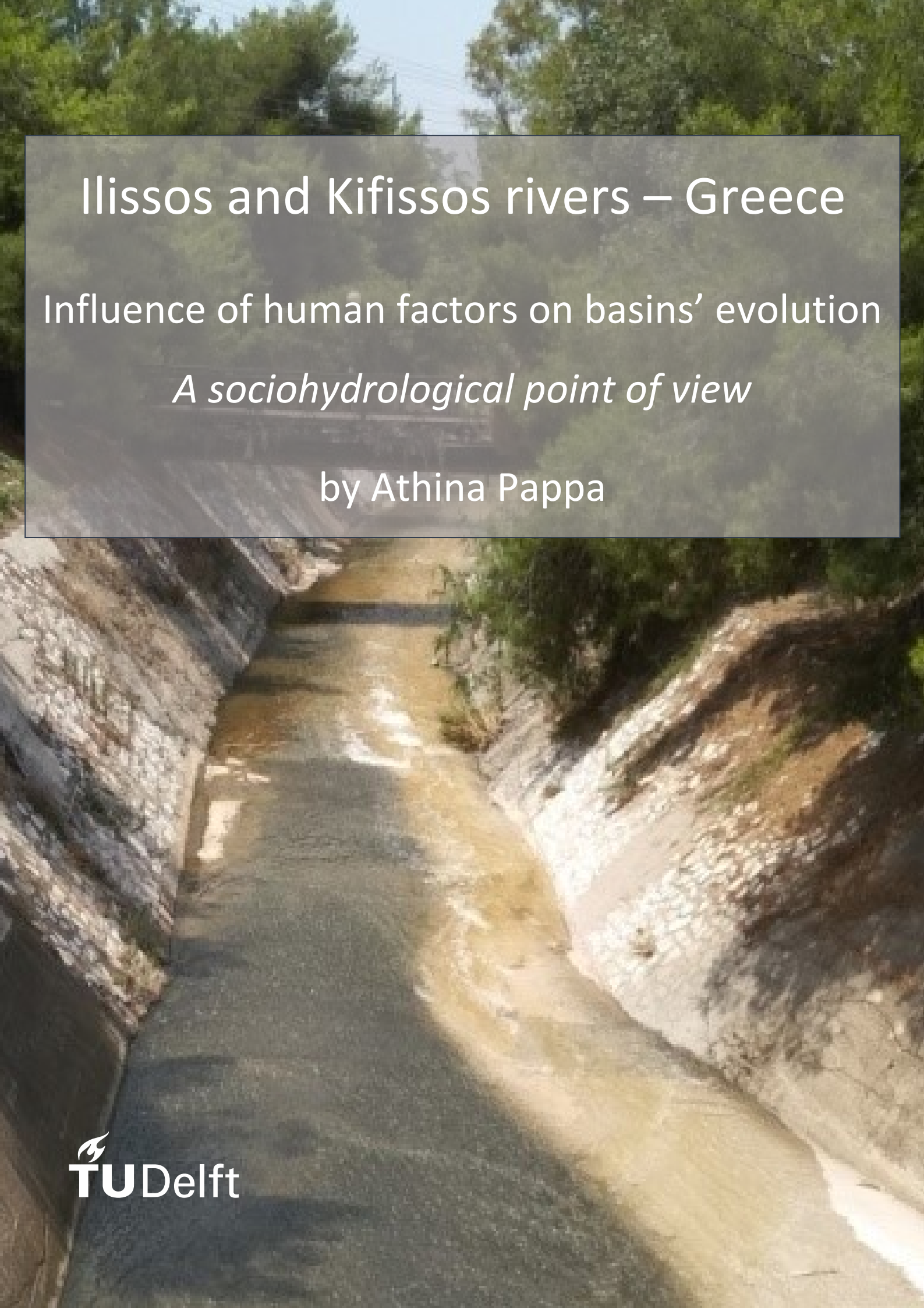

Ilissos and Kifissos rivers – Greece

Influence of human factors on basins' evolution

A sociohydrological point of view

by Athina Pappa

TU Delft

Ilissos and Kifissos rivers – Greece:

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A sociohydrological point of view

By

Athina Pappa

in partial fulfilment of the requirements for the degree of

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Abstract

The aim of this thesis was to investigate the evolution of Ilissos and Kifissos river basins in Athens, Greece and the ways this evolution was influenced by specific human factors. The dynamics of the human-water interactions have been studied in the frame of sociohydrology and the central key was to study the impact society had on the hydrological regime of the rivers and the rivers on society, at the basins of Ilissos and Kifissos.

Athens is the capital city of Greece, where about 4 million people are located, almost half of the country's population and the most important financial center of the country, where about 70% of country's financial activity takes place. The time frame of this thesis covers almost the last 200 years, from 1834, when Athens became the capital city of Greece, until 2019 and takes into account the most important political and social events of these years.

Sociohydrology is regarded as the most suitable approach for studying the dynamics of the city of Athens with the two rivers, since in this research field, people are regarded as inherent part and not as an outer force or boundary condition of the studied water system. In general, in the field of sociohydrology, the majority of the studies are conducted by examining the sociohydrological system at quantitative way, by using models. However, in this research it was selected to conduct a qualitative case study research, as an alternative way to examine the relations of water and humans, based on the thoroughly analysis of the case under study and including the collection of information by a variety of methods and from various sources. In case study research method, it is possible to use both qualitative and quantitative data methodologies.

In this research, the case study research method was selected for exploring in depth the interventions applied at Ilissos and Kifissos, the way the political, social and urban characteristics of Athens evolved, how the relations of people with water resources were during the study period and how the human characteristics interacted with the rivers' evolution. These interactions were examined in terms of the evolution of the sensitivity that community showed towards the rivers, what people remembered most about them and how these influenced the rivers management, by paying attention at details and attempting to correlate conditions and events. So, this study examines an urban sociohydrological system, in relation to the evolution of the urban characteristics of the city, unlike the other similar sociohydrological studies, where the agriculture use of the river's water was the primary water use.

The case study research for this study was conducted by using qualitative methods and then some further quantitative interpretation for some of the data was applied. The historical analysis method was conducted at the historical analysis of books, monographs and reports, with focus on technical and historical details, in order to cover the historical evolution of the social, political and urban characteristics of Athens and the kinds of human interventions at Ilissos and Kifissos basin. The method of content analysis at newspaper articles and municipal acts was chosen in order to collect information about the evolution of community's sensitivity and memory about the rivets, since articles and acts tone can represent the economic or environmentally friendly attitude of the community and provide information about the kind of memories people had for the rivers. The memories were distinguished between positive, including the historical value of the rivers and their past good environmental condition and negative, like past flood events or bad environmental conditions, at periods prior to publishing date of the article. These parameters were examined in order to evaluate peoples' influence on river management decisions. The data related to the evolution of community's sensitivity and the memories, were collected from the newspapers 'Empros' (1896-1920), 'Kathimerini '(1920-1967 and 1974-2019) and 'To Vima' (1967-1974) and the municipal acts of Athens municipality throughout the whole study period.

Concerning the city of Athens, it was a small, poor city, that became the capital of the new and small country of Greece in 1834 and by the end of the 19th century it was an economic, commercial and industrial center, designed and built under private and political interests, without respect for the natural environment and by applying in delay the European trends of urban development, when the uncontrolled and illegal constructions had left space. In the first half of the 20th century, a series of wars and political incidents, like the Balkan Wars, the World War I, the defeat of Greek Army at Asia Minor and the Catastrophe of Asia Minor with the 1.5 million refugees' arrival in Greece, the interwar period with the political instability, the economic crisis and the decline of the living standards and the

World War II and Civil War , had influenced the development of Athens. The city which was spreading without control and the demographic reclassifications, brought a series of problems in the city. Moreover, during the 7 years of dictatorship (1967-1974), combined with the diplomatic isolation of Greece, the suspension of the civil freedoms, the long delay of harmonization of Greece with Europe/EU after the accession in 1981 were the most important political incidents that affected the modernization of the society and economy. These problems influenced the way Athens expanded, since the city was exposed to the intense and uncontrolled urbanization.

Concerning the rivers management, the first major intervention was the diversion of Ilissos from its natural riverbed, in 1905. Until that period, Ilissos was a tributary of Kifissos, but it was decided, for flood protection of the city, to create two separate estuaries. Since then, the rivers and streams of the city started to be covered and boxed, like the coverage of Ilissos from mid 1930s until the end of 1960s, sand was abstracted from the rivers to be used for streets constructions purposes and industries started being installed along rivers' banks, especially at Kifissos, using the rivers as wastewater discharge system. Also, as city was expanding, the needs for streets and better urban drainage, made the authorities cover the streams and use them as city's sewer system. By the end of 1990s, Athens's environment had been deteriorated to that level, that the governments started to change the legislation about the quality of environment. These problems continued until the Olympic Games of 2004 held in Athens, with peak of bad water management, the coverage of Kifissos for creating part of the National Highway. Since then, the city is oriented to reconstructions and sustainability as long as the financial status of Greece is getting better year by year.

At content analysis of articles and acts, the evolution of community's sensitivity was examined based on whether the tone of the articles and acts was towards the economic exploitation of the rivers or towards environmental sustainability orientation. At the beginning of the study period, the newspapers' articles were mostly towards the economic development of the areas next to Ilissos and Kifissos and little attention was given to the ecological sustainability of the rivers and their riparian zones. During the 19th and almost all of the 20th century, people were more concerned about the flood protection of the city and the creation of extra space for residential and traffic needs, by covering the rivers. However, this tendency diminished towards the end of the 20th century and at beginning of the 21st century, with the community's sensitivity started being towards the environmental sustainability. This tendency became obvious by the attention of newspaper articles to environmental problems, water quality issues, rivers' banks and springs condition and the introduction of ideas about rehabilitating parts of Ilissos by uncovering it at certain locations. By conducting the content analysis of the municipal acts, community's sensitivity showed a totally different evolution pattern. Almost all acts throughout the years were about projects towards the economic exploitation of the rivers, and no act was found about protecting the rivers' environment or even discussing residents' problems with the rivers.

The type of the political regime of the country, at periods when the important technical interventions for the rivers were decided or implemented, was found to be a common condition and it was observed that usually residents were not to allow to freely express their will or opinion about the projects. Indicative of this condition were the projects of covering Ilissos river, which were decided and started being implemented before the World War II, during the dictatorship of Metaxas. Rivers' sand started being abstracted from after decisions taken by municipal authorities that were not democratic elected in the 19th century and continued even during the 20th century. Similarly, the construction of the National Highway over Kifissos was firstly introduced as idea during the dictatorship between 1967-1974, but implemented during democratic conditions, at the preparation period for the Olympic Games of 2004, with the typical procedures for objections and the environmental legislation for the protection of the rivers, to be ignored.

War periods were another common condition where similar community's sensitivity was observed. It was observed that during war periods, the tendency of the community's sensitivity was mostly towards the economic aspects of the rivers. Examples of this tendency can be seen at articles during the liberation wars in the 19th century, when Athens, as the capital city of the newly established country, was expanding continuously and according to the content analysis of the articles, the main concern of the people, was towards the economic development in relation with the rivers. People were mostly interested in the protection of the city against floods, the construction of the streets with rivers' sand, the use of the rivers' water for irrigation purposes or the use of rivers as sewer pipes to discharge wastewater. During the Balkan Wars, the World War I and the period of Catastrophe of Asia Minor, the majority of the articles related to the rivers, were mostly expressing peoples' concerns about the effect of the rivers to their properties at cases of

possible flood events and the management of space at the rivers' banks, that was influencing the expansion of the city and flood defense strategy. Similar tendency was observed in the period of World War II and the Civil War, since the mentions for the economic development of the areas around the rivers were more than those for the environmental sustainability of the rivers. After the World War II and during the Civil War this trend was continued, but the concern for sanitation of the rivers started to become vivid as well.

Concerning the kind of memories people had about the river, based on the articles and acts it was found that usually, the memories were included in the articles, either to criticize the progress of certain type of projects or express disapproval for certain type of projects or were used to express peoples' approval for projects that would bring back the positive aspects of rivers. In particular, the elements that were mostly remembered for Ilissos, were its historical value for the city and its past good environmental condition, supported by testimonies, mentioning the importance of the banks of Ilissos for the daily life of the ancient Athenians, as holy and cultural location and the good environmental condition it at anciency or from the 19th and 20th century. In total, the positive memory references for Ilissos were about the 60% of the memory references for Ilissos and about 40% was related to flood problems of Ilissos and bad environmental and sanitation problems. On the other hand, what was mostly remembered about Kifissos, were the bad environmental condition of the river and the past flood events, related to the devastating consequences they had at peoples' life. Also, Kifissos was connected with incidents of continuous pollution from sources related to the economic development, like industries located along the river, with people recognizing the river as a chronic source of problems for the urban environment. References for the historical value of Kifissos and the good environmental condition were significantly less, almost ¼ of the total memory mentions for Kifissos.

In general, what can be concluded form the analysis of the data over rivers interventions was the fact that the residents of Athens followed the 'fight' option against the river and did not leave the city and the riparian zones of the rivers, despite the devastating flood events which they had to face from time-to-time. They expanded the city of Athens and made a series of flood control projects in order to secure their properties by covering parts or whole the rivers, giving another aspect of the 'levee effect'.

From sociohydrological point of view, the scheme of human behavior that can be verified for Ilissos and Kifissos basin is the pendulum swing, according to the change observed at community's sensitivity, from economic development to environmental sustainability and this evolution of the community sensitivity was depicted as newspapers articles tone change over years. The qualitative investigation of the evolution of the two basins not only revealed the pendulum swing, but also the parameters that influenced this swing and that was kind of information that only by thoroughly analysis could be explored, since detailed analysis revealed the detailed variations of the parameters and allowed their parallel comparison. The shift of people's attitude towards the rivers and the reasons, contributing to this change, could mainly be found and analyzed by methods included in the case study research method and further research among the sociohydrology and the urban development could be proven beneficial for the studies of urban water system and that could reveal more important influential parameters about water systems management at urban environment.

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Special thanks to the Archive of the newspaper 'Kathimerini' for providing for free a three-months access to their articles' archive, to the Athens Municipal Archive Authorities for the access to the Municipal's Acts Archive and to all the people I contacted to public and private services that kindly answered my questions regarding their scientific field, like law, history, administration, engineering etc.

Finally, I would like to thank my family and friends for their support all this period.

Athina Pappa

Delft, June 2021

*Cover picture: Kifissos (photo by the writer)

Contents

1 Introduction

The aim of this thesis is to analyze the evolution of Ilissos and Kifissos river basins and the characteristics of their urban development in Athens (Greece), from a sociohydrological point of view. This chapter is dedicated to introduce the necessary information about the field of sociohydrology, urban development and rivers management, set the problem statement related to how these fields are examined and present the research questions that will lead to the final results.

1.1 Urban development and rivers

In general, the majority of the cities worldwide were developed close to water resources, like lakes, rivers or seacoast. (Brandeis, 2014). This phenomenon is already observed since the ancient years in various parts of the world, like in Mesopotamia, along the rivers Tigris and Euphrates, in Egypt at river Nile, at river Thames in London at United Kingdom, at river Seine in Paris at France, in Rome, Italy at river Tiber, at Hudson river in New York, USA etc. (Cengiz, 2013). The main reasons people were choosing to settle close to rivers and lakes was the fact that the rivers could provide them with water and food and facilitate food production by supplying them with adequate quantities of water for irrigation and fertile land for agriculture. Also, these water resources could help them to produce power, offered them flat land for building and facilitated the transportation of goods for trade. (European Environment Agency, 2016)

The settlement of people close to rivers and lakes has transformed nature into the urban areas of today and the relations of water resources with urban planning had a great impact on the growth of these areas, as time went by. (European Environment Agency, 2016) The urban development can significantly change the river system of a city and affect the catchment hydrology and river network. These changes may influence from the major courses of the river network, that can be several kilometers long, to the shorter sections, of hundred meters long, to even the smallest ones which are just a few meters. It is not only the size and morphology of the river network that is influenced by the urban development, but also the quality of the water, since surface runoff originates from urbanized surfaces and municipal and industrial outflows, enriched with contaminants, pesticides, nutrients etc. which are also discharged to rivers. (Gurnell, Lee, & Souch, 2007)

A common practice in the 19th and 20th century, which were characterized by the intense development of the industrial sector and the growth of the urban centers, was either channeling rivers into canals, or covering them, thus confining them. The main task of this practice was to upgrade the urban sanitary conditions and protect cities from floods. (Bruhn, 2015)

Moreover, these water bodies were, for a long time, the main receivers of urban wastewater, either from households or from the industry, which gradually caused their degradation and transformed them into a source of disturbance. Especially during the 20th century, it was quite common for many water resources in Europe, close to urban areas, to be polluted, their water quality to be deteriorated and finally lose their important and traditional role for fishing, bathing or boating, with even their banks not be accessible any more. Moreover, since the 1950s, the extended use of cars, resulted to the transformation of riverbanks to highways, like in the case of the Seine in Paris, France and that of the river Manzanares in Madrid, Spain. (Bruhn, 2015) Unfortunately, cities had regarded the rivers as important element for their planning only in extreme cases, like water shortages or flood events.

Cities have started to face urban water resources in a different way by trying to restore them, since people realized not only the aesthetic value of the water bodies, but also their contribution to the upgrading of the quality of life in the frame of sustainability. Therefore, many projects are towards that direction nowadays. (European Environment Agency, 2016) There have been significant efforts since the 1970s to ameliorate the quality of water in Europe, by investing the construction and extension of the sewer system

and the wastewater and stormwater treatment. This resulted in improving water quality and the image of rivers and lakes at the cities and making them a pleasant open space environment, suitable for recreation and social and cultural events. (Bruhn, 2015)

In general, cities and water resources are systems that continuously evolve and it is critical to be able to understand their evolution and recognize the point, at which changes start to happen between the relations of water systems and urban environment, by exploring the evolution of the water systems in parallel with the evolution of urban environment and sociohydrology is providing the frame for this kind or research. (Pan, Deal, Destouni, Zhang, & Kalantari, 2018)

1.2 Sociohydrology and urban development

Sociohydrology is regarded as the most suitable approach for studying the dynamics of cities and rivers, since in this research field people are regarded as inherent part and not as an outer force or boundary condition of the studied system. (Troy, Konar, Srinivasan, & Thompson, 2015) In the efforts for understanding the evolution of water resources and the urban environment, there has been a lot of progress at studying the hydrological part. However, what requires further investigation is the way the development trajectories of a catchment are influenced by people's behavior, under various societal circumstances. (Elshafei, Tonts, Sivapalan, & Hipsey, 2016)

It is important and useful for the authorities, that are responsible to take decisions and set strategies and long-term plans for water management, to understand the dynamics of this coupled human-water system. (Sivapalan, Savenije, & Blöschl, 2012) (Ferdous, Wesselink, Brandimarte, Slager, Zwarteveen, & Di Baldassarre, 2018) The interactions of humans with water resources are a crucial subject, since a better understanding of the procedures and circumstances, under which people take their decisions regarding water related issues, may provide strong predictive power and this may lead to better managerial practices of water resources and more sustainable management plans. (Troy, Konar, Srinivasan, & Thompson, 2015) The interaction of people with water bodies can be determined by the human activities that influence the hydrological characteristics of the area under study, like water use and abstraction, changes of land use that influence water flows, irrigation, infrastructures like reservoirs etc and the way people accept the changes of the hydrological regime.

1.3 Problem statement

A sociohydrological analysis can be conducted either by a qualitative sociohydrological study or by developing a coupled human-water model. (Mostert, 2018) In general, the use of models in socio-hydrology is the prevailing practice to reproduce past events and predict future people's reactions towards water resources. However, long-term socio-hydrological predictions are a challenging field, since the changing relations between society and water resources are not taken, at a sufficient level, into consideration, by the models. (Melsen, Vos, & Boelens, 2018)(Srinivasan, Sanderson, Garcia, Konar, Blöschl, & Sivapalan, 2017)

Water model experts and stakeholders do not interact much and usually modelers prefer to focus and work with variables that they can easily model, regardless their utility to the community and even if the stakeholders are more interested in other issues. (Melsen, Vos, & Boelens, 2018)(Srinivasan, Sanderson, Garcia, Konar, Blöschl, & Sivapalan, 2017) Modelers determine in advance which variables are going to be used, what the relations between them are (Mostert, 2018) and they also make assumptions on certain issues, like on the rationality and partiality stakeholders take decisions. The modeler is responsible for any assumptions that are made and decisions taken for the structure of the model and the assumptions are signs of what the modeler considers important or not, for example quantity versus quality, productivity over distribution etc. (Melsen, Vos, & Boelens, 2018) However, the modelers, working on water resources, should have as target the development of models that could produce useful results, given the aim of the model (e.g. explanation, prediction or supporting policy). (Srinivasan, Sanderson, Garcia, Konar, Blöschl, & Sivapalan, 2017)

Concerning the societal part, changing cultural values might affect how people react to hydrological phenomena such as floods and water pollution. This influence at peoples' value system is expressed by community's reactions, political choices and changes at laws, that subsequently affect individuals' behavior. (Srinivasan, Sanderson, Garcia, Konar, Blöschl, & Sivapalan, 2017) The societal part

has been embedded in sociohydrological models either representing the society as a homogeneous actor or as groups of multiples actors and usually the characteristics of the societal part are modeled as coefficients at the sociohydrological models. (Mostert, 2018)

Models in sociohydrology may reproduce patterns seen in real life, however there is always the case that due to simplified conceptualizations and the lack of information on certain parameters, they may exclude important aspects of human behavior. So, since these parameters are not included in the model, their variations are not taken into account and therefore the models might give same results, even if these parameters vary in time. (Mostert, 2018) Also, the lack of data may be an obstacle to create useful models and therefore modelers should try to look for data outside their usual working field, like data from other fields such as the citizen science etc and even pay attention to details, in order to collect the information needed. (Srinivasan, Sanderson, Garcia, Konar, Blöschl, & Sivapalan, 2017)

As an alternative methodology for investigating sociohydrological phenomena, where the variables and their relations are not determined in advance, Mostert, 2018 proposed the use of case study research method. (Mostert, 2018) Case study research method is based on the thoroughly understanding of issues, in their real-life context, by paying attention at details and attempting to correlate conditions and events of the case under study. By using this method, the researcher aims to understand a phenomenon by exploring and analyzing its interactions with the circumstances, in order to be able either to formulate a theory, based on the observations or falsify or verify an already existing one. (Dooley, 2002)

1.4 Research Questions

The aim of this research is to investigate and explain the main human interventions that influenced the evolution of the hydrological regime of Ilissos and Kifissos basins, the largest basins in the city of Athens, Greece, by taking into account human aspects characteristics, the social and political history of the country and the city and the urban and river evolution, through research at various sources, under the light of sociohydrological analysis.

The territorial boundaries for this research were within the city of Athens, which became the capital of the newly established state of Greece in 1834. This city has now about 4 million inhabitants and its development was influenced significantly by severe sociopolitical changes in the last 200 years. The water systems under study are Ilissos and Kifissos rivers. Kifissos is the biggest river in Athens and is the main water recipient of the city. Its springs are at the mountains at the northern limits of the city and it discharges to the sea at the south, at Saronikos Gulf. Ilissos river, which was a main tributary of Kifissos river and its springs are at the east of the city, was redirected from the main river of Kifissos and nowadays it discharges independently, also at Saronikos Gulf.

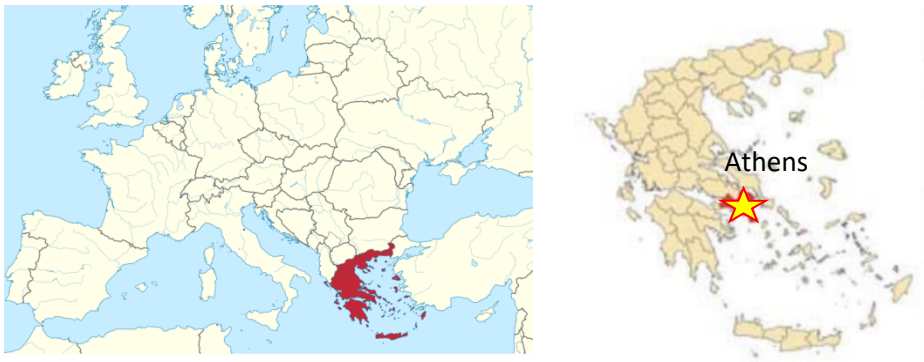


Figure 1-1 Left: Greece in Europe map, Right: Athens in the map of Greece ((https://www.britannica.com/place/Athens, n.d.))

In this research, the case study research method was selected as method for in-depth exploring the sociohydrological phenomena and examining the human factor over the hydrological regime of a basin. The choice of Athens basin was made since there haven't been studies about this topic for this area before. Also, the common language of the researcher and literature, needed for the purposes of this study, is an asset, due to the use of alternative data sources, needed to extract extra knowledge on the relations of people with water resources. Concerning the study period, the time frame chosen, covers the modern history of the country and the city. The following research questions will help to derive information about the main aspects of this study:

Main Research Question:

How did the human factor influence the evolution of Athens basin in the last 200 years, from a sociohydrological point of view?

Sub-questions:

1. Which human interventions have changed significantly the hydrological regime of Ilissos and Kifissos, since Athens became the capital city of Greece?

2. Which, sociohydrologically examined, human factors influenced the evolution of the basin?

3. a. Which elements of river's presence in the city remained vivid in the memory of the public opinion and how did they influence the trajectory of the rivers?

   b. What was the effect of the country's political regime at the decisions concerning the management of Ilissos and Kifissos?

   c. How did the environmental awareness and community sensitivity evolve among the residents of Athens in the last 200 years, related to the management of Ilissos and Kifissos river?

4. How did the planning system of Athens and rivers management evolve?

5. Which sociohydrological theory or pattern can be verified or falsified according to the evolution of Ilissos and Kifissos basins?

1.5 Thesis structure

This thesis is organized at chapters, each one dedicated to a different topic.

One chapter will be dedicated to provide the reader the necessary information, according to the available literature, about the field of sociohydrology, mentioning the prevailing practices used for examining a sociohydrological system and present the case study research method, through examples where it was used. Moreover, a selection of the human characteristics, among the ones that have already been used at other sociohydrological analysis of other river basins and influence people's reactions towards water resources and the assumptions about them, is presented.In a separate chapter, the steps that are going to be followed about this research are going to be explained, concerning the usage of certain categories of data source and the methodology to extract from them the information needed. At another chapter, there will be extended reference to the main interventions that changed significantly the Ilissos and Kifissos basins, by chronological order. In order to be able to deeply understand these interventions, special interest will be given to sociopolitical circumstances under which they were decided and applied, by providing the basic elements of Greek and Athens, particularly, political and social history. Furthermore, another point that will be at the research is how the urban planning of the city influenced and was influenced by these interventions, since any changes are reflected to the way the city developed. In following chapters the content analysis of the newspaper articles and municipal is presented in terms of the methodology followed and then the results are presented. Another chapter is dedicated to a further interpretation, by combining the knowledge gained from historical and content analysis in order to draw some findings concerning the way some parameters are combined. Finally, at the conclusions chapter the basic research questions are answered in order to provide an adequate overview of the most important findings of this research.

2 Athens

This chapter provides information about some basic characteristics of the city of Athens in relation to population evolution, climate condition, territory characteristics and the local administrative bodies. As it will be explained, the boundaries of the extended city, the Greater Athens Urban Area, coincide almost with the boundaries of the Kifissos and Ilissos basin and therefore the information provided are also related to the rivers. Athens was a poor, small city, with a few thousand residents, which became the capital of the new and small country of Greece in 1834 and nowadays almost half population of Greece, about 4 million people, live in this city. The climate is mild Mediterranean, with mild winters and hot summers. The local administration is divided at municipalities and Prefecture and their responsibilities have differed as time went by and the size of the city was changing.

2.1 General information

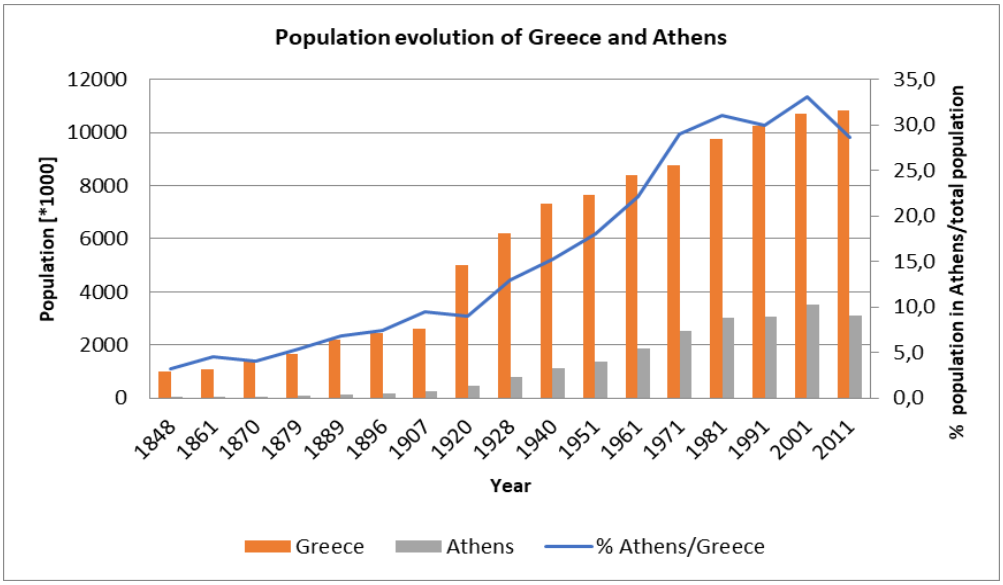
Athens has been the capital of Greece since 1834. It is the largest city in the country, located in Attica region, in Central Greece and is one of the oldest cities in the world, with a recorded history since 3,200 BC. According to the European Statistical Office, the Greater Athens Urban Area is the 7th most populous in the European Union, with its population estimated at 3.8 millions. (wikipedia)

Figure 2-1 Map of Greece with focus at Attica region, where Athens is located.

Modern Athens is the center of the country's economic, industrial and administrative activity. The population of the city has reached 40% of the total population of Greece and the economic activities in the same area reach 70% of the total economic activity of the country. (Τράπεζα της Ελλάδος, 2011) During the last century, the city evolved rapidly by increasing its population and expanding spatially, with the majority of its territory being urbanized and nowadays, almost 68% of the basin is urban areas.(Bathrellos, 2016)

2.2 Population evolution

The Greater Urban Area of Athens is one of the most densely populated in the developed world, with population density of 6,000 people/km^2, which is a bit more than the density of London with 5,900 people/km^{2}and almost double the density of Toronto or Los Angeles. The population density in the municipality of Athens, which is the core city of the capital, reached its maximum in 1981, with nearly 23,000 residents/km^2. However, this population declined in the next decades and now is 17,000 residents/km^2. Most of the population increase, about 2.2 millions people, occurred at the Greater Urban Area after 1951 and at 1970s at the suburban areas of the city. However, the population growth rate at the entire Athens metropolitan region declined over the last decade, probably affected by the financial crisis, that discourages people from forming families. (Cox, 2013) The evolution of Athens's population in relation to Greece's population is presented in Graph 2.1.



Graph 2.1 Evolution of population living in Greece and Athens and the percentage of inhabitants of Athens related to the total population of the country.

2.3 Climate

The climate of Attica region is characterized as Mediterranean, with the exception of highlands, where the climate is mountainous. In general, sunny days are common, even during the mid-January and most of the precipitation falls mainly from October to April. In more detail, the temperature depends on the altitude and the distance from the sea, while the annual average temperature is approximately 16°C. The warmest month is July with average temperature about 28°C. The coolest winter month is January, with average temperature about 10.5°C. During the summer months, temperatures reach very high levels and for a few days heat-waves, with temperatures exceeding 40°C, might occur. Moreover, at the densely populated areas, there might be conditions that significantly exacerbate Attica's already warm climate.

Rainfalls occur mainly from October to April, but in general are very low throughout the year and do not exceed 400-450mm. The average annual rainfall in Athens is 411mm and ranges from 350mm in the Attica lowland to 1,000mm in the mountainous areas, with rainy days ranging from 50 to 100 per year. December is the month with most precipitation, on average 63.5 mm, occurring for about 11 days in the month. In June rains for about 1 day and is the month with the least rainfall, with average height 5.1 mm. Snowfalls occur almost every year in the surrounding highlands of Attica, more rarely in the northern suburbs of Athens and even more rarely in the city center. In recent years snow happens also often in the city like in 2002-2004-2006-2008. (meteo-news, 2019)(Λέκκας, 2018) (Συνάνη, 2019)

2.4 Territory

The Athens Basin, formed by Kifissos and Ilissos river networks and with area approximately 534 km^2, (Bathrellos, 2016) constitutes the largest basin in the Attica Prefecture and is surrounded by the mountains Ymittos (1026 m), Penteli (1102 m), Aigaleo (468 m), Parnitha (1413 m) and a number of small hills. The shoreline of the basin is about 47 km long and is at the south and south-west part of the basin towards Saronikos Gulf. (Parcharidis, 2006) An overview of the basin and the city can be seen in Figures 2.2 and 2.3.

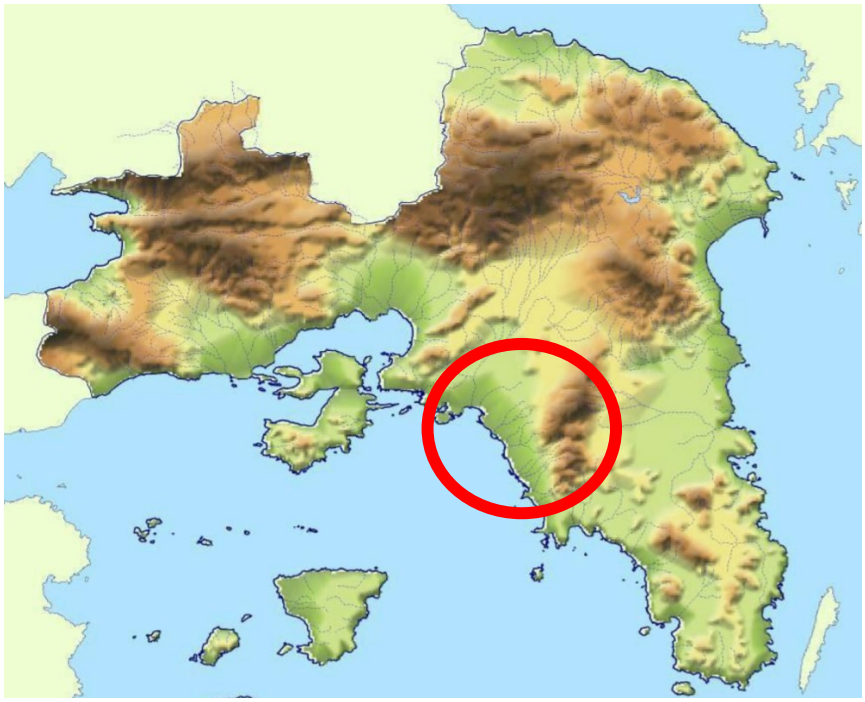


Figure 2-2 Geomorphologic map of Attica region, with focus to Athens city (Στουρνάρας, et al., 2011)

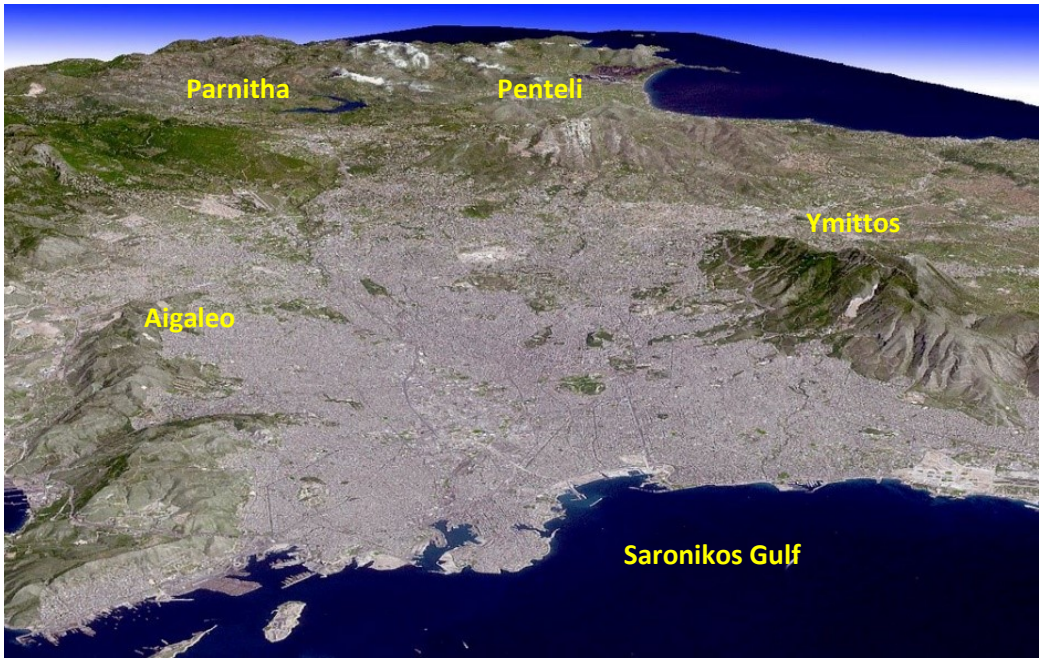


Figure 2-3 Athens city and the surrounding mountains
(https://www.flickr.com/photos/24919704@N04/3961286873/in/photostream/)

The geological base of the city is at the geotectonic frame of Attica and includes shales, schists, cherts, sandstones, marls and limestones, which are accompanied by generally small bodies of volcanic rocks. The hills of the city, like Acropolis, Lycabettus, etc. are covered by compact limestone. Regarding the younger formations, Athens is covered in places by marls, clays, sandstoes and conglomerates, talus cones, screes, alluvial deposits and historic and recent earth materials. (Koukis & Sabatakakis, 2000)

The seismological characteristics of Attica are characterized by a low-grade seismic activity and rare local earthquakes of high magnitude. The area is limited by seismic-origin arcs like the Euripos-Atalanti fault system and the Corinthian Gulf seismic zone at

each side, which might give earthquakes of 7.0 to 7.2R in a 70 to 100 years return period. (Koukis & Sabatakakis, 2000)

2.5 Administrative boundaries

According to information found concerning the administration of the state at local level, the municipalities are an administration structure, since the 19th century, close to citizens, where they could express their problems and requests, they were also responsible for projects related to the rivers.

2.5.1 Attica Region

Attica Region, which included Attica peninsula where Athens is located, was one of the first Regions of the country. It was first established in 1833 and with some territorial alterations as years went by, it was an administration structure until 2010, when Regions were replaced as administration division by bigger structures, the Prefectures. (Αρχείο Νομαρχίας Αττικής) (Σαρρής, 2019)

During the era that the Regions were in force, their responsibilities were changing according to the needs of the country. According to the archive that is still available for the Region of Attica for the years 1940-1965, the responsibilities of the Regional Governors included the supervision of political and police authorities. Governor's authorities included aspects of the ministries of Interior Aspects, Finance, Education, Public Health, Agriculture, Transportation, Labor etc and it was Governor's responsibility to apply the governmental policy at local level. Also, the Governor was responsible for the management of projects of public utilities like water, electricity, gas, sewers, spatial planning at local and municipal level, which were under the supervision of the Region, etc. (Αρχείο Νομαρχίας Αττικής) Moreover, it was not until 1994 that the Region Governors started being elected by the citizens, since until then they were chosen by the government. (Σαρρής, 2019) Only the Regional Councilors were chosen after elections by the citizens. (Αρχείο Νομαρχίας Αττικής)

2.5.2 Athens Municipality

In general, in 1830, during the first years of the establishment of the modern Greek State, the public infrastructures were poor and of bad quality and therefore the central administration was mainly interested in constructing infrastructures according to the European standards. However, prohibitive factor for these plans was the limited access to financial support for the projects, since most of the public projects were not appealing to the private sector, as they were not profitable. Therefore, the state tried to overcome these difficulties and make the projects by either undertaking the construction itself or through the municipalities. (Συλλογικό έργο, 2016)

Often, the residents of the municipalities had their own priorities regarding public infrastructures, which were mainly towards covering social needs such as educational, religious and medical needs, improving their water supply systems, extending roads etc. In second half of the 19th century, drying marshes and other river management projects became more intense compared to the previous period. Moreover, even if these projects were not supported by the central administration, the design, the financial cover and their implementation should be approved by the central management authorities. (Αντωνίου, 2013)

According to the administrative division of 1833, the municipality of Athens was one of the 8 municipalities that Attica was divided to. As years passed by, more areas were attached to Athens and in the end the municipality of Athens extended to almost the whole area of the extended city of Athens of nowadays. After 1925, certain areas and neighborhoods were gradually detached. In the present, the municipality of Athens is restricted to neiborhoods around the historcal centre of the city. (Φιλίππου-Αγγέλου, 2000)((ΚΕΔΚΕ), 2002)

By comparing the maps depicting the basin of Kifissos and the municipality of Athens during the 19th century and until 1925, it can be seen that the municipality of Athens coincided with the basin of the river Kifissos and that the basin of Kifissos and Ilissos administratively covered almost the majority of the extended area of city of nowadays, as it can be seen in Figure 2.4.

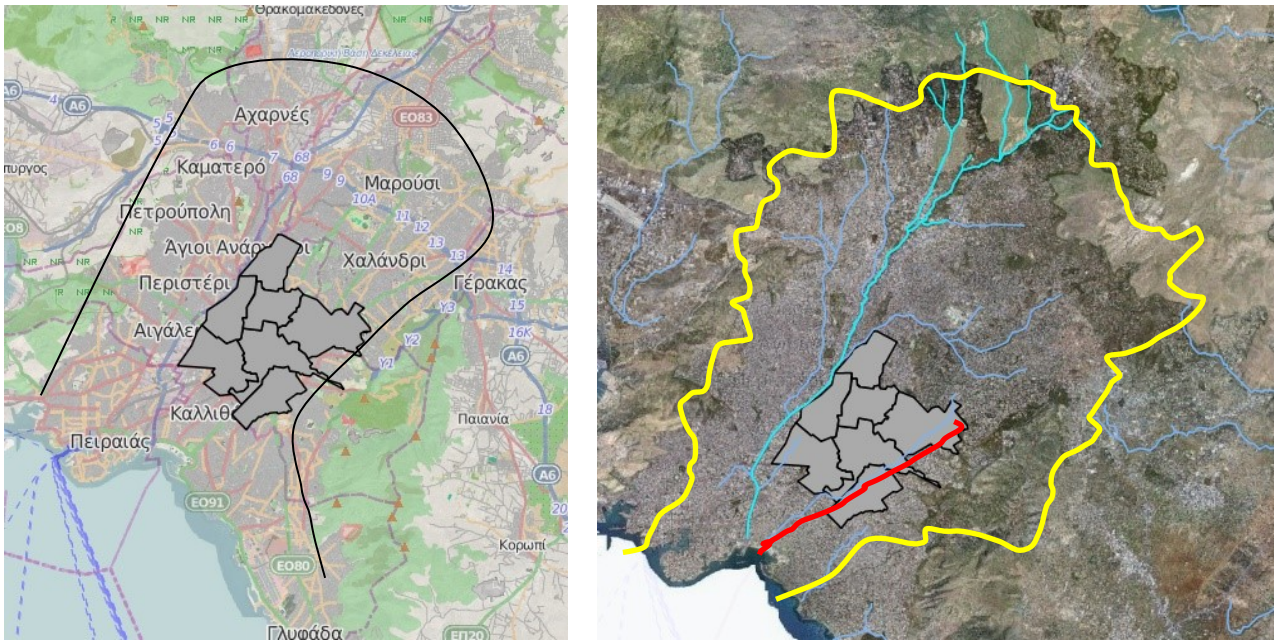


Figure 2-4 Left: Black line determines the boundaries of the extended Athens area and grey blocks determine Athens municipality (http://geodata.gov.gr/, n.d.) Right: Grey blocks determine municipality of Athens, Yellow line indicates the boundaries of Kifissos basin, Blue line within the basin indicates Kifissos river, Red line indicates Ilissos river

The basin of Kifissos includes Athens area and even nowadays, the municipality of Athens, which mainly refers to the historical center and some surrounding neighborhoods, includes part of Ilissos and Kifissos river basin.

3 Human factors in sociohydrological analyses

Sociohydrology is a science introduced in 2012 by Sivapalan et al., in an attempt to describe the interactions between water cycle and humans. The aim is to understand and predict the trajectories of development of a water body, like river basin or aquifer etc, taking into account people's behaviors in respond to water phenomena. (Sivapalan, Savenije, & Blöschl, 2012) In sociohydrology, there has been a lot of progress at studying the hydrological part, however, what requires further investigation is how the development of a catchment is affected from people's attitude, under various societal frames. (Elshafei, Tonts, Sivapalan, & Hipsey, 2016) There are frameworks developed and assumptions made, in order to explain the human-water relations and the way people intervene at the evolution of river basins. To gain the information needed, the sociohydrological analysis can be conducted by various methods, some of which are presented below.

This chapter presents some basic elements of the theory of sociohydrology, with more attention to be given on how the human aspect has been treated in sociohydrological analyses of different basins and on the common characteristics and patterns of human behavior that have been observed. At first the kinds of sociohydrological analysis are presented based on how a system is examined in terms of how it evolved in time or in relation to other systems or how the actors interacted. Then, the pendulum swing, a common conceptualization of human behavior, based on the changes at humans' attitude towards the management of the examined water system and found at sociohydrological analyses of systems in various parts of the world, is presented. Additional to this conceptualization, two already known patterns of human behavior in relation to rivers' floods are also examined. The 'levee effect' and the 'room for the river' indicate two common approaches of people arranging the conditions of their establishment next to rivers. In the end at this chapter, the aspects of human behavior that are going to be examined in this research are presented. These aspects were found as common at various basins' sociohydrological studies and represent society as political and social regime and people's memory and community's sensitivity.

3.1 Kinds of sociohydrological analysis

Historical sociohydrology is one method of sociohydrological analysis that allows more insight at a coupled human-water system, by studying immediate or distant past events, when possible. Systematic research of the dynamics and the circumstances, that have led to a certain situation and reconstructing them, is the common way used at historical sociohydrology. The findings of this kind of analysis may include patterns of water management in combination with the evolution of water technologies.

At comparative sociohydrology, the aim is to spot differences and similarities, regarding the interactions of human and water, at catchments in different locations. These interactions are examined in the light of social, economic, climate or even other criteria, that would help to form an opinion about the systems' dynamics and study and compare the ones with similar behavior.

Process sociohydrology is a more detailed research, where closer insight of the systems' dynamics is encouraged. A more in-depth collection of data, covering aspects of hydrological and social criteria, would enable the researcher to predict future trajectories at the human-water interactions, since several details can be learnt by the interactions of individuals and groups. (Sivapalan, Savenije, & Blöschl, 2012), (Pande & Sivapalan, 2017)

3.2 Pendulum swing of human behavior at Sociohydrological Systems

In an attempt to conceptualize human behavior towards water resources at basin level, some ideas were developed and some conditions were assumed. The concepts presented below are trying to give an insight of how the human factor is involved at decision making processes concerning water, under which circumstances is influenced and how it is expressed.

One way to explain human response to changes in water management is the pendulum swing. By having in mind a pendulum, like the one in Figure 3.1, that swings from one side to the other, it is easily perceived that by using this metaphor, it is attempted to resemble

the change of society's preference from one type of water use to another. There have been studies where the pendulum swing was revealed through qualitative research and others where models were used. Some characteristic examples, which reveal that behavior, are presented below at Table 3.1:

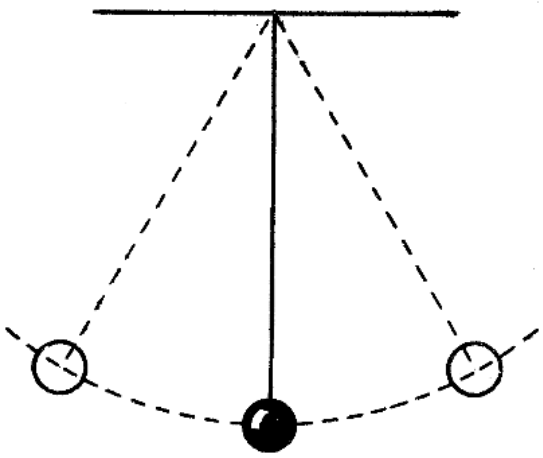


Figure 3-1 The swing of a pendulum between two positions

Table 3-1 Overview of water systems where pendulum swing at peoples' choices has been observed and/or conceptualized.

