncertain future developments. The aim of adaptive measures in cities is to create a robust living and working environment. Financial and spatial reservations are necessary to create a higher adaptive capacity. It is often hard to determine who is responsible for increasing the adaptive capacity (De Graaf, 2008).

This components should all be taken into account when designing an urban master plan in which a designer aims to create a less vulnerable city for flooding.

2.2. Flood Risk Definitions

Flood risk is defined by Kron (2002) as: Risk = Hazard x Exposure x Vulnerability, see figure 2.1. This equation leads to a monetary value as an indication for flood risk, usually expressed as the Expected Annual Damage (EAD). Hazard is defined as the probability of the occurrence of an event that leads to damage and losses to infrastructure and property. Exposure is an indication of the presence of infrastructure, property and other resources in a flood prone area. Although people could be included in the exposure factor, loss of life is

usually not considered when flood risk is expressed in a monetary value. Last the vulnerability expresses to what extent the exposed resources are affected by a flooding event. A common method is to use depth-damage-functions which indicate which percentage of the maximum possible damage occurs as a function of the inundation depth. (Field *et al.*, 2012; Kron, 2002; Merz *et al.*, 2010; Nootenboom, 2015)

Figure 2.1: Flood risk definition (Nootenboom, 2015)

2.3. Damage Categories

Damage can be divided in direct and indirect damage. Direct damage is the result of direct physical contact with the flooding event itself. Indirect damages are other damages caused by flooding, but mostly after the event or outside the flood prone area. A second subdivision can be made between tangible and intangible damages. The tangible damages are possible to express in an exact monetary value. Intangible damages are more difficult to describe such as loss of life or trauma. (Merz *et al.*, 2010)

Table 2.1: Damage examples (Merz *et al.*, 2010)

Direct, tangible	damage to buildings, infrastructure, livestock
Direct, intangible	loss of life, negative effect on ecosystem
Indirect, tangible	induced production losses outside flooded area
Indirect, intangible	trauma

3

Theory Overview

Albania has a lot of potential, however due to the history of the country, the development is a challenging process. At this moment, the EU membership plays a big role in the decisions the government has to make to improve the city and country. But to do that, the problems have to be clear. In this chapter, the problems will be described. After analysing the problems, the following groups are made, as can be seen in figure 3.1:

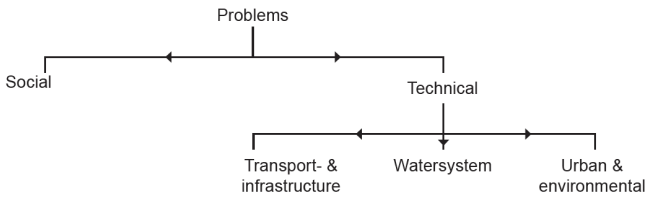


Figure 3.1: Problem overview

3.1. Technical; water system problems

3.1.1. Obstructed river flow (due to construction, garbage, sediments etc.)

In the entire water system, urban and industrial waste water is transported directly into the Lana river which causes high pollutant loads. Not only the chemical composition of the water is affected, but there is also a social impact. Because the river is not very attractive and there is no added value for local residents, there is no incentive to treat the river better. Current practices, such as using the river for other household material waste disposal, keep taking place. As a result there are odour problems along the entire Lana river. The pollutant load also heavily affect the possibilities for flora and fauna to establish itself along and in the river.

Another negative effect of using the river for urban waste disposal is the increasing amount of sediment and garbage aggregation. During higher discharges the water flow is obstructed and the water level rises. In addition the river banks are poorly maintained outside the city center. The increase in friction is an ongoing process in the current situation.

Furthermore several bridges are constructed that cross the Lana river. From visual inspection it can be seen that water levels rise above the height of these bridges (figure 3.2). During peak flows the bridges therefore obstruct the river flow and can create backwater curves, leading to even higher flood inundation depths further upstream.

Figure 3.2: Garbage on bridge after flooding event

3.1.2. Sewage system

Although plans are made for the construction of a wastewater treatment plant (WWTP), currently all urban and industrial waste water is transported untreated to the river. Investment cost for the renewal of the sewer system with connections to a WWTP are very high. In Albania residents have an average GDP of 13,270 US dollar (IMF, 2018), which means that there is little priority from the residents for higher sewer operation costs. This creates a vicious circle between the problems in the river and the origin of these problems. Methods with lower investment cost have to be found in order to increase the water quality of the Lana river.

