

# Mapping the Urban Changes Using GIS Technology Case Study-Tirana City, Capital of Albania

Msc. Marpol KOÇO<sup>1</sup>, Dr. Edmond HOXHA<sup>2</sup>, Ardit Balla<sup>3</sup>

<sup>1</sup>General Directory of Planning and Development Territory Tirana Municipality, Albania  
Email: [marpol.koco\[at\]tirana.al](mailto:marpol.koco[at]tirana.al)

Associate Professor, Polytechnic University of Tirana. Faculty of Geology and Mine, Department of Mineral Resources  
E-mail: [ehoxha63\[at\]gmail.com](mailto:ehoxha63[at]gmail.com); ORCID: 0000-0003-4049-0705

E-mail: [ballaardit2017\[at\]gmail.com](mailto:ballaardit2017[at]gmail.com)

Note: All the authors have contributed equally in this paper, and they share together the Co-First Authorship

**Abstrac:** Tirana is the capital city of Albania. During the years different government has apply different Urban Plans what bring many changes on the city, some of them with positive and negative impact on the city development and in environment. The purpose of this paper is to map the Urban Changes and their impact on environment over the years. The mapping and analyzing process is done using GIS technology. The methodology used is the comparison of the actual situation of the city with that before over the years through existing maps and satellite images. To realize these objectives the following steps have been taken: Urban Plans and satellite imagery analyzing; Identification of changed areas on the ground, etc. The result of this paper is the GIS maps of Urban Changes in Tirana over the year and the impact on the environment. The paper closes with conclusions and recommendations for the future.

**Keywords:** Tirana, Albania, Mapping, Urban Changes, GIS

## 1. Introduction

Tirana is the Capital of Albania, and the largest urbanized area in the country. The city has a favorable regional geographical position. It is located 40 km from the sea and near Mount Dajti. To the west of Tirana is the port of Durres, the largest in Albania. To the north is the historic city of Kruja, with the castle and museum of Gjergj Kastriot, while 25 km northwest of the city, in Rinas is the airport "Mother Teresa" (Fig.1). The territory of Tirana extends

within a radius of 25 km, but most of the built-up areas are within 10 km from the city center. The Municipality of Tirana has a total population of 828, 000 inhabitants (2018) of which more than 750, 000 live in the administrative units of Tirana, Kashar, Dajt and Farka. Within the main travel area of the metropolis, which also includes the urbanized territory of Kamza (but excludes low-density and remote settlements), the population exceeds 900, 000 inhabitants, according to an approximate estimate.

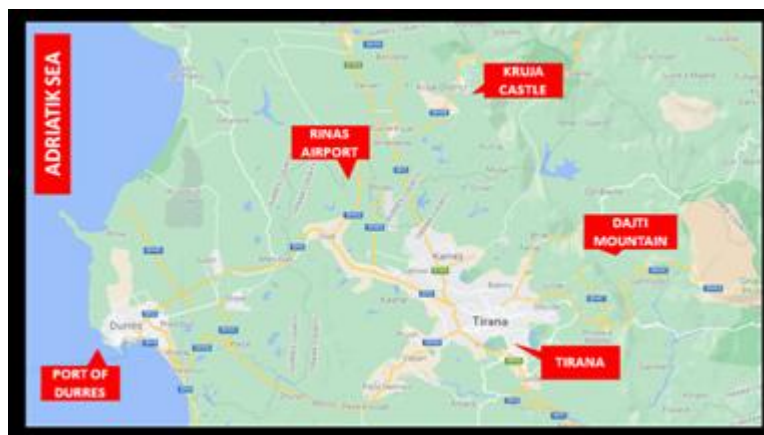


Figure 1: Geographical position of Tirana City Capital of Albania [Source: Google Maps]

## 2. Material and Methods

According of Census 2011, the population of Albania was 2, 800, 138 inhabitants. In the district of Tirana live 763, 634 citizens, which constitute about 29.96% of the population of