Socio-hydrological system	Historical analysis /Qualitative methods	Conceptualizations
Murrumbidgee Basin , Australia	(Kandasamy, Sounthararajah, Sivabalan, Chanan, Vigneswaran, & Sivapalan, 2014)	(Van Emmerik, et al., 2014)
		(Elshafei, Sivapalan, Tonts, & Hipsey, 2014)
Tarim Basin, China	(Liu, Tian, Hu, & Sivapalan, 2014)	(Liu, Tian, Hu, & Sivapalan, 2014)
Lake Toolibin, Australia		(Elshafei, Sivapalan, Tonts, & Hipsey, 2014)
Kissimmee River Basin, Florida, USA		(Chen, Wang, Tian, & Sivapalan, 2016)
Dommel Basin, Belgium and Netherlands	(Mostert, 2018)	

3.2.1 Murrumbidgee River Basin, Australia

Pendulum swing has been observed in south-east Australia, at the Murrumbidgee River Basin. At this river basin, the extensive land and water use for agricultural purposes resulted to environmental degradation and that concerned the local communities, which decided to switch their emphasis from agricultural sector and food production and allow more water to be directed to natural ecosystems. Humans' values over their natural surroundings changed over time and therefore they adapted a different attitude towards natural resources and became more conscious and environmentally friendly.

This management swift became obvious while making a historical analysis over the water usage and policies applied at this basin from 1900 until 2014, year that the Kandasamy et al, 2014 article was published. Also, there have been attempts to conceptualize this

human's behavior at a framework that would facilitate the development of a socio-hydrological model, as can be seen in the Figure 3.2 (Kandasamy, Sounthararajah, Sivabalan, Chanan, Vigneswaran, & Sivapalan, 2014).

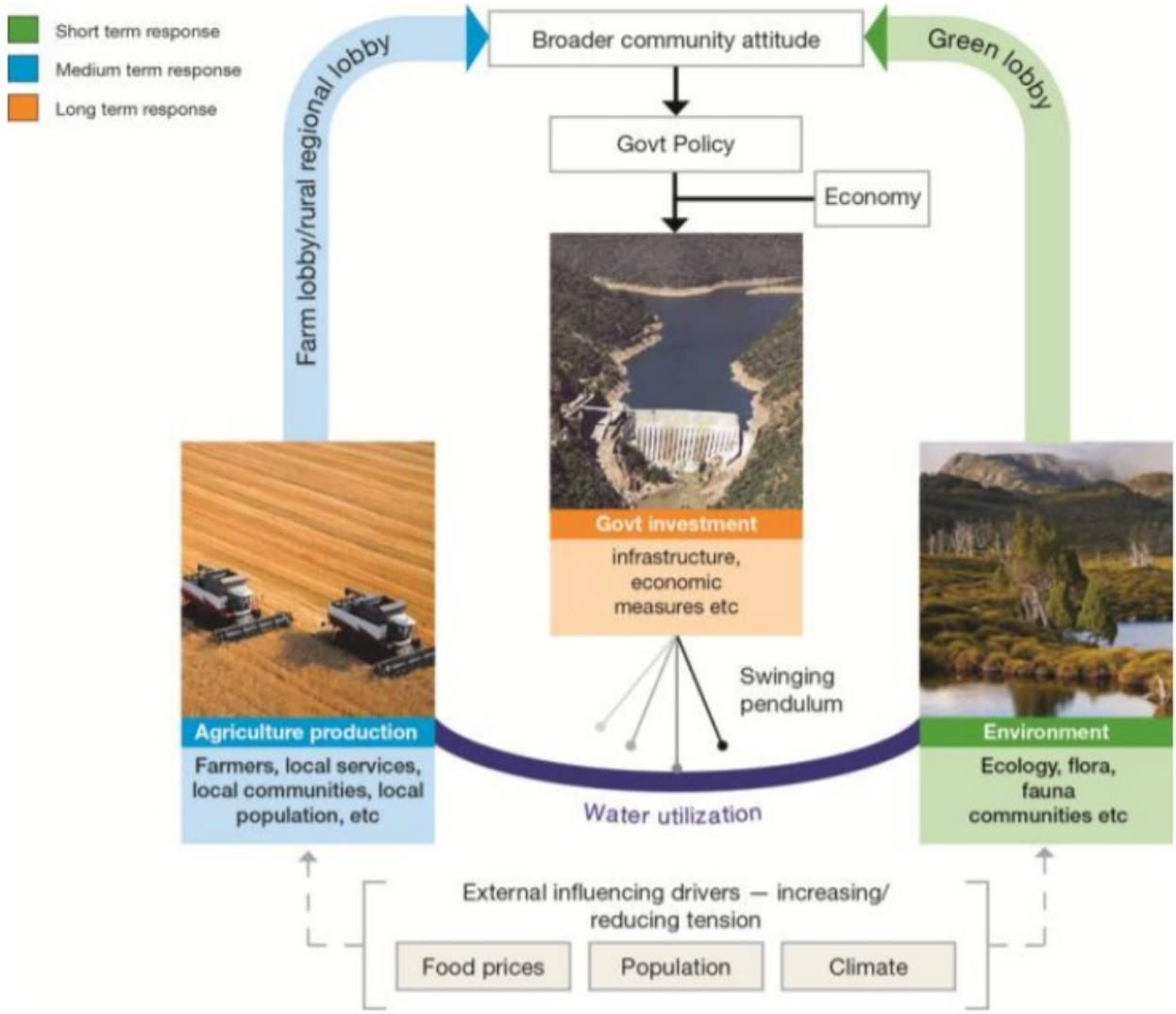


Figure 3-2 Framework proposed by Kandasamy et al., 2014 for Murrumbidgee Basin in Australia, for modeling the interactions between people and environment. (Kandasamy, Sounthararajah, Sivabalan, Chanan, Vigneswaran, & Sivapalan, 2014)

Van Emmerik et al, 2014 made a numerical model attempt to identify the drivers of the evolution of this human – water system in Murrumbidgee River Basin, that, as mentioned above, had led to pendulum swing in water management. At this model Van Emmerik et al, 2014 introduced, among others, the environmental awareness as model's variable, representative of peoples' characteristic, in order to track the pendulum swing that had been revealed by basin's data analysis, already carried out by Kandasamy et al., 2014. This conceptualization can be seen in Figure 3.3. Even though the model tried and managed to mimic the basin's system in general and brought to light how the different aspects of controlling the dynamic of this system co-operate, there have been some weaknesses related to simplifications made, the degrees of freedom that the model had and specific initial, boundary conditions, that need further research in order to make this model adequate for general use. (Van Emmerik, et al., 2014)

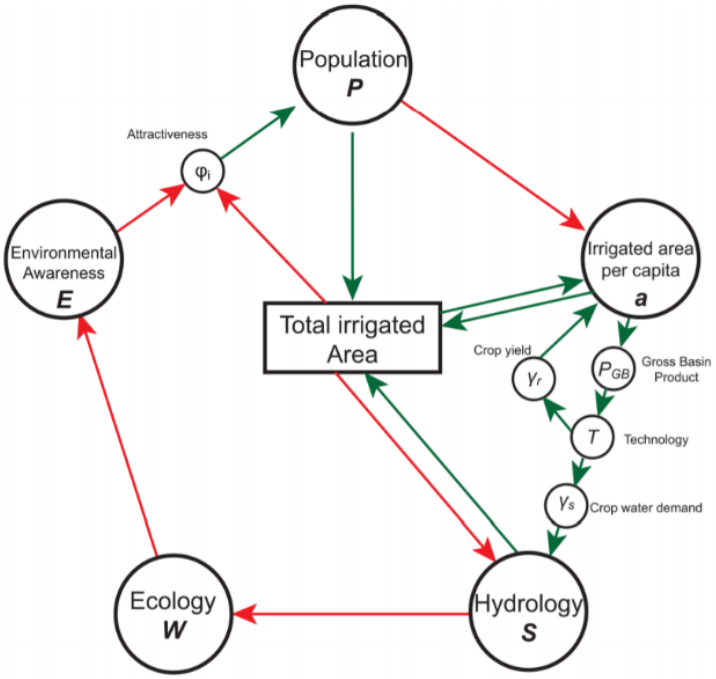


Figure 3-3 Conceptual framework for Murrumbidgee Basin in Australia, proposed by Van Emmerik et al., 2014, in order to couple human aspects and water system. (Van Emmerik, et al., 2014)

Elshafei et al., 2014 proposed a framework for agricultural basins that simplified the coupled system of people and water systems and provided another conceptualization of the ways people may interact with the catchment. Two basic feedback loops that emerge in this coupled system are the 'Economic-Population Loop' and the 'Sensitivity Loop' and can be seen at Figure 3.4. According to the 'Economic-Population Loop', the population of a catchment will be increased by the time the lifestyle will be improved, as a result of water use for capital production and this growth of population will lead to more water consumption. Concerning the 'Sensitivity loop', the decisions concerning the water management and the attitude towards water resources, which formulate the "Behavioral Response", they are influenced by the social and environmental values of the community. Based on the sensitivity state variable, the behavioral responses will tend to increase or reduce the interventions at the catchment, by managing activities or by intensifying or lessening water consuming. (Elshafei, Sivapalan, Tonts, & Hipsey, 2014)(Blair & Buytaert, 2016)

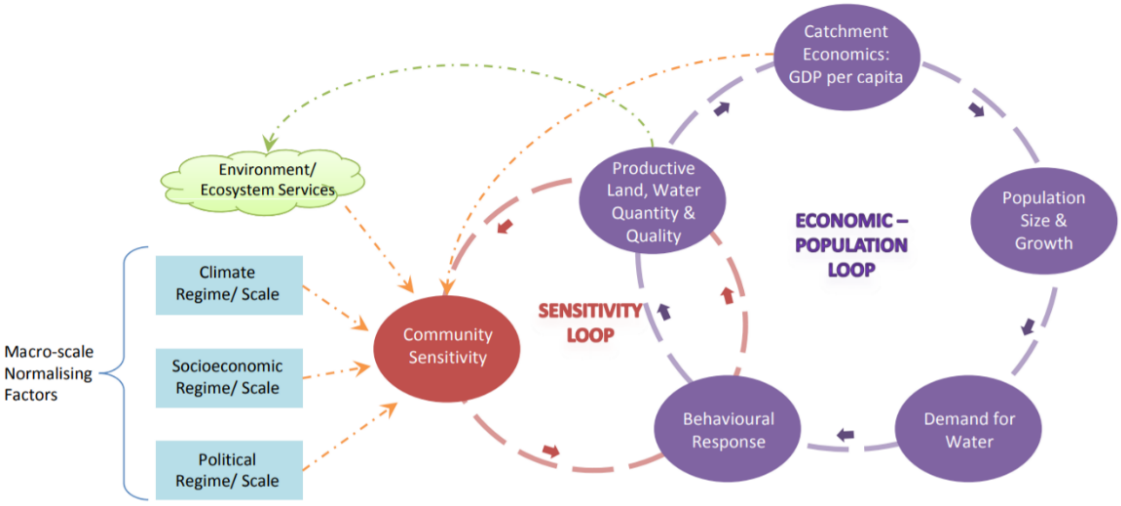


Figure 3-4 The socio-hydrological model proposed by Elshafei et al., 2014, with two feedback loops of human factors (Elshafei, Sivapalan, Tonts, & Hipsey, 2014)

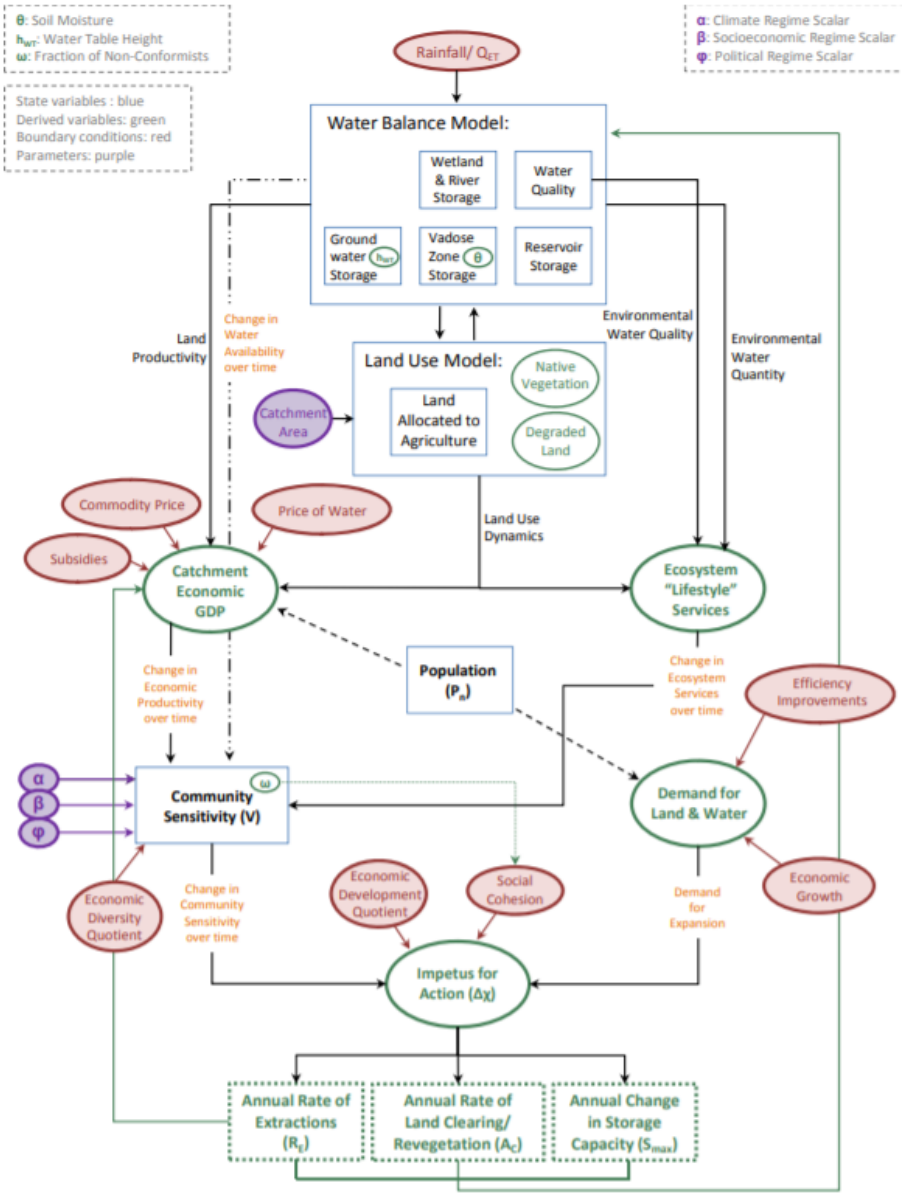


Figure 3-5 The generic conceptual framework for agricultural basin proposed by Elshafei et al. (Elshafei, Sivapalan, Tonts, & Hipsey, 2014)

The generic conceptual framework, which can be seen in Figure 3.5, was applied in two agricultural catchments in Australia and the Murrumbidgee catchment was one of them. At this case, the changes at the management of water dedicated either to irrigation and or to environment, were hypothesized to be connected to changes in the Community Sensitivity variable over the time and that was characterized as pendulum swing.

3.2.2 Lake Toolibin, Australia

Another example of the generic framework proposed by Elshafei et al., 2014 was applied at the case of Lake Toolibin in Western Australia. At this lake, the economic development was achieved by land clearing actions and then, the environmental degradation which was observed, due to high groundwater levels that caused salinization, motivated the local community to take measures to prevent further deterioration of the environment, that would endanger the agricultural production. This change of strategy was the result of a change of interest of the Community's Sensitivity due to decline of quality of life. (Elshafei, Sivapalan, Tonts, & Hipsey, 2014)

3.2.3 Tarim Basin, China

Another case, where a pendulum swing was observed, was at the Tarim Basin in China. The co-evolution of humans and water in this basin, was examined at first by a historical sociohydrological analysis, covering the last 2000 years. The evolution of this coupled system was divided into three eras, taking into account significant social and natural events and the way they influenced how people interacted with water resources. This analysis contributed to better understanding of the human-water relations and valuable information was generated, that could improve the predictions of how people and water resources dynamics will be.

A conceptualization that could describe this evolution was the Taiji-Tire model. The Taiji-Tire model, as it is presented in Figure 3.6, is a general framework used for the analysis of the ways human and water interact at the Tarim River basin in China. This framework uses as conceptual basis an example from the Chinese philosophy, the Yin and Yang poles, as the two opposite poles of a system, that interact and depend on each other. In terms of socio-hydrology, they represent the co-evolution of a system, due to the interactions among the two poles, human and water, which are influenced by natural and social factors.

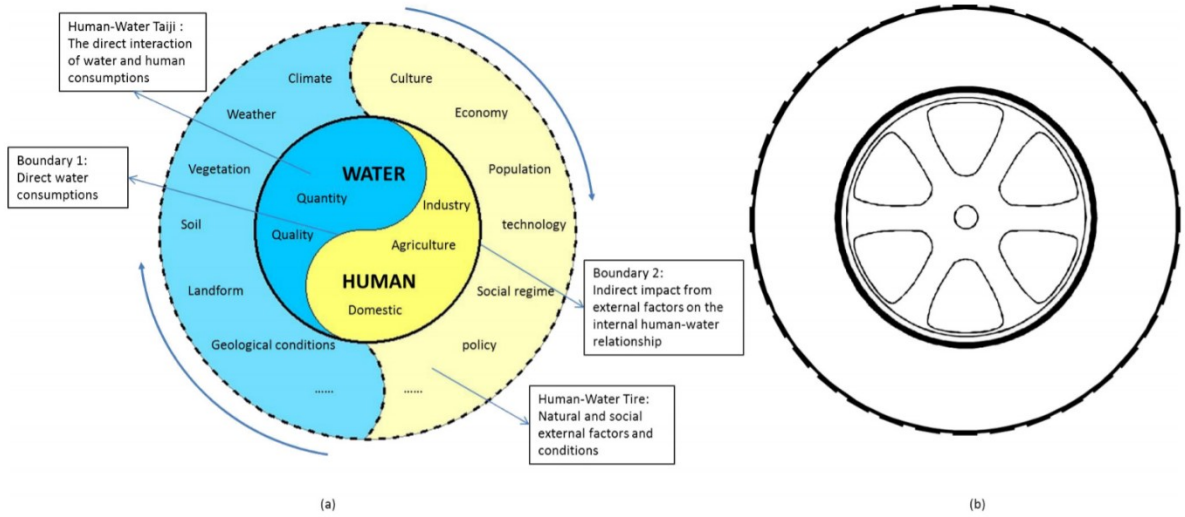


Figure 3-6 Taiji-Tire model proposed by Liu et al., (Liu, Tian, Hu, & Sivapalan, 2014)

According to this framework, the system of a basin is changing under the influence of an inner and outer Taiji system, which resembles also a tire model, therefore the name Taiji-Tire model. Both the inner Taiji system, which represents a specific socio-hydrological system and the outer Taiji system, which represents the environmental and social conditions surrounding the system, interact with each other. For the evolution of a certain sociohydrological system, both the inner and outer tire, are playing role. In more detail, the inner circle of the Taiji-Tire model includes the two factors, human and water. The ways these two factors interact are complicated and have various mechanisms that include water consumptions activities and they are governed both by the surrounding environmental circumstances and the human's personal and societal mechanisms.

According to this framework, crucial role at the development of the societal part plays the governing social productive force, which gives an overview of how human make use of the natural resources. Only when the usage exceeds a certain threshold, a new era may arise for the sociohydrological system. By having low social productive force, the alterations at the system are governed by the natural changes and humans have to adapt to that. But at cases, where the social productive force is high, the changes are governed by the social factors and then the sociohydrological system is expanding.

The regime, out of the examined sociohydrological system, is consisted by natural and social factors. This part is represented as the outer tire at the conceptual graph of the framework and will always interact with the inner tire, the examined sociohydrological system. For example, any climate change will affect the hydrological regime of the sociohydrological system and this will affect the human part through the path of the water-human interactions. (Liu, Tian, Hu, & Sivapalan, 2014)

So, for this framework, the water consumption activities at basin level are ruled by the human behavior towards water system and are affected by the personal and social characteristics. (Liu, Tian, Hu, & Sivapalan, 2014) At Tarim basin, the intense water use lead to the deterioration of the environment and people switched their attitude towards water resources and wanted to restore this condition. This conceptualization of the human – water relationships has been conformed also in the Murrumbidgee River basin in Australia, as described by the work of T.H.M. van Emmerik. (Van Emmerik, et al., 2014), which has also been analyzed above.

3.2.4 Kissimmee River Basin, Florida, USA

Another example of use of a conceptualization, in order to explain the human – water relationships, was developed at the case of Kissimmee River basin in Florida, USA, by Chen et al,2016 (Chen, Wang, Tian, & Sivapalan, 2016)

At the case of Kissimmee River Basin in Florida, USA, a conceptual model was developed in order to describe this sociohydrological system, as it is presented in Figure 3.7. After a short historical overview of the evolution of the management practices of the river, it was revealed that the downstream parts of the river were channelized into an open canal in the 1960s, in response to the increased needs of the residents, living at these lower parts of the basin, for flood protection, because of frequent flood events due to heavy storms. However, the ecological impact of this project was considerably large, since the total area of the wetlands and the population of various species decreased significantly along these lower parts of the river. In order to reverse this condition, restoration projects started in the 1990s by removing from the canal the artificial interventions of water control structures, in order to restore the environmental condition of these areas.

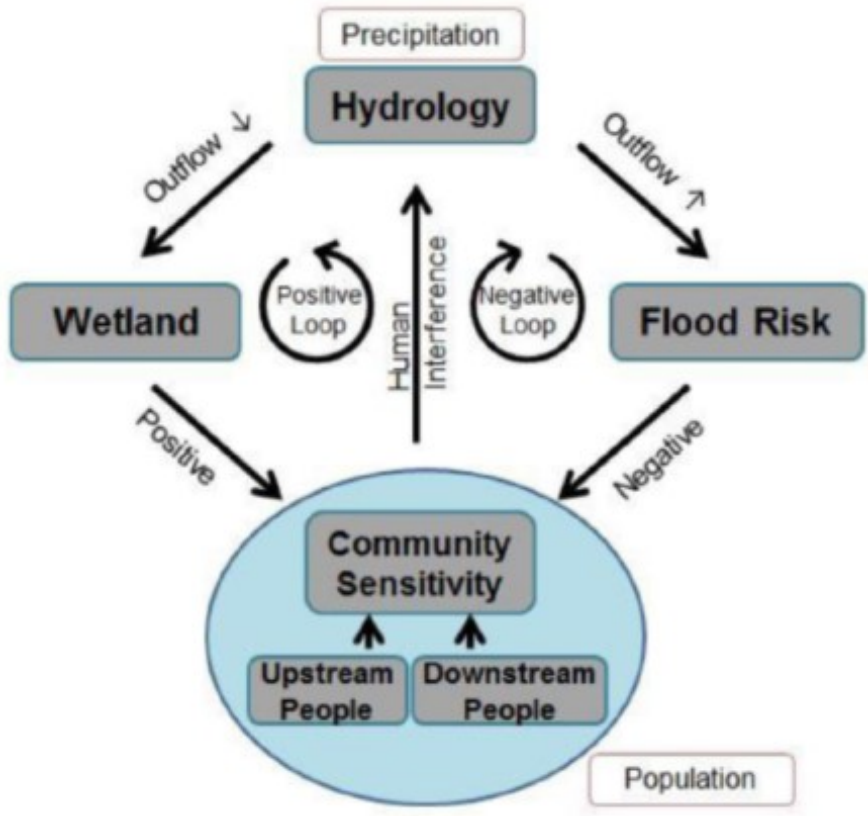


Figure 3-7 Framework for the sociohydrological modeling of the Kissismmee River Basin (Chen, Wang, Tian, & Sivapalan, 2016)

This shift at river management, from flood protection towards environmental restoration, was a result of changes at humans' preferences and values, that form the community's sensitivity, which were modeled in this case as a two-direction variable, representing the fact that they can be influenced positively or negatively by peoples' attitude, either towards environmentally friendly decisions or by controlling environmental in favor of economic development. (Chen, Wang, Tian, & Sivapalan, 2016)

3.2.5 Dommel Basin, Belgium and the Netherlands

The case of the Dommel Basin, in Belgium and the Netherlands, is another example showing a pendulum swing from development and controlling water resources to protecting and restoring them, after almost 100 years. The springs of Dommel River are in Belgium and then the river flows through the Netherlands, where it joins other rivers. Until 1900 the floods of this river were causing problems only in summer, because they were flooding agricultural areas, whereas in winter period they were considered beneficial for the fertility of the cultivated land. From 1875, some first flood control projects took place and it was not until the 1990s, when the first restoration projects started to be executed.

At this case, the pendulum swing was connected to community's sensitivity. Information about the evolution of community's sensitivity was taken from children's' book of the 20th century, revealing a tendency of people becoming more critical with technology and facing environment as a system that needed protection and not control, indicating high community's sensitivity. From the analysis of the evolution of the pendulum swing for Dommel river, it was concluded that the pendulum swing was conducted in three stages, from developing and controlling, to protecting and finally restoring the water system. (Mostert, 2018)

3.3 Patterns of human behaviors towards rivers

Two recognized ways that indicate how people interact with the rivers and the floods, regarding their settlement and development at the areas around the rivers, are the 'levee effect' and the 'room for the river'. (Ferdous, Wesselink, Brandimarte, Slager, Zwarteveen, & Di Baldassarre, 2018)

3.3.1 'Levee effect'

The 'levee effect' is a pattern of human behavior towards rivers, already mentioned since 1945 by White (White, 1945). Over the years, it was observed that people had the tendency to inhabit at floodplains, close to the rivers. This happened due to the need of people to make use of the benefits of these areas, which were the fertile soil of the riparian zones and the importance of rivers for transportation. However, the risk of floods was always apparent and people, for protecting measure, were either resettling away from the river or were modifying the river with flood control constructions.

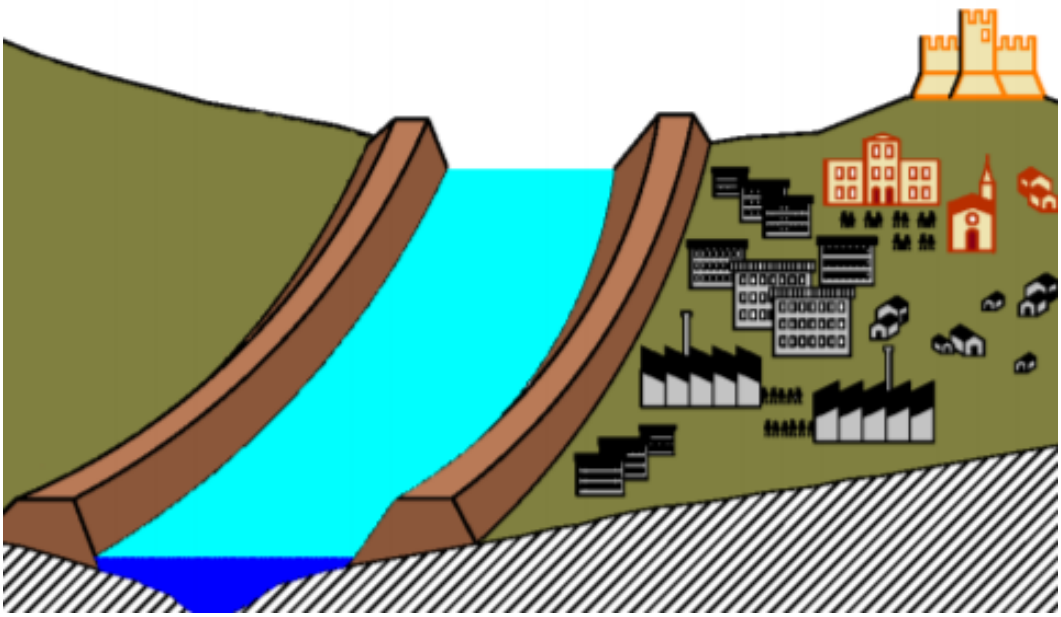


Figure 3-8 levee effect (Baldassarre, et al., 2018)

In more detail, at the case of 'levee effect', the chosen option for flood protection is building levees. By building levees, the frequency of floods is reduced, the feeling of safety increases and the financial activities can take place close to the river. With this pattern, the perception of risk against floods among people is reduced, resulting to intensification of settling at floodplains and increase of the population. However, these areas become more vulnerable to rare, but more catastrophic, flood events. (Baldassarre, Viglione, Carr, Kuil, Salinas, & Blöschl, 2013) (Di Baldassarre, Kooy, Kemerink, & Brandimarte, 2013)

3.3.2 'Room for the river'

The 'room for the river' is another option for dealing with floods from the rivers. It springs from the raise of peoples' environmental consciousness for the rivers and the areas along them, which are considered to have high environmental value. Mainly, this approach suggests to allow some levels of inundation and by diverging from the idea of making high levees, which, from one hand decrease the probability of floods, but on the other hand have more severe consequences when they fail. (Baldassarre, Viglione, Carr, Kuil, Salinas, & Blöschl, 2013)

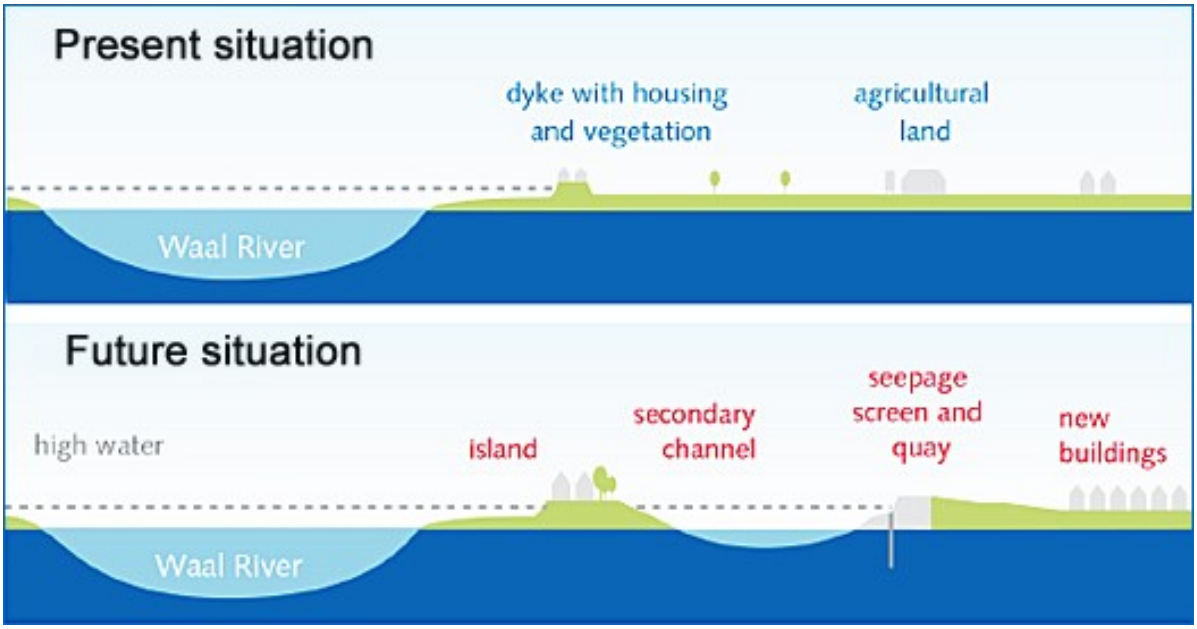


Figure 3-9Example of 'Room for the river' application (www.dutchwatersector.com, 2013)

3.4 Human characteristics in sociohydrological analyses

An overview of the human characteristics that influence the decisions of people and their attitude towards water resources and have been used at studies related to the pendulum swing are presented in Table 3-2.

Table 3-2 Human characteristics sociohydrological studies with pendulum swings

Sociohydrological system	Pendulum swing by Historical analysis /Qualitative methods	Pendulum swing by Conceptualizations	Human characteristics
Murrumbidgee Basin, Australia	(Kandasamy, Sounthararajah, Sivabalan, Chanan, Vigneswaran, & Sivapalan, 2014)	(Van Emmerik, et al., 2014)	• community's sensitivity / environmental awareness
		(Elshafei, Sivapalan, Tonts, & Hipsey, 2014)	• political regime • socio-economic regime • community's sensitivity
Tarim Basin, China	(Liu, Tian, Hu, & Sivapalan, 2014)	(Liu, Tian, Hu, & Sivapalan, 2014) – Taiji-Tire model	• culture • social regime • policy
Lake Toolibin, Australia		(Elshafei, Sivapalan, Tonts, & Hipsey, 2014)	• political regime • socio-economic regime • community's sensitivity
Kissimmee River Basin, Florida, USA		(Chen, Wang, Tian, & Sivapalan, 2016)	• memory • community's sensitivity
Dommel Basin, Belgium and Netherlands	(Mostert, 2018)		• social-political regime • memory • community sensitivity • policy

The human characteristics, that were found to be common at the studies related to pendulum swings and that influence people's attitude and decisions towards water resources, are the political and social regime, the memory and the community's sensitivity. The economic regime was excluded from this study for time and data limitations.

Regarding the human characteristics, some aspects of human reactions have been assigned with specific expectations and people were assumed to meet certain criteria of behavior. In more details the human characteristics mentioned above from the pendulum swing studies are presented below, along with assumptions taken for granted regarding human behaviors are presented below.

3.4.1 Rationality

In a community, people's decisions regarding a risk may vary, since the decision-making processes can be characterized both as individual and as social processes. However, it is quite common the decisions taken from a small group of people to finally be adopted by larger parts of a community, since people can be influenced either by imitating others' reactions or by learning from the experiences of their social surrounding. (Wens, Johnson, Zagaria, & Veldkamp, 2019)

At the decision-making process, regarding water management, there have been modeling studies in the field of sociohydrology, like the ones of Srinivasan,2015 (Srinivasan, 2015), Grames et al., 2016 (Grames, Prskawetz, Grass, Viglione, & Blöschl, 2016) and Pande et

al., 2014 (Pande, Ertsen, & Sivapalan, 2014), that assumed the notion of rationality. Rationality in sociohydrology is generally interpreted in individual terms, as the tendency of people to increase as much as possible their well-being. (Pande & Sivapalan, 2017)

In general, rational choices can be an indication of the most preferable option of humans, among a group of possible decisions. Cultural, psychological and social factors and specific characteristics of the general frame, influence the criteria for the selection of the final choice. So, the Rational Choice Theory can be a useful tool to model the way people make decisions, but there is a lot of debate whether this theory can represent successfully the human behavior. (Müller & Levy, 2019) The main reason for this is that humans tend not to act rationally, but are influenced by social norms, traditions and values. (Mostert, 2019)

In reality, people may make choices which could be characterized far from optimal and it is possible to be even against the laws. Such behaviors may be the water abstraction from prohibited locations or settling close to polluted rivers etc. Therefore, is important to understand the way culture and values influence people's preferences and in this way be able to model and predict people's behavior, instead of making assumptions. (Sivapalan & Blöschl, 2015)(Roobavannan, et al., 2018)

Water resources management is a challenging field, since water resources are common resources, with open access, that can be vulnerable to overexploitation by individuals that try to optimize their use, a phenomenon also known as 'tragedy of the commons'. However, the individual optimization is not always the target and the collective collaboration at common quandaries is affected by variables, like the diversity of the agents, the number of people affected by the decision, the way the purposes and actions are promoted, people's belief, time frame and general framework. Example of that, is what Kinzig et al. (Kinzig, et al., 2013) mention, that when people, who adapt a certain behavior, represent even a small percentage of the total population, like 10%, then a critical point is reached and their beliefs and norms might become more accepted by the community, like the case of the movement of environmental consciousness. (Elshafei, Sivapalan, Tonts, & Hipsey, 2014)

Many cases concerning the rationality in the field of sustainable water management, that cannot be explained adequately, are characterized as paradoxes (see discussion in Sivapalan et al. 2014 (Sivapalan, et al., 2014) and it is argued that the main reason is the irrational behavior of people. (Di Baldassarre, Brandimarte, & Beven, 2016) However, this kind of decisions, that deviate from what is considered as rational, need to be conceptualized as well. (Müller & Levy, 2019)

In general, according to Simon - a Nobel Prize winner for Economics in 1978 - in the economic science, humans are concerned as rational, whereas in the field of sociology and psychology humans are concerned to have both rational and irrational aspects at their reactions and decisions at cases, at individual or collective level. (Sivapalan & Blöschl, 2015) For instance, altruism or the sense of helping and showing interest for topics related to next generation and getting pleasure out of this attitude is an aspect of altruism that can be explained based on the dominated values and norms. (Roobavannan, et al., 2018)

For example, Yu et al., 2017 make an analysis about the reasons farmers in Bangladesh show willingness to contribute voluntarily at flood defense maintenance works, while they could benefit from the work of others. This behavior is not rational from an economic point of view. The explanation for this behavior could be the fact that people can follow rules of conduct that promote collective actions and it is not a general state, that individuals always show rational economic attitude when it comes to large common projects. (Yu, Sangwan, Sung, Chen, & Merwade, 2017) Another example of is a case in New Mexico, where a community, which manages an irrigation system, managed to sustain its functionality with decreased streamflows, because they adapted to the new water regime and decided to switch to different crop cultivation, even if they were less profitable. (Gunda, Turner, & Tidwell, 2018)

In general, the interest about defining a behavior as rational or not, stems from the interest of sociohydrology to be able to conceptualize the co-evolution of humans and water. And characterizing a behavior within a model, is influenced of the availability of information provided and the ability to detect patterns of behaviors. (Sivapalan & Blöschl, 2015) Concerning the rationality, assumed at the other studies analyzing water systems management, since it includes the economy part, for the purposes of this research, will not be included, since it was not easy to find the suitable data.

3.4.2 Memory

At sociohydrological studies about the way people interact with water bodies, memory has been considered as an intrinsic factor of human behavior, which affects the relation of people with water bodies and is related with risk awareness, linked to adaptation response (Fuchs, Karagiorgos, Kitikidou, Maris, Paparrizos, & Thaler, 2017). There have been attempts to parameterize, since it cannot be measured systematically over time as series (Di Baldassarre, et al., 2019) and relate it to flood risk awareness, like in Di Baldassarre, Viglione, et al., 2013 (Di Baldassarre, Viglione, Carr, Kuil, Salinas, & Blöschl, 2013) or to flood defense mentality, like in Di Baldassare et al, 2015 (Di Baldassarre, et al., 2015).

The categories of memory that can be found at sociohydrological studies are presented below, along with their role in the evolution of basins:

Social memory can be described as the field that encloses the knowledge, which after alterations and successfully applied adjustments, has become part of people's value system and can be translated into policy during the decision-making progress and through open dialogues with the community. Social memory is considered part of the culture of a society and it is important, since it can link experiences from the past with present and future policies. (Folke, Hahn, Olsson, & Norberg, 2005) Thus, conceptualizing social memory in terms of time length, is an indication of the preparedness of a society towards floods, through past experiences and new adaptations at the policy system. (Gober & Wheater, 2015)

Collective memory refers to the ability of the society to remain interested about a certain topic, like floods, that people tend not to remember for long time. The length of the time scale until an issue, is no longer a main concern, is influencing the way people, as community, handle such phenomena. Viglione et al, 2014 basically connect collective memory to flood risk culture and refer to it as the ability of the community to keep risk awareness at high levels. (Viglione, et al., 2014)

Flood memory according to Di Baldassarre et al, 2015, is built after people are shocked due to an extreme event that they have experienced, like flood.(Di Baldassarre, et al., 2015) It is not homogeneously distributed at the different parts of society, which can be either different social groups or individuals and this different perception of flood memory, can make the different social groups have a different point of view regarding water management, while each of these different components of the society has the capability to influence the administrative decisions concerning water management of a basin. (Di Baldassarre, et al., 2019)

Changes in memory related to water issues can be influenced by the policy makers, who can make the flood risk an issue of high priority at the public planning, but also, by the personal experience of people and by the media, which can increase or mitigate people's perception of risk. (Di Baldassarre, et al., 2015) Information about changes at peoples' memory, related to water resources management, can be found, according to Elshafei et al, 2016 (Elshafei, Tonts, Sivapalan, & Hipsey, 2016), at the media. Media retain memory for longer period and facilitate the implementation of long-term water management solutions. Media, through campaigns, remind the community the importance of the measures that should be taken after a significant event, especially like an environmental change. Also, social networks may play a very important role for social memory at critical periods, by allowing the transmission of knowledge. (Folke, Hahn, Olsson, & Norberg, 2005)

3.4.3 Political and social context

River basins' management determines the geographical entity where water resources are under the same managerial purposes and are influenced by political factors and ideological parts. The concept of having the river basin as operating unit was basically serving the management and development purposes of water resources. Gradually, the river basin evolved to a broader field of political conflicts, where opposing interests compete one against the another in order to prevail, even though they are occasionally compromise. (Molle, 2009)

The development of infrastructures at basin level emerges from the needs and interests of social groups and is claimed through tensions and tactics, that are usually difficult to handle compared to the pure technical problems. Engineered solutions within the urban

context, related to water and sanitation projects, can trigger conflicts on political and ideological basis, since infrastructures can be considered as 'politics pursued by other means'. (McFarlane & Rutherford, 2008)

The prevailing national political regime at a basin can be considered a macro-scale parameter, inherent of the community's sensitivity state function. One aspect of the national political regime, as parameter, can be the degree to which the government responds to the community's wishes. In societies with democratic regime and regular elections, it is expected that the people's preference is taken into consideration at government's decision. In the contrary, at totalitarian regimes, this response is estimated to be weaker due to depravity or different interests of the government (Elshafei, Sivapalan, Tonts, & Hipsey, 2014)(Wheater, 2015)

Elshafei et al., 2014 have used the Corruption Perception Index (CPI) by Transparency International as indication of the prevailing political regime at a basin. This proposal emerged from the work of Forbes et al., 2004 (Forbes, Fresco, Shvidenko, Danell, & Chapin, 2004) that connected the degree of vulnerability of the community with how stable a political regime is, concluding that the more stable the regulatory framework is, the less vulnerable the community is. (Elshafei, Sivapalan, Tonts, & Hipsey, 2014)

3.4.4 Community's Sensitivity/Environmental Awareness

The concept of environmental awareness was raised after the realization of the degradation of natural environment and it is related to the initiative of people to take measures against environmental problems. The severity of these problems and the potential benefits after solving them, influence the threshold after which actions are taken. (Troy, Pavao-Zuckerman, & Evans, 2015) In the field of sociohydrology, this restorative tendency of people in favor of the environment was named by Van Emmerik et al., 2014 as 'environmental awareness' (Van Emmerik, et al., 2014) and it was generalized by Elshafei et al., 2014 (Elshafei, Sivapalan, Tonts, & Hipsey, 2014) and became more broad by evolving to 'community's sensitivity'.

Community's sensitivity plays an important role in the evolution of basins and is related to the degree of threat, people assume, about their quality of life, at cases where the prevailing norms are distributed. The greater this threat is believed to be, the more alert the society is to changes at factors, that could later deteriorate their quality of life. On the other hand, a society is less sensitive to changes of particular factors, when the quality of life is not considered to be under threat. So, community's sensitivity is related to the way trivial changes of the hydrological variables impact on economy, society and environment. The more sensitive a society is, the more likely is to take environmentally friendly measures. On the other hand, if the sensitivity level of the society is low, then it is more unlike to make any action after a change of a hydrological variable. (Elshafei, Sivapalan, Tonts, & Hipsey, 2014)

Elshafei et al., 2014 (Elshafei, Sivapalan, Tonts, & Hipsey, 2014) and Elshafei at al., 2016 (Elshafei, Tonts, Sivapalan, & Hipsey, 2016) connected community sensitivity with social indicators related to economy and culture. Roobavannan et al., 2017 linked community sensitivity with the structure of the local economy (Roobavannan, Kandasamy, Pande, Vigneswaran, & Sivapalan, 2017). At the case of Murrumbidgee River basin community's sensitivity was an indicator of the balances achieved between a good environmental condition and financial welfare (Roobavannan, Kandasamy, Pande, Vigneswaran, & Sivapalan, 2017). Also, at Kissime Basin in Florida, Chen et al., 2016 (Chen, Wang, Tian, & Sivapalan, 2016) regarded community's sensitivity as an indicator of peoples' wellbeing and good environmental condition and it was related with flood memory of residents.

Data regarding the parameter of environmental awareness of the community and in general, data for intangible parameters it is difficult to have and therefore researchers have to be creative in order to capture their variations. (Troy, Pavao-Zuckerman, & Evans, 2015), therefore various alternatives can be used as indicators. One source for taking indication of community's sensitivity can be the participation of residents, at environmental protection organizations. (Elshafei, Sivapalan, Tonts, & Hipsey, 2014) Also, Wei et al., 2017, in order to measure community's sensitivity, analyzed qualitatively and then quantified, samples of newspaper articles with issues related to water and tried to assess whether the article had an environmental or economic tone. (Wei, Wei, & Western, 2017) Another way to measure community's sensitivity was introduced by Mostert, 2015 who analyzed 89 children's books related to floods from the 20th century in the Netherlands and released a turn in favor of nature around 1970. (Mostert, 2015)

The coverage of environmental issues at news media can also be a good indicator of the awareness of the people on these issues, since the media are an important mean of influence of people's opinion, who can affect, at their turn, the decision making processes at these issues. The extent to which the community sensitivity is affected by environmental problems might not be found only in the news media, but at the social media as well and one should keep in mind that the reference of environmental problems at the news media is usually due to particular incidents that occurred at that period and raised the awareness. (Roby, Gonzales, Quesnel, & Ajami, 2018)

4 Methodology

The aim of this research is to investigate the main human interventions that influenced the evolution of Athens basin and analyze which factors affected these interventions. Based on these questions, which set the frame of the topics that need to be searched, the option of conducting a qualitative research, by extensively analyzing a case study, was decided. The case study research method was selected for the purposes of this study due to the needs for in-depth analysis of the events and parameters as explained in section 4.1. In section 4.2 to 4.4 the frame of the research is presented. The case study research included the historical and content analysis, as will be explained in Section 4.5 and in Section 4.6 the sources are mentioned. The historical analysis of books, monographs and reports were conducted on technical and historical details, in order to cover the historical evolution of the social, political and urban characteristics of Athens and the human interventions at Ilissos and Kifissos basin. The content analysis was conducted on newspaper articles and municipal acts to cover the evolution of the tone of the articles and acts and to detect the kind of memories people had about the rivers.

4.1 Case study research method

Conducting a case study research is one way to examine the relations of water and human, based on the thoroughly analysis of a case over an extended period of time and includes the collection of information by a variety of methods. In case study research, it is possible to use both qualitative and quantitative data methodologies. (Creswell, 2014) (Mostert, 2018)

4.1.1 Benefits and limitations of case study method

The method of case study research is an exceptional methodology for in-depth understanding of complicated issues. This method allows the researcher to pay more attention at details, offers the possibility to explore the correlations among conditions and events related to the case under study, even if this is not immediately evident and capture information that with other methods, like the experiments or surveys, wouldn't be possible. (Dooley, 2002)(Hodkinson & Hodkinson, 2001)

By selecting the case study as research method is possible to develop theories, that can be verified based on the observations or to falsify already existing theories about the research topic or even enrich and improve theories by taking new data into account. (Hodkinson & Hodkinson, 2001)(Dooley, 2002) Case study allows the exploration of the causal mechanisms, between condition variables and the historical trajectory of the case and this may lead to the recognition of patterns, which can be generalized. Moreover, through the case study analysis is also possible to highlight and include in the research new variables and hypotheses, which were omitted at the initial design of the research. (Bennet, 2004)(Hodkinson & Hodkinson, 2001)

However, when using the case study research approach, one should keep in mind some limitations, basically judging if the findings of a particular case study are representative of the situations they describe and if they can be generalized beyond this case. (Bennet, 2004) The quality of the case study research is also related to the qualitative characteristics of the researchers, such as 'expertise and intuition', the focus to the research questions, the data decided to be used or to be excluded and the adequate amount of data presented as evidence. However, the researchers using the case study methodology may face a vast amount of data for interpretation. Collecting data for the case study can take a lot of time and the elaboration of them can be a time-consuming procedure, but any discount on the selection of the material could reduce the trustworthiness of the findings. Other limitations are related with the research findings which might complex to be understood from all the stakeholders. As a result, the reliability of the case study research can be disputed over the sample size, the researchers' bias, the locality of the results etc. However, one should keep in mind that the use of case study research is not the ultimate research method and there are many kinds of research questions that are not possible to be answered by this method. (Hodkinson & Hodkinson, 2001)

In order to tackle parts of these limitations, the choice of the basin was made considering the nature of this study, which required to extract information on the relations of people with water resources from various alternative data sources and therefore, the common

language of the researcher and literature was an asset. Also, concerning the study period, the time frame chosen covers a whole era which is the modern history of the country and the city. Moreover, the choice of the data sample size was attempted to be compliant with the nature and the special characteristics of the sources related to political orientation of the sources and the time frame they cover.