3.1.3. High vulnerability of residential housing

Since the fall of communism people have developed houses in places that are vulnerable to flooding because no regulations were in place. Several buildings are built very close to the river, others are in the inundation area. Because these inundation depths have increased due to the bad state of the river and climate change, more houses could be affected. In addition there is little “flood knowledge” available in the area. In flood prone areas that have been developed for hundred of years, people have adapted to the river flow and regime. Specific local knowledge and measures are often present to prevent damages.

In the research area the residential development is relatively new due to the rapid growing urbanization. When damages occur, one of the reactions of inhabitants is to seek for help at or blame the governmental institutions. However, also from their perspective little knowledge about flooding scenarios is available. A lack of clear regulations of building locations and requirements increases the vulnerability. Thereby it is unclear which responsibilities the government and the residents have to take.

3.2. Technical; transport and infrastructure problems

3.2.1. Problems private infrastructure

In 1991, communism was falling, but the effects of communism are still noticeable. One of those effects is the love for the private cars and residents keep driving their car even when the city is getting more and more polluted. In 2004 there were 300.000 cars only in the small capital city which most of them are Diesel-cars. Eljo Kamberaj, an Ecovolis activist, said: “People are getting more aggressive towards the car, because the car for them is a status symbol, of fashion, of wealth”. However, they don’t realize that these cars have the effect of 10 times the limit PM10s, airborne, cancer-causing particles, of the World Health Organisation limit.

In 2014 there were 600.000 residents in Tirana which means that one in two residents (including children) owned a car. On top of this the corrupt manufacturing of cars causes much more pollution than the ‘normal’ car. According to World health organisation, the pm10 level is three times higher than European average. Ened Mato, Ecovolis activist, said: “ people are using cars badly. They’re using cars to have a coffee with their friends, they’re using cars to go shopping for fruit. We’re worried they’re using their cars to drive to public toilets .. We are not against using cars, but for using them correctly”.

Figure 3.3: Obstructed biking lane

The effects of all residents driving their car is traffic jam during peak hours. Each morning and afternoon the city is filled with cars and the cycle lanes, an implemented project to tackle the air pollution, are clogged with cars with effect that it is unsafe to cycle (figure 3.3). In 2014 there were 20.000 cyclist in the city, which is 3% of the population. Ecovolis is a bicycle-sharing project that has multiple stations around the city and thousands subscriptions have been sold. However, cars are still blocking the way to cycle safely. Enno Bozdo, mayor of Tirana until 2015, launched several eco-projects included extra bus services, planting trees and stated that he is a big fan of cycling himself, but old habits die hard. “People love their cars”.

Another non-motorized mode of transportation is widely developed. 30% of all trips in Tirana are by foot, according to URPTM. However, the facilities for pedestrians are poor (e.g. no safe and holes in sidewalks, lack of crosswalks) which makes the chances of accidents high. (Seitllari and Luga, 2016)

3.2.2. Problems public transport

The bus transport in Tirana is privatized and there are six private companies that manages the market: Alba Trans, Ferlut, Tirana Urban Trans LTD, Tirana Lines ltd, Shega Trans and Tirana travels. (Vora, ????) Together they cover ten lines that are organized in a radial system from the suburbs to the city centre. The city lines itself manage 43.000 passengers per day and the circular lines along the middle ring 54.000 passengers per day. (Seitllari and Luga, 2016) Public transport covers a total length of 115,5 km and they transport 73 million passengers per year, see figure 3.4. (Vora, ????)