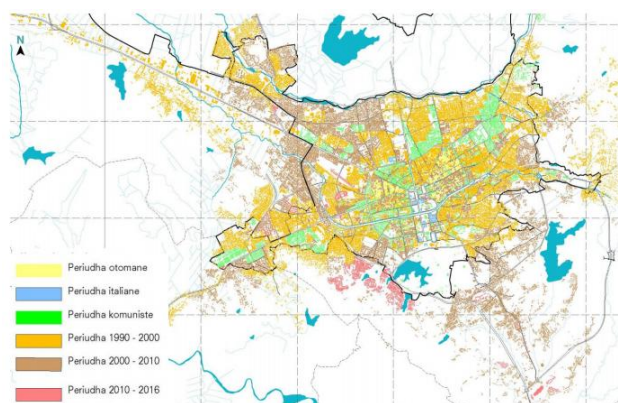
the country<sup>1</sup>. In 2020, according to the General Directorate of Civil Status, the Municipality of Tirana is composed of 24 administrative units, with a total area of 1, 111 km<sup>2</sup>,

<sup>1</sup> INSTAT, *Population and Housing Census in Albania*, 2011, p.17

population of 850, 530 inhabitants and a density of 766 inhabitants / km<sup>2</sup>. Tirana is the economic center of Albania and about 40% of foreign capital has been invested here. The capital is the main educational, research, artistic, cultural, and social and sports center.

On February 11, 1920 at the Congress of Lushnja, Tirana was decided to become the temporary Capital of Albania. It received its final status as Capital on January 31, 1925. During this period Tirana had 7, 000 inhabitants and an area of 3 km<sup>2</sup>. The first twenty years it confirmed the expansion of urban settlement, with a peak of industrial urbanization in the 1950s. After the Second World War, the communist regime took power in Albania, which exercised very centralized control over the environment and construction. The Tirana Regulatory Plan was redesigned in 1957, but constraints on public resources prevented the full achievement of ambitious planning visions, leading to fragmented and messy projects in practice, many of which remained unfinished. Despite strict controls, the capital and population of the capital increased significantly during communism. By the end of the 1980s, the urbanized area of Tirana covered 12 km<sup>2</sup> and its population had grown to almost 300, 000.

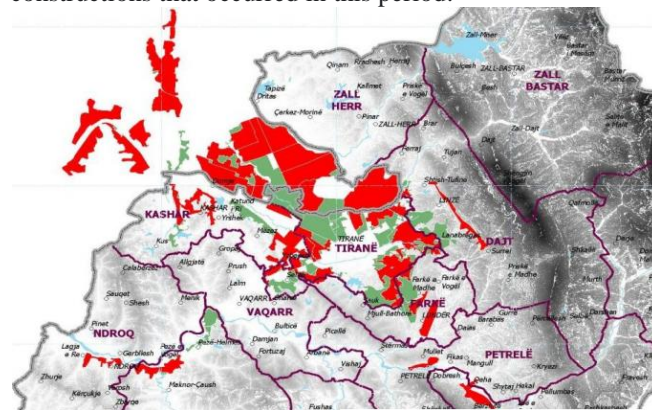
The end of the communist regime in 1990 led to drastic economic, social and physical transformations. Land management strategies varied significantly, from severely limited urban growth to extensive urbanization with large parts of unregulated land development. This is why, during the last decades, Tirana had a construction boom and has undergone a rapid and unregulated process of urban development. The city's footprint is now over three times the size it was in 1957. In addition to expanding its urban footprint, Tirana has also experienced rapid population growth since the 1991 reforms. Before the 1990s Tirana was a compact city with approximately 225, 000 inhabitants, while with the economic and development boom the city grew to about 600, 000 inhabitants. This rapid expansion of the city was due to the migration of many families from the northern and southern regions. Figure 2 gives an overview of urban developments in different periods ranging from the Ottoman period to the present day.