4.1.2 Case study and sociohydrology

At the first sociohydrological studies that were linked to specific places, there was a lot of criticism and many comments in order future studies of this field to broaden the objectives and the foundations of the field of sociohydrology. At the beginning, the methods used, were mainly from the field of hydrology and natural science, since the majority of the researchers were from this field. However, there were arguments that the sociohydrological research should also benefit from the research of other fields as well, like social science, like what Mostert, 2018 (Mostert, 2018) and Xu et al., 2018 (Xu, Gober, Wheater, & Kajikawa, 2018) have mentioned. (Konar, Garcia, Sanderson, Yu, & Sivapalan, 2019)

4.2 Research steps at case study research method

In order to conduct this case study research, the steps that were followed are depicted in the Figure 4.1. (Creswell, 2014) The first step was to define the general research question and then select the subjects that need to be further analyzed. After that, the relevant data were collected. After collecting the material, interpretations took place in order to examine any possible relations between the findings. Finally, after collecting, interpreting and inter-relating the findings, conclusions were drawn.

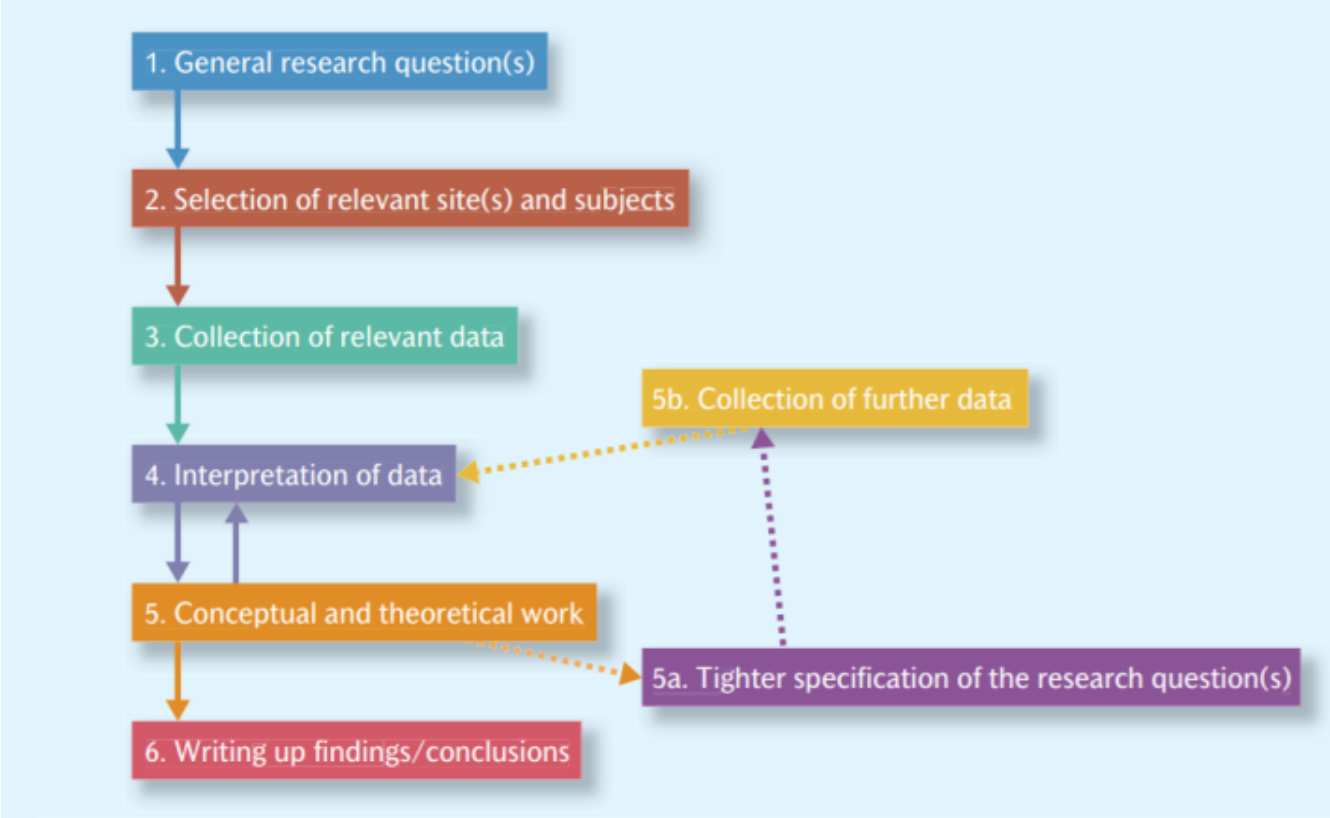


Figure 4-1 The general outline of the main steps of qualitative research (Creswell, 2014)

4.3 Defining general research frame

As it was explained in Problem statement in Chapter 1, the main task of this research was to detect and explain the main human interventions that affected the evolution of Ilissos and Kifissos basin and analyze what influenced them.

4.4 Defining site, time frame and subjects

The rivers, Ilissos and Kifissos, are the two main rivers of the capital city of Greece, Athens, that defined the site of this research. The time frame chosen was from 1834, after the independence of parts of Greece from the Ottomans and the establishment of Athens as capital of the new state, until 2019.

In order to be able to examine the evolution of these coupled human-water systems in the frame of sociohydrology, attention was paid to literature for sociohydrology and human characteristics, related Greece's history, Athens urban development and Ilissos and Kifissos management.

4.5 Data Collection and Interpretation

The information needed for this study was collected and analyzed through qualitative methods, since these kinds of methods are exploratory and focus on the justification and stimulus of the decisions and actions concerning the two rivers. (www.ndcompass.org) At this research the chosen methods, to collect and interpret data, are the historical analysis and the content analysis.

4.5.1 Historical analysis method

The method of historical analysis, followed at this research, was similar to studies of other hydrological systems, examined under the frame of sociohydrology. In general, at sociohydrology, historical analysis allows the systematic study of immediate or distant past events and the study of the ways societal and environmental systems interact, in an attempt to associate them and discrete them at phases. (Liu, Tian, Hu, & Sivapalan, 2014). Kandasamy et al., 2014 did a historical analysis and by studying historical evidences, related to the Murrumbidgee River Basin in Eastern Australia, managed to trace the evolution of the agricultural water, divide the history of water management into four eras and point out patterns of certain dynamics. (Kandasamy, Sounthararajah, Sivabalan, Chanan, Vigneswaran, & Sivapalan, 2014) Respectively, Liu et al, 2014 did a historical analysis of the societal and water system at the Tarim River basin in Western China. (Liu, Tian, Hu, & Sivapalan, 2014) So, the interpretation of past events at different locations, may enable the researchers to identify upcoming phenomena, that can reveal basic principles of the water-human interactions. (Pande & Sivapalan, 2017)

In this research, the historical analysis method was used to explore potential evolution patterns at the case of Ilissos and Kifissos basin and determine possible correlations among city's development and rivers' management over the study period. In this case, the systematic record of information focused on data related to the social and political evolution of the city and the country, on the urban characteristics of the city and the main interventions to the rivers. (Belyh, 2017)

The data for this study were technical and social. The technical data were searched at technical monographs and reports about the technical interventions at the rivers, mainly collected from conferences, from the Technical Chamber of Greece, Greece's technical universities, etc. The focus was on the technical modifications, related to projects and applied to the rivers' course, banks and bed and altered their natural flow. The interventions at basin level were related to alterations at land uses and the ways that people made use of the river. Concerning the social data, the attention was given on severe or unexpected incidents that changed the social regime of an era and on the political evolution, with the attention to be mainly on the political regime of the country, in terms of how democratic or not it was and the detailed record of the transitions from one regime to the other, in order to find how freely the residents could express their will concerning the future of the rivers. The data, about the social and political regime of the country, were searched mainly at historical books and sites related to the modern history of Greece.

The results of historical analysis on the sociopolitical evolution of the basin are presented in Chapter 5 and 10, where the political, social and urban characteristics of Athens are presented during the different historically defined periods. The results over the interventions at Ilissos and Kifissos are presented in Chapter 6 and 7.

The reliability of the historical analysis's findings was enforced by the wideness of the selected time frame, which covers about 200 years, representing the range of the modern history of Athens, after the city became the capital city of Greece, until 2019. The length of the study period is important, since an issue may not be fully explained and aspects of its evolution, may not be taken into account, at cases of limited time frame. (Belyh, 2017)

4.5.2 Content analysis method

Content analysis is a technique for systematically analyzing the presence of certain words or concepts in texts and a method for finding their relations, by categorizing them through a coding system. Examples of the use of content analysis in the field of sociohydrology, can be found at the work of Xiong et al., (Xiong, Wei, Zhang, & Wei, 2016) who analyzed Chinese newspaper articles in order to evaluate coverage of water issues by the press and of Wei et al (Wei, Wei, & Western, 2017), who tried to estimate the evolution of the societal value of water in Australia from 1843 to 2011 form local newspapers.

In particular about this research, the content analysis focused on certain human characteristics and on the way they influenced the interventions at Ilissos and Kifissos rivers. The human characteristics that were examined were the community's sensitivity and the memory, since these characteristics were found common among other socio-hydrological studies. During the coding procedure, the text was analyzed at thematic categories, which were easy to handle in order to be easier to explore the relations between them and find patterns, trends and changes at the evolution of the community's sensitivity and memory. (Stemler, 2001) (http://www.umsl.edu/~wilmarthp/mrpc-web-resources/content-analysis.pdf)

The community's sensitivity for the rivers was examined by recording the evolution of the newspapers' articles and Athens municipal acts' tone, either towards environmentally sustainable ways of treating the rivers or towards economic exploitation of the rivers. The articles and acts were also used to track the evolution of what people remembered concerning the two rivers. The correlation of these human characteristics with rivers' evolution was investigated by the content analysis of the research material, since with this method the changes at the public positions and the evolution of peoples' attitude towards the river can be detected. The way the material was interpreted with this method is presented on Chapter 8.

Main advantage of using the content analysis is the fact that it gives the possibility of processing the data both quantitatively and qualitatively and for this research analyzing the material over time, helps to observe the relation of historical and social aspects with rivers' management actions. In this research, at first, there was a qualitative interpretation of the articles and acts based on their content and then they were categorized at a coding table so that they could be statistically interpreted.

However, using the content analysis may also have several disadvantages, related both to the conceptual approach and its practical application, but in this research they were taken into account and it was tried to eliminate them. This method may require a significant amount of time to be conducted and the possibility of error during the interpretation of material, at higher levels of complexity, is apparent. In order to minimize the possibility of mistakes related to the coding procedure, attempts were made in order to keep the coding complexity at low levels, by making as much as clearer the themes to be coded. Also, usually, while applying content analysis, the researcher may ignore the historical surrounding frame of the material studied. (www.umsl.edu) At this research this phenomenon was eliminated, since the historical and social frame were examined as well.

4.6 Selected data sources

In order to conduct this research, it was necessary to be informed about the variety of types of material that could be collected and ensure the access at these sources, because certain types of data required the permission of their managing authorities and then, a selection of the ones that match the research criteria was necessary. (www.cdc.gov, 2018)

4.6.1 Newspapers

According to the review made on the possible sources of public opinion, at times prior of the research time, it was concluded that media and newspaper articles were the common field that could provide the necessary information for the purposes of this research. The criteria for this selection were related to the time period that the newspaper was published, its circulation and the accessibility to articles' archive.

'Empros' newspaper

One of the newspapers chosen for the purposes of this research was the newspaper *'Εμπρός' – 'Empros'*, which means forward. It was a newspaper published from 1896 until the break of the World War II and after the war until 1953 as daily newspaper and for some years as weekly newspaper. Concerning its circulation, it was for about 25 years one of the most popular newspapers published and distributed. (sansimera.gr, 2020) 'Empros' newspaper was chosen due to the fact that its archive is one of the oldest archives and covers continuously a wide time frame, from 1896 until 1930, so there would be no gap at the information gathered, after its first issue was published. Unfortunately, prior to 1896 there were no info found.

ΕΜΠΡΟΣ

ΗΜΕΡΗΣΙΑ ΕΘΝΙΚΗ ΕΦΗΜΕΡΙΣ

ΕΤΟΣ Γ'—ΑΡΙΘ. 804 | ΓΡΑΦΕΙΑ ΟΔΟΣ ΣΟΦΟΚΛΕΟΥΣ ΑΡΙΘ. 1 | ΕΝ ΑΘΗΝΑΙΣ Σάββατον 30 Ἰανουαρίου 1899

ΑΥΡΙΟΝ ΤΟ „ΕΜΠΡΟΣ" ΕΙΣ ΜΕΓΑ ΣΧΗΜΑ ΜΕ ΤΗΝ ΠΟΙΚΙΛΩΤΑΤΗΝ 5—ΛΕΠΤΑ—5

ΑΙΜΑΤΗΡΑ ΣΥΜΒΑΝΤΑ

ΧΡΟΝΟΓΡΑΦΗΜΑΤΑ

Ο ΡΙΖΑΡΙΤΗΣ

ΑΠΟ ΗΜΕΡΑΣ ΕΙΣ ΗΜΕΡΑΝ

ΑΙ ΙΔΕΑΙ ΤΩΝ ΥΠΟΨΗΦΙΩΝ ΤΗΣ ΑΤΤΙΚΗΣ

ΑΥΡΙΟΝ ΤΟ „ΕΜΠΡΟΣ" ΕΙΣ ΜΕΓΑ ΣΧΗΜΑ ΜΕ ΤΗΝ ΠΟΙΚΙΛΩΤΑΤΗΝ 5—ΛΕΠΤΑ—5

Figure 4-2 Newspaper Empros, in form provided to the researchers (efimeris , n.d.)

The archive of this newspaper is provided for free by the National Library of Greece and the Digital Library of Newspapers and Magazines. The newspaper has been digitized and is searchable either by article's title, author's name, publication date or by any keyword at any date and at any part in the newspaper's layout. The newspaper has been scanned and the text is digitally accessible, since Optical Character Recognition procedures are applied. (efimeris)

'Kathimerini' newspaper

The other newspaper chosen for the purposes of this research was the '*Καθημερινή*' - *Kathimerini* newspaper. 'Kathimerini', which means daily, is one of the oldest newspapers in Greece. It is continuously published since 1919, except the 7-years period of dictatorship 1967-1974 and with high circulation, which represents also the preferences of the audience. Also, it has an organized and on-line available archive, for which a free, three-month access was kindly provided by the Archival Department of the newspaper, after contacting and explaining the purposes of the research.

Η ΚΑΘΗΜΕΡΙΝΗ

ΓΙΑ ΝΑ ΜΗ ΓΙΝΗ

ΕΠΙΚΑΙΡΑ
ΠΟΛΕΜΙΣΤΑΙ

Ο ΠΡΟΕΔΡΟΣ ΤΡΟΥΜΑΝ ΑΠΕΛΕΙ ΝΑ ΧΕΙΡΟΔΙΚΗΣΗ ΚΑΤΑ ΜΟΥΣΙΚΟΚΡΙΤΙΚΟΥ

ΜΕΤΑ ΤΗΝ ΔΙΑΦΩΝΙΑΝ ΤΡΟΥΜΑΝ — ΑΤΑΥ ΔΙΑ ΤΗΝ ΑΣΙΑΝ

Η ΚΟΜΜΟΥΝΙΣΤΙΚΗ ΚΙΝΑ ΑΠΟΤΕΛΕΙ ΤΗΝ ΣΤΙΓΜΗΝ ΑΥΤΗΝ ΤΗΝ ΚΛΕΙΔΑ ΕΞΕΛΙΞΕΩΣ ΤΗΣ ΔΙΕΘΝΟΥΣ ΚΑΤΑΣΤΑΣΕΩΣ

ΟΙ ΚΙΝΕΖΟΙ ΘΑ ΣΤΑΜΑΤΗΣΟΥΝ ΕΙΣ ΤΟΝ 38 ΠΑΡΑΛΛΗΛΟΝ;

ΕΚΠΟΝΟΥΝΤΑΙ ΤΑ ΣΧΕΔΙΑ ΤΗΣ ΝΕΑΣ ΑΜΕΡΙΚΑΝΙΚΗΣ ΠΟΛΙΤΙΚΗΣ

Η ΚΑΘΗΜΕΡΙΝΗ

Ημερήσια Πολιτική και Οικονομική Εφημερίδα

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ΣΗΜΕΡΑ

ΑΠΟ ΤΗΝ ΕΚΤ

Η ρευστότητα δεν έχει φθάσει στην αγορά

Μικρό μόνο μέρος της ρευστότητας των 40 δισ. ευρώ που έχουν δανειστεί οι τράπεζες από την ΕΚΤ φθάνει στην πραγματική οικονομία. Το 57% έχει διοχετευθεί για αγορές ομολόγων, μείωση δανεισμού από τη διατραπεζική ή διακρατείται σε καταθέσεις στην ΤτΕ. Οικονομικά Κ, σελ. 2

Γιορτές με πολλά ρίσκα αλλά και προσδοκίες

Τι συστήνουν οι ειδικοί – Το στοίχημα των μαζικών εμβολιασμών τον Φεβρουάριο

ΑΡΧΙΕΠΙΣΚΟΠΟΣ ΑΛΒΑΝΙΑΣ

Τι προσευχόμουν στην «απομόνωση» του Ευαγγελισμού

Η περιπέτεια με τον κορωνοϊό

Figure 4-3 Newspaper Kathimerini, as provided to the reader at the archive form the previous century and nowadays (www.kathimerini.gr, n.d.)

The archive of the newspaper is divided into two groups according to publication year; the 1919-2010 group and the 2010-until nowadays group. It was decided to work with both groups of archives in order to cover a period of almost the last 100 years of the modern history of Greece and Athens. Although it is a nationally distributed newspaper, the emerging problems of the city of Athens were covered adequately. Another reason for choosing this newspaper, was the fact that at the past the newspaper facilitated an action for cleaning parts of the Kifissos river, therefore more attention to the problems of the river was paid and covered through the articles and therefore more information would be provided.

To Vima

The newspaper 'To Vima', which means step, was chosen to cover the period of 1967-1974, which were the years of Dictatorship in Greece and the 'Kathimerini' newspaper was not published. This newspaper was first published under the name 'Eleftheron Vima' in 1922 and after a short disruption it was republished as 'To Vima' after 1945. The online archive of the newspaper is available upon paid subscription for the years 1922-1944 for 'Eleftheron Vima' and for the years 1945 to 2006 for 'To Vima'. The online archive offers the possibility to search certain words, in specific time frame.

4.6.1.1 Data retrieval from newspapers

The dates that were used for the purposes of this research, from the archive of the newspaper 'Empros', were from 1896 until 1920, when the material from the other newspaper archive started providing information about the rivers. The archive of the newspaper 'Kathimerini' covered the period from 1920 until nowadays and the archive of the newspaper 'To Vima' covered the years 1967 until 1974.

What was found very useful at all the archives was the fact that they offer to the researcher the possibility to use keywords at the search engine. The keyword can be anywhere in the newspaper and since the newspapers' material are digitally accessible and searchable, it can be searched at any time period. In order to collect the articles concerning Ilissos and Kifissos rivers from the archives' databases, the keywords 'Ιλισ'- and 'Κηφισο' were used. Originally Ilissos river is spelt as 'Ιλισός' and Kifissos river as 'Κηφισός'. But due to grammar complexity of Greek language, according to which the names can change at their spelling, depending if they are used as subject or object in a phrase and due to the appearance of spelling of Ilisos either as 'Ιλισσός'- Ilissos or as 'Ιλισός' - Ilisos, it was decided to use part of their names ('Ιλισ'- and 'Κηφισο') that stays the same when they appear in text, in order not to miss important research material. This way of searching for the rivers, by using parts of their names, was reliable since the way the rivers were called by the residents and the state did not change as years went by.

4.6.1.2 Selection criteria for newspapers' articles

From the research at the archive of newspaper 'Empros' there were about 200 outcomes, from the newspaper 'Kathimerini' about 2000 outcomes and from the newspaper 'To Vima' about 2000 outcomes. These results included any kind of material published at the newspapers and included part or the whole word of the rivers' name.

A necessary step to identify the material to be included in the database and exclude any redundant parts, is to define certain criteria. (Lynch & Peer, 2002) The databases were manually reviewed and during the manual selection of the articles, items that were irrelevant to the rivers or were incidentally mentioning the name of the rivers, were detected and excluded from the list, as also did others at similar researches like Xiong, Wei, Zhang, & Wei, 2016 and Wei, Wei, Western, Skinner, & Lyle, 2015. The number of the articles that appeared by the searching tool of the newspapers' archives, was decided that was manageable within the time frame of this research. At each output, the keyword was highlighted with color within the text and therefore the process to determine whether this material was interesting for this research or not was fast, since the reading of the whole article and trying to spot where the keyword was, was avoided.

The manual selection of the suitable material helped to neglect material irrelative to the rivers, for example, neighborhood names with similar spelling, hotel names, football teams, bus terminals, crosswords, shops advertisements or texts that mention the river name but for purposes irrelevant to the management of the river and also exclude river with the same name but at the other part of the country like the case of Voiotikos Kifissos, which is a river at another region of Greece or even mentioned in cases of criminal acts were dead bodies found.

As a result, this procedure generated from 'Kathimerini' newspaper a selection of about 250 articles directly related to these two rivers, from 'Empros' newspaper about 30 articles and from 'To Vima' newspaper about 11 articles. For further processing of this material, the articles were exported either as PDF, when possible or when that option was not offered, they were printed straight from the archives database.

4.6.2 Local administration archives

The Region of Attica and the Municipality of Athens were the closest administration authorities and it was considered that there the residents could express their complaints about local problems about Ilissos and Kifissos. These problems could be indicative of peoples' attitude towards the rivers at local level and therefore it was decided, for the purposes of this research, to go through the regional and municipal archives for acts related to the two rivers.

It was assumed that the residents' complaints and requests would be discussed at the municipal council and the decisions and discussions or any attempt forwarding these problems to upper level authorities, would be recorded at the municipal and regional acts. Also, the municipality was responsible, until a certain time period, about infrastructures related with water, as was explained in the chapter about Athens.

The majority of the archive of the Region of Attica was destroyed during the Occupation of Greece by Axis Powers during the 2nd World War and at the break of the Civil War in 1945. That material was dated mainly before 1921 and part of it after 1921. The Regional Archive that is saved includes the archives of 1900-1930 and a few files from 1921 and afterwards. (Αρχείο Νομαρχίας Αττικής) Therefore, the idea of using the Regional Archive, as source of information related to citizens reactions and attitude towards the rivers, was abandoned, even though the Region was also coordinating projects related to water. From the material saved and provided to the public, there was not evident related to the management of Ilissos and Kifissos or the problems related to them that people of local communities addressed to the Region for solving them. (Αρχείο Νομαρχίας Αττικής (1940-1971))

On the other hand, according to information found concerning the administration at local level, it is concluded that the municipalities, apart from being a structure close to citizens where they could express their problems and requests, they were also responsible for projects related to the rivers. Therefore, peoples' attitudes towards the rivers and their preferences and opinions about projects related to these two rivers, was assumed that would be addressed to these authorities and recorded also at their archives.

4.6.3 Municipal Archive

The Municipal Archive is under the supervision of the authority of 'Historical Archive of Municipality of Athens' and is located in the city of Athens, at an office in a separate building from the central municipality building.

The main goal of this authority is to maintain the municipal archive and organize the archival policy of the Municipality, in close collaboration with the authority of the General State Archives. Its responsibilities include finding, collecting, preserving and listing the archival items of the Municipality of Athens that are related with the administrative, financial, social and cultural heritage of the city and make them available for research, at digital or physical collections. This authority is also responsible for providing study permissions of the municipal archival material, permitting publishing work related to this material and in general deciding about any issue concerning the archive.

Figure 4-4 Part of Athens Municipal Archive (photo by the writer)

It was decided to search through the archive of the decisions of the municipality council in order to record acts related to the rivers of city. The archive of the decisions is dated from 1841 and brief descriptions of the decisions are organized at indexes in books. The decisions of the years from 1841 to 1944 can be found at digitized form, at Excel sheets, representing the first 105 books of the acts' archive collection. From the year 1944 and after, the indexes of the acts can be found at physical books. However, there are gaps at the records because of some books do not exist anymore. Also, parts of the indexes, only available in books, could not be used, since they were being digitized at the moment of this research.

At the office of this authority, there was a library and working positions for the researchers, with two computers available. So, due to lack of space, simultaneous presence of many researchers was not possible and for this reason it was necessary to apply for reserving a working place, by indicating the days needed to spend at the office. That was a necessary step, since the data of the archive could only be processed at the computers available at the office and it was not allowed to extract them at external memory cards. Also, there were periods that there was a waiting list, since many researchers had to work at the office or days that the staff had to work on external projects and was not available to assist.

4.6.3.1 Municipal data retrieval

In order to find the acts concerning the two rivers from at the municipal archive, it was decided to follow the system the archive is organized to.

The research at the digitized archive of the Acts of the Municipal Council followed the chronological order according to which the files are organized to. There are 105 Excell files, representing 105 physical books, with starting date from 1841 until 1944. These files provide at chronological order the acts and at every record additional information is provided about the year the act was decided, the mayor that was elected during that period, the date and number of council meeting, the number ID of the act and the title or a short description of the act. The research was conducted by digitally looking for keywords like 'Κηφισο', referring to Kifissos river and 'Ίλισ', referring to Ilissos river, in order to cover all possible grammar aspects, since the spelling of the words change when they are used either as subject or object in a sentence.

The research at the physical books of the archive was conducted manually. At the available books, the registrations are organized in alphabetical order, according to the main keywords used at the description of the act. These physical indexes-books cover the period from 1959 to 2007. At every record the information provided was about the year the act was decided, the mayor of that period, the date and number ID of council meeting, the number ID of the act, the official title of the act and sometimes a short description with extra information about the act. For the years after 2007, the files are digital and fully accessible.

The indexes at these books were registered based on keywords, indicative of the main issues they were about. That is the reason why there can be more than one record, at different letters at the index, that still refer to same act. This fact, inevitably led to looking not only at letter 'I' for keywords Ilissos and at 'K' for Kifissos, but also at the other letters, since decisions related to them and their environment could be described by others words as well, such as 'pollution', 'complain', 'flood', 'environment', 'river'. This manual selection might appear gaps in fully covering all the decisions that truly match the selection criteria, since the enormous amount of pages and the different hand writings of the records, not always easily readable, might led to skipping records related to the main topic.

4.6.3.2 Selection criteria for municipal acts

From the digitized archive, the records gathered were these that the 'Ilis' or 'Kifisso' was included either in the title or in the description of the act. From the physical archive and the manual selection, the selection of Acts of the Municipal Council was based on the keywords of the titles found at the indexes. The next step was going through the Acts and their descriptions, in order to acquire an overall view on each topic and estimate the relevance of each act. That was a necessary step since at part of the acts that included the name of rivers at their title or description were not always related to decisions about the rivers, but there cases that they were referring to the neighborhoods next to the river or street names and decisions for the city planning bounded by the rivers.

4.6.4 Technical and historical academic reports

Information, regarding the interventions at the two rivers and the evolution of Athens basin, were tracked by accessing material found at technical and historical academic reports, monographs, papers, thesis, decisions and consultation plans. The majority of them were available online and were found at the official websites of the Municipality of Athens, the Region of Attica, the Ministry of Environment and Climate Change, the Decentralized Administration of Attica, Universities and Research Institutes, the Technical Chamber of Greece and the Greek Parliament to name a few. However, material produced at years prior to digital era, especially from previous centuries or material that for copyright reasons was not accessible online, the physical presence at their location was necessary, either to loan the material or take notes of the work needed. Moreover, in order to get clarifications about certain issues, people from the field of law, engineers, geologists, historians, employees and supervisors of public services were approached for explanations on questions that came up while processing the material found.

4.6.5 Field visits

In order to acquire a better understanding of the rivers and the surrounding environment, field visits were paid and photographs were taken. It was decided to have a closer look at certain locations of the rivers in order to formulate a better picture for the state of the rivers and the interventions. The field visits included about 50km driving along rivers' banks and estuaries. Due to the difficulty in finding the springs of rivers, more attention was paid to the inner-city parts of Ilissos and Kifissos. In order to spot the locations of interest, Google map was used and also knowledge acquired by the literature review, in connection with knowledge through personal experience of the city.

4.7 Material interpretation

At the initial interpretation of the data, the material found related to historical, social and urban aspects of the city and the intervention at the rivers was mainly in Greek and therefore it should be translated in English in order to become presentable. Another parameter that influenced the interpretation of the data was the condition of the material found, either they were digitized or physical. Much of the information was included in newspapers of the previous centuries and even though they were scanned and digitized, there were a few cases that the original paper was either damaged or with missing parts and parts of the information was missing. In Chapter 8, the interpretation steps for the content analysis are presented.

5 Historical analysis of political, societal and urban characteristics of Athens

In this chapter the political, societal and urban characteristics of Athens, from 1821, year of the Greek Revolution against the Ottoman-Turkish occupation, until 2019, are analyzed. Athens, a poor, small city, became the capital of the new and small country of Greece, in 1834 and by the end of the 19th century Athens became an economic, commercial and industrial center, designed and built under private and political interests, without any natural environment respect. In the first half of the 20th century, a series of wars and political incidents, like the World War I and World War II, the Interwar period with the political instability, the Asia Minor Catastrophe with the 1.5 million refugees arrival in Greece, the economic crisis and the decline of the living standards, influenced the development of Athens. Athens hosted a big proportion of the immigrants and refugees, with inequalities between the social classes, contributed to the uncontrollably spreading of the city, by arbitrary construction of residential complexes, that continued the degradation of the environment, especially of rivers and streams. Moreover, the German occupation (1941-1944) and the Civil War (1944-1949) had catastrophic results on infrastructures and the Marshall Plan financial aid was a relief for their reconstruction.

In the second half of the 20th century, from 1950 to 1967, the demographic growth of Athens brought a series of problems in the city, like traffic jam, pollution and intense urbanization with unplanned residential districts and the river and stream beds started to be covered and boxed. During the 7 years of dictatorship (1967-1974), combined with the diplomatic isolation of Greece, the suspension of the civil freedoms, the long delay of harmonization of Greece with European Community were the most important political incidents that affected the modernization of the society and economy, while the environmental catastrophe was continuing. Greece accessed the European Community in 1981. By the end of 1990s, in Athens, the large population, the millions of cars, the lack of green spaces etc, deteriorated the living conditions and created numerous barriers for the city's social users, so the governments started to change the legislation about the quality of environment. However, when Athens became responsible for the organization of the Olympic Games of 2004, with hundreds of infrastructures projects constructed, many environmental laws and regulations were violated, but since then, the city is oriented to reconstructions and sustainability as long as the financial status of Greece is getting better year by year after the financial crisis in the 2010s.

5.1 1821-1922

5.1.1 Politics (1821-1922)

Since 1453, when the Ottomans conquered Constantinople, the capital of the Byzantine Empire, nowadays Istanbul and until the Greek Revolution in 1821, the territories of Greece were occupied by the Ottoman Turks, who controlled the entire Middle East and the Balkans up until Vienna. In 1821 the Greek Independence War begun and was first launched in south Greece, at the region of Peloponnese.

Greece became an independent country after the London's Protocol in 1830 and the first capital city was Nafplio, in Peloponnese. Athens became the capital city of Greece in 1834. The development of the city could not be separated from the way the Greek state evolved after the Revolution of 1821. At the beginning, the political authorities were mainly rich land-owners and people representing the interests of the foreign Big Forces (Great Britain, France, Austria, Russia and Italy). (Κατηφόρη, 1981)

In 1844 the first Constitution was adopted and the political regime of constitutional monarchy was established. In 1864 the political regime changed to crowned democracy. It was not until 1877 that adult men acquired the right to vote. In 1881 the Greek state bankrupted. (www.tanea.gr, 2008)

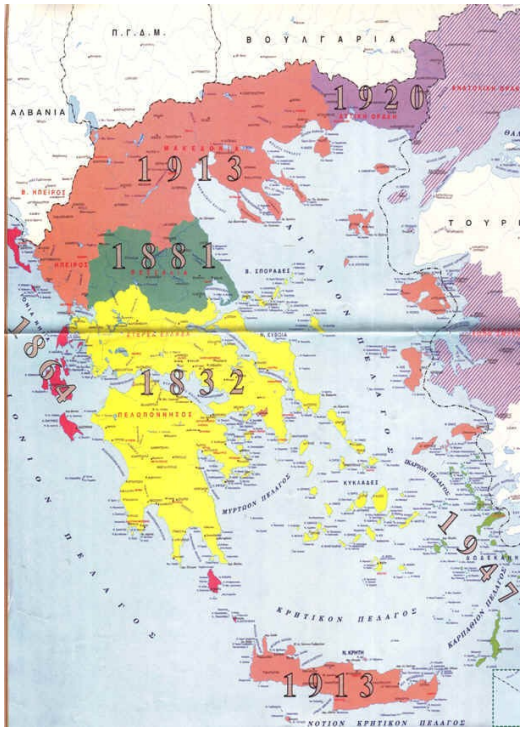


Figure 5-1 Evolution of borders of Greece after the Liberating Wars started in 1821. ((http://2dim-kalam.thess.sch.gr/old-web/0000/sinora/am%20diamorf.htm), n.d.)

At the years followed, Greece was involved to a series of wars like the Greek-Turkish Wars and the Balkan Wars in 1912 and 1913. Until 1914, when Greece was involved in the World War I, a series of political upheavals and continued wars for liberating territories that now are part of Greece, were the main factors that influenced the evolution the country. (www.tanea.gr, 2008)

Figure 5-2Greece and the two cities, Athens and Nafplio

After the end of World War I, Greece, as a victorious country, sent army to Asia Minor, the west coast of Turkey nowadays. This action was part of the national dream for liberating these regions from the Turkish occupation since the 15th century, but in August 1922, the Turkish army defeated the Greek army. The defeat of the Greek army resulted at the violent persecution of the Greek nationality residents from these areas. In Greek history this period is known as Catastrophe of Asia Minor and caused big refugee influx, almost

1.5 million people, towards the mainland and islands of Greece and a series of chain reactions. So, the main driving forces for the new political parties formed at that time, were the decline of the living standards of the middle class and the dissatisfaction for the progress of the national issues.

5.1.2 Society (1821-1922)

At that time, Athens was a city with very poor infrastructures and facilities. The administrative transition of becoming the capital, reinforced the position of the city, which became the first financial and cultural center of the country. The growth of the city was influenced by combinations of political, financial and demographical factors. The financial and demographical factors were influenced by the gradual territorial expansion of Greece. The attachment of more territories to the new country and the integration of their population and capital, accelerated the development of Athens.

Figure 5-3Athens in 1875 (www.tilestwra.com)

Until the last quarter of the 19th century the growth rate of Athens was low. In 1848 about 3% of the total population was living in the city**.** In general, at that time, the financially robust high class, living outside of Greece, was considering Athens as the capital city of a poor and fragile state that could not attract any investment. Athens was mainly the administration center, whereas the majority of the financial and industrial activities were taking place at other regions.

Since 1870, Athens was a city mainly inhabited by nonproductive population like middle class people, state employees etc and was maintained by the capitals from the rural and commercial areas outside Athens. Significant amount of money was invested at constructing buildings for the central administration and the cost of for these public buildings and cultural centers was often donated of eminent benefactors. (Κατηφόρη, 1981)

5.1.3 Urban (1821-1922)

When Athens became the capital of the newly established Greek state, it was a city of 12,000 inhabitants (Σαρηγιάννης, 2000) and needed a plan for its development in order to utilize the land and build infrastructure networks (roads, water supply, etc.). The first plan of the city was designed by S. Kleanthis and E. Schaubert, with the basic idea of developing the new city towards the north, along with the restoration of the ancient city center, through excavations around the Acropolis. (Γαλάνη, 2004) However, after many reactions from local landowners, the plan was modified by Leo von Klenze in 1834. (Σαρηγιάννης, 2000) This new plan was a compromise between state planning and private interests, with many streets being narrowed, others being removed from the plans and public spaces being reduced. The significant reduction of public and green spaces in the capital's plan was the first indication of what was

about to follow regarding the city's natural environment. Another indication was the conversion of several streams into road network sand the exploitation of their riverbeds. (Νταφά, 2014)(Τσιγδινός, 2016)

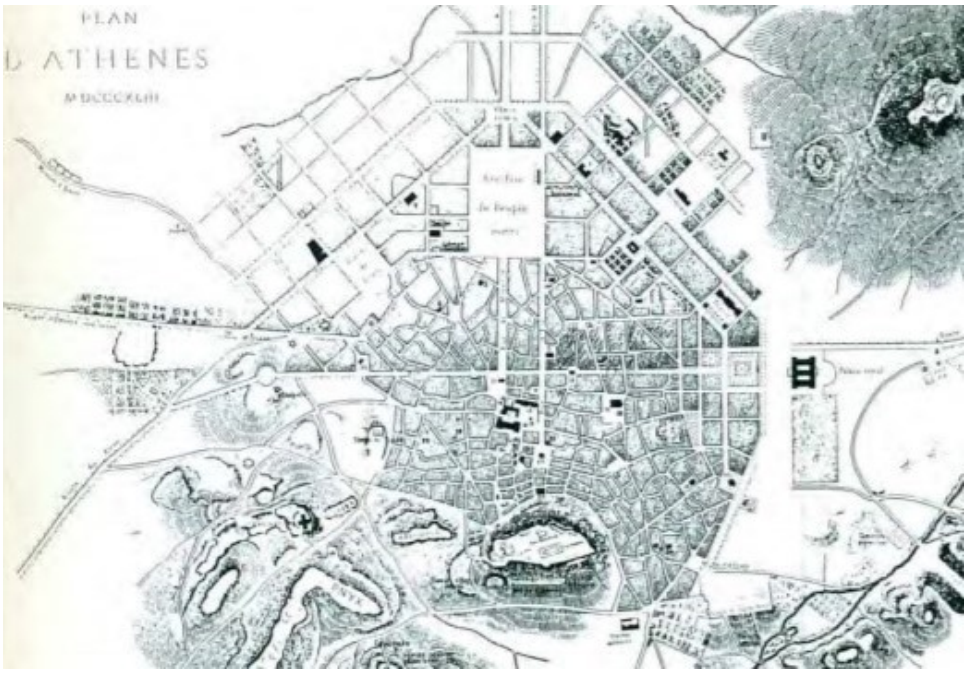


Figure 5-4 Athens urban plan in 1843 (Πορτάλιου, 2013-2014)

In 1860, Klenze's plan was partially adapted for a population of 50,000 residents and this plan shaped the core of the city, today's center of modern Athens. (Νταφά, 2014)

5.2 1923-1949

5.2.1 Politics (1923-1949)

During this period, the new political and social circumstances and the need for redevelopment were the main evolution drivers. The characteristics of society, at that time, give an insight of the format of Modern Greek society as it is today. It was the first time that the majority of Hellenism would be within the Greek State. This period could be described as the beginning of a transitional period.

The period after the Catastrophe of Asia Minor and until the World War II is the Greek interwar period, characterized by a lot of political instabilities. Another period where democracy had corrupted was between 1925-1926, while the dictatorship of T.Pagkalos. During the Interwar period, only one government completed a foul parliamentary 4-year term, between 1928-1932. After this period, the political uncertainty was more vivid. A series of extreme events like the assassination attempts against politician and two coups in 1933 and 1935, were some of the reasons that caused dead ends to the political regime of the country.

Moreover, the economic crisis, which struck the world economy unprecedentedly since the early 1930s, had maximized domestic political problems in the country. The weakness in governing in the years 1933-35, allowed the implementation of anti-parliamentary practices and led to the collapse of parliamentarianism.

In the early 1936, the lack of leading personalities and the inactivity of the politicians, enabled the promotion of Ioannis Metaxas, a minor political party leader, as 'Governor' of the country, as he used to declare himself, in the pretext that the country was in danger because of "social upheavals".

Figure 5-5'4th August, The dawn of a Big day' poster of the Metaxas's dictatorship period (Foundation of the Hellenic world, 1998)

Some of the political practices followed during the governance of Metaxa were resembling those followed by the Fascism of Mussolini in Italy and Nazism of Hitler in Germany, making the regime more totalitarian. The political liberties were suspended and citizens, opposing ideologically and politically the beliefs of the regime, were persecuted.

This dictatorship was ended when Greece entered the World War II in 1940, by being involved to a war with Italy, leading to numerous painful consequences like the Italian, German and Bulgarian occupation of Greece. All these issues led to a new era of the political status of the country. (Foundation of the Hellenic world, 1998)

After the end of World War II, between 1947 and 1949, Western European countries used the Marshall Plan[1] to rebuild their industry and strengthen the social welfare institutions in order to support low-income groups. In Greece, due to the civil war, the period of reconstruction shifted over time and differed in its priorities. Part of the $300 million allocated to Greece by the Marshall Plan, was spent in two years (1947-49) by the government on the civil war and the survival of the population. So, in 1949, when the American financial aid stopped, the reconstruction of infrastructures begun with no funds available and the society deeply divided into opposing groups. (Βαϊου, Μαντουβάλου, & Μαυρίδου, 2000)

5.2.2 Society (1923-1949)

In general, the Interwar was a critical period for the development of the modern Greek society. During the period, dynamic demonstrations took place, while the state was trying to manage the impacts of defeat in Asia Minor in 1922. People were protesting for better life in a more organized way, questioning the social system at all levels, but with their efforts being stopped violently by the coup at August 4th 1936 of I. Metaxas.

[1]The Marshal Plan referred to the financial help provided by USA to European Countries after the World War II in order to rebuild their economies.

Almost until the mid-1930s, the image of the cities changed to a most modern version, with new ideas being introduced to the society and many expectations for the future. The main cities of Greece, like Athens, had become industrial centers with dense population, contributing to the industrial and social conversion of the society.

The presence of refugees had also a great impact at the ownership regime of the large land properties, since these properties were expropriated and redistributed. During these years, the society in Athens was very uncertain due to the significant increase of the inflation, the extended poverty and the overcharging and adulteration of food products. The inequalities of living conditions between the higher and lower classes, the urban and rural areas and especially between the locals and the refugees were very vivid and were established during the Interwar. The few job offers and the problems of settlement were the driving forces that led big parts of the population at the outer limits of the big cities living under poor conditions. At the same time the rural population was migrating to the urban centers in order to find more opportunities for work.

Figure 5-6Refugees's camps in Athens in 1920s (Foundation of the Hellenic world, 1998)

At that time, there were more than one million people leaving in Athens, transforming the city into a big residential complex. The regime of Metaxas was spending the available budget of the state towards military equipment and propaganda, instead of taking measures to tackle the problems of the city.

During this period, the upper classes of society were choosing the higher floors of apartments buildings or started living at suburbs with special layout promoting open spaces and public gardens, in contrast to the layout of the rest of the city. For the lower class of the society the problems were quite serious. The high levels of unemployment and poverty resulted at the bad diet of people, poor and unhealthy housing, with appearance of tuberculosis and malaria. (Foundation of the Hellenic world, 1998)

5.2.3 Urban (1923-1949)

Athens had 453,000 residents in 1920(Σαρηγιάννης, 2000), while in 1928, after the large wave of refugees from Asia Minor, its population reached 802,000. The result was the creation of numerous new neighborhoods around the city and even some of them on forest land. (Τσιγδινός, 2016)

The ecological balance of the city was gradually disrupted, as its size and layout greatly differentiated from past urban plans. Arbitrary construction begun to be a generalized process of acquiring housing and the successive legalizations of these constructions, in order to incorporate them at the city plan, became a common process at city's expansion. Despite the uncontrolled spreading of the urban

tissue during this period, there were some streams left open. However, many of them were built or covered, after taking into consideration the stormwater runoff and sewage discharge. (Νταφά, 2014)

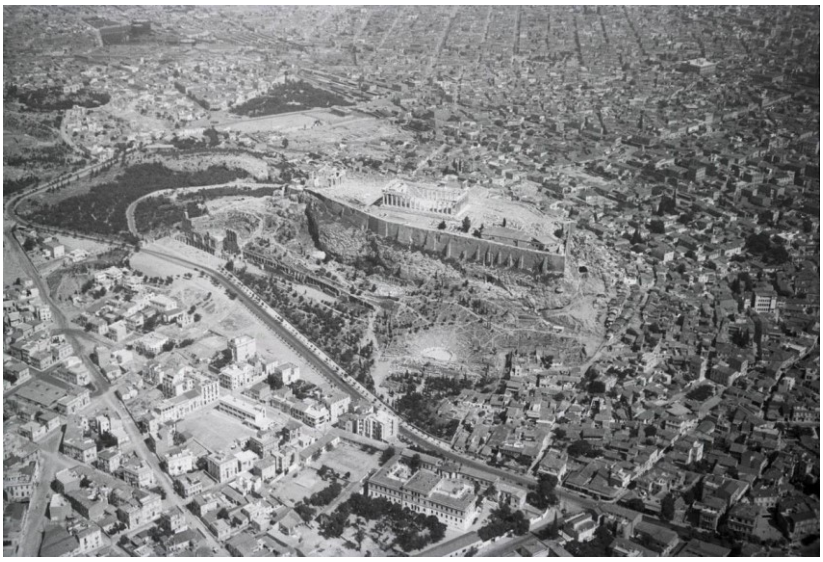


Figure 5-7Athens in 1930 (iloveoldathens.blogspot.com)

Before the World War II, Athens had about 1,125,000 residents (Σαρηγιάννης, 2000) and the spread of the city towards the suburbs was very vivid.

5.3 1950 – 1966

5.3.1 Politics (1950 – 1966)

After the Civil War, political instabilities were common and they were influenced by the Civil War characteristics. Regarding the European Community relations, Greece wanted to become a full member and in June 1959 Greece was the first state to apply for being associated with the newly established European Economic Community (EEC). In June 1961, the Association Agreement was signed between Greece and EEC, including customs union after a 22-year transitional period, financial protocol and tax and agricultural policy harmonization. However, the accession procedure was suspended due to the military coup in 1967 (Hellenic Republic - Ministry of Foreign Affairs, 2019) (Lekl., 2016)Society (1950 – 1966)

After the World War II and after the end of the civil war in 1949, the country's productive potential was completely destroyed and the years after 1950 can be characterized as the post-war re-organization period of the country. During this time, big groups of people from the province moved to Athens in order to find any kind of job and accommodation, making the housing problem in the city more intense. The observed higher demographic growth rates were triggered by the remarkable concentration of industrial activities in Athens (Γαλάνη, 2004), which caused the large influx of new residents from the Greek countryside. Thus, in 1961 the population of Athens reached 1.850.709 residents. However, many people decided to migrate abroad, due to the difficult working conditions and the high unemployment rates in Greece. (Τσιγδινός, 2016)

5.3.2 Urban (1950 – 1966)

As Athens was becoming bigger, it acquired some negative characteristics, similar to other large European cities, such as the lack of infrastructures, traffic jams, environmental pollution and unplanned residential districts mainly due to uncontrolled massive immigration towards the capital from the rural areas of the city in the 1950s and 1960s. (CEC, 1993)(Beriatos & Gospodini, 2004).

Since the 1950s, the urbanization of the city became more intense, at the expense of the free spaces and the forested areas of the surrounding mountains. Many industries were built adjacent to streams, in order to exploit them in the production process and discharge their wastewater, polluting them and abolishing their natural function. This created an attitude towards streams, as contamination sources, that had to be covered and disappeared and as result covering them became a sign of modernization and remediation. Some of the covered streams were part of the sewage system for municipal and industrial waste, while others were boxed due to the need for flood control (Βαϊου&Καραλή, 1995).