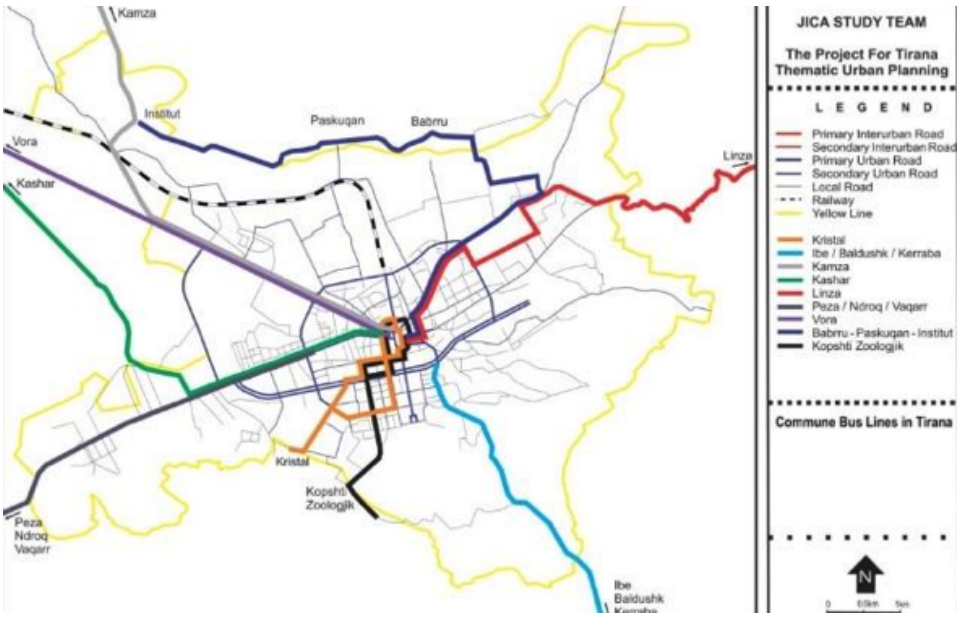


Figure 3.4: City bus line in Tirana (Seitllari, Luga. 2016)

Even with an privatized public transport system, inhabitants are not a big fan of the bus. Because of unregulated and inadequate infrastructure (e.g. signals), buses are often not on time and can't be reliable. There are 9 extra commune bus lines in Tirana but not all (suburban) areas are easy to reach by public transport (figure 3.5). (Seitllari, Luga. 2016)

Besides the buses there is no other public transport mode that can transport people within the city. Because of this, public transport makes the congestion heavier and PT is the main factor of traffic congestion. (Seitllari and Luga, 2016)

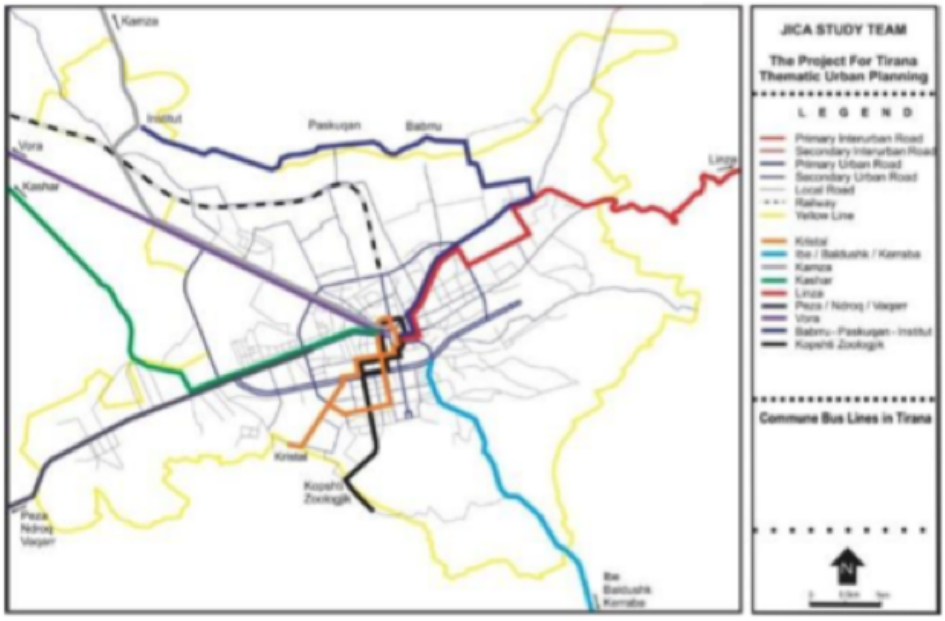


Figure 3.5: Commune bus line in Tirana (Seitllari and Luga, 2016)

The bus has no head terminal in Tirana, a non-fixed service frequency, overlapping bus lines and illegal transportation of passengers. This makes a chaotic situation and causes traffic jam and waiting time. Because of the lack of a head station, buses park on random parking spots even though there is already a scarcity of parking spots.

The slow economy of Tirana and Albania causes the slow implementation of the tram that will link across town. Until now, the bus is the only public transport mode.