**Figure 2:** Etaps of Urban development of Tirana [Source: General Local Plan of Tirana TR 030, 2016]

In contemporary Tirana, this trend has been accompanied by the appropriation of former public spaces. This transformation of the built environment in Tirana has

occurred within a very short period of time, leading to an extremely dense urban structure. The rapid growth and lack of proper legislation to control the development of the territory resulted in the expansion of informal settlements on the outskirts of the former city. The current government approach to these settlements has been the legalization process by investing in infrastructure through land capitalization and, thus, supporting rapid urbanization. As a result of economic densification and transformation, a dual city has been created. On the one hand, we have inner Tirana, a lively city, and on the other hand massive suburbs where commercial and social structures are almost non-existent. Figure 3 gives an overview of the illegal constructions that occurred in this period.



**Figure 3:** Urban Informality [Source: General Local Plan of Tirana TR 030, 2016]

The methodology used in this study, to identify urban change that has occurred over the years in the city of Tirana has been that of using GIS technology as a tool to map, compare and analyze urban change. To achieve this goal, satellite images of different time periods have been compared, enabling the identification of areas with changes, the calculation of changed areas, areas damaged by urban and environmental, etc.

### 3. Results

Based on the above methodology, the main areas of urban and environmental changes have been identified. The analysis was performed taking into account time periods of approximately 5 years (2002, 2010, 2015, and 2020). Due to the lack of images in earlier periods the comparison has started on 2002 thus comparing a 20 year period. In 2002 the area of the city was 1, 555 Ha. In this period there were many green areas which also served as parks for children's entertainment. (Fig.4). on this year the population density has increased by 2.37%, or 430, 407 inhabitants compared to previous years.

#### 3.1 Changing the surface of the city

In 2010 it is noticed that the living area of the city of Tirana has increased by 1926 Ha, from 1555 Ha that was in 2002, so we notice an increase of 371 Ha (Fig.4). The population this year has reached 763, 634 inhabitants. During these 10 years (2000-2010), Tirana has had a slow development both in terms of urbanization and economy. These were the first years when people started migrating from cities to the capital. The highest rates of population movement were

from 2001 to 2006. In the years 2007-2009 there is a decrease in the rate of movement. After 2009 there was stability in the movement of the population and their settlement in the district of Tirana. One of the reasons for the growth of the capital of Albania is the unplanned movement of the population, which in parallel was accompanied by legal and illegal constructions in the city and its surroundings. This phenomenon was not accompanied by the necessary planning for infrastructure development, which brought chaotic situation in Tirana and its surroundings. Population growth was not accompanied by an immediate increase in services, such as health, education or transportation, creating an initial chaotic situation. During the years 2000 to 2010, the first shopping centers were built, which also brought economic development through the creation of new jobs.

In 2020, the surface of the city of Tirana in 2021 has reached 5, 432 Ha, which means that it has almost doubled since 2015 (Fig.7). Many new residential areas have been developed in the territory of Tirana, which used to be green areas. Within the residential areas there are shops, offices, bars, restaurants, hotels, etc. With the development of the city we have the phenomenon of uniting Tirana with the Municipality of Kamza due to the construction of formal and informal facilities.