Figure 5-8Vasilissis Sofias Avenue in the 1960s (www.in2life.gr, 2016)

It is also worth noting that all these years after World War II, due to the extensive urban expansion, the use of the car was intensified and as result many public spaces and significant portions of natural environment were used for road projects. Typical examples were the construction of many long road axes over covered waterways because of their ideal shape line. (Νταφά, 2014) (Τσιγδινός, 2016)

5.4 1967-1980

5.4.1 Politics (1967 – 1980)

The elections' instability of the previous period was the excuse used by the military coup in order to take the government of the country. The military coup in April 1967 was the beginning of a 7-year period of dictatorship by the military forces. During these years Greece was diplomatically isolated and basic freedoms of citizens were suspended like the right to assembly, to join and form associations, the freedom of speech, the inviolability of mail and others. The Colonels' regime was overthrown in July 1974. (wikipedia)

Regarding the European harmonization of the country, Greece's choice to become member of the European Economic Community was based on a series of benefits believed to become real by this accession. It was not until the restoration of democracy in 1975 that the accession was re-activated. After years of political instability and dictatorship, accessing an organization like the Community, it was considered to provide the institutional framework to bring stability to political system of the country and develop and modernize the society and economy. Also, it was desired to strengthen the position of the country at regional and international level and play an important part at European integration.

5.4.2 Society (1967 – 1980)

During the dictatorship key articles of the constitution were suspended and the parliament and the political parties were not part of the governmental authorities. Moreover, there was a systematic political persecution of any left-leaning citizen or anyone who openly

opposed the dictatorship, with , imprisonments, tortures and convictions of people resisting to the regime. Nevertheless, democratic citizens were trying to express their free will at any occasion like demonstrating at the funerals of politician or Nobel Prize-winning poet and the important manifestations was held by university students.

Figure 5-9 Athens, 21st April of 1967, tanks in Athens's streets at the beginning of coup d'etat (www.kathimerini.gr, 2018)

5.4.3 Urban (1967 – 1980)

As the population was increasing, at the beginning of the 1970s, the urban area of Athens exceeded the 2.5 million inhabitants. (Σαρηγιάννης, 2000)

During the dictatorship there was a general devaluation of the archaeological and Byzantine heritage monuments of the city and many sacred archeological sites were destroyed for the reconstruction of modern buildings. Until the 1970s the city of Athens was covering almost the entire Attika basin. However, the most controversial aesthetic intervention in the city was the mass production of large buildings for residential or commercial purposes, done in the name of modernization and raised almost without the contribution of architects. (Πετροπούλου, 2011)

5.5 1981-2004

5.5.1 Politics (1981 – 2004)

The path of the European harmonization of the country was re-activated after the restoration of democracy in 1975. After years of political instability and dictatorship, accessing an organization like the European Community was considered that would provide the institutional framework to bring stability to political system of the country and develop and modernize the society and economy. Also, it was desired to strengthen the position of the country at regional and international level and play an important part at European integration.

Finally, Greece's Accession took place on 1rst January 1981. At the first period after being accessed, Greece was aiming to redefine its position and relations with the Community through a 'special regime' by a Memorandum along with financial aid in order to reorganize the economy. The financial aid was given through the Integrated Mediterranean Programs (IMPs) in 1985 and further by the 'Delors Packet' which also promoted a new policy structure.

Figure 5-10 28thMay 1979. Prime Minister Konstantinos Karamanlis signs the Treaty of Greece's accession to the EEC at Zappeion. (www.kathimerini.gr, 2015)

After that period, Greece started to support the model of 'union' by applying common policy in fields like health, education, environment, foreign and security and reinforcing supranational institutions like the European Parliament and European Commission. Despite all these converging efforts, there was a gab concerning the field of economy between the average development level achieved in the Community and in Greece.

Then, mainly since 1996 4, the European harmonization of the country in every sector was becoming more deep. The effort for further convergence on a financial and social base was more intense. Moreover, Greece became a full member of the Economic and Monetary Union and on 1rst January 2002 also adapted euro as single currency of the Economic and Monetary Union. (Hellenic Republic - Ministry of Foreign Affairs, 2019) (Lekl., 2016)

5.5.1.1 Olympic Games 2004

Another important moment for Athens was the Olympic Games of 2004. Athens was selected to organize the Olympic Games of 2004, for a second time since the first modern Games in 1896. The 2004 Summer Olympic Games were an international sport event that took place in Athens in the period of 13 to 29 August 2004. There were about 10,500 athletes along with 5,500 coaches from 201 countries for 28 different sports. (https://www.sansimera.gr). The locations of the infrastructure projects were mainly at the metropolitan area of Athens and the cost of the Games was estimated to be around 8.466bn euro according to the General Accounting Office.

The 2004 Olympic Games increased the international image of the city of Athens, even though this was for a limited period of time. Completing the construction of infrastructures on time and the organizational and management parts of the Games under extreme pressure, forced the establishment of suitable operational bodies, for managing the extensive and pressing needs in an effective way. (Δελλαδέτσιμας, 2015)

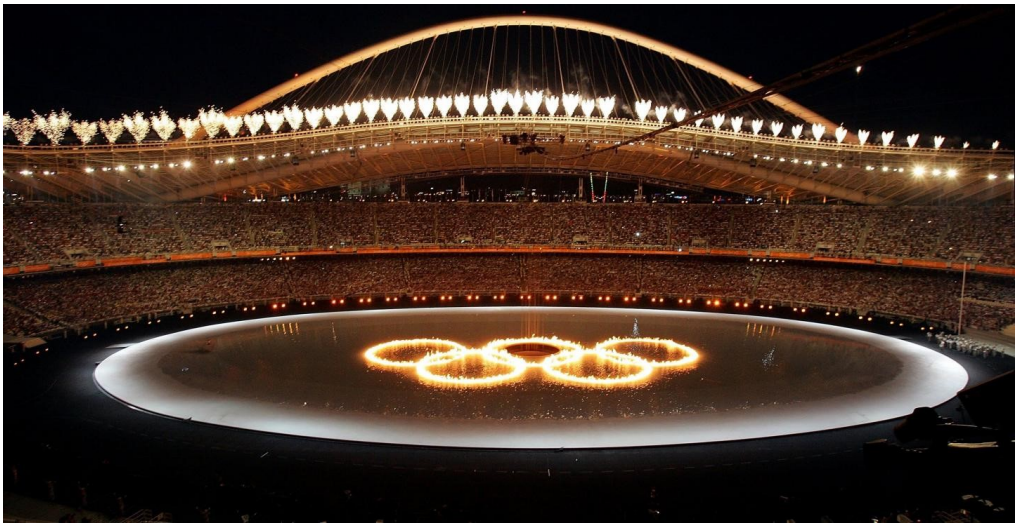


Figure 5-11 Olympic Stadium at Olympic games of Athens , 2004

5.5.2 Society (1981 – 2004)

With the accession of Greece to the European Economic Community (EEC), the relations with the European and Balkan countries were strengthened. At the same time, Greece made some commitments required by the EEC on equality between men and women, the participation of citizens in institutions and governing bodies, the introduction of voting rights at the age of 18 and many other reforms in education, law and the field of health. Many public projects were constructed, efforts were made to support farmers and small businesses so not to lose jobs. (Ντανά, 2013)

The economy of the country relied, for some years, mostly on industry and not exclusively on building activity. With the decline of industry and the declining growth rates that followed in the late 1980s, the economy again relied on the construction sector. (Μελαδάκης, 2011)

5.5.3 Urban (1981 – 2004)

In 1981, Athens was a capital city with 3 million inhabitants. Its urban environment had already begun to show signs of the current situation: traffic congestion, smog, lack of green spaces and many others. This dramatic deterioration of living conditions in the basin led many residents to look for better conditions and many of them began to shift rapidly to the suburbs. (Λουκόπουλος, 1994)

During the following years, Athens extended further in all directions, even beyond the Basin. Athens is now an independent region of the country, the Attica Region (Γαλάνη, 2004), which has significant economic activity and an extremely large population, but its dispersal has further reduced green zones and free land at the surrounding highlands.

After some point, private cars became a very important element for the citizens. This allowed further expansion of the city since greater distances could be quickly covered. In addition, the existence of large road axes leading to the center and even allowing high speeds, created numerous barriers for the city's social users, such as pedestrians and cyclists. In addition, the high demand for transportation by car, either to the center or to other areas, overloaded with vehicles the main road axes, resulting to congestion during peak hours. This situation caused loss of time, money, environmental burden, stress and generally an unpleasant situation.

Furthermore, another issue that deteriorated the living conditions in the city was the availability of green spaces. The green spaces of the basin corresponded to 2,55m^2/inhabitant, when according to Greek law the desired size is 8m^2/inhabitant. In fact, most of the green spaces such as large parks were "emerged" rather than planned. Still, their distribution shows disparities between areas of the historic city center, the northern and northeastern neighborhoods and the southern and western ones. Also, due to the continuous

urbanization, there is a dramatic reduction of the city's suburban forest area, which has various negative consequences (floods, landscaping, unpleasant microclimate, etc.). (Νταφά, 2014)

Figure 5-12Athens view, 2010 (www.greece.com, 2010)

Throughout the 1990s a number of urban planning laws were adopted, some of which were partially implemented, while others remained on paper. The General Urban-Planning Plan was already mentioned by the 1983 Law and made clearer by the 1997 Law and the Open City Spatial and Residential Planning Scheme introduced restrictions about small interventions for both cities and towns.

A series of studies for Athens were aiming to upgrade municipalities or smaller units at deprived areas, with mild interventions by encountering some local problems. These urban upgrading plans, as they were called, were intended to limit the already poor conditions in many central neighborhoods of the city.

The problems with the laws about the city did not appear suddenly. It is well known that a vague legal framework can be more "usable" by those who have the power to violate it. For example, major Olympic Games projects and large-scale interventions in the basin were not included to be constructed at specific city plans. (Μελαδάκης, 2011)

Regarding the water courses of the city, they are fragmented and are not connected one with another and with the urban tissue. From the dense network of streams the city used to have, only a very small part of them can be traced nowadays. Some of them are still visible, but isolated in the urban area, do not form a network and their functional value and role is weakening day by day. Over the years, over 550 km of streams have been covered and they are under concrete layers(Νταφά, 2014). The result of the above incorrect management of water bodies was the deterioration of water quality and human health conditions at the adjacent areas, while uncontrolled floods led to catastrophes, human victims and physical disasters.(Τσιγδινός, 2016)

5.5.4 Urban 2004

The Athens Regulatory Plan did not foresee an event of the size of the Olympic Games, but major infrastructure projects were constructed. These large investments were mainly in transport. These infrastructures changed radically the accessibility and the geography of many urban parts of the city. These investments were: the Athens International Airport, the extension of the Metro lines, the Suburban Railway, Attiki Odos, which is the ring road of Ymittos mountain, the Tram, the improvement of infrastructure of the port

of Piraeus, the Olympic Ring, as a big road project to improve transportation around Athens and a vast number of smaller improvements to roads. (Δελλαδέτσιμας, 2015)

Figure 5-13Attki Odos avenue (www.sport-fm.gr, 2013)

5.6 2005 – 2019

5.6.1 Politics (2005 – 2019)

The years since 2005 until nowadays, determine a separate period of relations of Greece with the EU. By the years 2008/2009 Greece is under economic crisis and therefore economic programs for readjusting the elements of the Greek economy have been applied in accordance with the European authorities. Meanwhile, in the first semester of 2014 Greece was having the Presidency of the European Union for fifth time of Greece's history, in a period with severe social and economical problems. Moreover, important legislation work was accomplished regarding the development and employment. (Hellenic Republic - Ministry of Foreign Affairs, 2019)

5.6.2 Society (2005 – 2019)

The Greek society is affected by the difficult socioeconomic circumstances, which derive from the fiscal crisis, influencing the levels of employment, business plans and quality of life. Despite that, at the moment is difficult to estimate the footprint of the crisis on the economical and societal aspects of the society, it is inevitable to assume that the crisis forces changes to the economic environment and worsens the situation in the city.(Schaffar & Pavleas, 2014)

5.6.3 Urban(2005 – 2019)

In recent years a gradual but significant effort has been made to improve the condition of Athens' urban environment. Policies and interventions that have already been applied, to a certain extent nowadays, such as refurbishments, reinforcing public transport, introducing regulations for the protection of the natural environment, etc. contribute to the reconstruction of the city in the direction of sustainability .(Τσιγδινός, 2016)

6 Ilissos River

Ilissos river, on the eastern side of the Athens, is one of the largest rivers of the Attica Plain. It originates from Ymittos Mountain, flows from the north-east part of the basin to the south-west, at Faliro Bay, forming a basin of 36.64 km^2 and its length is 7.81 km. Its runoff basin area has been highly urbanized and only 31% remains as natural environment, which is mainly found at river's springs. (Σαββίδης, 2004)(Bathrellos, 2016)(Κώτσιαρη&Ευσταθίου, 2015)

Ilissos is the recipient of a plethora of tributaries. These branches are in the form of closed conduits of various cross-sections, which either drain exclusively urban basins or are the recipients of streams and multiple converging seasonal creeks mainly from the slopes of Ymittos mountain. The total length of the basin's main streams is 120 km. The most important of these streams is the St. Ioannis Theologos, the stream of Asterios, the stream of Zografou and the Eridanos, which was a known stream in ancient Athens and was also constructed to have an underground channelization. (Μαλατέστας, 2004)

Ilissos was a tributary of Kifissos and underwent severe technical changes throughout the years, related to the exploitation of the river in various ways. The sand of the river was used for construction purposes even since the 19th century and the river itself was redirected in 1905 at a separate estuary in order to avoid further inundation phenomena at Kifissos. In general, the floods and the intense urbanization needs affected Ilissos basin and made the authorities to decide about its coverage, by allowing the river to flow in underground concrete pipes, which was completed in the 1960s.

6.1 Basin evolution – General description

The word Ilissos originates from the Pelasgous, which were the first residents of Athens. Ilissos was an important river for the ancient Athenians and they were considering it sacred, having at the banks of the river several altars for the gods, where many religious rituals were taking place. (https://iranon.gr/) The river was named after the demigod Ilissos, son of the ancient god Poseidon and the ancient goddess Demetra and was worshiped in a sanctuary near the hill Arditos. (http://urbanspeleology.blogspot.com, 2013)

Figure 6-1The cascades of Ilissos, Athens 1801-1806. Paint of British painter Edward Dodwell. (www.in2life.gr, 2016)

Also, according to testimonies of that time, from the philosophers Stravon and Plato, Ilissos could become a watercourse foul of water during winter and a dry stream during summer. The importance of the river for the Athenians is reinforced by the fact that Ilissos is represented as god at the temple of the Parthenon. (Μουντανέα, 2015) (Κώτσιαρη &Ευσταθίου, 2015) (perfectreader, 2019). In order to have a better idea of the importance of the river, it is worth mentioning that at an epigraph found and dated from of 440 B.C., it was mentioned that the use of the river for tanning works and for disposing wastewater was banned. (https://iranon.gr/)(Pappas, 1999) Also,

there are references that declared that the river was navigable for small boats during winter, flooding the areas nearby, making them fertile, while in summer period it was providing residents with clear drinking water, also suitable for irrigation. (Κώτσιαρη & Ευσταθίου, 2015)(Koutsoyiannis, 2002) Also, the river was forming small cascades, as depicted at the painting presented in Figure 6.1. (http://urbanspeleology.blogspot.com, 2013)

Ilissos was redirected from its original riverbed in 1905, in order to have its own estuary in the Faliron Bay and after years most of its riverbed in the city boundaries was covered until the 1960s.

Figure 6-2 Plan of Athens and Piraeus. With blue color are highlighted the main rivers of the ancient city, Kifissos, Ilissos and Iridanos. (Αρχαιολογία της πόλης των Αθηνών)

In general, the covered river flows under main avenues of the city of Athens. It passes in front of the Panathenaic Stadium and then flows uncovered to the southeastern side of the ruined Columns of Olympian Zeus, next to the Byzantine church of Saint Photini. Nearby is its ancient spring of Kallirroi, but nowadays the river is submerged under Kallirois Avenue. Then, at the area of Kallithea it flows under Thiseos Avenue. Originally at that point it was merging with Kifissos River. However, nowadays Ilissos is flowing to the south on a separate bed to Saronic Gulf at Faliro Bay. (urbanspeleology, 2018)

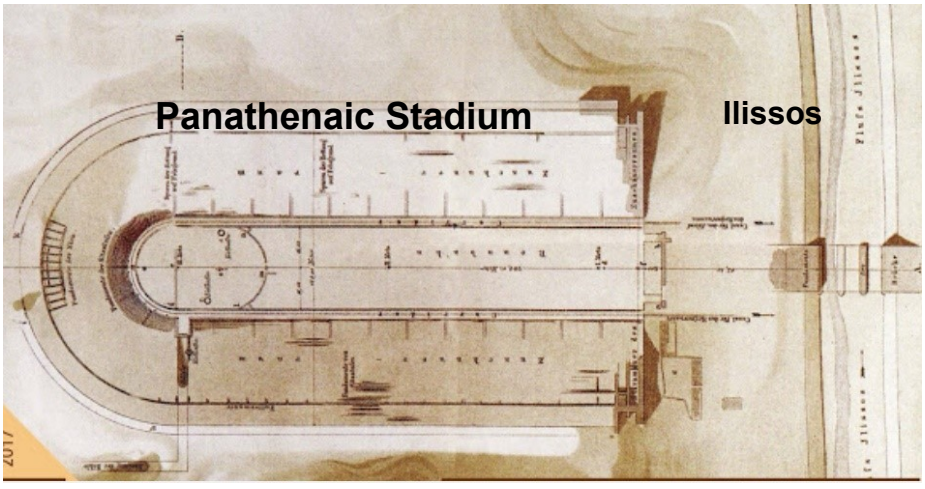


Figure 6-3Plan of Panathenaic Stadium and the bridge of Ilissos on the right of the plan, 1869 (https://geomythiki.blogspot.com, 2019)

Figure 6-4The Kallirois pring of Ilissos, Athens, 7th March 1891.(www.in2life.gr, 2016)

Figure 6-5 Photograph of Kallirois spring, taken between 1890 and 1935, with everyday footage (ΤαποτάμιατηςΑθήνας, 2019)

6.2 Overview of pressures at Ilissos Basin

During the years, Ilissos basin characteristics have undergone severe changes, under exogenous pressures. Human interventions tend to alter and change the boundaries of the natural basin of Ilissos, in the south-east part of Athens plain. In more detail:

Building activity

The rapid and intense building activity, at the expense of the natural landscape, led to the destruction of Ilissos hydrographic network. Many small streams were covered for building purposes, while others were used as open sewer pipes, as there were no plans for the construction of a sewer network in parallel with the house building activity. During the 20th century, streams in Athens were considered as a problem that could be solved either by flood control projects or by their coverage in order to create new roads. The length of the

riverbed that has been converted to sewer pipes is 23.1km. (Κώτσιαρη&Ευσταθίου, 2015) However, the dereliction and pollution of Ilissos was obvious even since the Turkish occupation, while after the liberation people were even allowed to build next to the river, covering the ancient remains of the area. (Τσολάκος, 2003) Even nowadays, continuous extensions at the construction of the campus of the National Technical University of Athens and the Olympic Games facilities at the area of Goudi, took place at Ilissos basin. (Σάρρος, 2004)

Sanitation

In general, the destruction of the streams of the basin was legalized by the State, as they were considered dirty and dangerous for public health. Ilissos was exposed to impurities from the discharge of wastewater and garbage, resulting in pollution of its waters. Therefore, the river covering was considered a modernization and a step of remediation, since the standing water was a source of germs, odors and mosquito breeding. (Τσιρογιάννη Κ., 2011-2012)

Road projects

The covered surface of the streams was the only public land available to construct new highways in areas where road projects were needed, as this option allowed the State to be excluded from the obligation of the costly expropriations. (Kotambasi & Skentos 2005) (Κουτσογιάννης, 2002) In recent years significant interventions have been made in the upstream basin of Ilissos, such as the construction of large highways, avenues, intersections and the construction of subway with transfer and parking stations. (Σάρρος, 2004)

6.3 Management projects of Ilissos River

The underground channelization of Ilissos started in the 1930s and was completed in the 1960s, with the projects being stopped during the World War II and the Civil war. In particular the projects can be separated into four geographical sections:

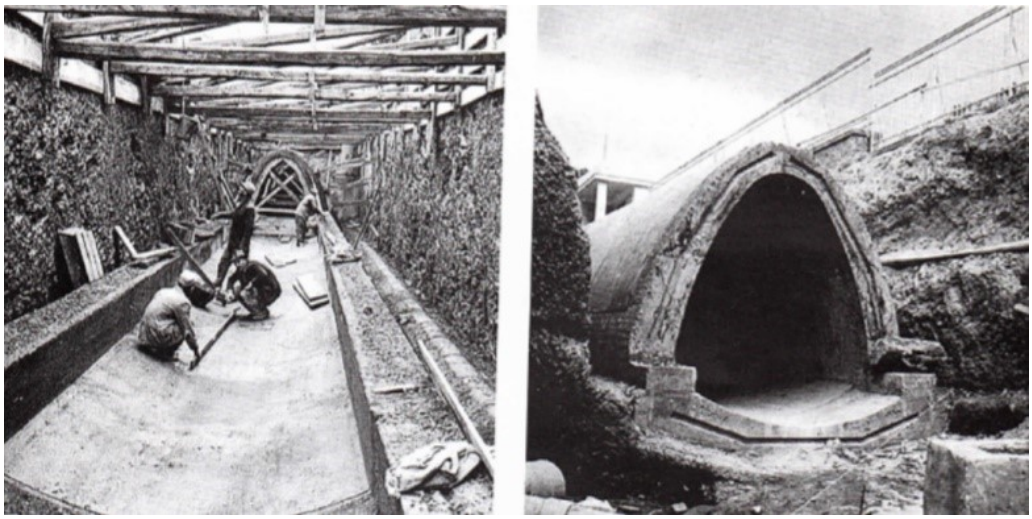


Figure 6-6 Construction project of water collecting pipes at Sotiria section (Παπαδάκης, 1997)

First section: The first section includes the areas of Sotiria Hospital and of Zografou where the Technical University campus is. The beginning of the underground channelization of the river was at the Gendarmerie School (known as Scholi Chorofilakis). However, part of the project, upstream of this starting point, was constructed in the 1960s, without taking into account the differences in the runoff coefficient which

changed due to urbanization of the area in the meanwhile and was firstly estimated in the 1930s. At this section the pipe diameters range from 2.60m at upstream areas to 4.20m at the main pipe collectors under central avenues and their shape is from oval to circular cross sections. (Παπαδάκης, 1997)(Δευτεραίος, 2013)

Second section: The second section included the zone between Papadiamantopoulou Street and Panathenaic Stadium and included the collection of water from the areas of Vyronas, Kesariani, Kolonaki, Zappeion, Lycabettus Hill up to the Panathinaiko Stadium. (Παπαδάκης, 1997)

Third section: The third section was including the area from Panathinaiko Stadium to Syngrou Avenue. (Παπαδάκης, 1997). From the Stadium starts the old covered riverbed of Ilissos, with trapezoidal cross section (Δευτεραίος, 2013) The discharge at that point was estimated at 200m^3/sec. From the Stadium until Vouliagmeni Avenue, where the church of Agia Fotini still is, a small part of the riverbed, which is no longer used, is still uncovered. This part is alongside the Vasileos Konstantinou street , at the side of Olympio, which has been characterized as an archaeological site. (Δευτεραίος, 2013)

Fourth section: The fourth section was defined between Evangelistrias Harokopou Streets and the seashore. (Παπαδάκης, 1997) Ilissos today flows underground the avenues of Kallirrois, Harokopou, Hamosternas, Panagi Tsaldari and Syngrou Avenue until it reaches Poseidonos Avenue. The last 7.7km of the river, upstream of the estuary, the river flows at open channel and flows to Faliron Bay. (Κώτσιαρη & Ευσταθίου, 2015)

6.4 Main Basin Interventions – Date milestones

6.4.1 1832-1920s: River and sand exploitation

During the years of Ottoman Greece, at the local Christian communities, 'dimogerontes' were the municipality leaders of each community, either for one year or for life and among their responsibilities were the management of the local community, in terms of interrelations and relations with the ottoman central administration and for Athens, among other, also the water and river management. After the establishment of the Greek state, this dominant management regime was repealed and delivered their authorities to the official Municipality of Athens.

The municipality was the exclusive administrator of the sand-gravel of bed of Ilissos river, which was sold to contractors, in order to use it to for the streets of the city. The construction specifications for the streets were determined by the Municipality of Athens, according to which the gravels should have certain characteristics in order to be suitable. The municipality was responsible to indicate the locations where the sand could be taken from, in order the sand to be thick enough, clear without other materials such as soil or clay, but also passing through screens in order to be the same size as the one used for buildings. The employees of the municipality had the responsibility to notify the contractors about the suitable season for taking the sand and allowing a time frame of 48 hours so that they could prepare the project. In case the contractors were not complied with the specifications, then the municipality had the right to take the necessary amounts of gravel needed for the road projects and charge them the daily salaries of workers. At the end of the period of King Otto, around 1862 and for 3.5 months, it was estimated that the needs for sand were about 400-600m^3 and each contractor

was obliged to take at least 50 m^3. The price of every cubic meter of sand was 2.80 drachmas and for gravel was 3.10 drachmas. The state was earning about 400,000 drachmas per year by the exploitation the sand of the river. However, this sand abstraction practice caused severe degradation of river environment at several locations, making them vulnerable to floods and prone to maintain standing water. This situation was worsened since sewage sludge from Pagrati was discharged to Ilissos. (HydriaProject, 2009), (topontiki, 2012)

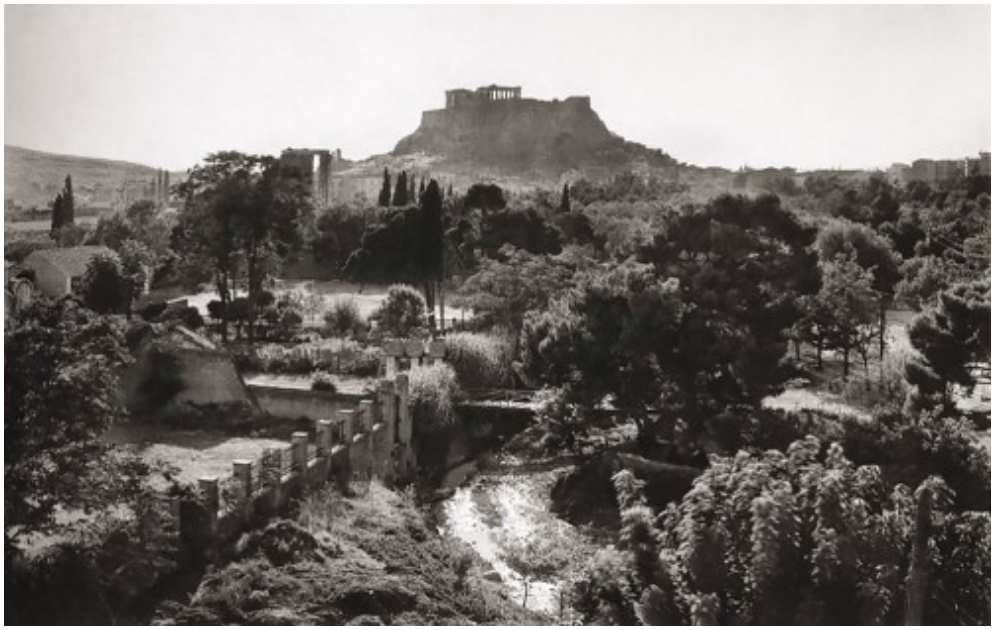


Figure 6-7Ilissos at the beginning of the 20th century.(www.in2life.gr, 2016)

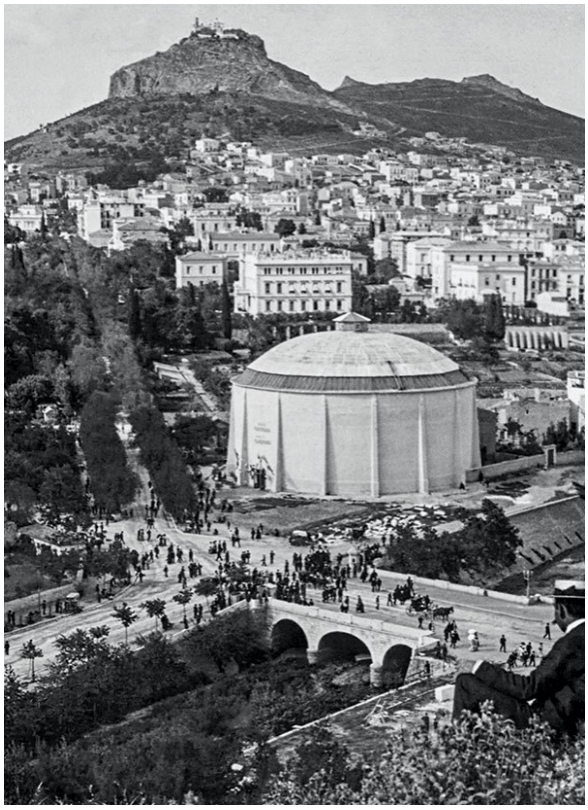


Figure 6-8Ilissos river and the river in front of Panathenaic stadium, beginning of the 20thcentury (www.kathimerini.gr, 2020)

6.4.2 1905: River diversion

A very important project for Ilissos River, was the diversion of its natural bank at the area in-between the two neighborhoods of Greater urban area of Athens, Kallithea and Moschato. The growth of the city and two devastating flood events in Athens in 1896 and 1899, were the main reasons for searching improved flood protection measures.

The dean of the National Technical University of Athens supported the idea to intervene to the hydrological characteristics of the river in order to decrease the possibilities of flood events at the downstream parts of Kifissos. The solution that the dean came up with was the diversion of Ilissos from Kifissos, so that the water load, discharged at Kifisos, to be less and therefore decrease the inundation phenomena at the area around Kifissos during heavy storm events. The study for diverting Ilissos was finally approved, especially due to the death of many people and the huge property losses because of the flood events. (Παπαδάκης, 1997)(geomythiki, 2016).

The plans for diverting the river started in 1905 and it was before 1930 that the project was completed. With this project Ilissos was diverted from its natural bank from Kifissos at Charokopou bridge, at the area of Kallithea and from the seashore and for about 3km upstream from the new estuary. (Σάρρος, 2004) By having its own estuary to Faliro Bay, Ilissos was not a tributary of Kifissos anymore. (geomythiki, 2016) However, creating new banks for Ilissos, at a new area, despite becoming a new reference axis, also caused quite some problems. It created discontinuities at the landscape of the areas and artificial obstacle at the transportation of residents and therefore several passings and small bridges had to be constructed. (https://geomythiki.blogspot.com, 2016)

Figure 6-9 Ilissos river bank, 1905 (www.in2life.gr, 2016)

6.4.3 1931-1960: Coverage projects and technical interventions

6.4.3.1 1931-1940: Ilissos Project before the World War II

Ilissos created many problems to the inhabitants of Athens, with its flood events despite the diversion and the bad water quality. So, among others, the help of foreign engineers was sought. After a series of proposals regarding river management, the proposal for covering the river, from an Italian engineer, Professor of Technical University of Milan, was finally accepted.

1931-1935 : In 1931 the final design construction of the project was assigned to the Hellenic Sewers construction Company for Athens - Piraeus and Surroundings, which was established specifically for this purpose. The study for the part upstream of Harokopou street was completed in 1935. (Παπαδάκης, 1997) At the initial river management plans, the river was supposed to have open channel riverbed with constructed lateral walls, but due to needs for intense building it was decided to cover the river. (Σάρρος, 2004)

27.10.1936 : The decision of covering the open streams of the city was taken during the dictatorship of Ioannis Metaxas. (www.ioannismetaxas.gr, 2009)

26.11.1936: The order for the beginning the construction of the management projects of Ilissos was issued by the Administration Office of the city. (www.ioannismetaxas.gr, 2009)

Figure 6-10 Dictator I. Metaxas at Ilissos river covering projects, 1937(www.in2life.gr, 2016)

Figure6.14Ilissos in front of Panathenaic stadium in 1937. Today is V. Konstantinou avenue (Η Αθήνα από τον 19ο αιώνα)

14.10.1938: The foundation stone of the great Ilissos cover projects was deposited (www.ioannismetaxas.gr, 2009)

'Today we bury Ilissos' is the phrase the dictator Ioannis Metaxas used to declare the start of the covering project of Ilissos. According to the initial planning for the channelization of the river, the river should flow at open channel, but due to intense urbanization, that was not possible. The study of the river management provided for open beds, but due to the dense reconstruction this was impossible. Also, coverage work began on Mesogeion - Katechaki Avenues and extended to Michalakopoulou and Papadiamantopoulou Streets.

6.4.3.2 1940-1945: Ilissos Project during the World War II

The underground channelization of Ilissos and many other technical projects stopped during the World War II due to the circumstances and the poor financial situation of the state. The few engineers of the projects that were in Athens were trying to help the workers of the projects to collect the materials that were left at the warehouses, maintain the unfinished projects, reconstruct parts of the drainages and create a soil laboratory at the construction site of Ilissos in order to help the studies of soil quality of the project. But as years were passing every aspect of life was worsening. (Παπαδάκης, 1997)

Figure 6-11Ilissos in 1944 (www.lifo.gr, 2019)

6.4.3.3 1945-1950s: Ilissos Project after the World War II

*1945-1950***:** After the war, the president of the United States of America (USA), Harry Truman, offered Greece financial and technical help, in recognition to the contribution of the country at the war against the Axis powers. The Ministry of Public Works was asked to hierarchy the needs of the country and within six months the reports were sent to the US representatives. In 1947, President Truman officially announced the help towards Greece with the Marshal plans and in 1950 their help at Ilissos projects was completed.

*1949-1951***:** The disasters caused during the war were continued during the years of civil war. So, it was not earlier than 1949 that the emergency reconstruction projects started again.

According to one of the engineers that participated at the projects of covering Ilissos, he declared that if the river was remaining uncovered, that would be a great threat for the central parts of the city due to dirty and toxic water, polluted from garbage thrown at the river. According to his opinion the decision for covering Ilissos was the right one to be taken.

Moreover, during the covering projects, engineers tried to pay attention to traces of anciency, like at the location of Kallirois spring, the plans left the river uncovered. However, this part was covered in the end after World War II, since the spaces was needed for

residential and traffic needs, since part of the population from the rural areas moved to Athens for employment reasons, leading to urban sprawl. (Παπαδάκης, 1997)

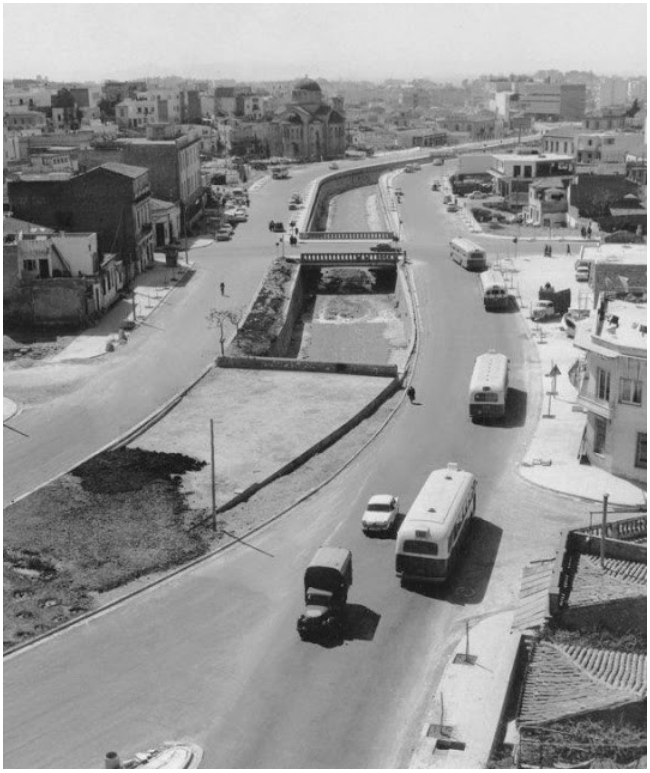


Figure 6-12Ilissos flowing between Kallirois street, Athens 1963 (www.in2life.gr, 2016)

6.4.4 2018: Land Subsidence

The river became again part of the city's reality due the sudden caving of the ground at the parking slot at the Taurus Subway Station in the neighborhood of Kallithea, on 11/5/2018. After a heavy rainfall, the ground under the road subsided and hauled three cars, revealing the abandonment and the non-maintenance for over sixty years, underground channelization of Ilissos. This incident triggered the search for the situation of the riverbed.

Figure 6-13 Flood at Ilissos, 22.02.2013 (www.enikos.gr, 2013)

Ilissos is flowing under this location at an underground channel. The situation of the erosion of the underground concrete pipe, where Ilissos is flowing through, was revealed after this incident and showing signs of damages to the side concrete walls of the channel, the parts of the concrete that were dragged out by the water and many other technical failures.

Figure 6-14 Land subsidence at parking slots over Ilissos, 2018 (photo by the writer)

After this incident, the Region of Attica, in cooperation with the Ministry of Infrastructure and EYDAP (the Athens Water and Drainage Company) decided to begin the process of checking the condition of the underground riverbed of Ilissos, in order to identify the serious problems. (Ministry of Infrastructures and Transport, 2018). Also, for safety reasons the tram passing over the covered river have been suspended since then, until the situation of the river channel is clear to the technical representatives of the state. (kathimerini, 2018)(Υπουργείο Υποδομών και Μεταφορών, 2018)

It is also very impressive that Ilissos is not mentioned anywhere, either as a river or stream in the Water Basin Management Plans, nor is its river basin separately examined from that of Kifissos. (Υπουργείο Περιβάλλοντος & Ενέργειας, 2017)

6.4.5 2019: Placement of memory landmarks

"Ilissos as a Road", was an iniviative that took place until the end of July 2019 and referred to the creation of markings, made of mud-bricks that were positioned at sidewalks along the roads that cover Ilissos, like the streets of Michalakopoulou, Vasileos Konstantinou, Arditou and Kallirois. The aim was to create temporal urban landmarks that would make the river known to the public and declare its presence at these areas. A key structural element of these markings was the use of the mud-bricks, that would carry a mark, made by stamp, making the name 'Ilissos' over them and were embedded with seeds of flora that could be found at Attica streams and in particular they were collected from the banks and the drainage basin's area of Ilissos River at mountain Ymittos, under the guidance of a specialist botanical scientist. This clay and straw brick was an eco-friendly proposal, minimizing the environmental footprint in the public space and primarily making a symbolic reference to the river.

Figure 6.12 Bricks construction that were used as landmarks(Ολισόςωςδρόμος, 2019)

The construction of bricks and the assembling of the landmarks were made at open-air participatory design workshops, so that residents could also be involved. The constructions were placed on soil in order to gradually and as time would go by to decompose naturally and integrate into the natural environment and the seeds to flourish. The seeds in the bushes would start to germinate and gradually be transformed into large natural horticultural compositions, that would enrich the biodiversity of the location with native species of plants that have disappeared from these sites.

The locations that this action took place were of great importance for the cultural landscape of Ilissos River and were in relation to the anthropogenic and natural environment of the areas that the river passes. The action was part of the POLIS project implemented by "This is Athens" action of the municipality of Athens. (arxeion-politismou, 2019)(Ολισόςωςδρόμος, 2019)

Figure6.13 Bench indicating where Ilissos river used to flow through the city(Ολισόςωςδρόμος, 2019)

6.4.6 Nowadays: Estuary redevelopment

Only a few parts of Ilissos river are currently uncovered, such those at Goudi Park, Metz area and at Panagi Tsaldari Avenue in Kallithea. At these areas, the river flows at an open channel, but is left without care and as a result, people passing by, pay no attention to the river. In recent years, the story of the river has triggered some ecologically sustainable ideas for the city about the ways the river could be upgraded in the urban environment, like by linking it to historical, natural and cultural sites of the city. (HydriaProject, 2009)

Figure 6-15 Design for redevelopment of Ilissos and Kifissos estuary area (Karagiannis, 2021)

Moreover, the estuary of Ilissos at Faliron Bay, constitutes a small wetland. Although at this area there have been embankment projects for two times until today, the delta has a strong natural regeneration. Today there are dozens of species of herbaceous and shrubby plants. The area's vegetation provides sites for both nesting and sheltering for many species of birds and other organisms. Prior to the debris-coverage of the area, many species of plants were there, but due to these embankment projects they were destroyed and many of them disappeared. (Μάνου, 2005) The Delta of Ilissos River belongs to the list of important habitats in the Greek CORINE[2] and the avifauna is included in Annex I of Directive 79/409 EEC for the conservation and protection of the wild birds. Until nowadays, the coastal area faces problems due to the pollution in the estuaries of Kifissos and Ilissos rivers, because of illegal household waste dumping. (Economou, 2012) Protecting and restoring of Ilissos is of strategic importance. The estuary of Ilissos is characterized by serious environmental problems and its protection and restoration requires a special management plan. (Λέκκας, 2018)

[2]The CORINE (Co-Ordinated INformation on the Environment) dataseries was established by the European Community as a way of compiling geo-spatial environmental information in a standardized and comparable manner across the European continent (https://www.epa.ie/soilandbiodiversity/soils/land/corine/)

7 Kifissos River

Kifissos is the greatest river and the major drainage channel of the city of Athens. Projects at Kifissos started in the 1930s and the projects were more intense after the World War II. In general, the projects were related to flood control, city's sewer system and streets construction. The majority of the river has been channelized and during the Olympic Games preparation period, part of the National Highway was constructed above the river. Today, the river flows close to or under the National Highway, which connects the capital city in central Greece, with the second major city, Thessaloniki, 500km away in north Greece. Also, the riparian zone of Kifissos was allowed to be used as industrial zone after the 1940s. The basin and the river have been under the effects of the intense urbanization of Athens and that also degraded the natural environment. The human interventions at the basin and the river are going to be presented in this chapter in more detail and chronological order, with also some extra attention to certain legal aspects concerning the protection and the nature of this water body, whether to be regarded as pipe or river during the preparation period of the Olympic Games.

7.1 Basin evolution – General description

Kifissos is the greatest river and the major drainage channel of the city of Athens, since its drainage basin covers 67% of the total area of the city of Athens and Piraeus – the port city of Greater Athens Urban Area- (Αντωνίου, 2002). The river originates from the mountains of Penteli, Parnitha, Aigaleo and Ymittos, flows through the city from northeast to southwest direction and discharges at Faliro Bay, at Saronikos Gulf (Bathrellos, 2016). The basin area of Kifissos is 381.10 km^2 (Κουτσογιάννης, 2010) and the length of the river is estimated at 33.7km (Bathrellos, 2016), with 25km of its main route flowing through urban areas, while the total length of the tributaries exceeds the 150km (ITIA-NTUA).

In ancient times, Kifissos was worshiped as a god, as rivers and streams were considered local deities and sacred sites. The river was first exploited in the Roman Emperor Hadrianus era (135-117 BC), when the first organized water supply system for Athens was built in the Roman period.

Figure 7-1Athens and Kifissos with blue color line (https://www.in.gr, 2011)

In modern history and especially in the post-World War II period, Kifissos was one of the first elements of Attica's nature affected by anarchic city's development. Specifically, the southwestern part of the river, separating Athens from the Piraeus region, was trapped in

the industrial zone of Attica, since on both sides of Kifissos, factories, industries, and manufacturing businesses were quickly established in an unplanned and informal industrial park. At the same time, there was no land-use plan and sewer system and there were industrial wastewater pipes that ended up in the river.

Also, one of the main highways of the city and country's National Highway, has been constructed on the river, along the Kifissos riverbed. The highway constructed over about 8km of river, was the result of hydraulic and transportation projects that started in 1972, based on studies of 1971 and finalized in 2004 as part of the projects constructed for the Olympic Games. (Mazi & Koussis, 2006) Until 2000, the overflow of Kifissos in every rainfall threatened homes and human lives, until the river was completely boxed. Even though the cross-section of the lower part of the river has now been widened to provide water discharges of up to 1400 m^3/ sec, the flood events are common during heavy storms. (Πέρρου, 2016)(Bathrellos, 2016)

Figure 7-2 Kifissos river and part of the National Highway over and next to it (photo by the writer)

7.2 Overview of pressures at Kifissos Basin

For many years, Kifissos river basin was left unprotected against human activities, under the pressure of many kinds of exploitation and its environment was degraded by fires, debris, liquid waste discharge, encroachments and increased building activity. In more detail, these pressures could be enclosed at the following categories:

The ownership status

The biggest problem, in any attempt to introduce protection measures for the banks of Kifissos, was the land ownership regime. Private plots that existed on the banks, often with buildings and numerous land claims by individuals, even at areas appearing on maps as forest, were an obstacle at any effort to apply protection zones at the riparian area.

The industrial areas

The land boundaries of the factories, operating at areas next to the river, were gradually extending towards the riverbanks and there were cases that factory units were built on a very short distance from the river. In general, the area was attractive for manufacturers due to large and unstructured properties, relatively low land prices compared to other areas of the Attica Basin, close proximity to the center and easy access to the highway. However, the practice of uncontrolled installation of industries next to the river resulted to the degradation of the environment of the stream and the restriction of the riverbed, even at risk to the safety of the factories.

Illegal buildings

Illegal constructions such as factories, houses, pig farms, etc. were built on the river banks and reduced the cross section width by technical works such as debris grounding, walls etc. These constructions were filling the area with building blocks, disrupting the continuity of the landscape with the surrounding landscapes and radically changed the morphology of the stream zone.

Geophysical changes

The changes of the morphology of the riverbed were caused by the large-scale illegal debris deposition, the expansion of private properties at public forests and the installation of greenhouses. In general, the lack of policing, the land clearing, the illegal enclosures and landfills resulted to the destruction of the natural riverbed and the region's flora and fauna. Despite the numerous court decisions, the illegal activities did not stop.

Tourist facilities

Camping and recreational centers at the north part of the river and close to the springs, without the necessary infrastructures, occupying significant areas and irreversibly damaging the landscape with their waste, having in addition requirements for road, parking and auxiliary installations, were another source for of degradation of the river basin. (ΟργανισμόςΑθήνας, 1992)

Figure 7-3 Natural forest at rivers banks in north Athens, close to springs (https://oikoinfo.wordpress.com, 2010)

7.3 Management projects of Kifissos River

Management of Kifissos in the urban area started 35 years ago and was partially completed with the 2004 road project. In particular:

Section A: Kifissos Estuary Project in Faliron Bay is from position 0 m until 900m upstream.

Section B: Kifissos, upstream from the Estuary, until Agia Anna Street, from position 900m to position 3000m, is uncovered and channelized.

Section C: From Agia Anna Street to Treis Gefyres, which corresponds from position 3000m to position 10330m, the river is totally boxed.

Section D: At Kifissos route from Treis Gefyres to Kokkinos Milos, from position 10330m to position 13700m, the river is open, channelized, but with inadequate cross section.

Figure 7-4 Uncovered part of Kifissos river at upstream location (photo by the writer)

Figure 7-5Kifissos river flowing under the Highway, built above it (photo by the writer)

Discharge calculations for the projects in various sections of Kifissos range from 400 m³/s to 1400 m³/s (Νικολόπουλος, 2008). It should be noted that all calculations for the channeling and coverage of Kifissos, which constitutes the basic system of rainwater collection in Attica, were based solely on theoretical assumptions (Μαμάσης, 2007). The management of Kifissos, as well as the flood control projects, were designed and constructed in accordance with the design of 1974, meaning that the hydraulic studies for the river, the contributing streams and the rainwater collectors were not up to date. Although there were several floods in Kifissos, there was no attempt to verify the calculated hydrological discharges with actual flood flow measurements (Νικολόπουλος, 2007). Also it should be noted that in the section from the estuary and at some kilometers upstream, seawater intrusion takes place and therefore there is need for further investigation. (Ειδική Γραμματεία Υδάτων, 2017)

7.4 Main Basin Interventions – Date milestones

1900: Management of Kifissos River started in 1900, at the section downstream of Piraeus Street, after the catastrophic flood of November 18, 1889, also known as the "flood of Agios Philippos". This flood event remained in city's history with this name, because it occurred the day of the celebration of the memory, according to Christian faith, of Philip the Apostle. The rain height was 150.02mm and it caused damages, property losses and 61 human victims. (Σάρρος Μ., 2004)

Figure 7-6 Drawing from the press of the damages that the flood of 1896 caused (Empros Newspaper, 1896)

1934 - 1956 : During the years 1934 -1939, 17 streams were covered as part of the creation of the Athens sewer system (Λάσκαρης, 2009). In 1935, the Central Drainage pipe of Athens was planned and constructed along Kifissos. (Κομνηνός et al, 2010). Channelization of Kifissos riverbed from the location Treis Gefires to the estuary of the river started in 1935 and was completed in 1956. The projects were based on studies made in 1934, when the capital's population was about 800,000. With these projects Kifissos canal had discharge capacity for 400-600 m³/s (ΣάρροςΜ. , 2004).