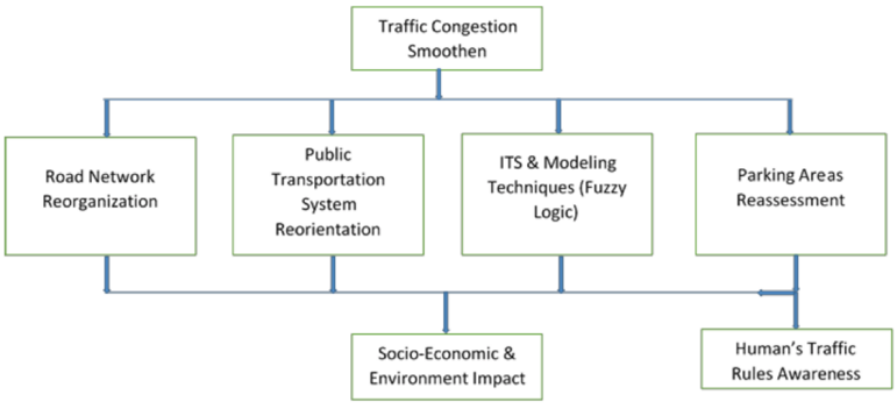


Figure 3.6: Study framework

3.2.3. Technical; urban design problems

Before the 1990s there were 225.000 inhabitants in the compact city and 3.2 million lived in rural areas. But after the communist government collapsed and property was being privatized, people started to move to the

city. In 1991 private property laws were approved. After 1992 a construction boom started in Tirana as a result of releasing land and business buildings to individuals, national land was registered and a mapping program was initiated. Besides that, also large numbers of auto mobiles were imported in the country and the city grew to 600.000 inhabitants; city size increased fivefold.

Because of this the city became pressured with cars and inhabitants and as a result the periphery began to grow in population. Shops and restaurants all moved to the suburban areas because of the cheap rent and temporary structures that were later changed to permanent buildings. However, because of the fast transformation there was lack of urban planning and public spaces where not the most important.

To provide every inhabitant with a house was high priority for the government and the they were not prepared for the administrative tasks of dealing with the land claims. As a result land recipients on the North and West of Albania are observed illegally selling assigned parcels to new migrants and urban speculators seeking buildings sites. This all happened without public planning, street layout or infrastructure investment and water and electricity are often stolen from public grid through illegal taps. And because even now there are no guidelines to draw streets and lot lines, it's hard to solve the problem. Because the lack of administration of parcels and illegal houses there is a lack of public space and greenery is unmanaged. (Felstehauser, 1999) Despite being flanked by mountains and a beautiful coastline Tirana has one of the lowest amounts of green space of any major European city. (Williams, S., 2014)

Table 3.1: City population data (Felstehauser, 1999)

Tirana city population, 1990-98	
Population in 1990 (under central planning)	225,000
Population in 1994 (estimate)	325,000
Population of total metropolitan area in 1995 (estimate)	425,000
Population of total metropolitan area in 1998 (estimate)	550,000
Rate of population growth of metropolitan area, 1995-1998 (approx)	9% per year
Average number of new housing units required per year, 1995-1998	10,000

3.2.4. Social- and environmental problems

The rapid urbanization had not only effect on transport and urban design but also on the social development and the environment.

The amount of municipal solid waste (MSW) in Tirana is increasing and in 2008 there was 762,353 ton waste. Compared to 2003 there was 571,218 tons of waste which is an increase of 33,5%. (Ministry of Environment and Administration., 2010) This percentage is higher than the increasing population which means that the consumption of goods is growing.

Integrated management systems of MSW are normally applied in developed countries like the Netherlands but with regard of management of MSW the only method of MSW treatment is dumping it in open dumps all over the country. This is considered as one of the main causes of pollution.

There are six contracted collectors and transportation companies in Tirana but there is a residential refuse. Individual households refuse to place waste in containers. There is a lack of realisation under inhabitants what the effect of throwing waste in the water is. (Alcani *et al.*, 2010)

3.2.5. Conclusion

The collapse of the communist government was a first step to a better future but the effects are still noticeable. The rapid urbanisation has taken care of water management-, transportation-, urban design-, social- and environmental problems. With poor inhabitants that have their priority on housing, food and work they don't think about environmental issues. Looking at the government there is still a lot of improvement needed for a better future. Administrative orderliness, dealing with illegal housing, a working water system and an improved transport system could be improved.