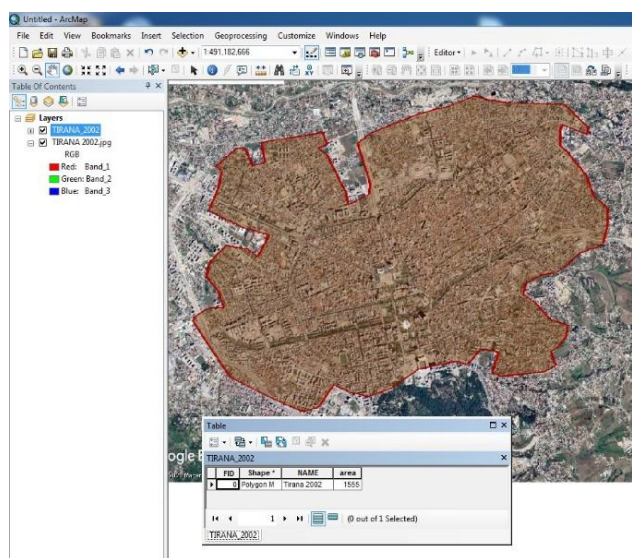


Figure 4: Tirana surface on 2002

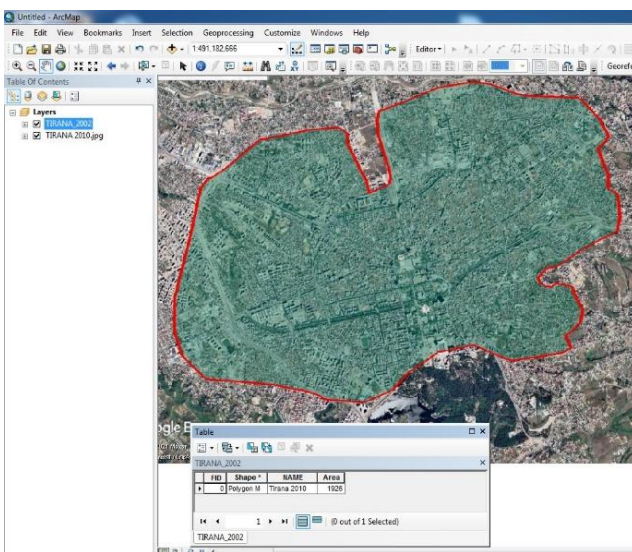


Figure 5: Tirana surface on 2010

In 2015, the surface of Tirana reached 3, 605 Ha. As can be seen in Figure 6 it is noticed that there has been a drastic change in this 5 year period from 2010 to 2015. The development of constructions has had a growth boom in these years because internal migration has had a significant increase.

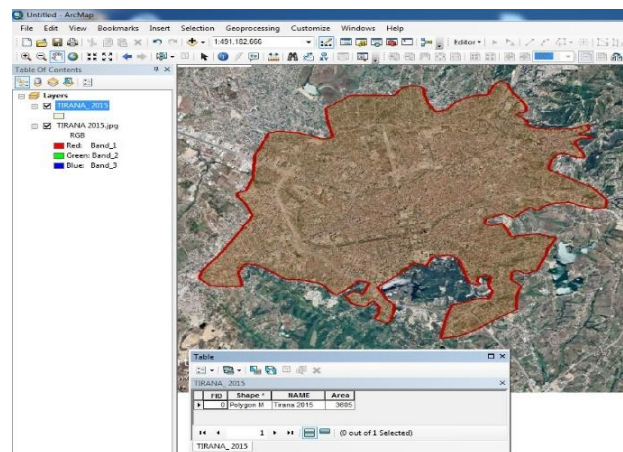


Figure 6: Tirana surface on 2015

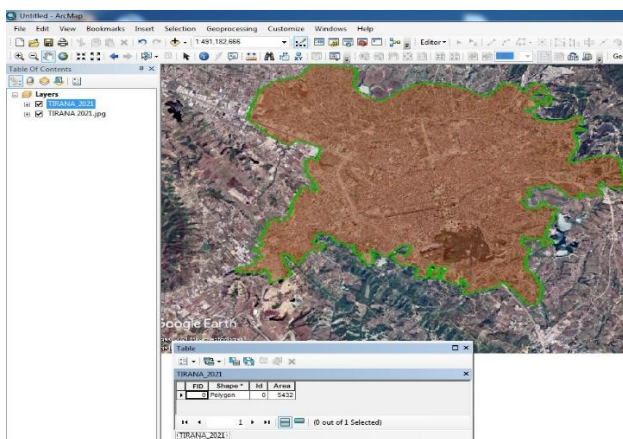


Figure 7: Tirana surface on 2020

Some characteristics of urban changes during these years are: *Sports facilities* have been reduced, due to the return of land to previous owners, privatizations, etc.; *The industrial areas* that once surrounded the city have now been relocated along the highway; *The green areas* that served as parks for children within the city have been reduced; *Exterior Ring Roads* have been built which have reduced traffic and developed peripheral areas; *Bicycle lanes* have been built within the city; *Tall buildings, Towers* have been added especially in the city center.