In the section between Constantinoupoleos Street and the neighborhood of Sepolia, namely from position 800m to position 7500m, the management of Kifissos did not follow the line of the river, but was engraved westwards outside the city plan of 1932. Next to the artificial riverbed, embankments were created and roads were later constructed on them, which were a precursor of Kifissos Avenue. The canalization was made with embankments higher by 1.00 - 1.50m above the surrounding terrain. Later, the roads next to the river were constructed at the lower part of the embankments and this explains why since nowadays areas next to the river still flood (ΣάρροςΜ. , 2004) (Σάρρος, 1996)(Λάσκαρης, 2009)

Figure 7-7 Kifissos river in 1904 (http://www.amapola.gr)

1937: For the first time, the design of highway on each side of the river is announced. (Κομνηνός et al, 2010).

1940: In 1940 the "Capital City Plan" was prepared. According to this plan the Supreme City Planning Council approved for the area of city of Piraeus, the installation of more industries apart from the already existing ones at this area. Since then and for several decades, the official State was allowing the installation of any operation that considered "annoying" and “industrial” in the area of Eleonas in general, and in particular in Moschato, Renti, Tavros and Kallithea, which are neighborhoods of Piraeus. The area had mainly oil, chemical, construction, tannery, textile, food, winemaking and ice industries, the electricity power plant and more. (Κομνηνός et al, 2010)

1961: Following the catastrophic floods of 1961 and 1977, large hydraulic and anti-flood projects were constructed in the most prone areas, such as Kifissos and the major tributary streams there, the Eschatia stream and Ilissos river. (Mazi & Koussis, 2006)

1962: In 1962 the first part of Kifissos Avenue was inaugurated. This highway was constructed parallel to the river of Kifissos and it was considered of vital importance for the street network of the city of Athens since it connected the capital city with the main highways leading to Europe (Kotsikou, 2010).

1971: The Ministry of Public Works decided in 1971 the redevelopment of the highways next the river and the construction of multilevel intersections, in order to achieve the re-management of the river from Acharnon Stream to Poseidonos Avenue, which is a seaside boulevard, scoping to the covering of the river in a future time. (Σάρρος, 1996). In the 1970s it was decided, apart from constructing intersections at the side avenues, to cover Kifissos river and streams in the section between Petrou Ralli Str. and Treis Gefires and also construct a highway, with the projects starting in 1993. (Κομνηνός et al, 2010)

1972: The exploitation of Faliron Bay was based on a winning plan of an architectural competition of 1963. The Faliron Bay projects, as well as the Kifissos estuary projects, began in 1972. The 400m marine landfill of the bay, in order to build the Peace and Friendship Stadium (Stadio Irinis kai Filias or SEF) and the prediction for construction of a yacht port between Piraeus and Kifissos estuary, led to the extension of Kifissos riverbed by 680m towards the sea, within the marine area and at a depth of -9.50m. The configuration of the port and the extension of the sea breakwater wall, which would protect the Kifissos estuary, were not completed at that time. As a result, sea waves caused damages to the Kifissos estuary funnel pedestals and made very problematic the outflow of stormwater collectors. (ΣάρροςΜ. , 2004)

1979-1980: In 1979-1980, a collector of waste waters was constructed at the river and the overpass avenues with their Fly Overs were built. (ΕΙΔΙΚΗΓΡΑΜΜΑΤΕΙΑΥΔΑΤΩΝ, 2013)

1983: In 1983, it was decided to complete the protection projects of the Kifissos estuary funnel and construct the sea breakwater wall. The breakwater wall would protect the estuary from marine ripples and in the end the estuary project funnel was 880m long towards the sea and the bottom level was at -10m. (ΣάρροςΜ. , 2004)

1994: In 1994, the protection of Kifissos was enacted by Presidential Decree (632D / 27-6-1994), since its basin had been heavily affected by human activities in previous years. In particular, the Presidential Decree defined two protection zones on either side of the river, about 12,500 acres. The First Zone, in which any kind of construction was prohibited, was 50m wide on each side of the river and only agricultural activity was permitted. The Second Protection Zone was extended beyond the First, with varying widths and construction was permitted at a low rate and for mild activities. It also provided a ten-year deadline for removal of all installations and relocation of industries settled within the boundaries of the Protection Zones. (http://mlp-blo-g-spot.blogspot.com/, 2018).

1996: In 1996, it was decided to cover the last kilometers of the river from the Treis Gefires location until the estuary, in order to create a motorway over it. (http://mlp-blo-g-spot.blogspot.com/, 2018)

2002: In 2002, the "Management and Redevelopment Body of the Kifissos Attica River and Streams" was established by Presidential Decree 346/2002, with the aim of implementing the 1994 Presidential Decree (ΠΔ 346/2002, 2002).

2004: In 2004, year of the Olympic Games in Athens, after many interventions and adjustments, the projects for Kifissos were completed and eventually legalized the boundaries of the river from the location of TreisGefires until its estuary at Poseidonos Avenue. In the end, the construction of major public transport projects created the Kifissos Avenue over Kifissos river for the needs of the Olympic Ring, which was the big road project of the capital, that would cover the transportation needs for the Olympic Games (ΣάρροςΜ. , 2004) So, in the early 2000s, Kifissos River was boxed as part of the major technical and construction projects that took place at the 2004 Athens Olympics.(http://mlp-blo-g-spot.blogspot.com/, 2018)

Figure 7-8 Highway over the river Kifissos (https://ais201.wordpress.com, 2009)

Figure 7-9 Evolution of covering projects of Kifissos in 2001-left and 2004-right (https://ais201.wordpress.com, 2009)

2011: The legal body "Metropolitan Body for Restoration and Management of Protected Areas of Attica" was established pursuant to the provision of article 59.1 of Law 4002/2011 (Government Gazette A 180), after the merge of the "Antonis Tritsis Environmental Awareness Park Development and Management Organization" (Presidential Decree 184/2002, Government Gazette A 172), "Attica Eleonas Development and Management Organization" (Decree 205/2002, Government Gazette A 187) , "Management and Redevelopment Body of Kifissos Attica River and its Streams" (Presidential Decree 346/2002, A 287) and is supervised by the Minister of Environment, Energy and Climatic Change. (ΥΠΕΚΑ)

7.4.1 Kifissos Avenue

Kifissos Avenue is the central axis of Athens, built over parts of Kifissos River. Its length is 14 km, it starts from the area of Kifissia, at the north areas of Athens and runs through many Attica municipalities and districts, towards the sea at south west of the city. This avenue is the extension of the Athens-Thessaloniki National Highway, which enters the city and when it reaches the Athens Municipality is named Kifissos Avenue. Acting as a high traffic density road, it ends at the Peace and Friendship Stadium at the coast of Piraeus, giving access to the suburbs of Piraeus and all of the beachfront areas along Poseidonos Avenue (http://www.athens24.com/kifissou-avenue.html). It is part of the European Highway 75 (E75) and Highway 1. The avenue has three lanes per direction, with runways, bridges and a number of exits, serving numerous businesses along its route. Kifissos Ave. serves over 100,000 vehicles daily and is connected with other major Athens highways.

7.4.2 The legal part of the coverage project of Kifissos for the construction of the Olympic Ring

The Ministry of Environment, Planning and Public Projects, in an effort to diminish the reactions of residents and environmental organizations for the Kifissos Coverage Project and the construction of the highway over the river, tried from the first moment, to link the road project with the area's flood problem.

From the first moment, residents, prefecture authorities and academics working with the residents committees from the neighborhoods located next to the river, Moschato and Neo Faliron, were against the Kifissos road project and rejected the governmental dilemma "road and flood control projects or nothing", requesting only for the flood control projects. Moreover, they expressed their opposition to the proposed flood protection plans, since they regarded them as projects that were not meant to protect the area from floods, but only to support the fly-over highway project. On the other side, the Ministry attempted to declassify the water body of Kifissos from the category of the rivers, so that the legislation of the European Union on rivers and streams could not be applied. (Αλανιώτης, 2007)

It all started from a complaint from a Greek citizen that reached the European Parliament's Committee on Petitions in 1996, referring to the uncontrolled discharge of urban and industrial waste water into Kifissos River and to the plans for constructing a highway above the riverbed. The communication between the Commission and the Greek Authorities included the following characteristics and illustrate the Greek authorities' attitude towards Kifissos:

In July 1996, the European Parliament's Committee on Petitions received a complaint by a Greek citizen about the discharge of waste water to Kifissos and the promotion of highway construction projects over the river.

In April 1997, the Greek authorities replied that Kifissos River did not belong to any of the categories of the Directive 78/659 / EEC regarding the quality of fresh water bodies that need protection or improvement. Also, they declared that Faliron Bay, where Kifissos flows in, was at the ‘non-protection’ category.

In June 1997, the Greek authorities claimed that there were no industries discharging dangerous substances in the river. All pollutants were classified as biodegradable and were considered harmless to the environment. In addition, they stated that there was no evidence that Kifissos was polluted by industrial waste water.

In May 1998, the Commission, in a new letter, requested information on the type of pollutants discharged to Kifissos. The Greek side did not respond and received a letter of reminder in July. Greek part continued to be indifferent and for this reason an extradition procedure was initiated against Greece for misapplication of Directive 76/464 / EEC about dangerous substances discharged in aquatic environment.

In September 1998, the Commission, in a new letter, requested clarification on the industrial wastes, recalling the country's commitment to develop pollution reduction programs for Kifissos.

In September 1999, in direct meetings with Community’s officials, the representatives of the Ministry of Foreign Affairs disputed about the complaints for Kifissos contamination, referred to the Capital’s Water and Drainage Network Company (EYDAP) river monitoring system to support their positions and made their first "retreat". They described Kifissos as a stream that they considered it did not fall within the scope of the Community’s Directive.

In February 2000, the Commission rejected the Greek side's argument that Kifissos is a stream. It is noted that the Directive applies to surface water, without excluding streams; Kifissos, therefore, is under the Directive.

In March 2000, the Ministry of Foreign Affairs responded that the monitoring program of Kifissos by EYDAP was in progress, while the information provided to the Commission indicated that the level of contamination was limited.

The E.U. however discovered that the contamination at Kifissos was at the upper limit values even for sewages pipes and under any circumstances could this situation be accepted for a river. It was further noted that the Greek authorities should have determined the area adjacent to Kifissos as sensitive zone.

The issue was discussed at the annual meeting of European and Greek officials in December 2000. The pressure on the Greek side, which still characterized Kifissos as stream, was intense. In addition, the river, which was characterized as stream in September 1999, had by that time been classified by the Greek side as drainage pipe.

In January 2001, the Commission requested a written confirmation of the Greek position about considering Kifissos as a drainage pipe. This came in May 2001. At this response, it was stated that Kifissos was not a river due to lacking natural water throughout the year. Moreover, it was mentioned that it was part of the sewers that discharged into capital's Wastewater Treatment Plant, Psittalia. According to the Greek government: "We cannot control the pollution of Kifissos. EYDAP already uses it as a sewer pipe anyway and therefore we characterize it so. Therefore, the contamination limits recorded are compatible with ... sewers." (Τερζής, 2003)(EuroParl)

In the summer of 2002, a year after Kifissos was described as drainage pipe "because it lacks natural water throughout the year", the river was flooded with rainwater, flooding many areas and allowing government officials to delegate significant budget for projects for "river bed management". (Τερζής, 2003)

7.4.3 Laws on expropriation during the Olympic Games

Due to the urgent character of the projects related to the Olympic Games, the government had introduced laws that would bypass the typical legal building procedures in order to avoid delays caused by peoples' objections and Kifissos projects were included in this category. In more detail:

The National Commission and the Organizing Committee of the Olympic Games (Athens 2004 SA), established by the Law 2598 / 24-3-1998, were two administration bodies, responsible for the planning of the Olympic Games, that operated independently from the existing state mechanisms. According to the Olympic Committee, Kifissos Avenue would be part of the transport projects for the Olympic Games. It would serve the Olympic activities that would take place on the coastal front at the stadiums of baseball, softball and beach volleyball and was included in the Olympic Ring road project in accordance with Law 2833/2000. (Νόμος 2833-2000)

However, the Olympic Committee changed the plans and the stadiums would be transferred to other areas. Therefore, the residents expressed their opposition about the utility of the road part of the projects for Kifissos, because it would no longer serve any of the needs proposed for its construction. According to the residents, neither the leadership of the Ministry of Environment, Planning and Public Projects, nor the representative of the Olympic Committee, responded to the discussion with the Residents' Committee at the Council of State, the higher degree court of the country, where the residents referred to.

After a while, the need to connect the National highway to the port of Piraeus has been argued by both the Olympic Committee and the avenue supporters. This connection would facilitate visitors, from cruise ships docked in Piraeus, to be transported to the Olympic installations. This argument fell short after the decision of the Ministry of Foreign Affairs that denied the project.

According to the residents, it became clear that the Olympic Ring was an excuse to integrate the project into the Olympic Project legislation and in that way the government could use the Olympic expropriation law. This law prevented the reaction of the inhabitants and thus ensured the smooth construction of a project. (Αλωνιάτης, 2002)

It should be mentioned, that at the Athens Master Plan there was not any prediction that the city would host a big event like the Olympic Games, neither in terms of space, nor in terms of infrastructures needed.

For this reason, in 1999, two years after taking over the organization of the Olympic Games of 2004 and just five years before the Games, the law No. 2730 / 25-6-1999 was enacted, introducing specific urban arrangements for the areas in which Olympic projects would take place, defining the expropriation procedures and introducing new organizational and administrative arrangements.(Νόμος 2730-1999)(Δελλαδέτσιμας, 2015) (Διαλεισμάς, 2007)

Figure 7-10 Projects at Kifissos river during the preparation period of the Olympic Games of 2004 (https://www.rizospastis.gr, n.d.)

This law provided the institutional coverage and the procedural acceleration for selecting the location of the projects, so that with the excuse of urgency, the established decision-making processes could be overruled. In addition, the state adopted the appropriate legislation in order to minimize the possibility of appeals against the expropriations. Also, a second law, (Law 228/9- 10-2001), two years after the first one, filled any gaps left from the previous law. (Δελλαδέτσιμας, 2015) (Διαλεισμάς, 2007)(Νόμος 2947 - 2001)

This legislative intervention was an indication of the necessity of the state to deviate from the established policy and planning processes for this special occasion. The modifications of the Athens Mater Plan allowed the Minister of Environment, Urban Planning and Public Projects to establish a common system of project licensing for all areas related to Olympic projects, with a view to ensure a uniform licensing and coordination system across all activities into the strict and narrow time slots for project development. (Δελλαδέτσιμας, 2015).

8 Content analysis – Coding procedure

In this chapter, the details of the coding procedure of the content analysis of the newspapers and municipal acts is going to be presented. At first it was decided to define the coding variables according to which the articles and acts would be classified. At first, the material included in the final database was classified according to the river it was refereeing to and then, its tone was classified whether it was towards the environmentally friendly and sustainable management of the river or towards their economic exploitation, representing community's sensitivity. The other group of classification was about the kind of memories people used they had about the river, either positive of negative, according to the research material. As positive were regarded the memory mentions about the historical importance of the rivers for the city and past good environmental condition of the rivers and as negative memories were the memories related to past flood events and bad environmental conditions.

8.1 Coding process description

The steps that are necessary for the content analysis include the appropriate selection of the research material and then its coding. These processes are described schematically at Figure 8.1, with visual explanation of the steps that are needed, in order to end up to the most suitable coding scheme, based on the purposes of this research.

The first main group at activities, which was related to the selection of the research items, has already been explained in the chapter of Methodology. From the original material, selected from the newspapers and municipal acts, the items that were excluded, were the ones that on one hand included the name of the rivers, but on the other hand were irrelevant to the frame of this research. After having completed the database with the final selection of these items, the coding procedure was the next step.

The second main group of activities described in Figure 8.1 was about the process of coding, as an inherent part of the content analysis, which allows the organization of the collected material at groups with similar content, in order to explore thematic correlations among the issues mentioned.

At the coding process, the classification of the material is based on the coding variables. These codes indicate the most important elements that better match the purposes of this study and can be found at the collected research items. The thematic categories are clusters of these codes, according to which the material analysis was done and facilitate the identification of relationship and patterns among the codes. (Braun & Clarke, 2006).

These thematic categories are the corn stone of the coding process and it was indented to make them as clear as possible in terms of how they were defined and what information they included, in order every time the coding attempts to be consistent under the same frame. (Busch, et al., 1994-2012) Moreover, since each database item could be attributed to more than one thematic category, it was important to carefully group the codes and create the thematic categories in the most efficient way, in order to make them unique and the differences between them to be significant, so that to avoid any confusion during the coding procedure, eliminate the possibility of overlapping and finally produce trustworthy content analysis results. (Lynch & Peer, 2002) The codes were grouped on the base of similarity of the information described at each research item (Altaweel & Bone, 2012).

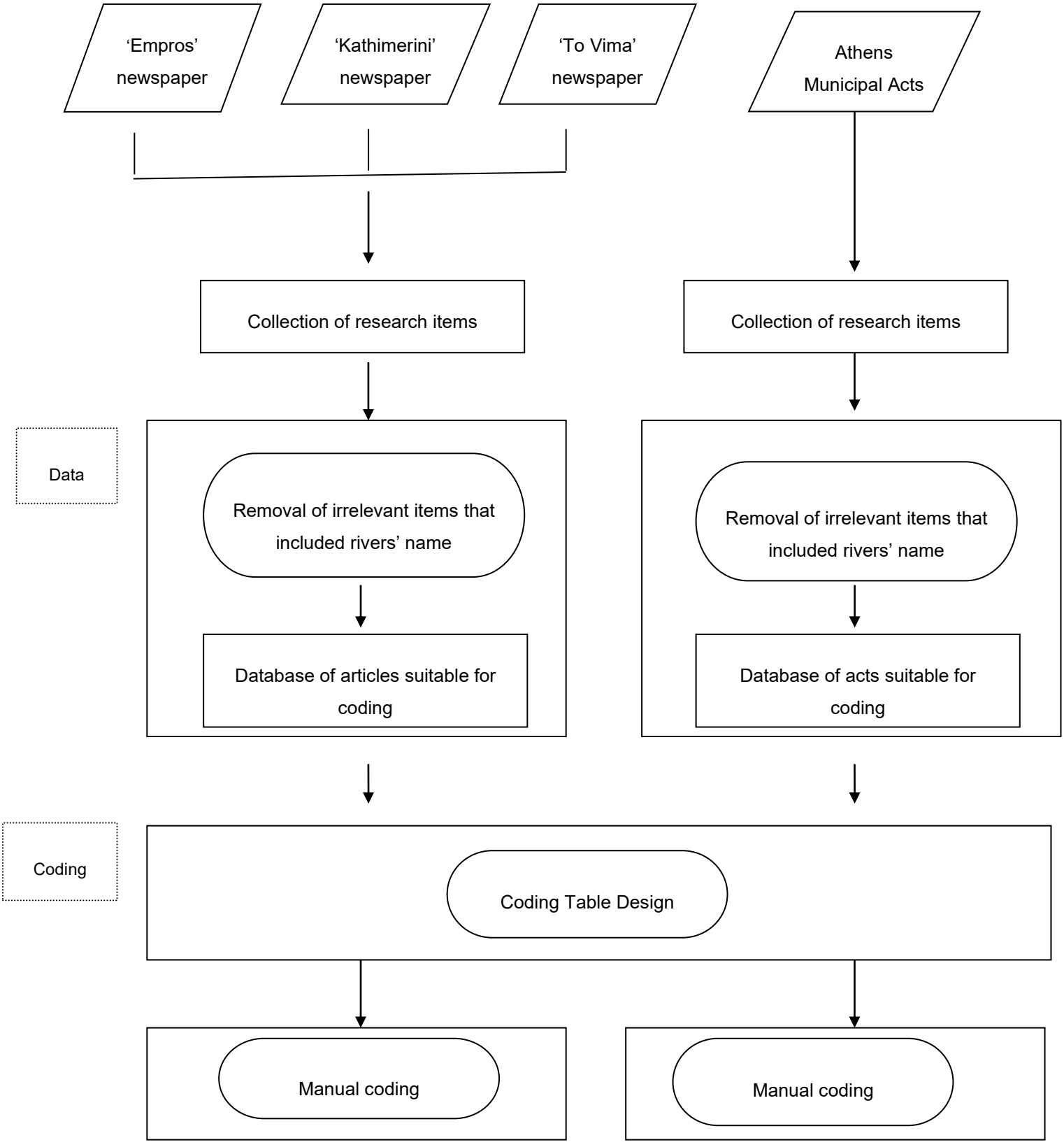


Figure 8.1 Content analysis steps for data retrieval and coding process from newspapers and municipal acts archives (Wei, Wei, Western, Skinner, & Lyle, 2015)

To start with the coding process, it was necessary to decide about the way to define the concepts to be used for the categorization of the material and the degree of flexibility to be used at this process, by either pre-defining the codes or adjusting them, according to the material found. (Busch, et al., 1994-2012)

By defining in advance the codes, the researcher can remain focused on the inquiry's subjects during the coding procedure. (Busch, et al., 1994-2012) On the other hand, by the emergent coding, the codes are decided after first evaluating the data and then are revised during the coding procedure, in order to be closer to the collected data. (Stemler, 2001) At this research, the idea was to first evaluate the data, make an initial estimation of the codes and then revise them during the coding procedure.

Also, the coding of the material was made manual, by reading the texts and mentioning the main information. Alternatively, the coding could be conducted automate, with the use of a computer program which could allow the interpretation of large amount of data at short time. (Busch, et al., 1994-2012) However, the manually coding, which was selected for this research, offered the possibility to identify the codes during the interpretation of the data and discover the hidden and implied meanings and ideas and ironic comments (Wei, Wei, Western, Skinner, & Lyle, 2015), whereas computer coding would be based only at the obvious information that a computer program can recognize according to predefined the directions of the researcher. (Busch, et al., 1994-2012)

8.2 Coding steps

For the purposes of this research, the analysis of the material was based at first, on the presence of certain words (Busch, et al., 1994-2012), which was decided to be the name of the river, indicating if the item was about Ilissos, Kifissos or both rivers. This discrimination between the articles and municipal acts, about whether they referred to one of the river or both of them, as seen in Table1.1, could provide an overview about the presence of the rivers at the public debate on a yearly base.

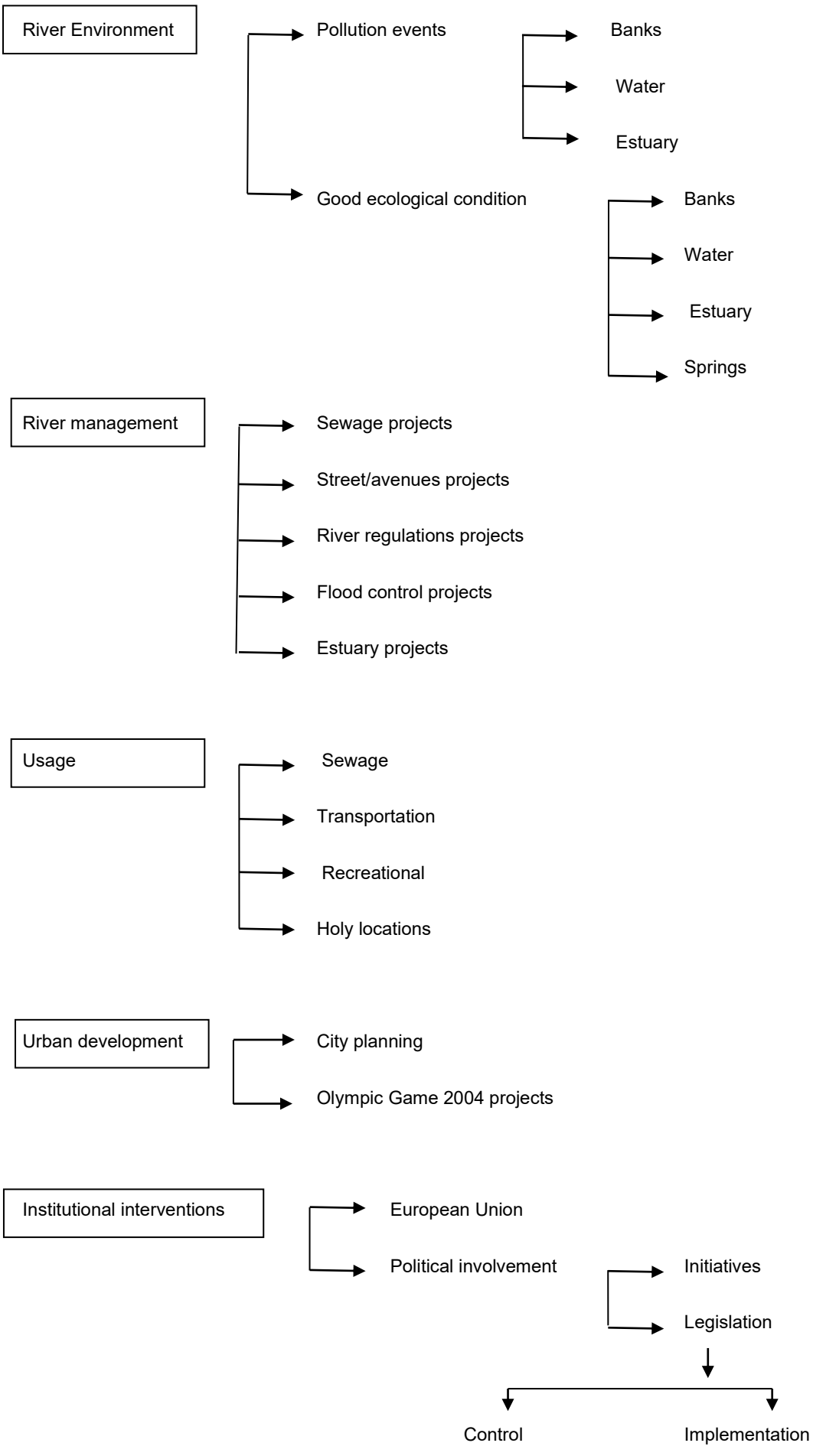
Table 8-1 Classification of research items based on the reference to one or both the rivers

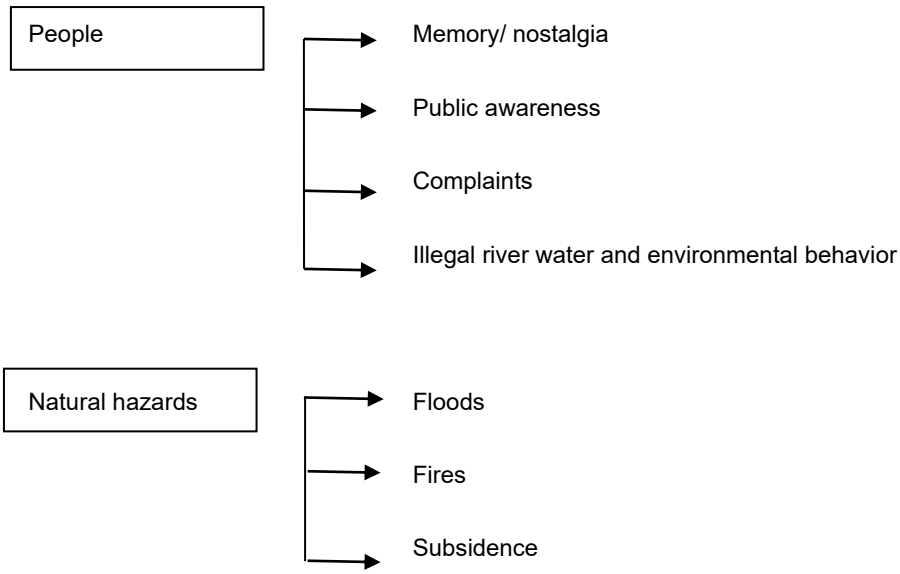
Date	River's reference	
	Ilissos	Kifissos
# research item ID #		

Then, the main part of the coding process started with becoming more familiar with the data, by going through the research items again and mentioning some initial ideas related to the information provided at each item. The next step was to generate an initial estimation of codes that could be implemented at the coding procedure of the content analysis.

At this stage, the most important information at each database item was attributed to codes that represented better the information and was useful for this study. A visual representation of this stage can be seen at the Thematic map 1. At this stage, the decision for the codes focused on classifying into groups the raw information that was provided concerning the rivers.

Thematic map 1: Initial thematic map showing the first thematic categories and codes

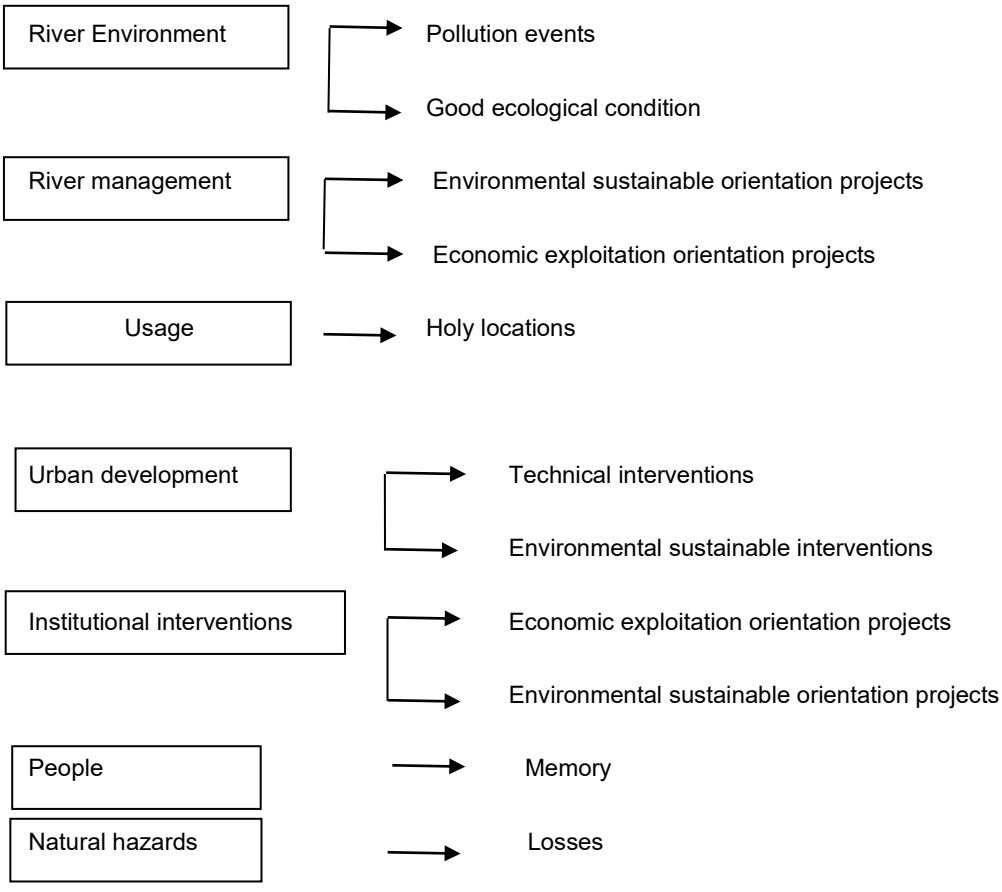




After making this first analysis of the material and the first list of the codes and thematic categories, the need for broader thematic categories, closer to the purposes of the research, was obvious. Therefore, the list of codes needed to be interpreted, so that they to be clustered into larger and more representative groups.

For this reason, it was important to assess again the thematic categories by evaluating them for the suitability for the purposes of this research, evaluating their homogeneity and if they were unique and include characteristics that could distinct one form the other. The second Thematic map can give an indication of this procedure.

Thematic map 2, showing thematic categories after interpretation

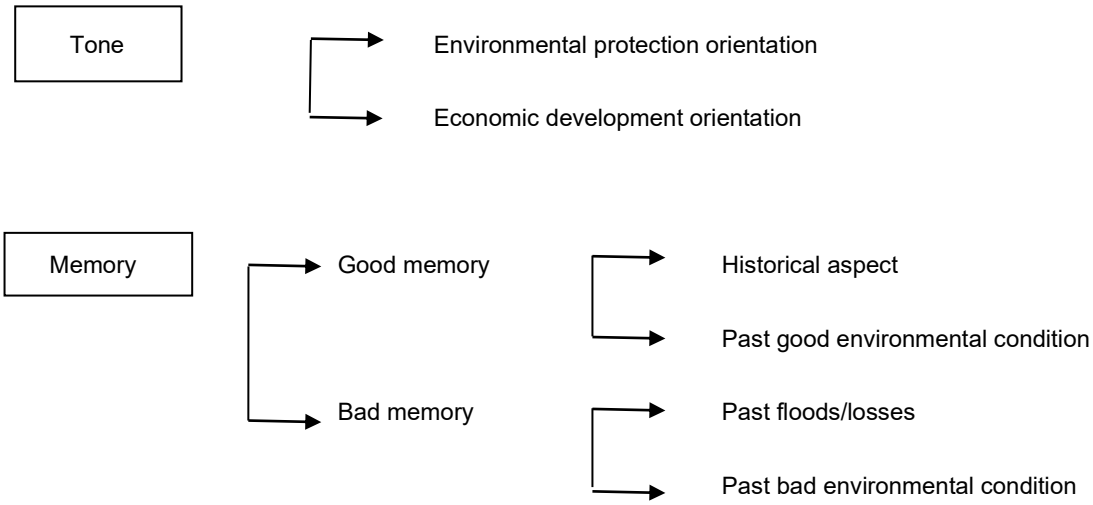


At the first two stages of configurating the thematic maps, the codes and thematic categories were oriented towards aspects related to rivers on infrastructural, management, environmental and institutional level and on people's attitude. However, this approach was overlapping information and data that had already been explained at previous chapters of this research, like the information about the condition of the construction activities and the usage of the river. So, keeping these thematic categories, was not adding any further value to the research.

Therefore, the reorganization of the codes was decided to be based on people's interest and attitude towards the rivers, either as clear opinion about the projects and the prevailing rivers' institutional regime or even as wishful thinking about the future of the rivers. For example, articles with opinions, references and information about projects and laws for the protection of river's banks, environment and water were grouped under one thematic category.

It was important, for the purposes of this research, to focus more on the human factor. In terms of sociohydrological analysis, the two aspects of human factor were the community's sensitivity and the memory. Therefore, at the final stage of determining the coding Thematic map 3, the selection of the codes and thematic categories was based on these aspects. Below, the details for classification of the research material at these thematic categories are explained.

Thematic map 3, showing final the thematic categories



So, the coding process can be based on this scheme.

8.2.1 Coding Community's sensitivity

As it was mentioned in the chapter of Methodology, one of the possible options for acquiring information about the evolution of community's sensitivity over environmental awareness, was the use of newspaper articles and municipal acts.

For the purposes of this research and in order to acquire measurable results about the community's sensitivity for the environment, it was decided to process the newspaper articles and municipality acts, based on the orientation they have between the categories of 'economic development' and 'environmental awareness', as at the work of (Wei, Wei, & Western, 2017), (Xiong, Wei, Zhang, & Wei, 2016), (Wei, Wei, Western, Skinner, & Lyle, 2015), representing two main dimensions of the societal value of the rivers.

In order an article to be attributed to the category of the 'economic development', the main topic should focus to infrastructures related to river management and water control, flood control projects, sewage systems, transportation projects related to the river etc and in

general focus on protecting and promoting the economic development of the areas around the river and support humans' financial benefit over river's natural sustainability.

In order an article to be attributed to the category of the community's sensitivity for environmental sustainability orientation, the main topic of the article's content should be related with the protection of the environment, either by infrastructures or policy reformations, mentions of incidents of ecosystem's degradation, pollution of river's water and environment, complaints of people about the condition of the river's environment and references for penalties imposed by the authorities or residents' campaigns for river protection.

8.2.2 Coding for Memory

The use of media for acquiring information related to the memory around rivers was mentioned in the Methodology Chapter. For the purposes of this research, the notion of memory, linked to the rivers Ilissos and Kifissos, was connected to the references of the two rivers in newspaper articles and municipal acts and can have two aspects: a positive and a negative. Since, these two different aspects of memories for the rivers were found often at the material collected.

In order an article to be categorized in the positive memory code, there should be reference about the historical value of the river, as landmark, important incidents that occurred at ancient or modern times, mentions about the actions of great personalities around the river or the presence of important constructions at certain locations that made the river famous about and were significant for the city, which in general can be included in the general frame of social memory. Also, criteria, to include the article under the positive memory theme, can be the references for the good ecological condition that the river used to have, even at periods that the writer did not experience and learned about them from literature references or testimonies.

The river's negative aspect of memory can refer to the periods that the river used to be source of problems for the local communities. This kind of memory can be related with devastating flood events and loss of human lives and properties as part flood memory and incidents related to the everyday life of the city, which were disturbed by floods as collective memory. Also, references about past pollution events and degraded river environment, like smells or any kind of pollutants discharged at the river, created a negative perception for the river, that people could recall in articles at cases that the problems appear again can indicate a bad memory of the river for the people.

Table 8-2 Coding table for articles and acts for community's sensitivity and memory categories

Community's sensitivity/ environmental awareness		Memory			
Tone		Good memory		Bad memory	
Economic development	Environmental sustainability	Historical aspects	Past good ecological conditions	Past flood events	Past pollution events/ degraded environment

9 Content analysis Results

In this chapter, the results of the content analysis of the newspaper articles and municipal acts are presented. In section 9.1, the content analysis results of the newspaper articles are presented by the overview of the yearly sums of the articles and the distribution of the articles per month, from 1896, when the first articles started being available, until 2019. In section 9.2, the results of the classification of the articles' tone are presented. In this section, the evolution of the tone of the articles, either towards environmentally friendly orientation or towards the economic exploitation of the river, are presented in total, for all the years and per year, for both rivers together and separately, with further explanations on the results. Each tone category is presented as percentage of the total yearly sum of the articles. Since the results are presented per year, the fluctuations of the representation of each tone at different time periods can become obvious. Next, in section 9.3, the distribution of the memories, mentioned in the articles, is presented based on their content, either towards positive memories, like the historical value of the rivers and their past good environmental conditions or negative memories of the rivers, such as past flood events and past bad environmental conditions. In the end, similar analysis was followed and for the municipal acts in section 9.5.

9.1 Content Analysis Results from Newspaper Articles

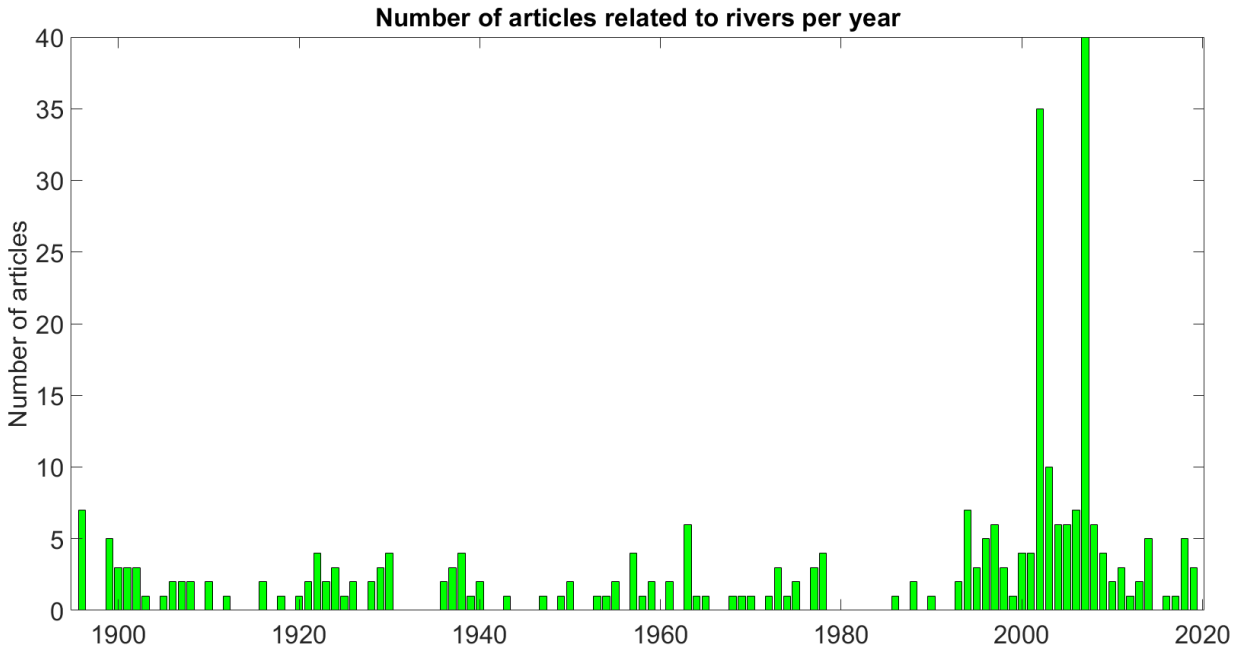
From the content analysis of the newspapers' articles, it can be seen that the coverage of the issues at the daily press, related to Kifissos and Ilissos, varied numerically. In total of the 124 years of newspaper coverage, from 1896 to 2019, mentions of the rivers can be found in 81 years and the years without references are 43. So, in about 65% of the total study period there are mentions related to them. Despite the fact that the study period starts in 1834, the first articles related to the rivers were published, in the selected newspaper, in 1896, which was the starting publishing year of the oldest newspaper that could be found.

9.1.1 Overview of the yearly sums of articles related to rivers

The overview of the yearly sums of the rivers-related articles that were published at the selected newspapers is presented in Figure 9.1. The interpretation of the data was on a yearly basis, by summing per year the number of articles related to the rivers, in order to provide an overview of the attention the rivers received each year in the newspapers and within the study period. The maximum number of coverage was 40 articles in one year, but for the majority of the years the number of articles was below 10. Also, there have been years that there were no references for the rivers. The longest period with no reference for the rivers, was from 1979 until 1985. Other empty periods were from 1931-1935, 1941-1942, 1944-1946, 1951-1952, 1975-1976 and 1991-1992.

The increased number of articles found in the first years of 2000s, compared to the number of articles found in the previous years, may be explained by various factors. The year 2002 was an election year for the municipalities and prefectures and the authorities wanted to show their environmental awareness and their power against the polluting industries at the banks of Kifissos and this was depicted at the increased journalistic coverage they received that year. Also, in 2002 and 2003 the number of mentions of the rivers was more than usual, since that period was just before the Olympic Games of Athens in 2004 and the construction of projects in an improper way, in combination with unexpected heavy rains during summer, resulted to extreme flood events, that caused many problems to the city, incidents that were extensively covered by the press.

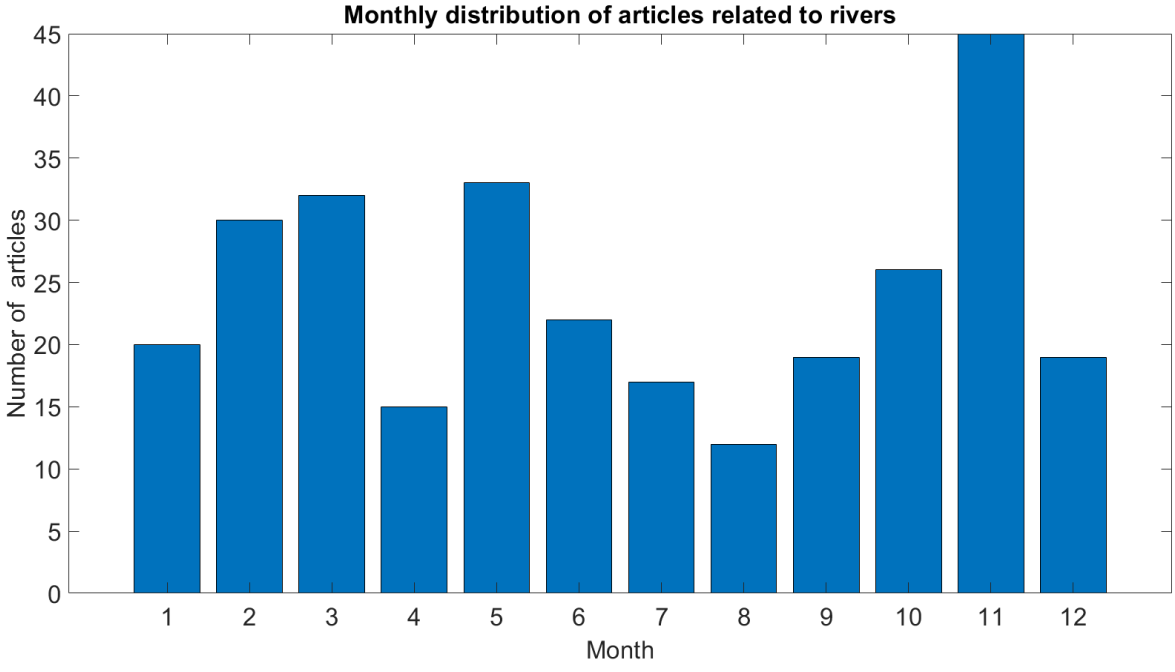
In 2007, the number of reports was also high and especially dedicated to Kifissos, due to fact that Kathimerini, the newspaper selected for that period, was running a campaign for promoting the protection of this river against pollution events at the water and the banks of Kifissos river and was including often articles with references to river in its issues. The newspaper was highlighting the environmental problems of the river and at the same time was covering extensively the legal and physical initiatives and activities for the protection of the river, like banks clearing activities.



Graph 9.1 Evolution of the yearly sum of articles found in the newspapers, in absolute numbers.

9.1.2 Monthly variation of articles

The distribution of articles according to the month they were published, for the whole study period in total, can be seen in the Graph 9.2 and Table 9.1. In general, during the summer months, the number of river related articles was less than the ones found during autumn, spring and winter months. In more detail:



Graph 9.2 Distribution of articles according to the month they were published, for the whole study period.

Table 9-1 Overview of the distribution of articles per month

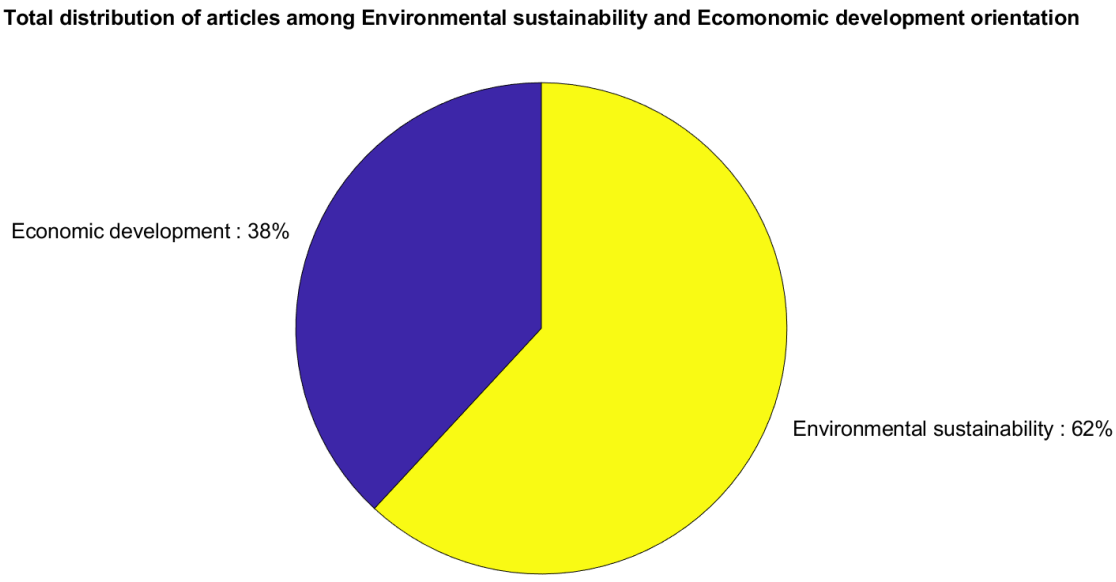
Month	Number of articles	Percentage of articles (%)
January	20	7
February	30	10
March	32	11
April	15	5
May	33	11
June	22	8
July	17	6
August	12	4
September	19	7
October	26	9
November	45	15
December	20	7
Total	291	100%

The relatively high numbers for November correlate with the occurrence of flooding, as will be shown in the next section.