4

Vision

To ensure that a plan for Tirana is clear to all stakeholders, a general vision for the city is provided. If a general direction is given people have a tendency to follow and participate more in the proposed solutions.

A core value is that proposed solutions and interventions have to be durable and preferably nature based. In addition it is important that inhabitants experience a strong connection with their direct surroundings and the city, thereby increasing the sense of responsibility among them. In the long term this will lead to self sustainable solutions and behaviour

With this core values measures are recognizable and uniform. For every solution strategy a division can be made between short-term and long-term. The short-term solutions are top-down and enforced by government institutions. They are meant to break the cycle and show the potential of the city. By doing so people are confronted with new possibilities and build confidence in the new approach.

The long-term solutions not only aim on physical interventions, but also try to make a change in the behaviour of the inhabitants. Technical and spatial interventions can only be durable if the next generations are willingly to change. Therefore projects that involve children are important. They are key to the durability of the Tirana of the future.

5

Spatial Strategy

With the potentials of Tirana and the master plan of 2030, the spatial strategy of the second area is designed after looking at the problems and forming a vision. The different subproblems are solved in an interdisciplinary way that will be given in this chapter however for the overview the solutions are given per subproblem. At the end of this chapter the interdisciplinary overview will be given.

In the second area there are two important aspects designed in the master plan of 2030. First of all the intermodal station where freight can be transferred from train to truck and vice versa. Second aspect is the "Bosco Orbitale", where three millions of new trees will be planted as a green wall around the city. The masterplan is part of this spatial strategy.

5.1. Water management solutions

In this section the specific water management solutions will be given. First the general solution for the whole area can be read followed with the more specific solutions.

General solution
As mentioned earlier the plans for a WWTP and renewal of the sewer system is an expensive measure. In the general vision for the river all river banks have to be reconstructed. It is proposed to combine this reconstruction with a new sewage pipe line. Current outer ends of sewage pipes will be connected to this pipe. By combining groundwork for both the river bank and the sewage pipe investment costs remain relatively low. As a first step the sewage will merely by transported away from the urban area and will join the Lana river again further downstream. While this doesn't change the water quality from a broader perspective, more local improvement is expected. By redirecting the core of urban waste water problems to a location further away from the urban area, a vicious circle can be broken. As soon as the quality of the river increases, local residents have more incentive to keep the river clean. In a second step this newly constructed pipeline could be connected to a WWTP if financial circumstances are sufficient.

Specific solutions
In the industrial area waste collectors can be placed as a try-out measure. Several waste collectors are currently used in rivers worldwide. These collectors differ from advanced collectors for large rivers to simple grates that can be placed in small streams. Starting with a technical uncomplicated structure, a first impression of the waste collection possibilities can be obtained. Also a positive effect on the waste aggregation problems is expected. Challenges can be found in the operational aspects of the collector. The collected waste has to be removed by a continuous operating system to prevent blockage of the river flow. During high peak flows the system must be removed completely to increase flow capacities.Even if the feasibility of the system is low, more awareness is created by the active collection of waste.

At the industrial site flooding has occurred frequently. Along the industrial development the highway is located which is the main transport line between Durres and Tirana. Not only direct tangible damage is at risk at this location, also more indirect tangible damages due to economic losses have been reported. Local measures for the long term have to be taken to reduce flood risk in the area. On the opposite site of the river not

much of the area is developed. It consists mostly of grassland. At this location a flood inundation area can be constructed, which is specifically assigned to overflow during high peak flows. The system consist of multiple compartments and can be drained during lower discharges of the river. By creating room for the river at this location, water levels in the main stream of the river will be reduced.

In the peri-urban area the coverage of residential housing is much lower and thus the population density as well. Cost effective measures are dependent on the investment costs and the number of people that benefit from the intervention. In the peri-urban area top down measures from the government are by definition less efficient to reduce flood risk compared to a high density urban area. For the peri-urban area more individual measures are proposed. People are encouraged to build housing with low vulnerability. Creating awareness about flood levels is essential. Finally local residents have to be warned in time to initiate there private measures accordingly. A flood risk warning system operated by the government is needed to provide the residents with essential information.