### 3.2. Changing green areas

Tirana is the capital of the country and has the highest population. For this reason urban greenery is a necessity to enable a better and healthier living. Below are some of the main areas which in the early 2000s served as parks, or just green areas, which have been the lungs of the city, but which due to unplanned and illegal construction, have either been reduced, or are disappeared altogether.

Area "21 Dhjetori": In Figures 8 and 9, is given a comparison of changes in green areas in the area called "21 Dhjetori" during the years 2002-2020. In 2002 we had a green space of 4 Ha which over the years has been greatly reduced due to residential buildings and multi-story services.

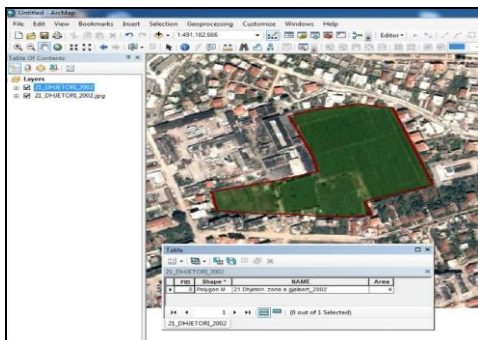


Figure 8: Area "21 Dhjetori" on 2002



Figure 9: Area "21 Dhjetori" on 2020

Great Park in Artificial Lake: In addition to the positive side of the development of this area which has already become much frequented, there is a drastic change of the green area. In 2002 there were 581 Ha of greenery, including the lake park and the Kodra e Diellit area. We currently have 454 Ha thus losing 127 Ha of green space (Fig.10.11).

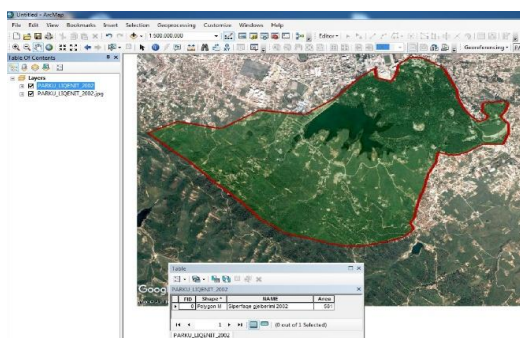


Figure 10: Great Park in Artificial Lake 2002

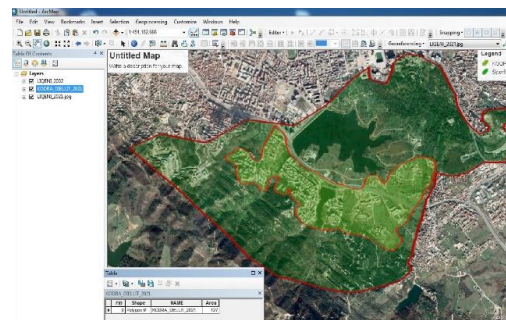


Figure 11: Great Park in Artificial Lake 2020

Park near Parliament: Figures 12 and 13 show the Parliament Park area. Here we had 4 Ha of green space. Currently this area has been halved due to the construction of Shopping Centers, Hotels and Mosques.



Figure 12 Park near Parliament, 2002



Figure 13: Park near Parliament, 2020

"Fresku" area: This area has had a significant development in recent years. In addition to the positive sides of this development, Figure 14 shows that in this area we had a land area of 45 Ha in 2002, while in 2020 we notice a drastic reduction of greenery due to the indiscriminate construction of residential buildings, which in addition to occupy many damaged areas in the area of Dajti National Park.