9.2 Articles' tone classification

In order to acquire a general idea about the prevailing tone at the articles of the database either towards economic development or towards environmental sustainability following steps were made:

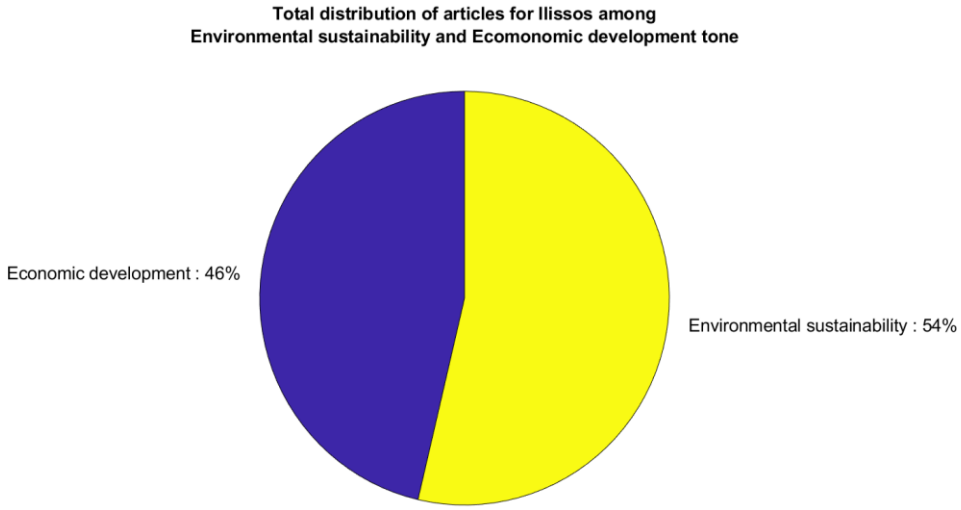
Every article, according to its content could be towards the economic development or the environmental sustainability and in some cases the tone could be shared between the two tones. In total, for the whole study period, the classification of the articles, among the two tones, was based on the total sum of the articles attributed to each of these categories. This total distribution is depicted in the following graph:



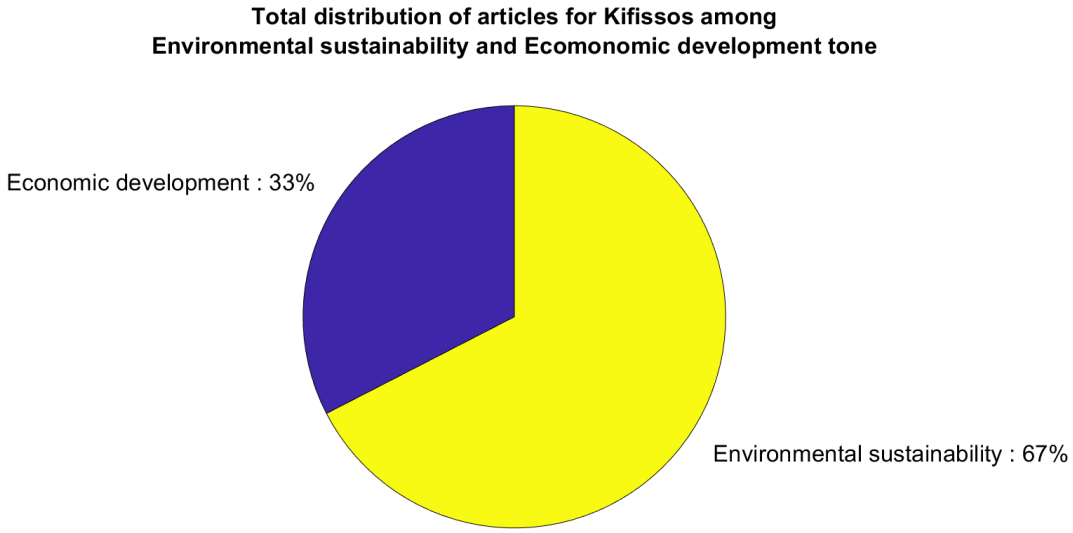
Graph 9.3 Distribution of articles for both rivers between Economic development and Environmental sustainability tone, for the whole study period

In general, during the whole study period, the majority of the newspaper articles included in the database, about 62%, was having an environmental orientation and about 38% of the articles were mentioning issues about the economic development in relation to the rivers.

For Ilissos and Kifissos separately, the tone distribution for the articles referring to them cab be seen in the following graphs:



Graph 9.4 Distribution of articles between Economic development and Environmental sustainability tone for Ilissos



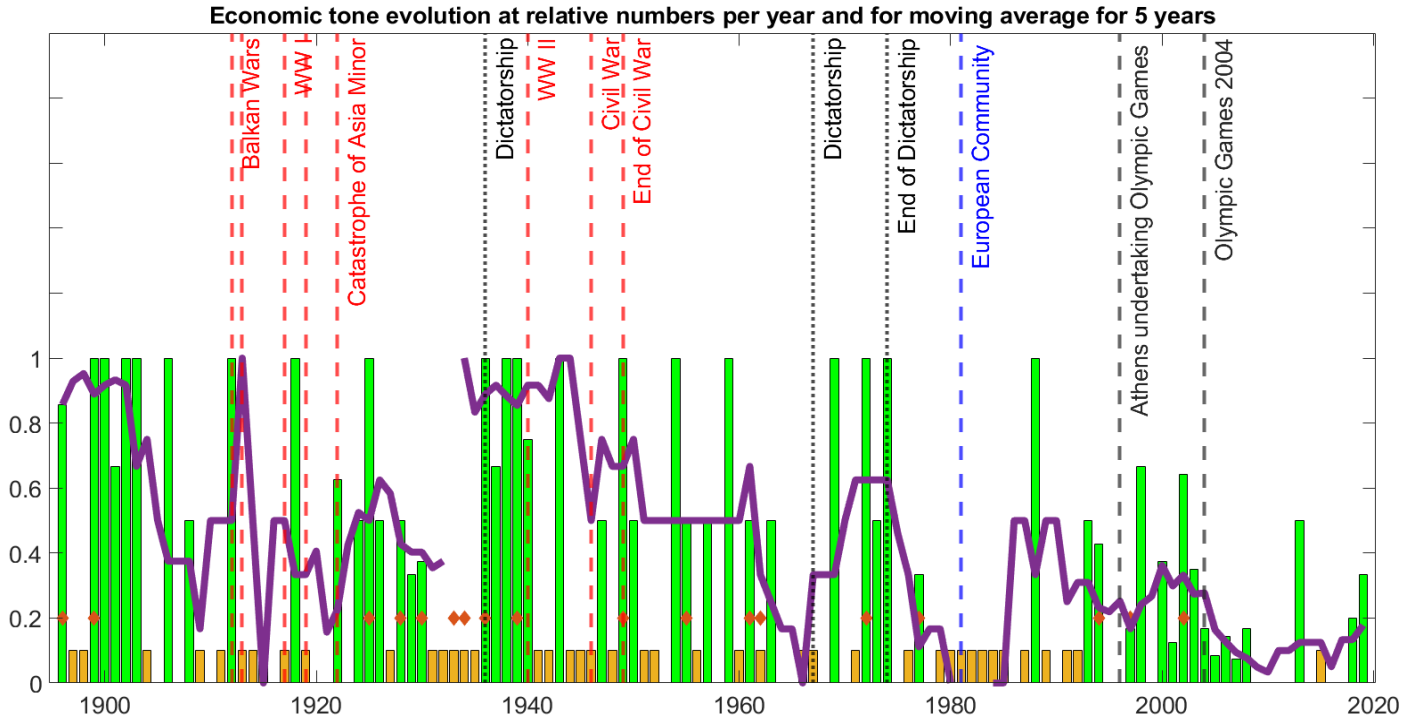
Graph 9.5 Distribution of articles between Economic development and Environmental sustainability tone for Kifissos

From these graphs, it can be seen that the environmental concerns for Kifissos represent 67% of the articles dedicated to this river and the economic development issues were included at 33% of the articles. Similar tendency, but with different rates, is also valid for Ilissos, where the rates between economic development (46%) and environmental sustainability (54%) show also a tendency to cover more issues related to the environmental status.

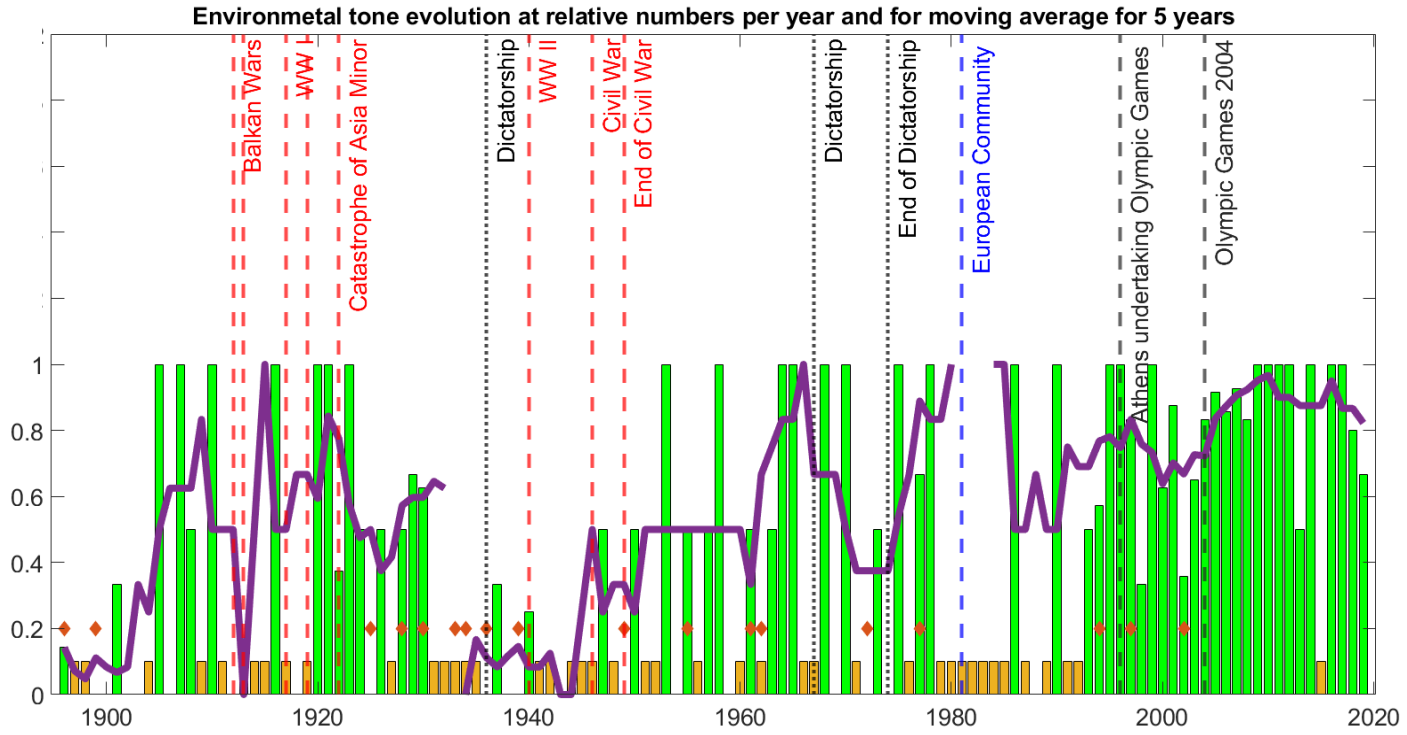
9.2.1 Articles' tone evolution per historically defined periods

In the historical analysis of the sources, for exploring the political and social history of the country and the city, certain historical periods were defined, as presented in Chapter 5. These periods were also used in the content analysis of the articles' tone evolution. In the

following graphs the main wars are depicted and the dictatorships are specially mentioned, along with the accession of Greece at the European Community and the Olympic Games of 2004, two important moments of country's city's history.



Graph 9.6 Economic tone evolution, based on the articles' tone and the moving average for 5 years. Green bars: relative numbers representing the economic tone articles compared to total number of articles – Orange bars: years with no data for the rivers – Red dots: flood events – Blue line: moving average



Graph 9.7 Environmental tone evolution based on the articles tone and the moving average for 5 years . Green bars: relative numbers representing the environmental tone articles compared to total number of articles – Orange bars: years with no data for the rivers – Red dots: flood events – Blue line: moving average

The two graphs 9.6 and 9.7 present the evolution of the percentage (in relative numbers) of articles whose tone is towards the economic development of the areas or towards the economic sustainability. Before the Balkan Wars there were a whole series of liberating wars that didn't have specific starting and finishing dates, that is why they are not presented with dashed vertical lines. For acquiring a better view of the evolution of the percentages, the moving average of 5 years was selected, in order to give an idea of the tendency of the articles is in periods. The orange bars represent years that in the newspapers there were no references for the rivers and it was decided to depict them, in order not to confuse it with 0 percentage, that would influence the moving average value. The graphs represent the total image of the articles' tone evolution, for both rivers.

9.2.2 Over the period 1896-1922

In this time frame, the periods that were peaceful were not many, due to the consecutive wars, like the liberating wars, the Balkan Wars, the World War I and the Catastrophe of Asia Minor.

The tendency of articles towards the economic development of the areas next to the rivers was vivid in the first years that articles started to be available, which was after 1896. The catastrophic flood event of 1896 contributed towards that direction and the problems caused by this flood, made the mayor of Piraeus to propose the creation of two separate estuaries for the two rivers, since until then Ilissos was a tributary of Kifissos. (Empros, 1899-11-08) Also, the references for the exploitation of the rivers through sand abstraction methods, made more clear the economic development altitude towards rivers for that period. (Empros,1902-04-06)

However, an important issue, that twisted part of the press towards the environmental sustainability, was the malaria outbreak which was reported in the newspapers as a serious problem of the city. According to the local medical community, malaria incidents in Athens were connected to the stagnant water at Ilissos river and their proposal was to cover the river. (Empros, 1905-05-25, 1907-05-05) The sand abstraction from the rivers was also considerd as another reason for the malaria outbreak, since it was influencing the flow of river's water. (Empros, 1907-07-26)

Also, the twist to environmental concerns for the rivers became more obvious by the contrast at the desriptions between the condition of upstream and downstream parts of the rivers. There were articles describing the picturesque rivers' environement, especialy close to the spring (Empros, 1920-08-04,1921-12-15), in contrast to the bad environmental condition at the banks at downstream parts of the rivers, due to the garbages that the residents throwing. (Empros, 1910-11-12)

9.2.3 Over the period 1923 to 1949

During this period, the tendency of the articles was in general towards the economic development of the areas around the rivers, though there was an indication about environmental concerns for the rivers in the first years after the Catastrophe of Asia Minor, which was triggered by the displacement of immigrants from Asia Minor to Greece and especially in Athens.

In the years after the Catastrophe of Asia Minor, in 1922 and until the end of the Civil War, in 1949, the sociopolitical condition of Greece changed significantly. In this historical frame, the rivers were considered source of problems for the city.

In particular, after the Catastrophe of Asia Minor in 1922 and until the end of the decade of 1920s, the articles' orientation was shared between the categories of environmental sustainability of the rivers and economic development. Examples of the environmental issues that concerned people about the rivers regarded various sources.

An example of a problem that was disturbing the everyday life of the residents of Athens was the dust of the streets, that needed to be faced. It was decided to make the dust settle down by sprinkling the streets with water from the sea, as this was an unlimited source of water for the city. However, this method was affecting the water quality of Kifissos, since the city's runoff was becoming salty. This runoff water was mixing with the water of river, which was used for agricultural purposes as well and the salt was making the river's water unsuitable for irrigation purposes (Empros, 1926-11-17). So, in one hand they wanted to use the river as sewer, receiving the

streets' surface runoff, but at the same time they were causing an environmental problem by affecting the quality of the water used for irrigation purposes.

Another example, was malaria, which was still a problem for the city. In order to solve the problem, the municipal authorities of Piraeus proposed at that time, instead of applying the expensive solution of covering Ilissos, to install sewer pipes along the rivers' banks to collect city's wastewater. What was also proposed was the forbiddance of sand abstraction from the river in order to ameliorate rivers' natural environment and have less locations with stagnant water that were contributing to the spread of malaria. (Empros, 1928-10-03)

The tone of the articles at the end of the 1920s was more towards the environmental sustainability of the rivers, since the main concerns in the articles were about the bad environmental condition of the rivers' banks, even at locations close to historically important sites, such as the Kalimarmaro Stadium. (Empros, 1929-05-22) At the daily press of that period, there were testimonies about requests to the residents with houses next to the rivers, to construct cesspools and not throw impurities to the river. Similar sanitation measure was given as order to refugee camps and hospitals in order to prevent malaria. (Empros, 1929-06-28) Also, concerns about the good environmental condition of the river and the free flow of water, were reported at the press about debris from building constructions being left at the banks, making river's cross section even smaller and resulting to more often flood events due after rain events. (Empros, 1930-02-25)

There are about five years, from 1931 to 1935, where there were no references for the rivers in the newspaper articles of that time and therefore this did not allow the clear evaluation of how much community's sensitivity changed in this period.

Since the dictatorship of Metaxas in 1936 and during the World War II and Civil War, the economic development was the prevailing issue related to the rivers. The construction of a sewer system and the configuration of the riverbed were important projects for the city (Kathimerini, 1936-05-28), turning community's interest towards the economic development. In 1938, two years after the establishment of the dictatorship of Metaxas, the projects for covering Ilissos started and according to the press, they were welcomed by the people. (Kathimerini, 1938-10-15) In general, river management projects were regarded as sign of sanitation and development (Kathimerini, 1939-05-19) and they were continued until Greece's involvement in the World War II. (Kathimerini, 1940-10-16, 1940-10-18).

After the World War II and during the Civil War the main articles' tone was both about the economic development by managing the rivers (Kathimerini, 1949-05-12) or using the Kifissos water for operating about 20 watermills (Kathimerini – 1957.04.11) and also for the sanitation of the rivers (Kathimerini, 1947-10-31).

9.2.4 Over the period 1950 to 1966

At the first years after the end of the Civil War, the press was having an interest both for the economic development and for the environmental sustainability of the rivers. The articles were shared between these two categories, since the main concerns during this period were the sanitation of the rivers, the good environmental condition of the riparian zone and the economic development of the areas around the rivers.

After the Civil War, the development of the city was characterized by intense urbanization. There were references of positive acceptance of the covering of the river (Kathimerini, 1949-05-12) and ideas that the historical memory of the river Ilissos could be combined with the economic development of the area next to the river. (Kathimerini, 1950-05-10) Also, there were references that the water of Kifissos river was used for agricultural purposes in years before the 1960s. (Kathimerini, 1963-03-31)

At beginning of 1960s, the articles were mostly directed towards the environmental sustainability of the rivers. There has been environmental friendly article, focusing on the mentality of the modern Athenians towards the rivers, characterizing as 'vandals' the Athenians for deciding for covering the rivers and especially covering Ilissos. (Kathimerini, 1958-05-13)

9.2.5 Over the period 1967 to 1980

During the Greek Junta, from 1967 to 1974, the orientation of articles changed, compared to the tendency they used to have before the dictatorship. Until 1967, the articles' tone evolution was indicating a tendency towards issues related to the environmental sustainability of the rivers. However, during the years of the Dictatorship, this tendency switched towards articles with economic development orientation and this trend, switched again after the restoration of democracy.

During the Dictatorship, the orientation was towards the economic development of the areas next to the rivers, with the construction of more pipe lines, in order to be used for the transportation of waste water to the rivers and building a diversion of Ilissos for these purposes. (To Vima, 1972-04-18) Also, other plans included the development of the area at the rivers' estuaries, with concrete constructions for shopping areas and theatre. (To Vima, 1974-03-07)

After the Dictatorship, the environmental problems of the rivers and the causes of these problems came to the spotlight and started having more coverage at the press. The reports about the condition of the rivers' water quality and the condition of their banks and estuaries, started to become an important issue since then. (Kathimerini, 1975-07-02, 1975-07-12, 1978-05-25) After seven years, at the end of Dictatorship and the Restoration of Democracy in 1974, there was a significant decline at articles' orientation towards the economic exploitation of the rivers and people started having and expressing more their environmental concerns for the situation of the rivers and the rivers' environment. (Kathimerini, 1975-01-01) Only flood events kept people considering the rivers as source of problem that needed to be solved in order to secure the economic development of the areas around the rivers.

9.2.6 Over the period 1981 to 2004

After Greece accessed the European Community in 1981, the environmental sustainability tone was dominant among articles, in contrast to the economic development tone related to the rivers, which was not, in general, a priority in the press for this period. However, there have been significant moments that caused a switch of the tone towards the economic development.

In the 1980s and 1990s there have been some examples of articles with economic development orientation referring to rivers and the flood defense projects, since after some flood events, people expressed their indignancy and dissatisfaction for the flood defense strategy of the city. (Kathimerini 1988-02-28, 1988-03-06, 1994-02-13) Also, there was a proposal for covering Ilissos river, at locations that were remaining uncovered, in order to create extra parking slots and decrease the problem of parking, at densely populated areas. (Kathimerini, 1994-10-08)

However, the majority of the articles were having an environmental sustainability orientation and were either mentioning the bad environmental condition along the course of the rivers or were referring to the bad quality of the water discharged at the sea. There have also been articles reporting some good environmental facts regarding the flora and fauna, either at the springs of the rivers or at their delta area. (for example Kathimerini, 1993-03-13)

The amount of attention that the environmental sustainability received until 1997, showed a decline after Athens was assigned to organize the summer Olympic Games of 2004. The small increase of articles towards economic development came up during this preparation period, because of the need for improvement of the transportation infrastructures that made the state to invest in covering Kifissos, for creating a highway. Also, the heavy and unexpected rainfalls in the summer of 2002, in combination with the bad execution of the projects at Kifissos, contributed to flood events that caused severe damages. As a result, almost all the articles related to the rivers in 2002 were reporting about this situation, increasing press coverage for Kifissos and mentioning peoples' attitude towards the protection of their properties and the economic development.

However, during this period the articles about water quality and banks condition continued to be published more often. Indicative of the government's attitude towards the rivers was the insistence of the government to treat Kifissos as sewer pipe, allowing water of poor quality to flow. But what changed significantly citizens' means for protecting the environment, was the fact that Greece, as part of the European Union, had to follow more strict rules for the protection of the rivers and that citizens, along with some politicians, had the

capability to address to the European Commission and force the government to follow more strict regulations for the protections of the river, treating it as river and not as sewer pipe, something that increased public awareness for the rivers. (Kathimerini, 2003-12-21)

9.2.7 Over the period 2005 until 2019

At the post-Olympic Games period in Athens, the rivers' bad environmental condition increased public interest towards their protection and this tendency was depicted in the press, with the increased quantity and frequency of articles related to these issues.

Since 2005, the negative aspects of the covering project of Kifissos started to annoy the neighboring communities. In the press, it was mentioned that the residents, at areas next to the projects, were upset and were organizing protests against this situation. What was also reported, as severe environmental degradation, was the smell from the stagnant water of the river. Moreover, it was reported that after heavy rainfall and at cases of high flow discharges of Kifissos, illegal and polluted ingredients were discharged to the river, while the official state claimed that the dilution of the pollutants due to extra water, was the solution to the pollution. (Kathimerini,2005-06-01) There were articles characterizing the situation of Kifissos as 'environmental misery' (Kathimerini, 2005-06-04, 2007-02-11) and this situation caused the prosecutor's intervention, in order to investigate the reasons and the culprits that caused this bad condition. (Kathimerini, 2007-02-13) However, it was remarkable that despite this situation, the owners of industries located at the riparian zone of Kifissos, declared their unwillingness to move their industries from these locations for at least 12 years. (Kathimerini, 2007-02-18)

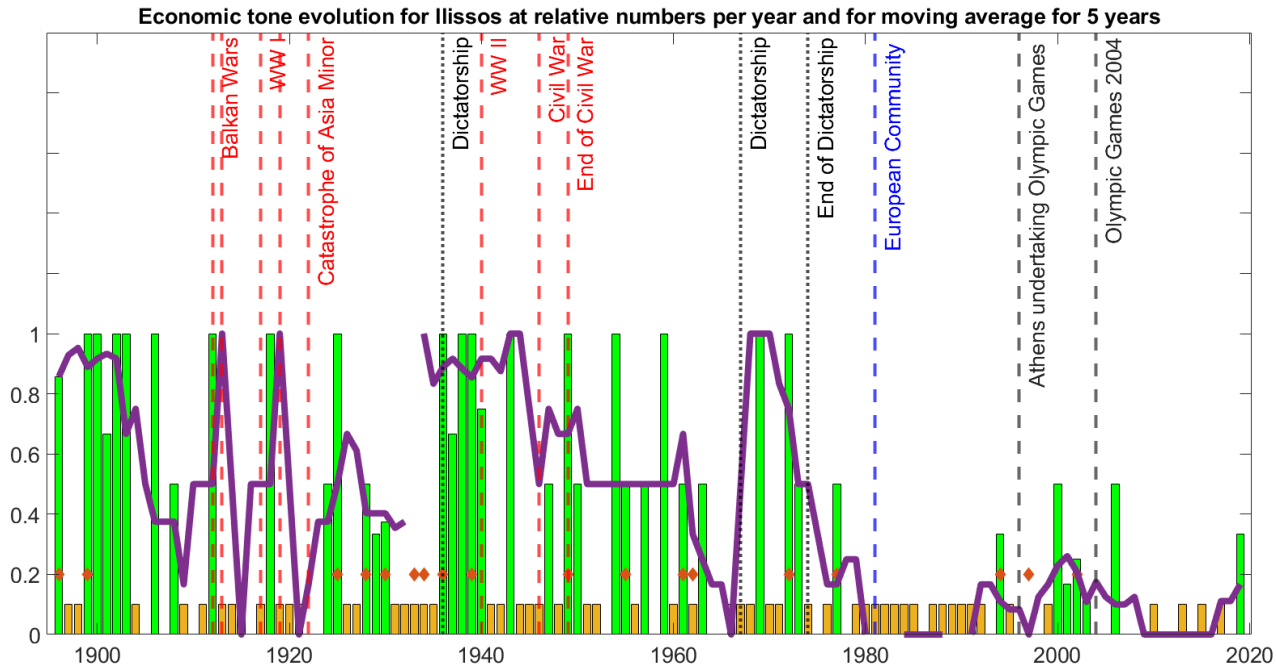
In 2009, the interest for re-opening the city's streams started to appear at press, for example from scientific interest about the benefits of open streams for the city's environment. (Kathimerini, 2009-08-16, 2014-11-29) Also, proposals for uncovering part of Ilissos river and other city's streams, in order to upgrade city's environmental condition, started to appear at the daily press. Moreover, similar proposals about uncovering Kifissos and Ilissos river were stated at an architectural symposium, in order to bring the residents, again, in contact with the nature. (Kathimerini, 2011-06-01) Towards that direction were also initiatives about raising students' awareness on Kifissos presence at the city's landscape. (Kathimerini, 2011-06-11) Moreover, since 2014, there had been references about the rehabilitation and development of Faliron bay, that would include the delta areas of Ilissos and Kifissos. (Kathimerini, 2014-06-01) The proposals for uncovering Ilissos river became more specific about uncovering the river at locations where the concrete cover needed a lot of money to be maintained and as a result create green zones in the city (Kathimerini, 2019-02-19). This issue however was characterized as an issue mainly of political initiatives influenced by the change of the governments. (Kathimerini, 2019-03-16)

9.2.8 Articles' tone evolution for each river separately

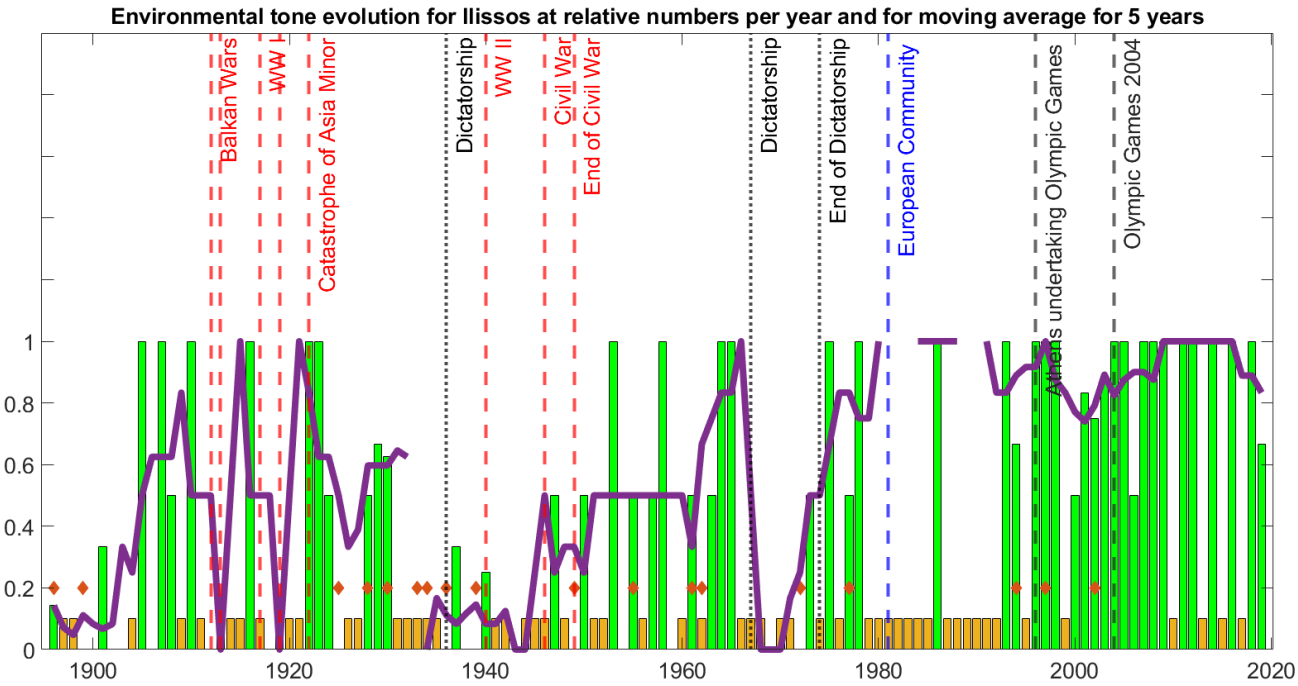
The evolution of the articles' tone, separately, for the Ilissos can be seen in the following graphs.

Concerning Ilissos, the Graph 9.8 and Graph 9.9 depict the evolution of the tone of articles that refer to Ilissos river. The economic development tone was more vivid among Ilissos's articles before the mid 1960s. Until then, the main issues at the daily press related to the river, were about the coverage of the river, the river's water exploitation, the sand abstraction from the river for the construction of streets, the banks' usage and the construction of streets and highways over the river, as it became common practice to cover city's streams and rivers for the construction of streets and avenues. After the river was covered by the end of 1960s, the economic orientation articles related to Ilissos declined significantly and environmental issues started to attract peoples' attention related to water quality and rivers environmental condition in general, until nowadays with talks about re-opening the rivers.

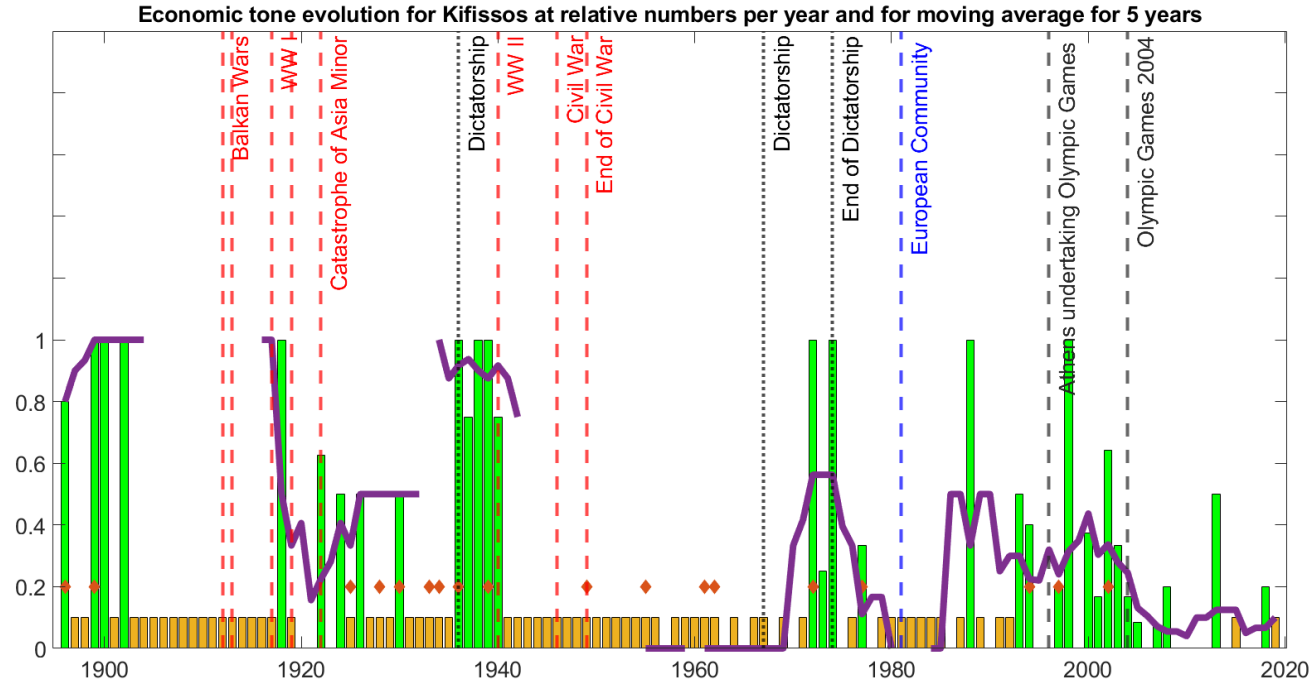
Concerning Kifissos, the Graph 9.10 Graph 9.11 depict the evolution of the tone of articles referring to Kifissos river. The articles about Kifissos are less than those to Ilissos at the first years of the study period. The environmental sustainability orientation was the prevailing tone among the articles related to this river, especially after the 1960s. In general, after the 1960s, issues related to the economic development and the environmental sustainability of the river started to appear more often at the daily press as it can be seen in the graphs. Issues related to the constructions of highway over this river or issues related to the environmental problems that affected the quality of the river's water, started to be reported in the daily press.



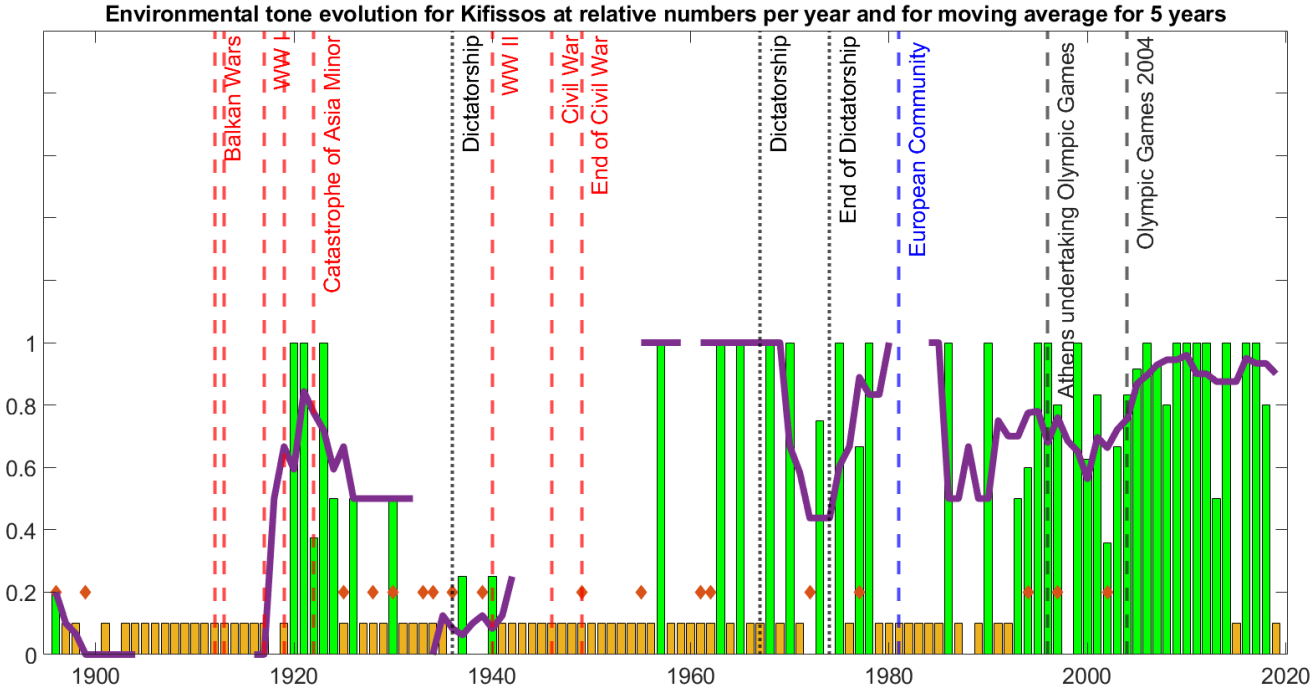
Graph 9.8 Evolution of percentage of articles with economic tone orientation referring to Ilissos. Green bars: relative numbers representing the economic tone articles compared to total number of articles – Orange bars: years with no data for the rivers – Red dots: flood events – Blue line: moving average



Graph 9.9 Evolution of percentage of articles with environmental sustainability tone orientation referring to Ilissos. Green bars: relative numbers representing the environmental tone articles compared to total number of articles – Orange bars: years with no data for the rivers – Red dots: flood events – Blue line: moving average



Graph 9.10 Evolution of percentage of articles with economic tone orientation referring to Kifissos. Green bars: relative numbers representing the economic tone articles compared to total number of articles – Orange bars: years with no data for the rivers – Red dots: flood events – Blue line: moving average



Graph 9.11 Evolution of percentage of articles with environmental sustainability tone orientation referring to Kifissos. Green bars: relative numbers representing the environmental tone articles compared to total number of articles – Orange bars: years with no data for the rivers – Red dots: flood events – Blue line: moving average

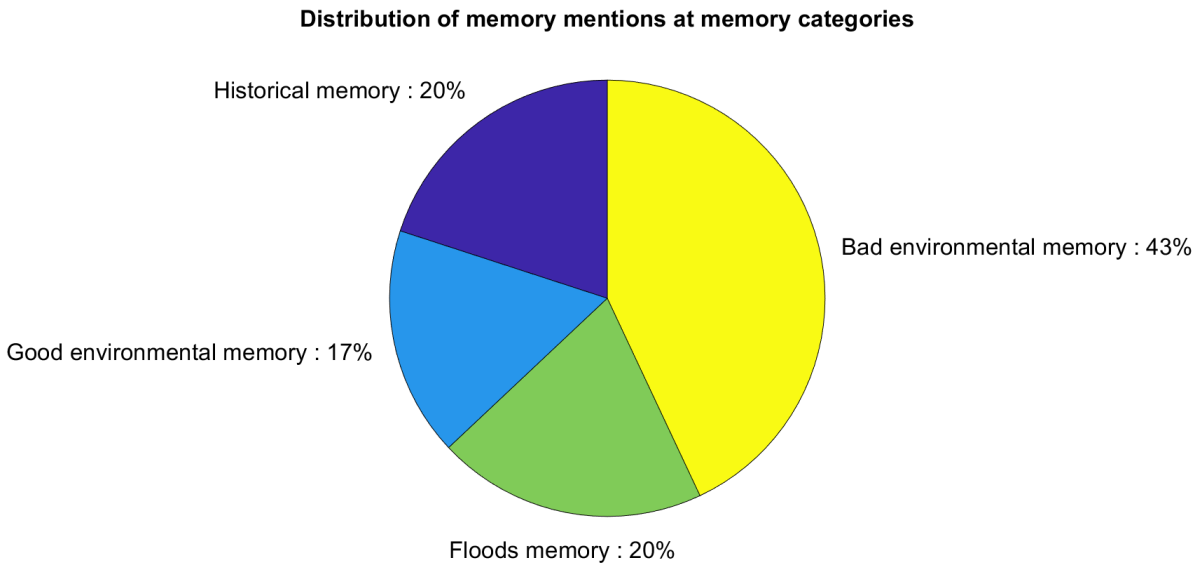
Explanations regarding the differences at the rates of the articles' tone, between the two rivers - even though both rivers are in the same city - might be related to individual basin's urban planning and development characteristics.

9.3 Distribution of memory mentions at memory categories

In order to acquire a general idea about the prevailing memories that can be found in the newspaper articles for the study period from 1896 to 2019 and are related to the rivers, the following steps were made:

In order to fill the coding table, the content analysis of the articles was based on whether memory mentions related to the rivers were existing in an article and if so, in which memory categories could these mentions be included.

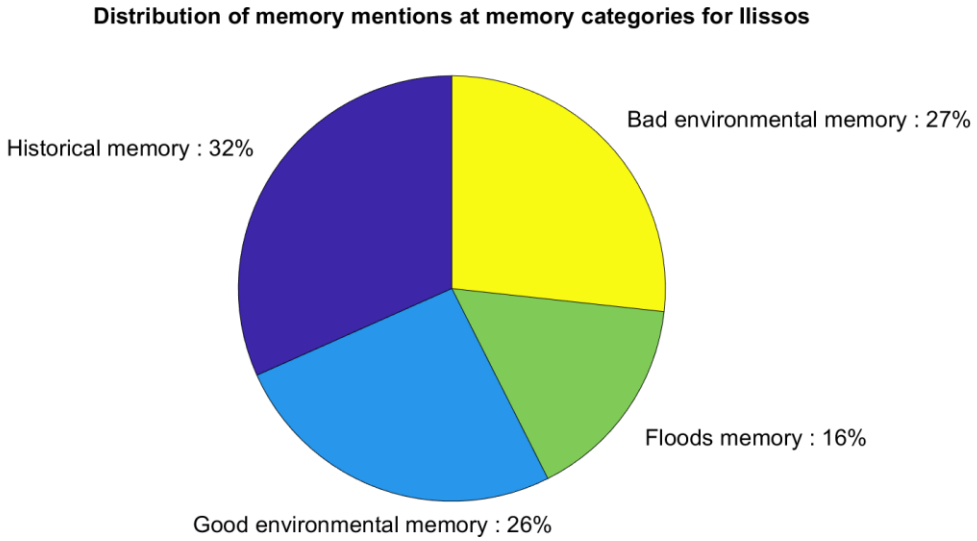
In total of 290 articles, there were 190 articles with memory mentions related to the rivers and 100 articles without memory mentions. An article could include memory mentions related to the rivers that could belong to multiple memory categories. So, for the whole study period, the memory mentions related to both rivers, were distributed at the memory categories as presented below:



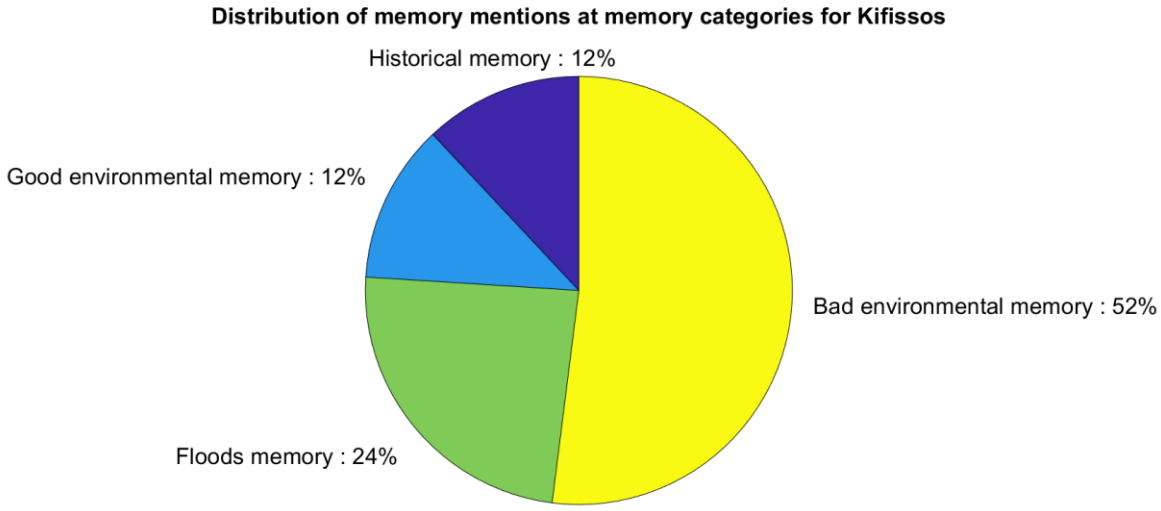
Graph 9.12 In total distribution of memory mentions at memory categories

From the graph it can be seen that in general the historical importance of the rivers, the memory of the past good environmental conditions and the memory of past flood events were having almost equal coverege in the articles. However, the majority refered to past bad environmental conditions of the rivers, such as pollution events or distribance of the natural enviornment. In specific, the historical mentions of the rivers covered 20% of the cases of memory mentions. Similarly, memories related to the good environmental conditon of the rivers represented 17% of the total memory mentions and past flood events concerned 20%. However, the majority of mentions, about 43%, was related to memories of bad environmental condition of the rivers.

Studying the two rivers separately, it can be seen that:



Graph 9.13 In total distribution of memory mentions at memory categories for Ilissos



Graph 9.14 In total distribution of memory mentions at memory categories for Kifissos

The distribution of memory mentions is different between the two rivers. For Ilissos the positive memories, such as memories related the historical value of Ilissos and past good environmental condition, cover 58% of the memory mentions, with past flood memory mentions to represent 16% of the mentions related to this river and less than 30% to be about past environmental problems.

Regarding Kifissos river, the rates are different. The positive memories related to this river represent only 24% of the total memory mentions and the percentages for the historical value of the river and the past good environmental condition is the same, up to 12%. In contrast, almost the ¾ of the mentions are about the negative aspects the past river's conditions, with flood memory mentions to be about 24% and past bad environmental memories almost 52%.

By comparing the distribution of the memory mentions at each memory category it can be seen that the percentages differ significantly for some categories.

From the graphs it can be seen that among the memory mentions of Ilissos, the majority refers to the historical value of the river, whereas among the memory mentions of Kifissos the historical memory of the river is among the ones with the less attention. This

means that the historical and cultural aspects of Ilissos were more important as river's memory elements compared to Kifissos. Similarly, the memory of good environmental condition of Ilissos was more significant among the memory mentions of Ilissos compared to the low percentage the good environment category has in the memory mentions for Kifissos.

A reason that might explain this difference was the fact that Ilissos was mentioned at certain ancient testimony about its cultural importance and its picturesque scenery and this testimony was used a lot in the press in order to highlight the historical value of the river and the good environmental conditions it used to have. On the other hand, for Kifissos, even though it was also an important river in ancient Athens, since both rivers were represented as statues at Parthenon's pediment, there were not many references to support its historical importance and no testimony was used to highlight the historical importance of this river in the daily press.

Another memory category that the difference in percentages between the two rivers is very big, is at the bad environment memory. From the graph it can be seen that almost half of memory mentions referring to Kifissos are related to bad environmental memory of the river, whereas for Ilissos about a quarter of the memory mentions are related to bad environment memories. This difference may result from the fact that Ilissos, after a certain moment, was covered and was flowing underground, in concrete pipes and any bad environmental condition was only obvious at the estuary and not in the city any more. Also, the environmental problems related to Kifissos seemed to be more important for the residents, since the mentions for them were more often, especially since many industries were installed along this river.