5.2. Transport and infrastructure

With this in mind, the infrastructure was designed. Ecovolis should be more workable when there are safe bicycle lanes. A bike lane route along the Lana River connects the city center with the rural areas. Besides that the route is safe, it should also be an experience on it's own. When residents want to drink coffee with a friend or go shopping for fruit, it's should be easier, shorter to drive (especially during peak hours) and more fun to use the bicycle instead of the taking the car.

However, the car network should be improved as well. The roadway network will be improved by adding roads so the system becomes radial. The capital costs of a radial network are relatively low, travel times and link road are low and the centrality is high. As a long term solution, the radial network can be extended in the future by adding a circular road system (Bolt archetypes networks). An overview of the networks can be seen in figure 5.1 and table 5.1.

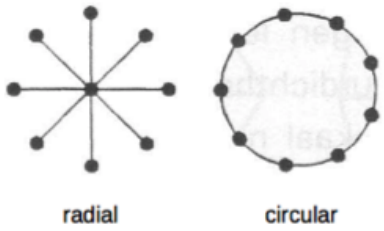


Figure 5.1: Radial vs Circular

Table 5.1: Characteristics network systems

	Radial	Circular	Radial + Circular
Capital costs	Very low	Very low	Very low
Travel times	Low	Medium	Low
Link load	Low	High	Low
Centrality	High	Very low	Medium

On this radial road network there are priority lanes. This means that buses have their own lanes. The bus network, also working in radial network, has been designed in such a way that people have a maximum walk of 15 minutes to the bus stops. An real-time travel information system and frequent scheduled buses are implemented to make this system work. An impression and overview are given in figures 5.2 and 5.3.

The bus is also connected at the inter-modal stop. Especially employees of the factories can use this stop to go to their work. At this inter-modal stop, the train system is already designed in the master plan of 2030. There are normal stops, industrial stops and inter-modal stops designed. Residents from other cities can reach Tirana on an easy way by using the train.

With this solution, the urban area, industrial area and the suburb area are connected with each other with private and public transport.

Figure 5.2: Impression

Figure 5.3: Public transport network design

5.3. Urban design

With the lack of public space in the neighbourhood it's not pleasant to walk around in the neighbourhood or talk with neighbours. By designing a more pleasant public area around the Lana River it should be more attractive to enjoy the neighbourhood. A park will be constructed to reach this goal. This park can be used as leisure for people who live around the river but also by inhabitants who live in the city center and want to get out of the loud noises and busy crowds.

Besides the implementation of the park the quality of general public space like streets should be improved. Streets should be more accessible to walk, and with the lack of integrated management system of MSW a lot of waste is on the streets that should be removed. The greenery on the public space should be maintained. This also has a positive effect on the job creation and is a start for solving the inequality in Tirana.

To encourage walking instead of taking the car, areas should be designed on a smaller level with a diversity of uses. Instead of taking the car to get coffee in the city, people can walk to the neighbourhood coffee café for example.

One last option to make the neighbourhood more attractive is implementing pocket parks in the city. Pocket parks can be designed on 'forgotten places' like old parking lots, under bridges etcetera.

5.4. Social and environmental

Even when a plan is implemented by the government to remove waste from streets by contracted companies, the problem is still not solved if inhabitants keep dumping it in public areas like streets and rivers. That's why there should be created an awareness among the inhabitants what the effects are of throwing waste in rivers and on streets. Because of the different generations and their ways of thinking and how to reach them, they are divided into three groups:

1. Children: will be education with a specialised program on how to deal with waste.
2. Adults: flyers, mail and other advertisement, neighbourhood meetings.
3. Elderly: neighbourhood meetings.

Besides that there can be cooperation projects along neighbours to deal with waste or a credit system can be implemented. However, more research should be done before deciding how to deal with this problem.

5.5. Interdisciplinary overview

In this chapter the interdisciplinary overview will be given where subsolutions all come together. First looking at the Lana river where a watermanagement-, transport-, urban design- and social solutions. In this part of the area the water will have more room so the risk of flood will be reduced. However, the area that is created will also make place for cycling roads along the river and public area where people can meet and enjoy the greenery. This will be a place for inhabitants to experience on it's own. An impression is shown in figure 5.4