**Figure 14** Zona e Freskut, 2002 (on the left); 2020 (on the right)

**Area “Fusha e Aviacionit”:** At the ex-Aviation Field in 2002 we had 40 Ha of free and green space. In 2020 this

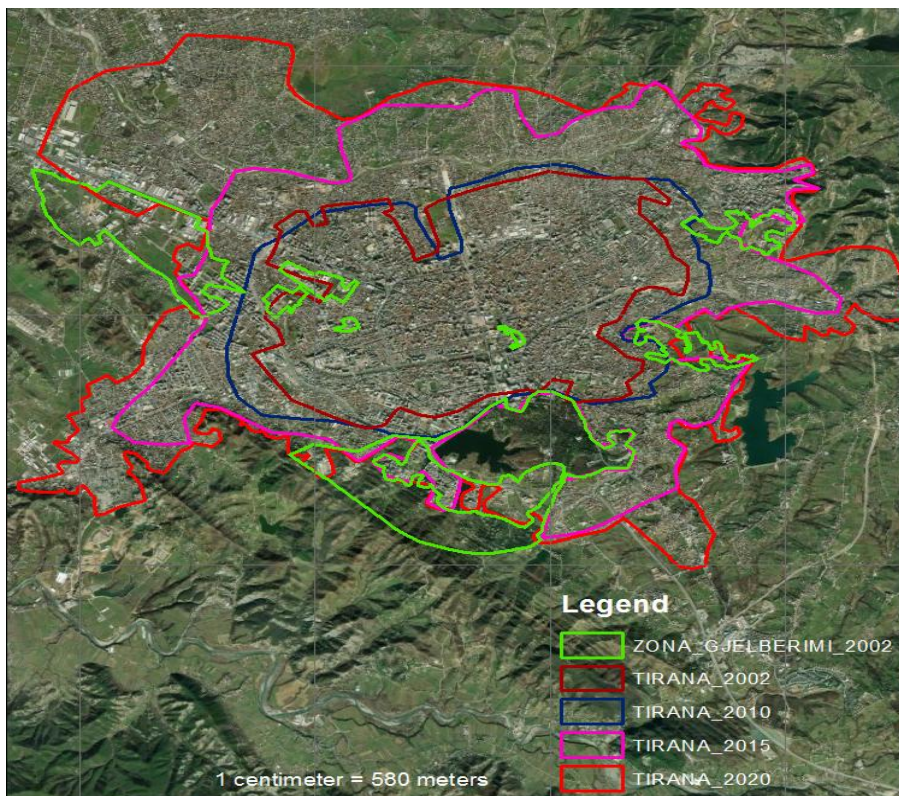
area has been turned into a construction site with various facilities (Figure 15)



**Figure 15:** Fusha e Aviacionit 2002 (left); 2020 (right)

In conclusion, from the analysis of all different areas of Tirana, from 2002 to 2020, we lost about 205 Ha of green area. Figure 16 presents the Final GIS Map of urban changes in Tirana in the period 2002-2020. This Map clearly shows

the very large development, almost 3 times, of the city of Tirana from 2002 (blue border) to 2020 (border with red color).



**Figure 16:** GIS MAP of Urban Changes in Tirana City during 2002-2020

#### 4. Conclusions

The study shows that due to urban and demographic changes, from 2002 to 2020, the city of Tirana has grown in area by almost 3 times the area of 2002.

Due to urban changes the city has lost in a period of 20 years, about 205 ha of green space.

The use of GIS Technology is an efficient instrument for the identification and analysis of urban change as well as decision making in the implementation and management of urban change.

It is recommended to create a GIS System that enables the unification of all data within the Region of Tirana, but also their centralization at a national GIS level. This unique basis will enable the relevant bodies to manage, assist, advise and support the Institutions and the citizens.