9.3.1 Evolution of the memory mentions distribution at memory categories at periods historically defined

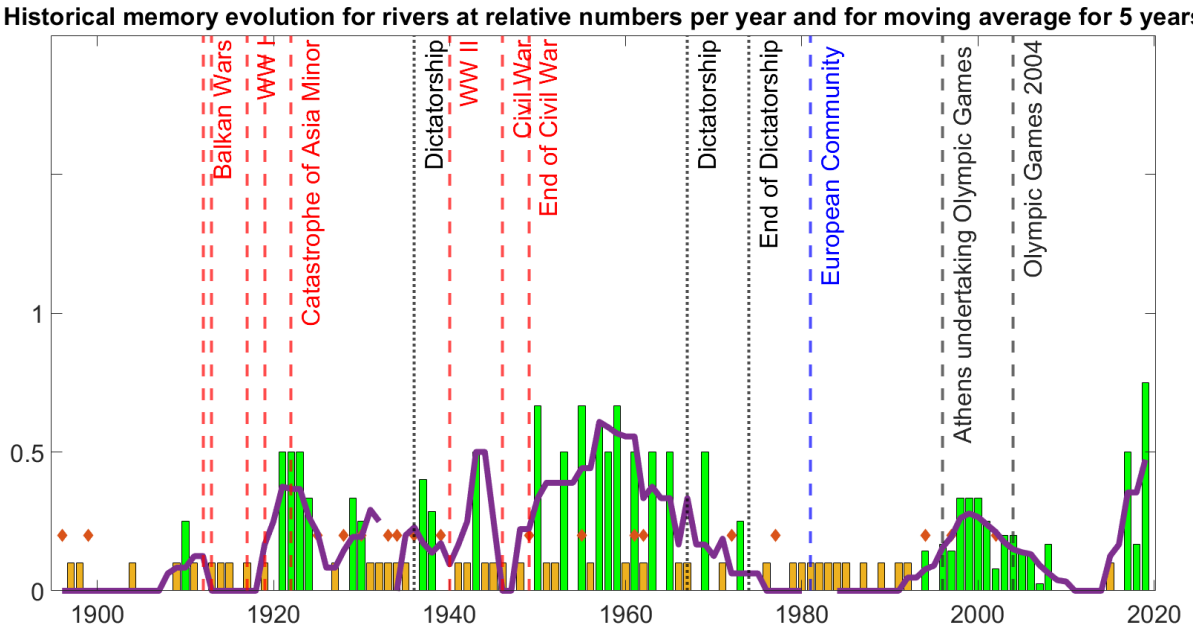
In order to explore the evolution of the importance of certain type of memory in the daily press, representing public opinion, the evolution of the percentage of the different types of memory mentions was examined. This evolution was examined by calculating the percentage, certain type of mentions captured among the total number of memory mentions in one year, since it was decided to analyze the evolution per year.

For every year that articles were found

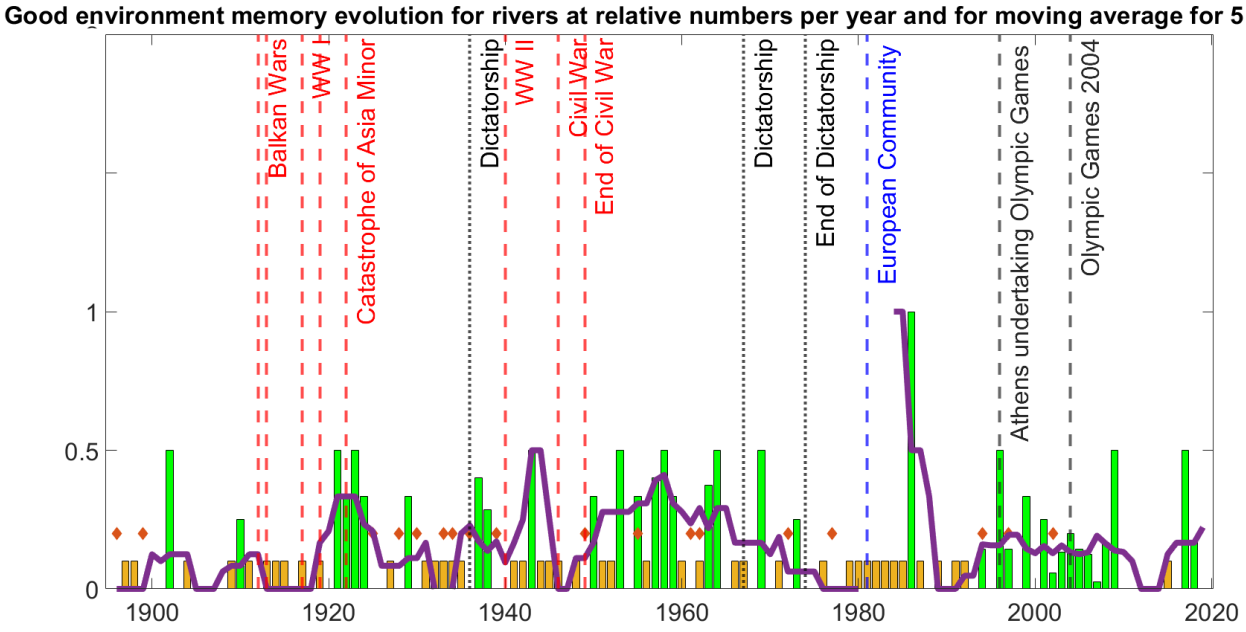
$$rate\_of\_mentions_{i,j} = \frac{\sum mentions_{i,j}}{\sum_{i=1}^{4} mentions_{i,j}}$$

for memory category $i = \begin{matrix} 1: historical\_memory, \\ 2: good\_environmental\_memory \\ 3: flood\_memory, \\ 4: bad\_environmental\_memory \end{matrix}$ and for the years $j = 1896 - 2019$

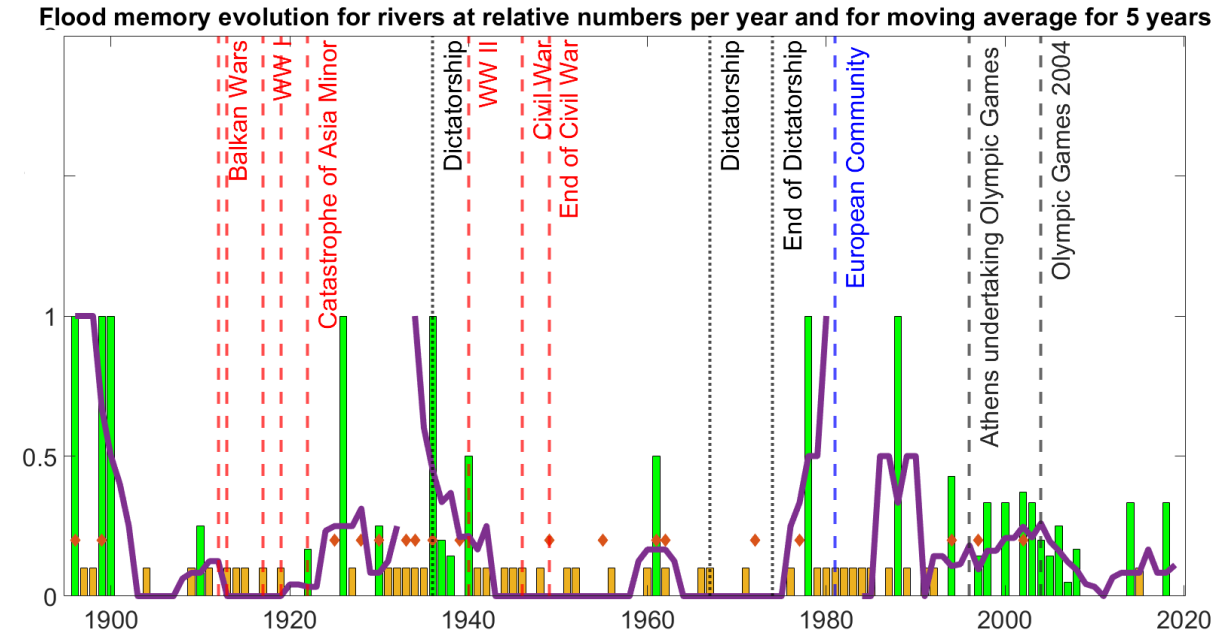
Schematically, the evolution of the importance every category of memory mentions received appears in the following graphs:



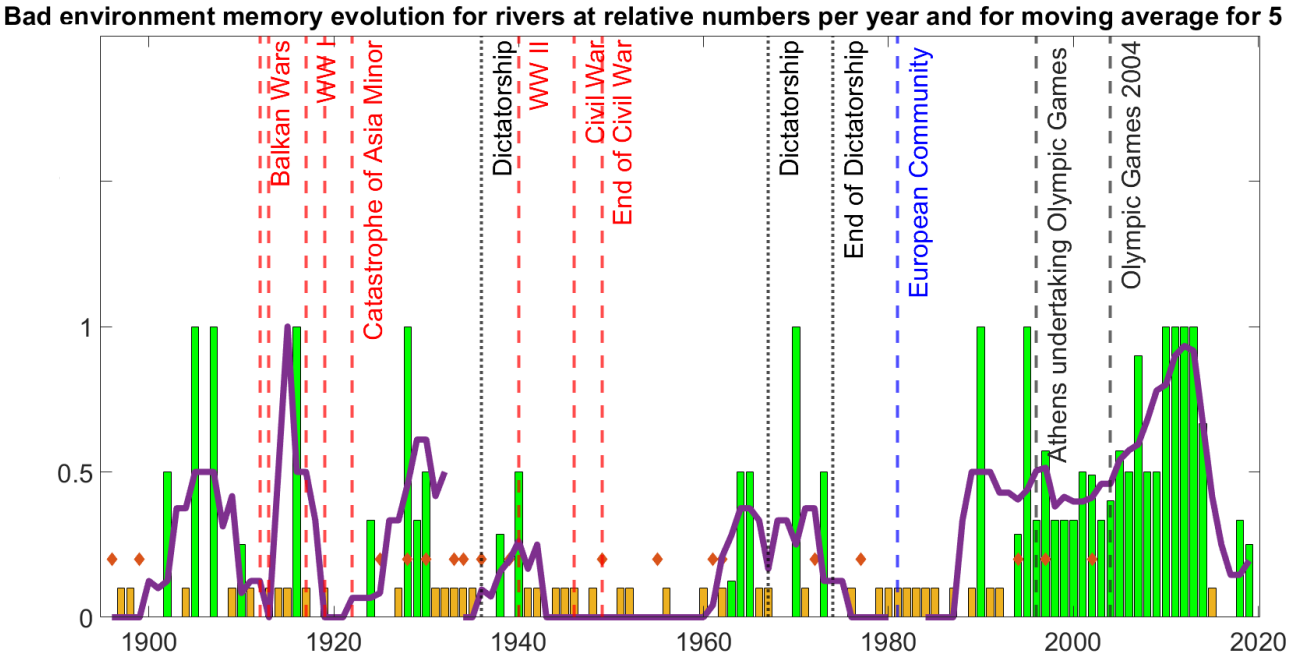
Graph 9.15 Historical memory mentions presence per year compared to total memory mentions, at relative numbers. Green bars: relative numbers representing the historical memory mentions in articles compared to total number of memory mentions in articles – Orange bars: years with no data for the rivers – Red dots: flood events – Blue line: moving average



Graph 9.16 Good environmental memory mentions per year at relative numbers compared to total mentions. Green bars: relative numbers representing the good environmental memory mentions in articles compared to total number of memory mentions in articles – Orange bars: years with no data for the rivers – Red dots: flood events – Blue line: moving average



Graph 9.17 Flood memory mentions per year at relative numbers compared to total memory mentions. Green bars: relative numbers representing the flood memory mentions in articles compared to total number of memory mentions in articles – Orange bars: years with no data for the rivers – Red dots: flood events – Blue line: moving average



Graph 9.18 Yearly Bad environment memory mentions at relative numbers compared to total memory mentions. Green bars: relative numbers representing the bad environmental memory mentions in articles compared to total number of memory mentions in articles – Orange bars: years with no data for the rivers – Red dots: flood events – Blue line: moving average

9.3.2 Period 1896-1922

9.3.2.1 Historical memories over the period 1896 to 1922

In general, during this period, the historical references of the rivers were not often in the daily press. However, at years they were reported, they covered almost 50% of the memory mentions and they were mostly about the ancient history of the city and sacred locations at the riparian zone of the rivers, especially for Ilissos.

9.3.2.2 Good environmental memory over the period 1896 to 1922

The mentions, related to memories of good environmental condition of the rivers, were found in four years and at the years they were reported, they were covering 50% of the total memory mentions. In general, during the war periods, there were no references for memories related to the past good environmental condition of the rivers.

However, when this kind of memory mentions were in the press, they were used to promote the example of rivers' locations that have been improved in terms of sanitation and sustainability, after flood defense projects, at times, previous of the publishing date of the articles. The good environmental references were also referring to the ancient time periods and were giving descriptions of the good water quality of Ilissos and the vegetation at the banks of the river.

9.3.2.3 Flood memories over the period 1896 to 1922

Regarding the flood memory mentions during this period, they were either closely related to the floods events of 1896 or in general, they were describing the problems in the city caused by past flood events. They were the prevailing kind of memories in the first years that data exist.

9.3.2.4 Bad environmental memory over the period 1896 to 1922

Memories of bad environmental conditions were also reported in the daily press in this period and were from near past, closely related to the problem of stagnant rivers' water.

9.3.3 Period 1923 to 1949

9.3.3.1 Historical memories over the period 1923-1949

In the period, after the Catastrophe of Asia Minor, the historical mentions for the rivers started having more proportion among memory mentions, covering from 25% to 50% of the memory mentions and appearing more frequent in the press.

The reasons for these increased presence in the press was due to the sociopolitical circumstances of that period and the tendency of people to refer to the glory past of the river in the ancient time.

In rough lines, due to the catastrophe of Asia Minor and the sociopolitical regime, groups of population moved to Athens and settled close to the rivers' banks, under poor sanitation conditions, that contributed to the degraded rivers' environment. This situation, along with the stagnant rivers' waters that contributed to malaria outbreak, directed the attention of the press towards these water systems and emphasized at rivers' bad environmental condition. In the articles, the disappointment of people was also expressed, by comparing the condition of the rivers with the exceptional environmental condition they used to have in the ancient years and especially at the case of Ilissos and they used to remember the glory and importance of the sacred locations along Ilissos.

Also, before the World War II, at the period of the dictatorship of Metaxas, the historical mentions for river were reported more frequently, since that was the period that the decision for covering Ilissos was announced and the articles were mentioning the

historical importance of the Ilissos for the city. However, during the World War II and the Civil War, the historical aspects of the rivers were not often in the press.

9.3.3.2 Good environmental memory over the period 1923-1949

After the Catastrophe of Asia Minor and until the dictatorship of Metaxas in the mid of 1930s, references for good environmental condition memories of the rivers were representing up to 50% of the memory mentions. These memory mentions were referring at periods in the past and mostly at ancient times and they were describing various locations of Athens along the rivers, where Socrates, the ancient philosopher, was strolling, according to ancient references.

Also, this kind of memories appeared mostly during the dictatorship of Metaxas and before the beginning of the World War II for Greece and they were focusing on the good environmental condition of Ilissos in ancient times, in order to overemphasize the disapproval for the covering projects expressed by part of the academic society of the country, since this river was very important for the city of Athens as a holy place in ancient times.

9.3.3.3 Flood memories over the period 1923-1949

The flood memory mentions were about floods that occurred about 30 years prior to the publishing dates of the articles of this period. Description of disasters, caused by flood events of 1905, were used to compare the losses caused by flood event in 1936 and was expressing the writers' indignation about the progress of the flood defense strategy of the city. (Kathimerini, 1936-11-08)

Also, descriptions of past floods were among the memory mentions, in order to inform readers about the rivers' discharge capacities and fluctuations over the year and during extreme cases. (Kathimerini, 1938-10-12) There were cases that these two rivers were characterized as 'dragons', that the city had to fight against them, with flood control projects. (Kathimerini, 1940-10-28)

9.3.3.4 Bad environmental memory over the period 1923-1949

Despite the reference, written by the ancient historian Loukianos, for the past good river environmental condition and the rich river flow discharge, there were also other ancient geographers, like Stravon, that the newspaper articles used in order to refer to the low river discharge, similar to the condition of Ilissos in the early 20th century.

Due to various causes, Ilissos river was having a long history of pollution events that made the river to be considered as a source of problems for the city. The content analysis of the articles of this period revealed that the pollution causes, such as the mentality to throw garbage at the banks, were remaining the same as years were passing or they used to appear at periodic. (Kathimerini, 1938-10-12)

9.3.4 Over the period 1950 to 1966

9.3.4.1 Historical memories over the period 1950-1966

The mentions about the historical value of the rivers were appearing almost in all years of this period. They had represented up to 70% of memory mentions in one year of this period and in general they were mainly focusing on the importance of the banks of Ilissos for the ancient landscape of Athens.

9.3.4.2 Good environmental memory over the period 1950-1966

Concerning the good environmental memories, during this period there was an increase and then a decrease in the percentage of the presence of this category in the press. After the Civil War, the projects for covering the rivers and streams of the city and especially of Ilissos, made the press focus on the good environmental conditions that used to exist at the river in the ancient times, in order to use

this as motivation to leave the river uncovered. However, as the projects continued and until they finished in the mid of 1960s, the percentage of this type of memories dropped significantly and gradually, even by 50% during the years until the mid 1960s. The main reason was that the projects for covering of the rivers and especially Ilissos were completed and therefore disputes over the suitability of these projects stopped.

9.3.4.3 Flood memories over the period 1950-1966

Also, at this period, there were references, in the press, about the anniversary of the occurrence of severe flood events that caused a lot of problems at time prior of the publishing date of the articles. By referring to past flood events, the writers wanted to express their opinion about the little progress made for the protection of the city against floods, like in article at Kathimerini on 1961-11-8, mentioning the flood of 1896-11-14, making a connection with a severe flood event on 1961-11-6.

9.3.4.4 Bad environmental memory over the period 1950-1966

At that period of time, Ilissos was considered as source of repetitive problems for the city. (Kathimerini, 1964-11-26)

9.3.5 Over the period 1967 to 1980

9.3.5.1 Historical memory over the period 1967-1980

In the years of the military Dictatorship, from 1967-1974, the references for the historic value of the rivers, related to a nostalgic view for the ancient glory of the rivers as holy locations, were not many and their percentage among memory mentions dropped from 50% to 0%. For the years after the end of Dictatorship in 1974 and until 1980, there were no articles found, related with the historical importance of the rivers.

9.3.5.2 Good environmental memory over the period 1967-1980

During the Dictatorship, the amount of the good environmental memory mentions was having a descending route. After the restoration of Democracy in 1974 and until 1980, there were almost no references of good environment memories. However, at these few mentions, it could be concluded that the covering of Ilissos had been established in peoples' consciousness and there were only some nostalgic references of river's past good environmental condition, which were in complete contrast to the situation that citizens around the river were facing daily.

9.3.5.3 Floods memory over the period 1967-1980

During these years, flood event memory mentions, were related either to the causes of the floods or to the condition of infrastructures after past flood events, about 6 months prior to the articles. They were mostly cited in order to criticize the measures already taken for the protection of the city against floods and declare the emergency for improving the flood defense constructions. (Kathimerini, 1978-04-16)

9.3.5.4 Bad environmental memory over the period 1967-1980

During the Dictatorship, the mentions about bad environmental memories were mostly referring to past bad environmental conditions that caused severe degradation of the rivers environment quality, that were still obvious at the time of the articles were published and they were used as stepping stone for criticism about present condition of the river and the measures that were not taken for governments in order to improve the situation. After the Dictatorship and until 1980, there haven't been mentions about bad environmental memories.

9.3.6 Over the period 1981 to 2004

9.3.6.1 Historical memory over the period 1981-2004

In the years between 1981, when Greece accessed to European Community and until it was assigned with the organization of the Olympic Games in 1997 , there were no articles found related to the historical importance of the rivers. However, during the years of the preparation for the Olympic Games, from 1997 until 2004, the mentions with historical memory orientation were having increased percentages and almost 30% of memory references were about the historical aspects of the rivers.

9.3.6.2 Good environmental memory over the period 1981-2004

Since 1981 and until 1997, the memory mentions for the good rivers' environment were not a prevailing memory category. An increase at the mentions for good environmental memories was observed during the years of preparation for the Olympic Games and they were mostly related to the ancient urban topography and the good river's water quality at that time, supporting ideas about uncovering the rivers. It had already been many years since the coverage of Ilissos in the 1960s and in this period, in more articles, writers started describing with nostalgia the rivers and the areas around them, overlooking any environmental problems.

9.3.6.3 Floods memory over the period 1981-2004

During this period, there had been references about the devastating flood events of 1864 and 1896 and the bad flood defense state of the areas around Kifissos banks, due to garbage or illegal constructions. The references of the past flood events, were used by the writers to evaluate, after almost 100 years, the condition of the rivers' banks and conclude, with critical mood, that the situation did not change. (Kathimerini, 1997-01-19)

9.3.6.4 Bad environmental memory over the period 1981-2004

There have been references at this period about the bad environmental condition of the river in the mid of 1960s, when river's covering projects were taking place and how this practice degraded the environmental and historical importance of the river. (Kathimerini, 1997-01-16) Also, the bad environmental condition memories, related to the presence of illegal constructions at the banks of Kifissos and the lack of initiatives to improve this condition, were intensifying the concerns about the diachronic reluctance of the authorities to take rehabilitation measures, according to the writers.

9.3.7 Over the period 2005 to 2019

9.3.7.1 Historical memory over the period 2005-2019

The interest for the historical aspects for the rivers was decreased after the Olympic Games of 2004 and for about a decade, from 2008 until 2017, there were no mentions related to this kind of memories. However, the interest for the historical part, especially of Ilissos, increased after 2018, when a parking slot, over the covered riverbed of Ilissos, collapsed due to soil subsidence. This parking slot was near a tram station and as a result the tram passing stopped over the covered river, for security reason. Since then, there was an increase of historical mentions, that covered up to 70% of the total memory mentions in a year and with more articles bringing to spotlight proposals for uncovering part of Ilissos, especially at locations with elements of historical importance.

9.3.7.2 Good environmental memory over the period 2005 -2019

The articles with mentions about good environmental memories were not often at the post-Olympic Games period and the percentage of coverage was not high, compared to other memory categories. However, the mentions of rivers' good environmental condition were mostly referring to ancient times.

9.3.7.3 Flood memory over the period 2005-2019

During this period, there have been publications, like the ones in 2005, with references of the flood events of 2002 and 2003 and their devastating consequences. In these articles, there have been references about the causes of that flood events and it was mentioned that the local community was characterizing these causes as re-occurring.

9.3.7.4 Bad environmental memory over the period 2005-2019

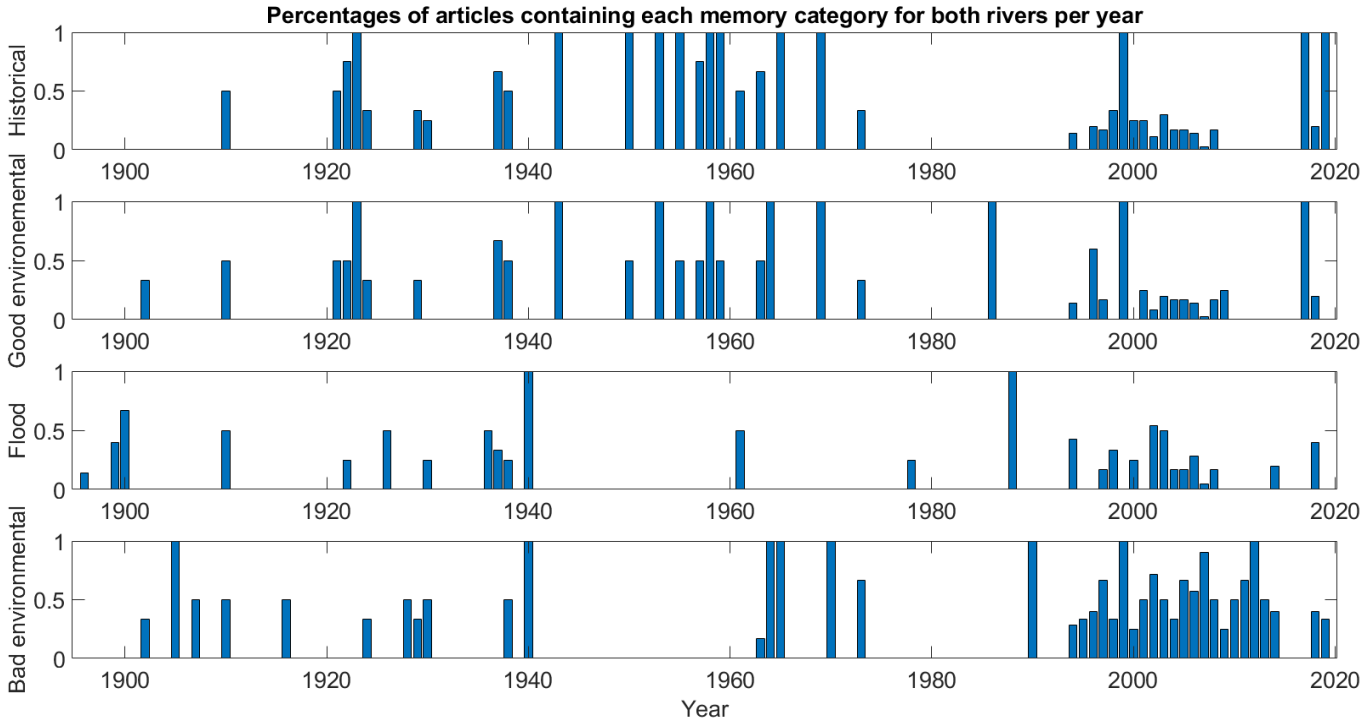
The increase of bad environment memories, after the Olympic Games, was mostly related to the degraded condition of the rivers and the fact that people realized, through comparison with past conditions, that the bad state of the rivers was still a condition that did not improve as years went by, because the authorities had not worked efficiently to improve them. This kind of references was appearing with higher frequency during this period compared with pre-Olympic Games period and was covering from 40% to 100% of memory mentions in some years.

9.3.8 Memory categories distribution among articles

In order to find the percentage of articles that include certain memory category mentions, compared to the total number of articles that have been found, the following calculation is excecuted:

$$rate\_of\_articles\_of\_memory\_category_{i,j} = \frac{\sum articles\_category_{i,j}}{\sum articles_j}$$

for memory category $i = \begin{matrix} 1: historical\_memory \\ 2: good\_environmental\_memory \\ 3: flood\_memory \\ 4: bad\_environmental\_memory \end{matrix}$ and for the years $j = 1896 - 2019$

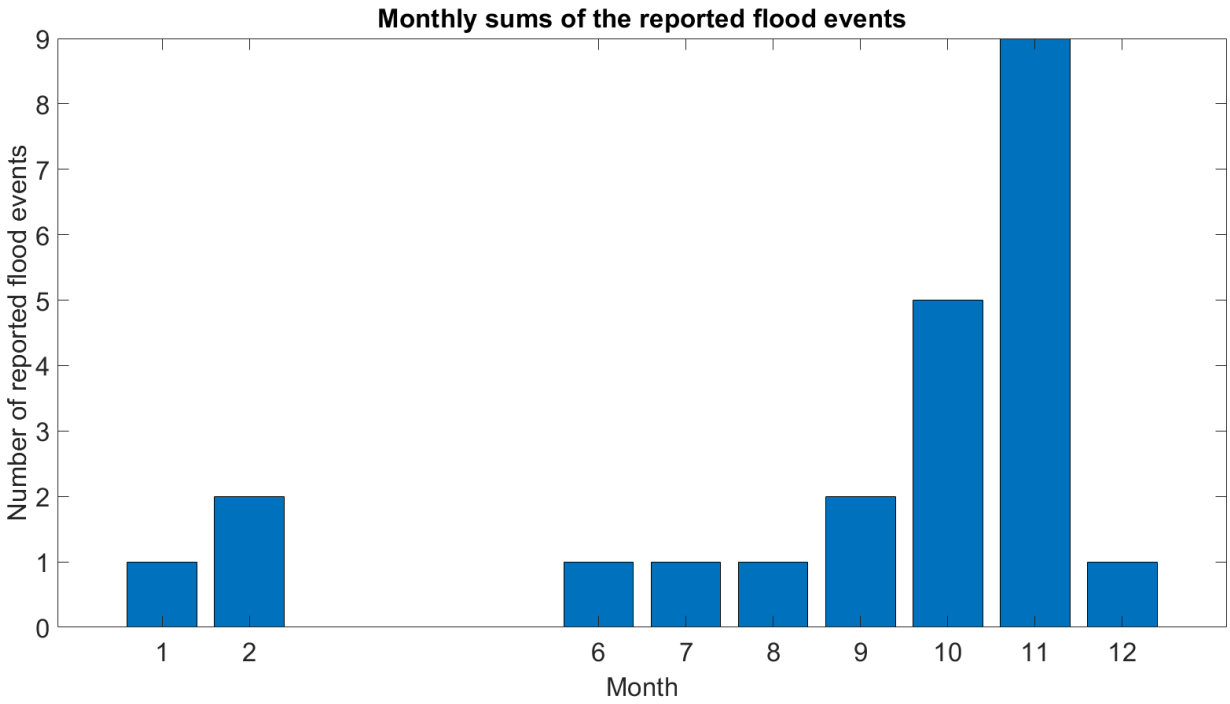


Graph 9.19 Evolution of memory categories distribution among articles

Concerning the percentages of the articles, it can be seen that the percantage of articles, related to the historical value of the rivers, was similar with the percentage of articles containing mentions of past good environmental conditions, not only in a certain time frames, but almost during the whole study period. The percentage of articles with flood memories was very often close to 0 compared to other categories and similar was the case with articles with mentions related to bad environemtnal memories. However, the flood and the bad environmental memories articleswere reported more often around 2000 and afterwards, compared to the good environmental memories of the rivers.

9.4 Flood memories and flood events

The monthly distribution of the flood events related to Ilissos and Kifissos, that have been reported during the study period and were detected from various sources of literature, is depicted in the following graph:

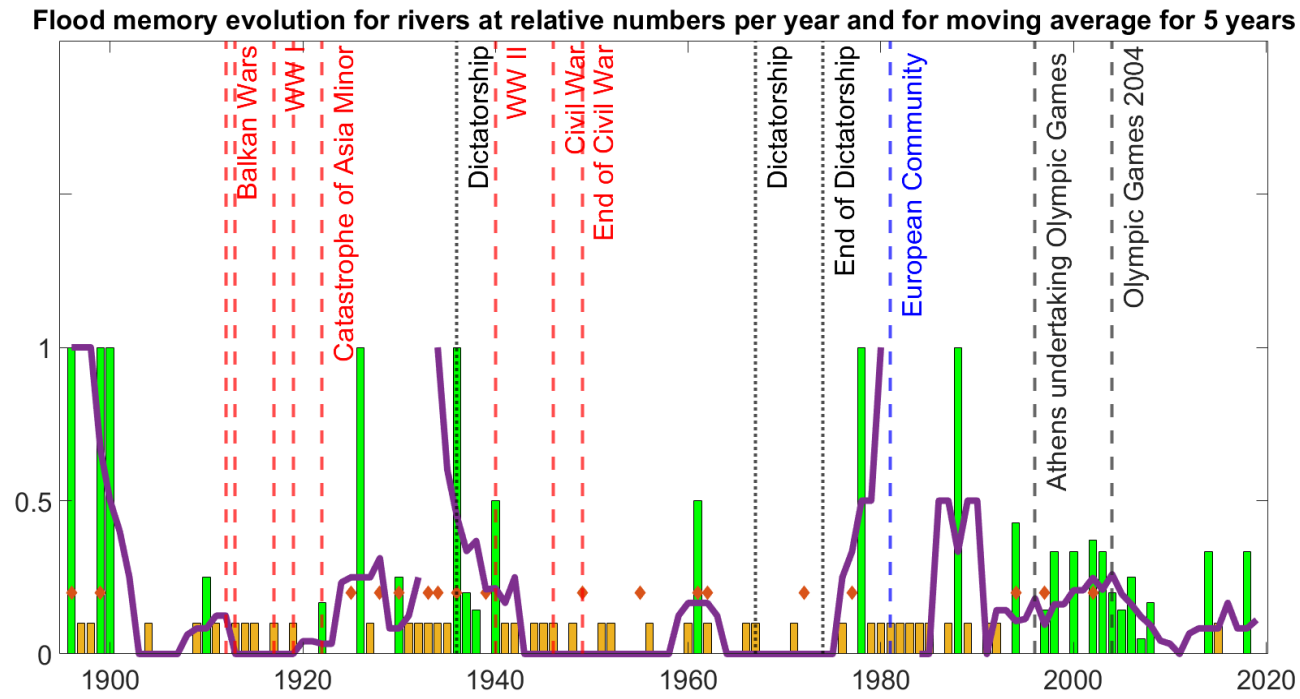


Graph 9.20 Monthly distribution of reported flood events during the study period (Diakakis, 2014)

As it can be seen in the graph with the monthly distribution of the reported flood events, most of them were reported in November and there have been months without severe flood events to be in the press, like in March, April and May.

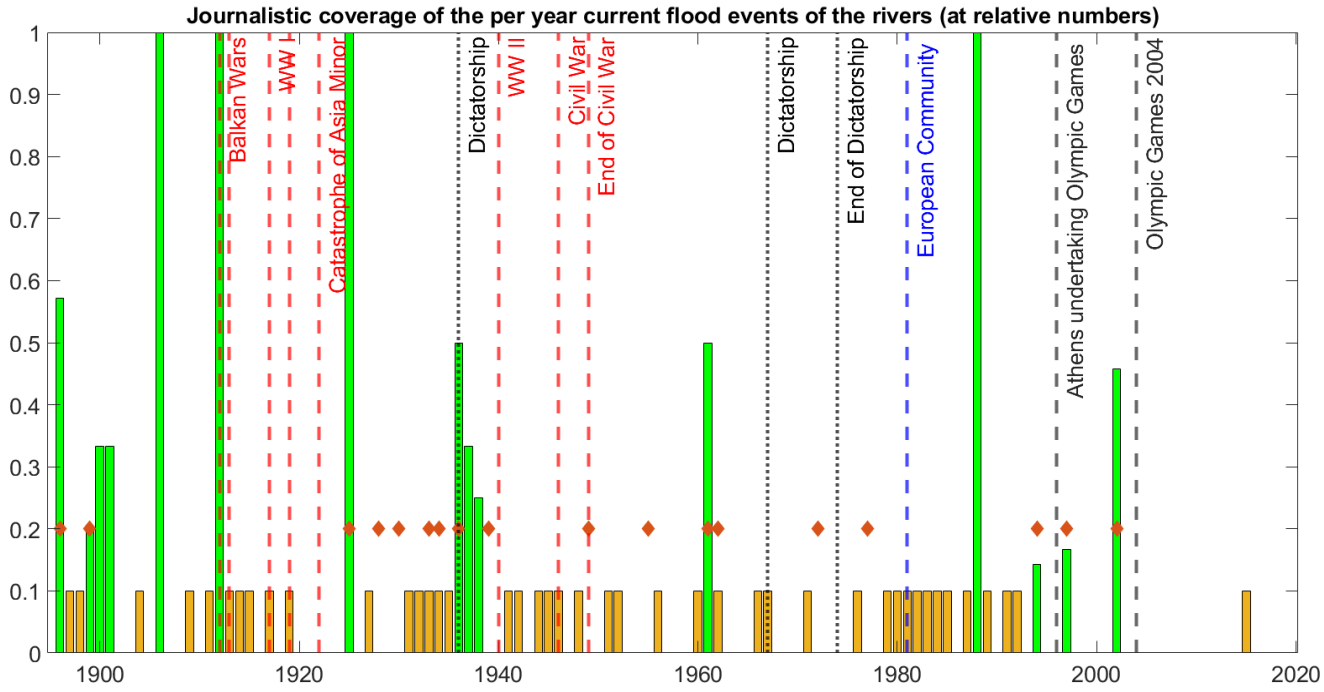
Moreover, it can be seen in graph with the monthly distribution of articles, the maximum number of articles related with rivers has been reported in November and similarly in the graph with the monthly distribution of reported flood events, the maximum number of flood events is also reported in November.

The per year evolution of the percentage the flood memory mentions cover in relation to the total memory mentions, can be seen in the following graph.



Graph 9.21 Evolution of per year flood memory mentions. Green bars: relative numbers representing the bad environmental memory mentions in articles compared to total number of memory mentions in articles – Orange bars: years with no data for the rivers – Red dots: flood events – Blue line: moving average

Apart from the flood memory mentions, articles covered current flood events. In the following graph it can be seen the percentage of articles, with current flood mentions, cover in comparison to the total number of articles published in that year.



Graph 9.22 Newspaper coverage of current flood events as percentage of the total number of articles published in a year. Green bars: relative numbers representing the bad environmental memory mentions in articles compared to total number of memory mentions in articles – Orange bars: years with no data for the rivers – Red dots: flood events – Blue line: moving average

The time period between a flood event and the newspaper coverage of that event was usually 1 or 2 days. For the coding table, a reference about a flood event even after 20 days was not considered as flood memory mention, for example at the case to the flood event of 1896. (Empros, 1896-12-08)

Mentions of flood events, after a period longer than 2-3 months from the date the flood event took place, were regarded as flood memory mentions. For example, at the last days of the summer period in 2002, an article about flood event occurred at those days, with small extend consequences, had a very clear reference at a flood event two months prior. This reference was regarded as flood memory mention, since the writer mentioned that the fear caused from that past flood event, forced the authorities to be more alert and prepare by taking extra measures at the banks. As a result the consequences the heavy rainfall resulted at not having a severe flood event. (Kathimerini, 2002-08-31, 2002-09-05)

Also, it was observed that severe flood events were compared to past flood events of similar severity. There has been articles, mentioning floods that occurred in Athens and it was found that at the severe flood events people tended to remember the past flood events that had been of analogous catastrophic.

In the newspapers it was found, that at a severe flood event in 1977, people remembered a similar flood event about 80 years ago (Kathimerini, 1997-01-19). Similar comparison was made between the disasters caused by a flood event that occurred in 1961 and the severity the disasters caused by the big flood event of 1896. (Kathimerini, 1961-11-08) Also, at the severe flood event of 1896, people remembered and compared those losses to the ones occurred after flood events in 1874 and 1864. (Kathimerini, 1997-01-19) (Empros, 1896-11-16) That was a similar case with an article with reference about a flood event in 1938 that praised the flood control projects that protected some areas whereas others suffered for the flood. (Kathimerini, 1938-10-15)

Also, as it can be seen from the previous graph, there have been flood events, found from the literature, which were not reported at the selected newspapers, probably because of their low impacts at people's everyday life and infrastructures.

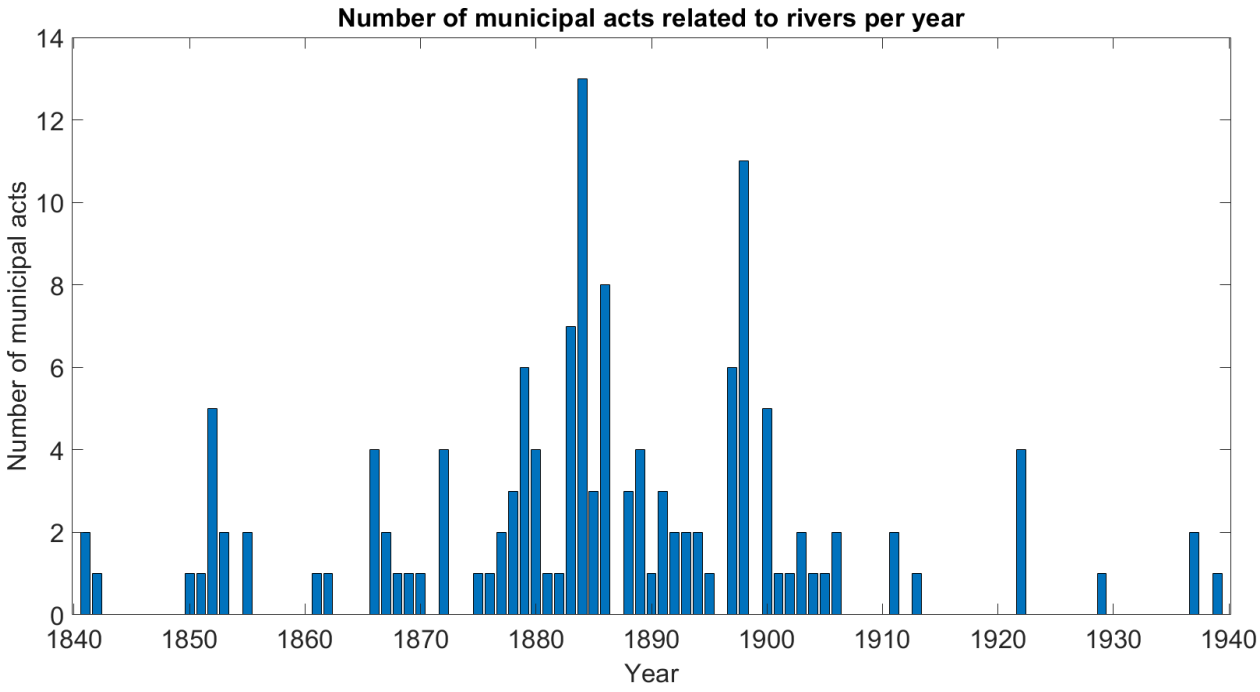
Usually, what was found during the research was that low intensity flood events were only mentioned at the day after the event, like in Empros, 1900-05-30, 1901-05-20, 1906-07-18, 1906-08-09 and others. More severe events were reported more than once at the next day's issues and extended articles were dedicated to them, like for the flood events in 2002.

9.5 Content Analysis Results from Municipal Acts

The research for the municipal acts from Athens Municipal Archive covered the whole study period, but from the selection of suitable acts related to Ilissos and Kifissos as water bodies, the ones found more appropriate for the purposes of this study were dated for Ilissos from 1840s until the 1940s and for Kifissos from 1840s until the mid-1910s.

9.5.1 Overview of the yearly sums of municipal acts related to rivers

Here is an overview of the yearly sum of the municipal acts that were found at the municipality databases and were related to the rivers. The interpretation of the data is similar to the one used for the newspaper articles and was on yearly base, by summing per year the number of acts within the study period.



Graph 9.23 Number of municipal acts per year, related to Ilissos and Kifissos

There were in total 138 municipal acts about Ilissos and Kifissos. Acts that were not related to Ilissos and Kifissos as water bodies were not included. For example, acts that were referring to the rivers as landmarks, in order to describe the location of a specific building, for instance house boundaries next to the rivers, were not included in the selection. The maximum number of acts that was found, was 13 municipal acts in one year. Also, there have been years that there were no acts related to the rivers and some years that the municipal archive was not available as explained in previous charter of this study.

The longest periods without acts until the last year river related acts were found were 1843-1849, 1914-1921 and 1930-1936. In the period from 1945 until 1958, the data of the archive were not reachable and from 1959 and afterwards no acts, related to the purposes of this research, were found. For example, since Ilissos became a street, other issues were discussed in the municipal meetings, such as projects around the the new avenue (Municipal Act, 1960-06-13) and in 1970 there was a municipal act about naming in honour of the Greek Sailors of the banks of Ilissos (Municipal Act, 1970-03-10) and it was not included in the database of this study.

For Ilissos there were maximum 4 municpal acts that were found in a year, in the archive. The acts related to Ilissos were dated from 1841 until 1939.

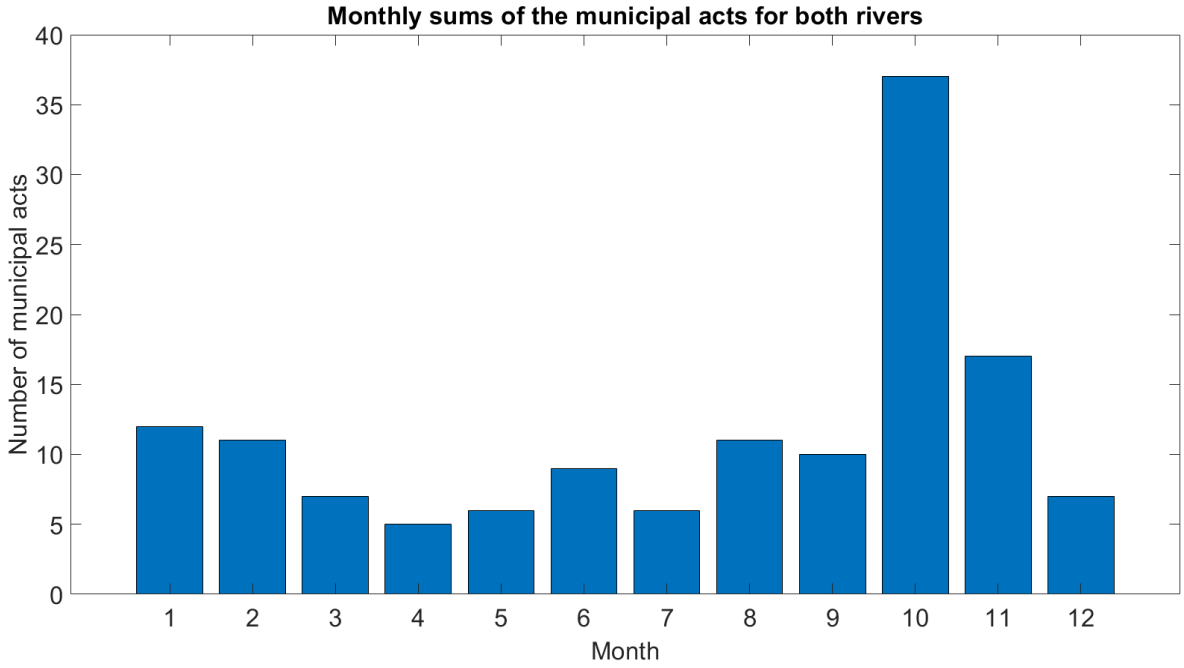
For Kifissos river the municipal acts were from 1841 until 1913 and the maximum number of acts, related to Kifissos as water body, was up to 9 acts in a year.

The presence of river-related acts in the archive of Athens municipality might was affected by the fact that the areas, where the rivers were flowing through, had changed administrately, since new municipalitites were created or because the river related issues were under the jurisdiction of the perfecture or a ministry. It is worth mentioning that, as was explained in chapter 4.7.4, the municipality boundaries had changed since 1925 and certain areas and neighborhoods were gradually detached from Athens municipality.

It should also be taken into account the fact that no data were available for the years 1945 to 1958, because for these years the municipal acts were not available,either because they were destroyed or because the original books were under digitization procedure and were not available for the public during the research.

9.5.2 Monthly variation of municipal acts

The distribution of the municipal acts on the month they were decided and for the whole study period can be seen in the following graphs and table. In general, during the summer months, the number of rivers' related acts was less than during autumn, spring and winter months.



Graph 9.24 Distribution of municipal acts per month for both rivers

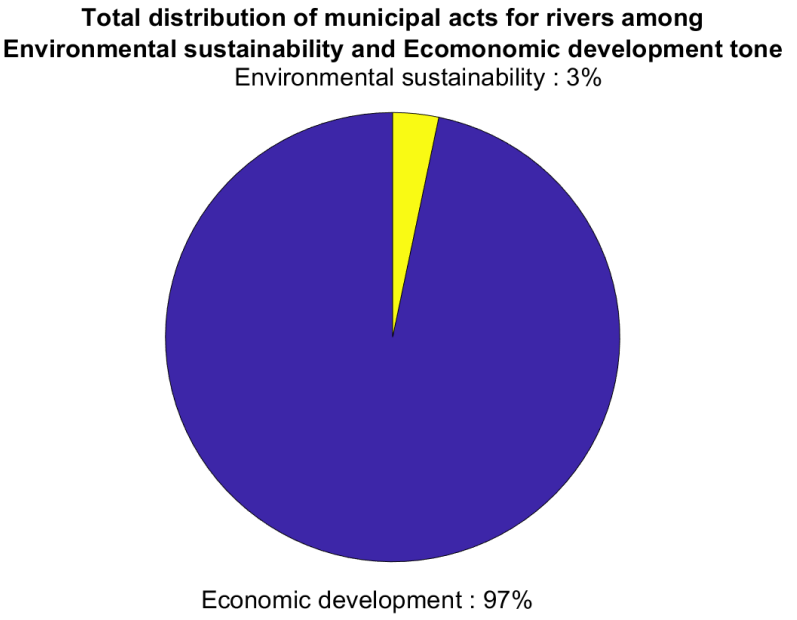
Table 9-2 Distribution of municipal acts per month for both rivers in absolute and relative numbers

Month	Number of acts	Percentage of acts per month (%)
January	12	9%
February	11	8 %
March	7	5 %
April	5	4 %
May	6	4 %
June	9	7 %
July	6	4 %
August	11	8%
September	10	7%
October	37	27%
November	17	12%
December	7	5%
Total	138	100%

The increased number of acts in the month of October might be related to the irrigation programminf purposes, so that to clear to farmers who would had access to river form the water and according to that define the type of crops to cultivate. Moreover, it might be related to the budget organizing for the winter period as similar acts were found at the archive. comparison with the monhtly reported sums of flood events wouldn't be wise since the time periods covered are different and after certain year there are no information for the municipal acts.