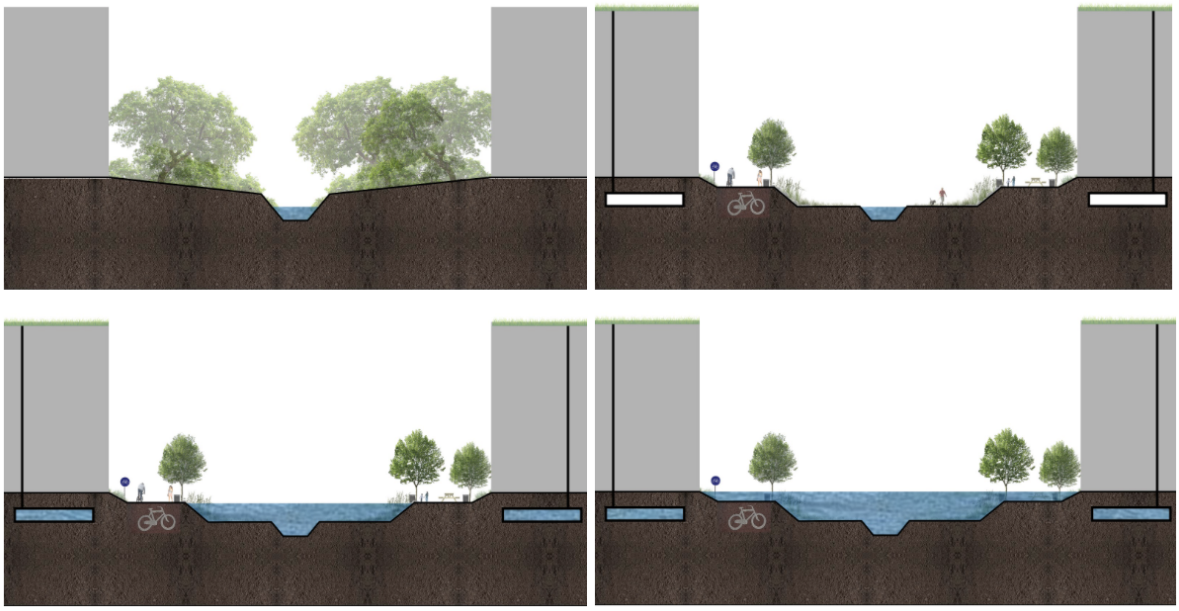


Figure 5.4: Cross section impression

The public transport network will be expand and improved so people have a maximum walk of 15 minutes to the bus stops. This makes it easier to use PT instead of taking the car which decreases the emissions. Besides that the city will be more liveable for people to walk or cycle because of the decrease of congestion and the total travel time of inhabitants will be decreased so they can focus more on other things.

Implementing an integrated management system of MSW can make the city more liveable as well because public areas will be more clean, there will be less pollution and the flood risk will be decreased. However, this won't tackle the problem of waste and the problem should be tackled at the beginning of the loop system. On the social side it is important to make people aware of the effect of dumping waste in the public area instead of a bin.

6

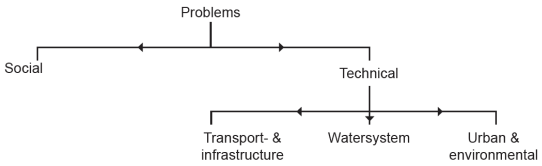
Conclusion

Working on this interdisciplinary project showed how integrated and complex the city is. Implementing a technical solution like improving the water system can be the first step to a better future but is not going to show the full advances when the social part of this problem is not improved. In this case when inhabitants keep throwing waste in the water and on the streets.

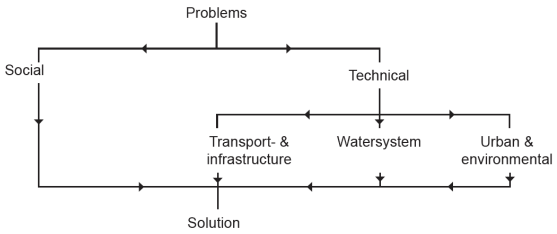
Even when the problems are divided into subcategories as shown in diagram x. the solutions of the problems can't follow this division. Each solution should touch at least one technical aspect and the social aspect.

The technical solution part can be implemented by the government. Examples of these are improving the public transport network, improving the urban areas and improving the water system. This way another option for inhabitants will be provided. These technical solutions will only work with a social solution. For example breaking habits like using public transportation instead of taking the car, using urban areas in the right way and not throwing waste in the water anymore

When the government will follow this advice the chance of success of the solutions that are given in this report will be increased.



(a) First problem overview



(b) Final problem overview

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