#### References

- [1] **DPGJC** Drejtoria e Përgjithshme e Gjendjes Civile
- [2] **Bashkia Tiranë** “Koncepti i zhvillimit Rajonal për Qarkun e Tiranës”, [http://www.qarkutirane.gov.al/sites/default/files/Koncepti%20i%20Zhvillimit%20Rajonal%20per%20Qarkun%20e%20Tiranes\\_0\\_0.pdf](http://www.qarkutirane.gov.al/sites/default/files/Koncepti%20i%20Zhvillimit%20Rajonal%20per%20Qarkun%20e%20Tiranes_0_0.pdf)
- [3] **Bashkia Tiranë** “Plani i Veprimt për Tiranën” I 2018, <https://www.ebrdgreencities.com/assets/Uploads/PDF/9e3afe8944/Tirana-GCAP-Alba.pdf>
- [4] **Bashkia Tiranë** “Struktura urbane, Plani i Përgjithshëm Vendor i Tiranës”
- [5] **Bashkia Tiranë** “Plani i Përgjithshëm Vendor i Bashkisë Tiranë”, <http://planifikimi.gov.al/index.php?eID=dumpFile&t=f&f=1730&token=e25abaef3f11df543632f27ab83f8f700979065e>
- [6] **Bashkia Tiranë PPV** – “Plani i Përgjithshëm Vendor i Bashkisë së Tiranës”, [https://tirana.al/uploads/2019/2/20190214160604\\_bashkia-tirane-plani-i-zhvillimit.pdf](https://tirana.al/uploads/2019/2/20190214160604_bashkia-tirane-plani-i-zhvillimit.pdf)
- [7] **Kristo Frashëri** “Historia e Tiranës” – Vol. I, Tiranë 2004
- [8] **INSTAT** *Censusi i Popullsisë dhe Banesave në Shqipëri*, 2011, f.17
- [9] **iC Consulenti** “Vlerësimi Strategjik Mjedisor për Planin e Përgjithshëm Kombëtar”, <http://planifikimi.gov.al/index.php?eID=dumpFile&t=f&f=1339&token=a67d15e790640e735d8cbde38a0127b22b2aead9>
- [10] **Hoxha E** “Sistemet e Informacionit gjeografik GIS” 2004
- [11] **Ministria e Zhvillimit Urban dhe Turizmit** “Dokumenti i Politikave për Planifikimin dhe Zhvillimin e Territorit në Shqipëri”, [https://infrastruktura.gov.al/ep-content/uploads/2017/10/DOKUMENTI\\_I\\_POLITIKA\\_VE\\_TË\\_PLANIFIKIMIT\\_DHE\\_ZHVILLIMIT\\_TË\\_TERRITORIT.pdf](https://infrastruktura.gov.al/ep-content/uploads/2017/10/DOKUMENTI_I_POLITIKA_VE_TË_PLANIFIKIMIT_DHE_ZHVILLIMIT_TË_TERRITORIT.pdf)
- [12] **RPT**-Rregullore e Planifikimit të Territorit, <http://planifikimi.gov.al/index.php?eID=dumpFile&t=f&f=4456&token=827cf726b27b80dde0be4ec0409119cf1f83be4a>
- [13] **Selfo L, Sulçe S, Guri S, Hanxhari R, Malltezi J** “Vlerësimi Strategjik Mjedisor i Planit Rregullues të Tiranës”, <https://www.yumpu.com/xx/document/read/15690250/vleresimi-strategjik-mjedisor-i-planit-rregullues-bashkia-e-Tiranës>
- [14] **VSM**-Vlerësimi Strategjik Mjedisor, [https://tirana.al/uploads/2019/1/TR030\\_VSM-report.pdf](https://tirana.al/uploads/2019/1/TR030_VSM-report.pdf), [https://openjicareport.jica.go.jp/pdf/12087813\\_04.pdf](https://openjicareport.jica.go.jp/pdf/12087813_04.pdf)