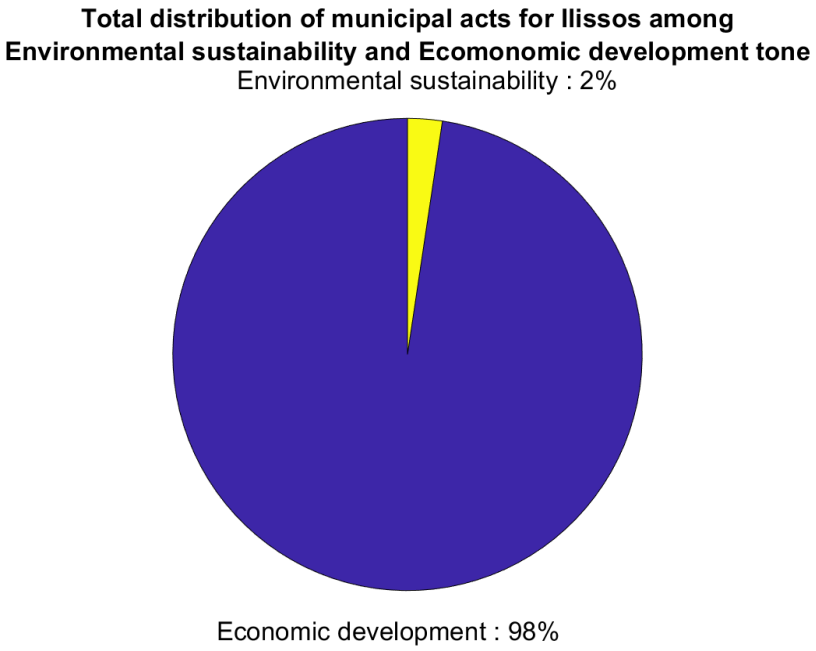
9.5.3 Distribution of municipal acts among the tone categories

The distribution of the tones of the municipal acts, according to the coding table, was calculated similarly with the tone of the newspaper articles and can be seen in the following graph:



Graph 9.25 The distribution of the articles between the economic development and environmental sustainability

For Ilissos :

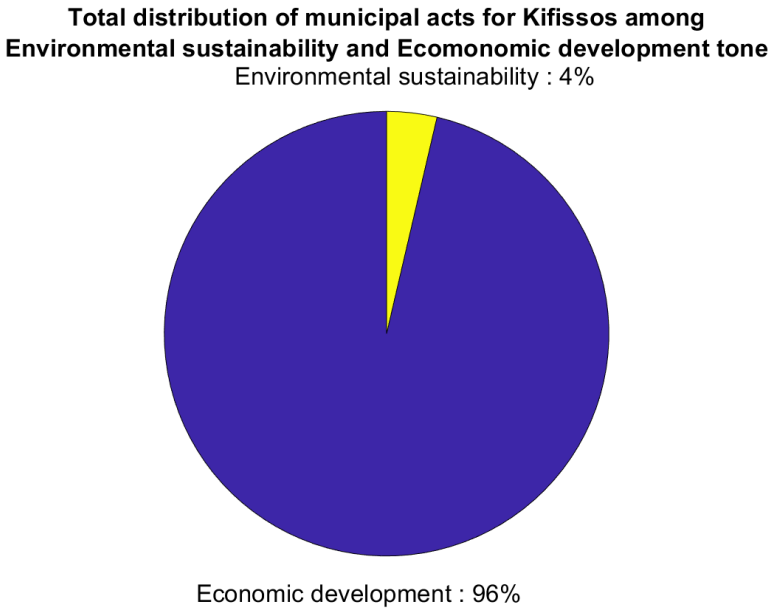


Graph 9.26 Distribution of the municipal acts between economic development and environmental sustainability for Ilissos

For Ilissos, the main concerns discussed in the municipality meetings were in relation to projects about bridges constructions. (Municpal Acts 1852-10-10/26) There have been numerous municipal acts related to the construction of bridges for the river and at various locations along the river, like the ones in 1855, 1862, 1876, 1879, 1884, 1891, 1893, 1897, 1898, 1900, 1905, 1922 , that even include peoples' wishes for the construction of a bridge like the one found in 1929. Also, there have been a case that due to the need

for constructing the bridge, the metal bariers of the 1st Cemetrery of Athens were used. (Municipal Acts 1905-11-16Moreover there have been municipal acts related to clearing parts of river banks. (Municipal Acts 1884-05-07, 1889-06-08)

For Kifissos:



Graph 9.27 Distribution of the municipal acts between the economic development and environmental sustainability orientation for Kifissos

The main concerns for Kifissos were about renting the river's water rights for irrigation purposes, at various locations along the river's course and at the springs, even since 1841.(Municipal Act, 1842-01-13) Moreover, in 1869 it was found that the municipal authorities decided financing the construction of small scale dams and cascades for controlling the water of Kifissos river in order to avoid floods. (Municipal Act, 1869-08-13) Similar acts were found until 1913. (Municipal Act, 1913-06-12) Also, there were acts declaring that the municipality was taking care about clearing the riverbed of the river. (Municipal Act, 1884-10-31) In general, at the municpal acts there were several refererreces describing the municipal authority efforts to repare and construct projects for the river, without more information aboutthe scale of the projects, like for example in the Municipal Act, 1895-21-01.

The first act with environmental tone was found in 1841, it was referring to Ilissos and it was about finding water resources related to the river. (Municipal Act, 1841-10-14) The other acts with environmental tone were related to Kifissos and were about clearing actions at various parts of the river. (Municipal Act, 1884-01-13, 1884-10-31, 1885-01-10) After these acts, no other environmental acts were found. The overwhelming majority of the acts were economic oriented. However, the tendency towards environmental protection issues, not only related to the rivers, but in general to the protection of the city's environment started by the municipality in 1980, by creating the Centre of Environmental studies (Municipal Act, 32/30.10.1980). Similar initiatives were decided more often in the 1990s, by expanding the field of actions for protecting the environment of the city (Municipal Act, 4/04.02.1985). These acts had no clear reference to the rivers of this study and therefore they were not taken into consideration in the graphs.

9.5.4 Distribution of municipal acts at memory categories for all years

By the interpretation of the municipal acts there were no acts found with mentions to any memory category. There is only one exception in 1978, for an arranged meeting for discussing the disasters of a flood event of 1977, but all meetings in 1978, dedicated to this event, were postponed and in the end it was decided to be canceled.

9.6 Explanation of the difference between the two basins at articles' tone and memories

The differences at the articles' tones evolution between the two rivers were significant and the reasons related to different evolution characteristics at the different locations in the city.

9.6.1 Population's proximity to the rivers

Ilissos was mostly flowing through the older part of the city, inhabited since the ancient years. As it can be seen in the following graph, the municipality of Athens and the neighborhoods nearby, were the first parts of the city to be inhabited even before 1875 and most of them are located in the Ilissos basin. The areas depicted with yellow colors, at the western parts of the city, were inhabited after the mid 1960s and are mostly at the basin of Kifissos river.

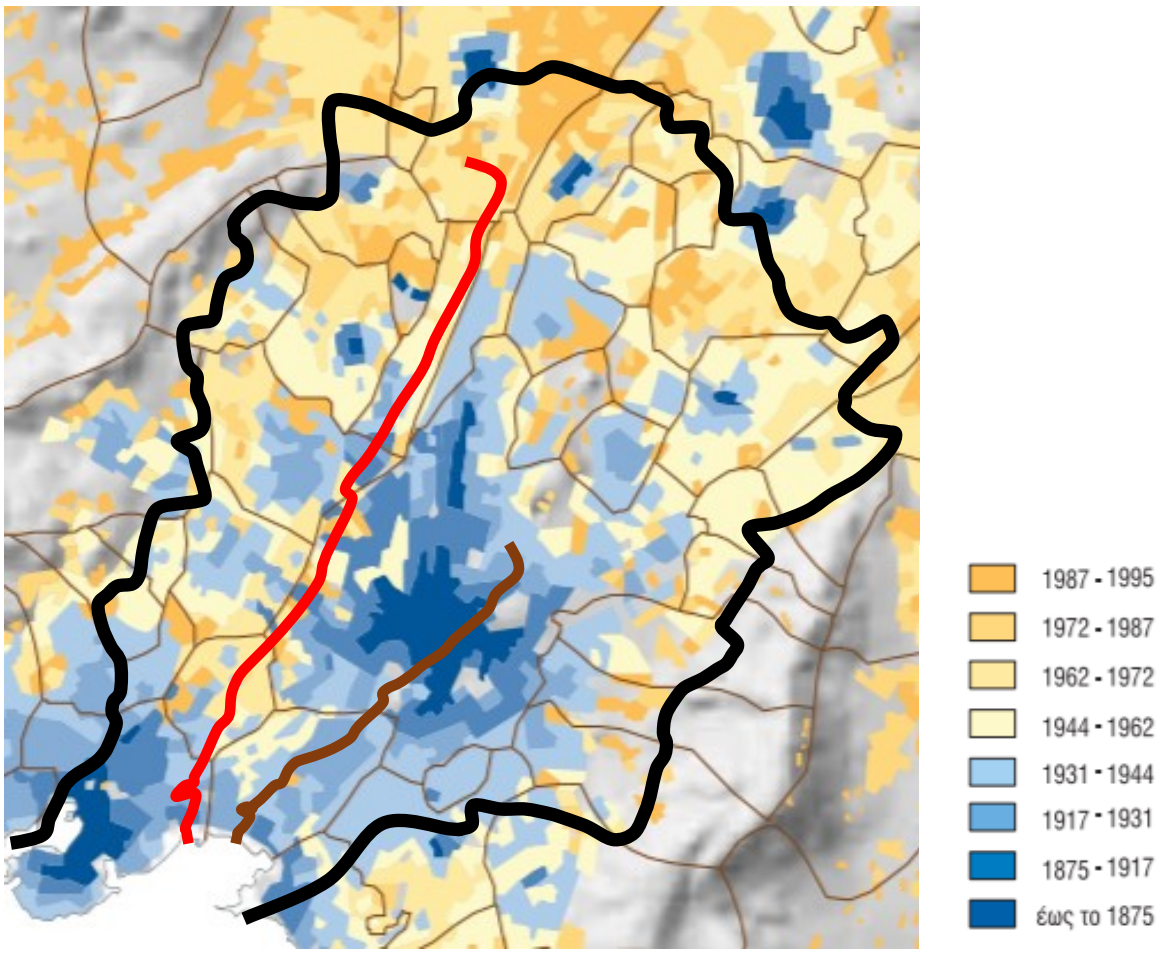


Figure 9-1 Residential expansion of Athens from 1875 until 1995 (Μαλούτας, 2002) Black line: boundaries of Athens basin, Red line:Kifissos river, Brown line: Ilissos river

So, the concentration of residents, at certain areas close to Ilissos, might explain the attention that was given by the daily press to Ilissos compared to Kifissos, at the beginning of the study period. The settlement of more people close to Ilissos, probably made the problems caused by the proximity to this river, more vivid to larger part of the capital's population and therefore the issues reported were mostly about economic aspects in relation to Ilissos, since the river was affecting the economic development of these residents by the problems it was causing.

Similar orientation articles started to appear also for Kifissos since new neighbourhoods started to be formulated at this basin and more people were in contact with Kifissos. The number of people, living in the basin of Kifissos, increased after the Catastrophe of Asia

Minor in 1922, by the arrival of refugees and after the World War II, by internal immigrants. As a result, more people were in contact with areas that flooded and since they were living there, they were witnessing this condition.

9.6.2 Industries installation and residential areas

In the period 1875-1917, Athens and Piraeus were the urban planning focus centers in Attica region. Regarding the new industrial plants of this period, they started to be installed along Kifissos river. (Αβδελίδης, 2010)

While until the 1950s the industrial activity was distributed relatively balanced in the country, in the period 1950s-1970s, Athens and the surrounding areas absorbed more than 57% of the newly established industrial plants in Greece and 71% of the job openings at these industries. Most of these industries were installed at areas without the basic infrastructures, without environmental permissions and as a result they degraded the environment at these locations. (Πετροπούλου, 2012)

In more detail, the evolution of the installation of industrial units in Athens, compared to the rest of the country, for the period between 1930 until 1969, can be seen in the following table and figure, showing that Athens was a significant industrial center for the country.

Table 9-3 Industrial evolution in Greece and Athens from 1930 to 1969

	Industrial Units			Labour Force		
Year	Greece	Athens	Athens (as percentage)	Greece	Athens	Athens (as percentage)
1930	73317	8353	11%	208802	41115	20%
1951	81433	12500	15%	296722	84838	29%
1958	109236	25709	24%	413639	171247	41%
1969	124651	40956	33%	501522	233779	46%

(Πετροπούλου Κ. , 2011)

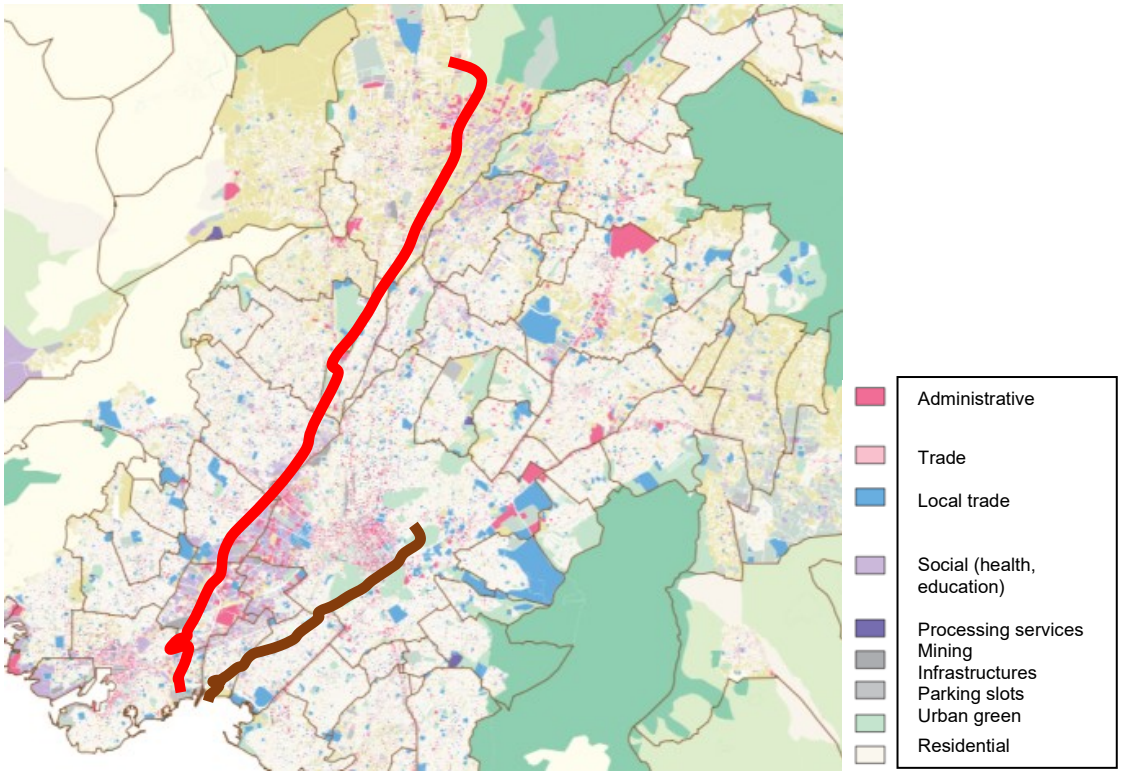


Figure 9-2 Main land uses in 1996 (Μαλούτας, 2002) Red line:Kifissos , Brown line: Ilissos

As years went by and despite the tendency for deindustrialization in the 1980s (Νικολόπουλος, 2017) (Βενιζέλος, 1999) the operation of smaller industrial units along Kifissos continued as it can be seen the following map from the mid 1990s (Μαλούτας, 2002).

As it can be seen from the main land uses map, at the basin of Ilissos the main land use was mostly dedicated to residential purposes, whereas in the basin of Kifissos there were more wholesale trade services, processing services and products storage facilities, especially at downstream part of the river and at some upstream parts.

So, the increased environmental sustainability articles related to Kifissos after the 1960s, might be explained by the fact that most industrial plants were installed along Kifissos river. The environmental problems, either related to the water quality or the river banks, were one of the main concerns of local communities, connected to the operation of the industries. So, it could be expected to have increased number of articles about the environment and about the attempts to remove all the industrial units away from Kifissos banks with various legal ways.

9.6.3 Unregulated building

The fact that Athens became a very important economic center for the development of the country, as was explained above, increased the attractiveness of the city as establishment choice for the labor force. Also, refuges and internal immigrants settled in Athens, since the majority of the new working positions were at this city. (Πετροπούλου Κ. , 2011) However, all this new population settled usually in uncontrolled way, at neighborhoods and areas without predictions for the basic infrastructures related to water and wastewater, green spaces, streets and sewage system.

The arrival of the refugees from the Asia Minor increased significantly the population of Athens. In 1920 the population in Athens was 453,000 inhabitants and after the refugees arrival, the population of the city became 802,000 in 1928 counting. Also, about 230,000 internal immigrants settled also in Athens and Piraeus in the period before the World War II. (Κοτζαμάνης, 1997)

The different population groups were distributed in categories as it is presented the following table, representing the population counting of 1928.

Table 9-4 Population distribution at the Extent Athens Area in 1928

	Athens		Piraeus	
	Absolute	Relative %	Absolute	Relative %
Locals	131.81	28.7	68.86	27.6
Immigrants	198.02	43.1	81.62	32.4
Refugees	129.38	28.2	101.96	40
Total	459.21		251.66	

(Κοτζαμάνης, 1997)

In general, refugees settled at organized and unorganized campus at the two basins. Mostly, the refugees settled at the downstream parts of Kifissos and both upstream and downstream at Ilissos basin as it can be seen the following map.

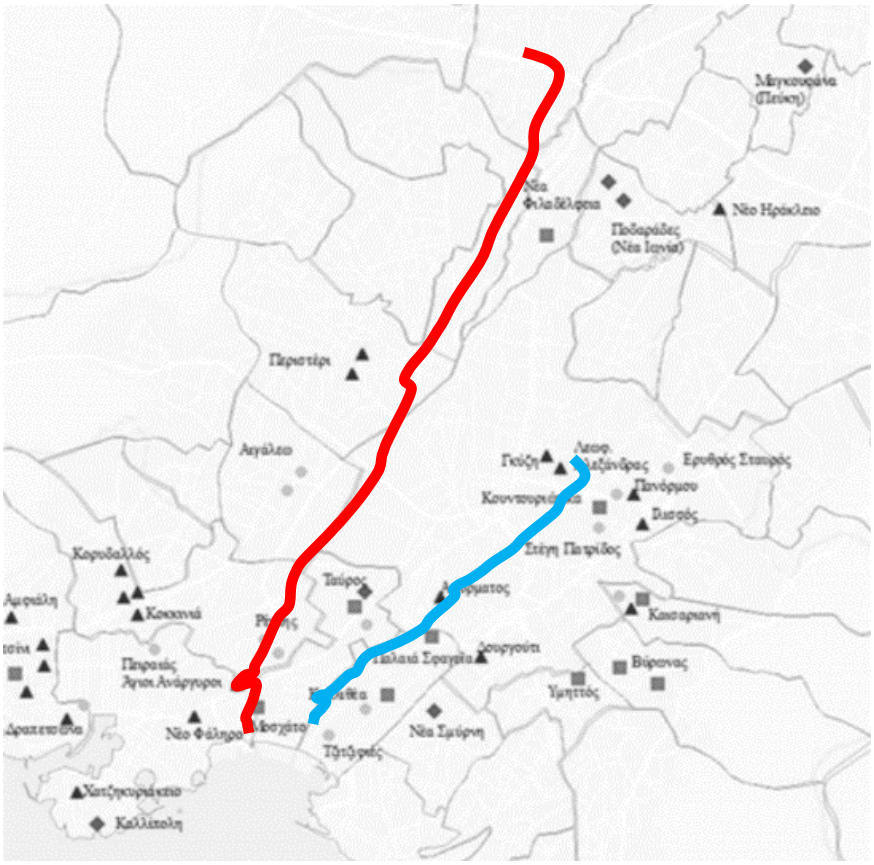


Figure 9-3 Locations where refugees settled in Athens (indicated with squares and triangular) (Myofa & Stavrianakis, 2019), Red line: Kifissos river, Blue line:Ilissos river

As a result, the refugees arrival, in combination with the internal immigrants' arrival, increased the population of the capital and created new neighborhoods.

Therefore, due to these intense residential needs, the different neighborhoods of Athens became larger and started gradually to be unified and the whole city started to be urbanized. Indicative of the changes in the urban characteristics of Athens can be found in the following table.

Table 9-5 Changes in land use categories in Athens (Αβδελίδης, 2010)

Years	1961		1991	
Land uses Categories	Land uses (km^2)	Land uses (%)	Land uses (km^2)	Land uses (%)
Agricultural	73.8	17.6	35.2	7.7
Wood	66.9	16	68	14.9
Water	4.3	1	0.8	0.2
Built	271.3	64.7	323.1	70.7
Others			30.3	6.6
Total	416.3		457.4	

In the city, the built environment was increased significantly, but as it can be seen the water areas were the ones that decreased significantly, almost by 80%.

The increased needs for residential and industrial areas changed the size of the city, which was constantly expanding, even outside the boundaries of the basin. In 1875, Athens, along with Piraeus, was the industrial center of the country and the total area coverage was 12.3 km^2, which was 2.5% of the area Athens covered at the end of the 1990s. In the period from 1875 until 1917, the development was mainly focused at the installation of the industrial units next to Kifissos rivers. Until 1931, the arrival of the refugees from the Catastrophe of Asia Minor caused the urgent and unplanned city's expansion towards at the suburbs and the city reached almost 13.4% of the area modern Athens covers. In the period between 1931 until 1944 and especially in the pre-war period, the city expanded almost 70%. The next years until 1962, the main characteristic at the development of the city was the intense urbanization and the house construction outside the city's boundaries resulted the city to be larger by 73.9km^2. In the next ten years, until 1972 this phenomenon continued. Until 1987 the city reached 78% of the current area and the next years it reached the area the Athens covered in the end of the 20th century.

Table 9-6 Terrestrial expansion evolution of Athens from 1875 until 1995 (Μαλούτας, 2002)

Year	Areas added (km^2)	Total Area (km^2)	% Difference with previous counting period
1875		12.3	
1917	23.6	35.9	+ 192%
1931	29.8	65.7	+ 83%
1944	46.5	112.2	+ 71%
1962	73.9	186.1	+ 66%
1972	98.6	284.7	+ 53%
1987	71.8	356.5	+ 25%
1995	134.7	491.2	+ 8%

So, from these numbers it can be seen that the city expanded rapidly and in an uncontrolled way, with the necessary infrastructures not to be developed at the same time. As a result, environmental and flood problems started to be noticed by more people and more often reported in the press. So, therefore all these conditions could be an indication for the increased the number of environmental orientation articles found in the daily press after the 1960s-1970s.

10 Athens urban characteristics evolution in relation to European urban characteristics evolution

In this chapter a short overview of the evolution of the urban characteristics of Athens and the western European Cities is presented. As presented in section 10.1, the urban development of the cities in western Europe followed a more organized way, influenced by the residential needs of their inhabitant and the technological advances of each period that influenced the productive procedure starting with the industrial revolution. The urban development of Athens, found in section 10.2, did not follow the development of the European cities at the same period of time, only with some delay at some cases. However, in the last years both converge at more environmental friendly orientation. The comparison of their development characteristics is presented in Section 10.3. However, the common trend in urban development towards environmental protection, with respect to rivers is presented in Section 10.4., with examples from some rivers in European cities and in section 10.5, the relation of urban development with sociohydrology is presented, in order to support the importance of their in parallel study for the urban water management.

10.1 Urban development in Europe

10.1.1 The Industrial Revolution and modern Urban Planning in the 19th century

From the end of the 18th century, but mainly from the 19th and in some regions from the 20th, first in Europe and the USA and then all over the world, the outbreak of the Industrial Revolution brought a complete disorganization of the cities, with population growth and migration towards urban-industrial centers due to the creation of new jobs in the secondary and tertiary sector, that sharply increased the demands for space. Thus, the existing problems, such as housing and technical infrastructure, were increased and others, like environmental degradation, were added to the already existing ones. At the same time, new forms of transportation, such as metropolitan railways, trams and at the beginning of the 20th century, cars, also caused new demands for space, but they additionally strengthened the geographical spread of urban centers.

Cities in general lost their cohesion and character. The solution for the new housing needs was undertaken by for-profit companies, by exploiting the surplus value of the urban land. Workers' housing complexes that began to be built, often close to highly polluting industries, were among the most degraded forms of housing. Later, the public sector (state, municipalities, special bodies) began to intervene in the organization and construction of workers' housing and imply the first specifications about their qualitative and quantitative characteristics. At the same time, there were programs to meet the housing needs of the middle and high income population, away from the polluting industries and the constantly degraded centers. The idea of the "garden city" was first applied in England in the late 19th century. A variation of them is the various "satellite cities", in fact suburbs, with the main function of the residence. (Zinkina, Ilyin, & Korotayev, 2017)

10.1.2 Urban Planning in Europe in the 20th century

In the 1930s, the principles for organizing a city into zones were introduced. These principles proved to be insufficient at their implementation, due to the extensions of the road network which often destroyed the cohesion of the city. This condition resulted to the introduction of the type of universal urban plan, like the regulatory plan (Master or Development Plan) which was originally called the Land Use and Transportation Study.

The master plan, as a basic urban planning tool, was widely used by the end of World War II and allowed stakeholders to reorganize and reconstruct rapidly the damaged cities throughout Europe, which were applied for the mass construction of large residential complexes and accompanying uses. In addition to regulatory plans, urban planning in each country begun to impose strict urban planning restrictions on uses and building conditions.

10.1.3 After World War II

The urban plans of the first post-war period, which were usually drafted by technocrats and decided by politicians, but without participatory procedures despite their advantages, could be characterized as too decisive and inelastic. These weaknesses began to be addressed in the 1970s.

At the same time, the problem of low birth rate began to be intensified in the countries of Western Europe and the population remained stagnant or even declined of some cities. Another problem was the overproduction of buildings, such as e.g. housing, meant that certain type of needs had been satisfied, while the increased use of space for urban purposes caused significant problem of insufficient available space for natural resources (forests, agricultural land etc). The latter finding is also related to the ecological and environmental movements and the corresponding state policies from the 1970s and especially the 1980s. Thus, recent urban planning policy, it is mainly oriented towards regeneration of degraded areas, preservation of urban complexes, changes of uses in old buildings or complexes (e.g. factories) or addition of new building or urban planning elements to existing "gaps", e.g. in damaged or ruined parts.

At the same time, the strong ecological and environmental dimension is another feature in modern urban policy, that requires the transformation of the once disturbing production facilities or utility networks into "environmentally friendly" facilities. Also, the awareness of social groups regarding urban and environmental issues and the awareness of rights and obligations are intensified.

However, it should be kept in mind that the urban space is still largely the subject of business activities and overexploitation even with modernized methods. Responsible for the urban planning decisions shouldn't be only the technocrats and the political leadership. For this reason, the Urban Planning sector is enriched with new procedures, such as Participatory Planning, Advocacy Planning, Negotiations and the application of "dispute resolution" methods with the emergence of new specialties, such as Mediators. Thus, large-scale designs, such as regulatory plans, are no longer predetermined, but more guiding, while design cannot be described as "final", but as continuous and ongoing and are the result of compromises between political leaderships (of different levels and areas of responsibility), technocrats, investors, users and other social groups. (Clark, Moonen, & Nunley, 2019)

10.2 Athens Urban Development

10.2.1 19th century

The Greek capital was a new city created on the ruins of ancient Athens and the remains of the Ottoman city, which had only 10 thousand inhabitants. Urban planning and architecture during the period of King Otto - the first king of the new free state - played an important role in shaping the identity of the modern Greek state.

In the 19th century, the first ambitious city plan of Stamatis Cleanthis and Eduard Schaubert was modified by Leo von Klenze, who was the planner of the plan of 1834, the basis for the following plans. The effort of organizing the area according to the principles of European urban planning, with interest in highlighting the monuments of antiquity, marked the detachment from the Ottoman past. The Greek capital functioned as a symbol of cultural renaissance and Europeanization, thanks to the way the glorious past was addressed and the institutional and legal interventions through the regulatory plans.

In contrast to Europe, where the increase of the urban population was mainly due to industrialization, the demographic development of the Greek capital was a result of the growth of the tertiary sector, consist of all service occupations and the intensive construction

activity. Factors that contributed to that directions were the corrupted state, the strong relationship of the modern Greeks with the land ownership and the fact that real estate was addressed as the top investment object. (Μπίρης, 2005)

Another distinctive characteristic of Athens was the lack of the necessary public land. In addition, arbitrary building constructions contributed to the expansion of Athens beyond the approved city planning. These peculiarities occurred due to the difficulties at implementing the urban plans, which were requiring expropriations for the creation of public spaces, widening of roads etc. (Φεσσά-Εμμανουήλ, 2018)

In general, the ambivalence of Athenian society towards the new urban planning reality was based in hand on the ambition of the "ruling class" (i.e. governing society) and urban planners and architects for a new capital with European standards, coexisting with the opposition of the inhabitants to the authoritarian interventions, like the ones of King Otto time.

Under the pressure of the owners of urban and suburban land, the residential development of the capital - after the Revolution of September 3rd, 1843, when constitution was demanded - began to take place in expense to free spaces and ancient monuments. In general, the conditions of urban modernization were anything but smooth and painless for the Athenian society of the 19th century.

The Municipality of Athens failed to play an important role at the configuration of the city, mainly due to the lack of land and financial resources, combined with the tolerance of land financial over-exploitation speculation by citizens/voters and its constant conflict with the Government. Particularly, in the urban planning issues, the Municipality had only the right of express opinion, which was not binding for the Governments.

Since the mid-1870s, there had been a large increase in the number of alterations and extensions of the master plan, which were happening along with the rapid growth of the population, the beginning of the formation of the Greek capitalist system and the urbanization of Athens. The regulations of the urban space became a less strict and more flexible process than that of the previous period. The main reasons for this were, on the one hand, the increase of the invested funds in the land market and the construction of buildings and on the other hand, the expansion of the corrupted state. (Μπίρης, 2005)

At the end of the 19th century, Athens had decisively promoted its urban planning and architectural modernization. These processes enhanced the spatial distinctions, since at the eastern part of the city was the official center and the residential areas of socially high class, while at the western part were small industries and slums. At the same time, a remarkable project had been carried out for the promotion of the ancient monuments of the Greek capital. Despite the social and political instabilities and the bankruptcy of 1893, Athens became a Mediterranean capital, capable for hosting in 1896 the first Olympic Games of modern times. (Φεσσά-Εμμανουήλ, 2018)

10.2.2 20th century

From the beginning of the 20th century until 1922, the population of Athens reached almost 500,000 inhabitants, while the city went through historical changes related to the future of the country. A series of reform projects, the two victorious Balkan Wars of 1912 and 1913 and the introduction of a variety of innovations into the daily life of the Athenians, brought the city closer to its European standards. However, they did not change the cultural character of the Athenian society, in which Western modernity coexisted with the Eastern Mediterranean tradition.

The optimistic climate of the 1910s favored the systematic effort for a planned development of the capital according to the European standards, but these plans remained on papers. They were canceled mainly in 1922 due to the severe housing problem of 230,000 Greek refugees from Asia Minor and immigrants from the province and abroad (areas of the former Ottoman and former Russian Empire), since the Greek capital attracted the largest volume of internal migration and repatriated expatriates, among other Greek cities. At the same time, Athens was expanding uncontrollably and some of the problems of the industrial city started to appear such as poor housing conditions for immigrants, insufficient infrastructure, etc. (Φεσσά-Εμμανουήλ, 2018)

10.2.3 After World War II

During the 1950s, the spatial planning took into account all the disasters caused by the German Occupation (1941-1944) and the Civil War (1947-1949), which along with the destruction of the infrastructures and economic activities that had been developed in the inter-war period and the internal mass migration to Athens, led to the radical reconstruction of the Greek society, which was divided due to the Civil War, resulted in not having a common starting point with other European countries for post-war reconstruction.

In the 1950s, the Marshall Plan helped with the construction of basic infrastructures and it was combined with reconstruction of other commercial activities and a few new productive activities.

In the 1960s, the migration of populations towards Athens and abroad continued. The attempt of the political system to establish a welfare state, according to European standards, was violently interrupted in 1967 with the overthrow of democracy and the imposition of a 7-year military dictatorship.

The period of dictatorship (1967-1974) imposed a development with third-world characteristics, attracting large investments, based on authoritarian decision-making processes and the society hoping to benefit directly or indirectly. The dictatorship further aggravated the situation in the urban centers with a compulsory law that imposed a general increase of building rates by 20% in the cities. This fact, in combination with the introduction of new General Building Regulations, led to more dense urban fabric and degradation of the urban environment. Until the fall of the dictatorship in 1974, the efforts to reform the spatial planning system are few, limited and linked with strong investment interests. (Γιαννακούρου & Καυκαλάς, 2014)

The post-dictatorship political period was characterized by successive efforts to modernize and reform the Greek spatial planning system. In the direction of the inclusion of spatial planning and urban planning in the Constitution were many legislation initiatives until 1986.

The period 1990-1993, a more neo-liberal shift was attempted in urban planning policy, without, however, a significant response from market forces. The next two attempts to modernize urban and spatial planning policies were made in the late 1990s, when the current laws on sustainable housing development and spatial planning were approved. (Μονιούδη-Γαβαλά)

10.2.4 21st century

In the period 2005-2009, spatial plans of national level were prepared and approved, indicating the general directions of spatial development and organization of the Country and the specific spatial directions for certain sectors or productive branches and business activities of national interest.

A common component of all the modernization efforts made from 1975 to 2009 was the attempt of the Greek urban and spatial planning policy and legislation to adapt the housing, business and economic development standards that prevailed at that time in Western Europe, in which Greece has joined since 1981. However, the effort often clashed with the reactions of various political, economic and trade union interests, which defended the traditional institutions of the Greek model of housing and business development, which relied on the legal or illegal over-exploitation of small property and small-scale construction activity. (Φεσσά-Εμμανουήλ, 2018) (Φεσσά-Εμμανουήλ, 2018)

10.3 Comparison

So, the characteristics of the urban development in Greece, throughout the 20th century, differ radically from those in Central and Western Europe. The over-concentration of activities, found at the large urban centers of the industrialized countries in the 1900s, was not a problem found in Athens in the same period and the presence of the 'modern movement' in architecture and urban practice was not present in the Greek reality.

In Greece, there have been only a few cases of organized constructions, like in the case the refugee wave of 1922. The "typical" building processes in the Greek urban centers included the concession of the land from land-owners, in exchange to free provision of a number of flats in the new building and the uncontrolled and illegal building, which do not appear as processes in the industrialized countries.

The urban development in Greece in the 20th century had its own special features, mainly related to the limited involvement of the state at the construction of modern cities, the large participation of the private initiative and the problem of arbitrary construction. In general, the systematic intervention of the state, at the organization and regulation of the built environment was absent from the Greek construction development processes. All these parameters may give an explanation of the way Ilissos and Kifissos were treated.

In the 21st century Greece is following the European trends since as member of European Union has to be harmonize the national legislation to the European one and adapted to more environmental friendly urban planning policy.

10.4 Re-opening urban streams

Concerning this environmentally friendly urban development tendency, urban rivers and streams had been elements that this policy could applied at cases these rivers had been covered at years where their economic exploitation was more important. The idea of 'reopening' the rivers that have been covered has already been applied at several cases in western and central Europe.

For example in Berlin, despite the fact that in the last 200 years, the urban stream Panke had been extensively covered or flows underground into pipes, the restoration plans include projects for recreating the natural structure of the stream. Similar case exist in Paris, for the river Bièvre, which is already uncovered in the frame of a park, becoming visible and reachable for the residents. In 1989, in Aarhus, analogous decision was taken, to uncover the urban river of the city which was totally covered due to water pollution and traffic conditions, since they wanted to upgrade the city into a modern urban center.

In Leuven, the Flanders Environment Agency wanted to promote the importance of rivers in the urban fabric. Branches of the river Dyle were uncovered in order to create more green spaces at the banks and improve people's quality of life. (European Environment Agency, 2016) In the city of Brussels, there has been a case recreating an open stream again. This case was the Woluwe stream, which was covered since the 19th century. The developing open green spaces along the river banks was part of a larger initiative about the green spaces of the city and it was designed with special care for the stormwater and sewage water of the city, so that the operation of the wastewater treatment plant to be disturbed.

In Zürich, in the frame of the Zürich stream daylighting program, there have been attempts to uncover as many streams as possible, making them again part of the city by paying attention to the ecology and the recreational needs of the residents and enhance the aesthetics of the city. This effort came into action as part of an initiative to separate unpolluted water from the sewage channel system. (Conradin & Buchli, 2004) Similar initiatives have taken place in Oslo. Their uncovering strategy managed to bring back to light the natural streams by taking care of preserving and keeping clean the urban sewage water, in order to upgrade the streams' water quality. (European Environment Agency, 2016)

10.5 Urban development analysis at sociohydrological studies

As it was seen in the case of Athens, the urban planning of a city meets the needs of the residents and is the in-practice application of policies related to the development of the residents. As it has been seen, the plans can change and adapt to peoples' preference, like in the case of the first plans of Athens that changed since the residents didn't want the extensive public spaces in expense of their properties or when the in European cities, the development of residential blocks for the workers were built to cover the residential needs and were positioned at certain locations. The rivers' networks are part of the city's topography and therefor are also influenced by the urban planning. For example, in the case of Athens and other European cities the rivers were covered. As it has been explained in previous chapter, sociohydrology is regarded as the most suitable approach for studying the dynamics of cities and rivers. So, since the treatment of urban rivers is also influenced by the urban planning, including the evolution and the special features of the urban development plans at sociohydrological studies, might reveal a lot about the way the state and people face rivers in one region, which can be indicative at other cities as well or future urban development plans and be useful for the authorities, that are responsible to take decisions and set strategies and long-term plans for water management.

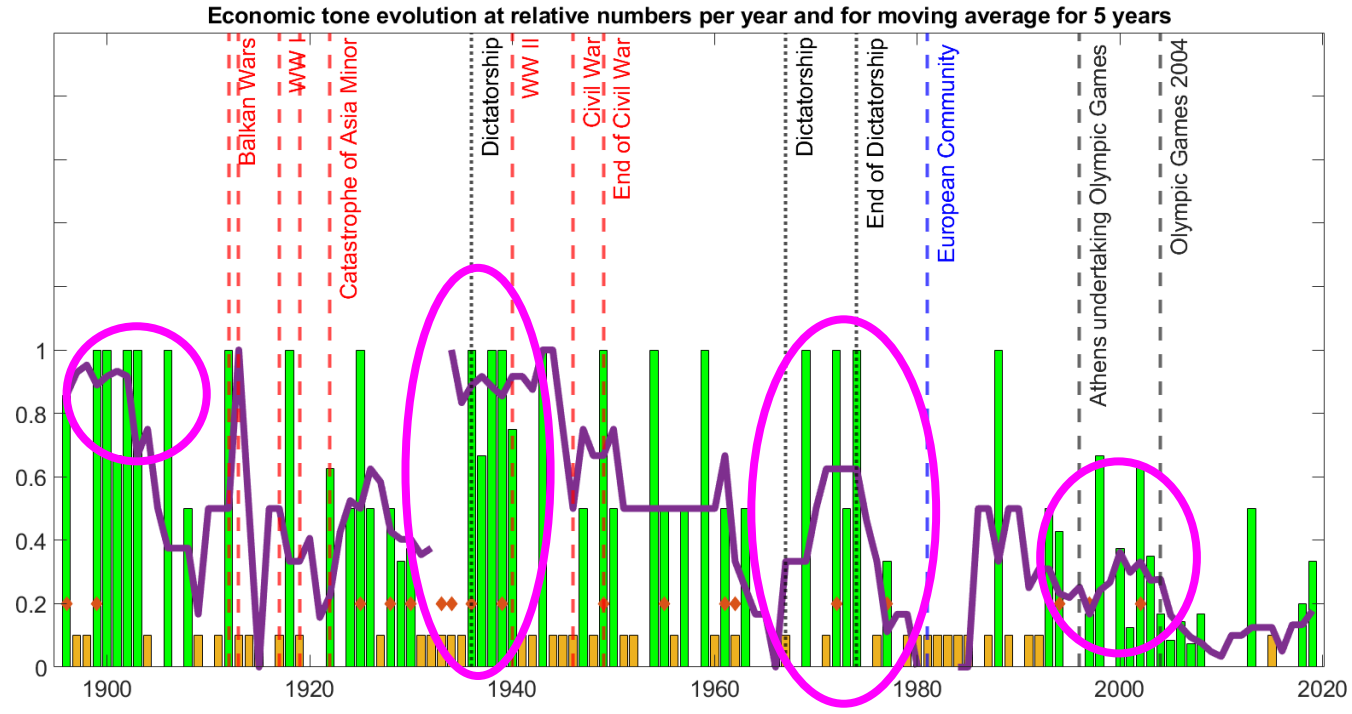
11 Historical and content analysis combination results

In this chapter, the results from the historical and content analysis are combined. In Section 11.1, the river management decisions are examined, under the light of the type of political regime that was prevailing at the time the interventions were decided and implemented. In Section 11.2, the way the community's sensitivity evolved during war period is presented, as it was derived from the newspaper articles' tone and in section 11.3, the way the nostalgic memories are related with the decisions of the water management, is examined. Finally, in section 11.4, the findings of this research about the evolution of the community's sensitivity verified as pattern, from the sociohydrological field, the pendulum swing.

11.1 River management decisions and community's sensitivity under different Political regimes

11.1.1 Totalitarian Regimes

Based on the historical and content analysis of the sources and examining the basic interventions at the rivers and the political circumstances under which they were decided and executed, there was a common pattern found between political regime and major interventions.



Graph 11.1 Economic tone evolution based on the articles tone with special attention (pink circles) at time periods when people's free will could not be completely expressed. Green bars: relative numbers representing the economic tone of the articles compared to total number of articles of that year – Orange bars: years with no data for the rivers – Red dots: flood events – Blue line: moving average

The changes of the political system, towards totalitarian or more inelastic regimes, with less free expression of peoples' will, were accompanied by an increase of community's sensitivity towards the economic exploitation of the rivers, as it was depicted at the daily press of that time and the planning or execution of major interventions at rivers.

For example, the sand abstraction from Ilissos, was decided under unstable political regime. In the 19th century and at the first years of the 20thcentury, after Athens was liberated and during other national liberating wars, abstracting the sand for the rivers was a method to ensure the supply of sand for the construction of streets of the city. The decision about sand abstraction was responsibility of the municipality, under the supervision of a mayor, who was selected by the king, among three candidates that citizens' representatives were proposing. So, the decision was taken from a mayor, who was not directly selected from the people in order to express their preferences. This method, in the end, degraded river's environment and resulted to the accumulation of standing water at the rivers' banks and contributed to the spread of malaria in the city.

Another significant management decision for Ilissos was taken in 1905 and was about the diversion of the river from its original and natural riverbed as tributary of Kifissos, create a separate estuary and decrease the flow discharge of Kifissos, due to the desire to eliminate the inundation phenomena in downstream areas of Kifissos, especially after the devastating flood events in 1896. This decision was taken during a period of difficult sociopolitical conditions, with the state facing continuous wars to liberate more territories and the residents trying to acquire political rights and demanding for democracy at the newly established state, which was also facing a poor financial condition, as in 1883, the Greek state was bankrupted. The state was trying to find solutions for the floods even since 1890, but the final decision for diverting Ilissos was taken after almost 15 years. Until 1905, Ilissos was a tributary of Kifissos and it was only Kifissos that was having estuary at the sea.

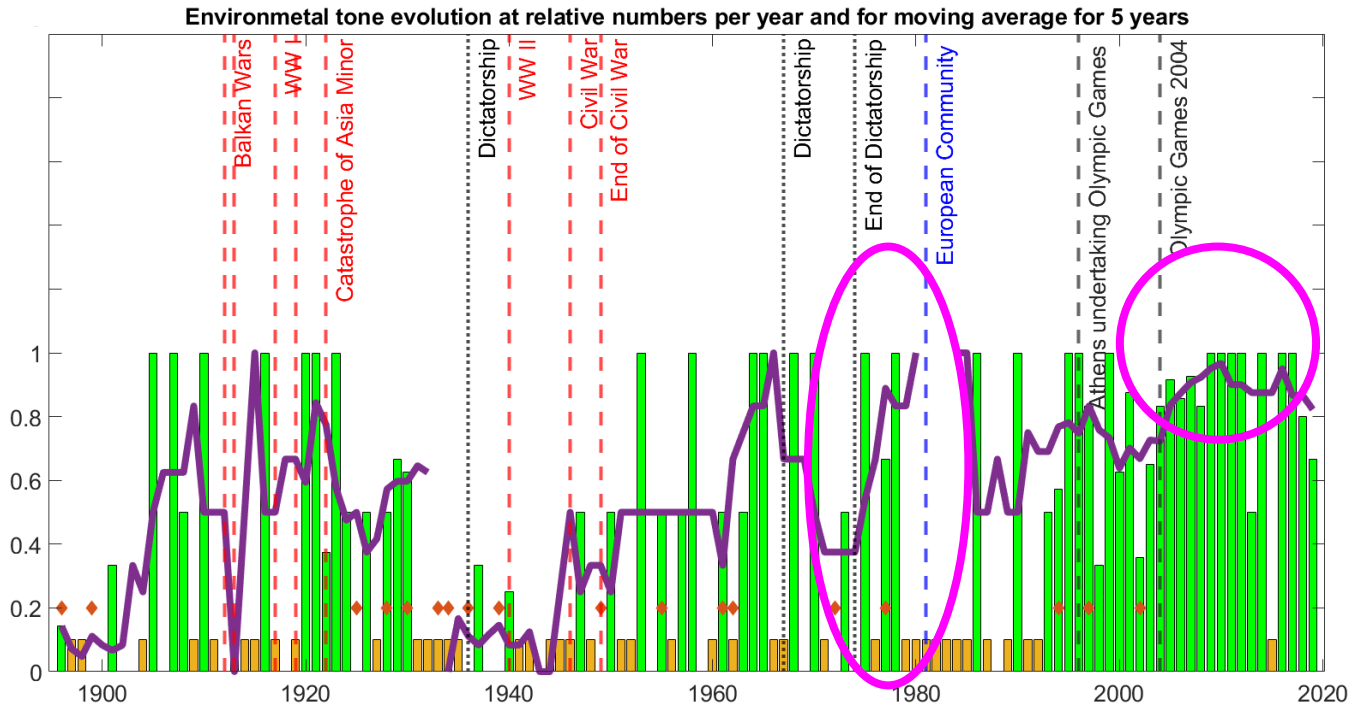
In general, in later years, during the dictatorship of Metaxas (1936-1940), World War II (1940-1945) and Civil war (1946-1949), the democratic rights of people, for judging the government's decisions, could not be expressed and subsequently influence the decision-making processes and the only objections were expressed, mainly, from a few people from the academic community.

In more detail, the decision of covering Ilissos, was taken and implemented in the period of 1930s to 1960s. These projects were decided under the dictatorship of Ioannis Metaxas in the 1930s, while the citizens' free will could not be expressed and represented at the decision-making processes. The World War II stopped temporarily the projects and after the Civil War, the political instabilities did not stop or alter the projects. It was reported, at the press, that the authorities found the solution of covering the streams as the only appropriate one to face the malaria incidents reported in the city and also, that this solution was the only one that could satisfy the needs for free space for street construction, without paying expensive expropriations and facilitate the construction of a sewage system for the city. In the articles, there were no other solutions, reported to be discussed to solve the problems, without altering the natural regime of the river.

Regarding Kifissos, in the period of 1930s-1950s the partial channelization of the river and the coverage of many streams of the city were decided and implemented and the idea of constructing a big highway along Kifissos was also first introduced during the dictatorship of Metaxas in the 1930s. Moreover, the areas around Kifissos were decided to be dedicated for the construction of industrial zone, contributing to the development of the city. Also, during the military junta of 1967-1974, the construction of highway over Kifissos was decided and the exploitation of the Kifissos 's delta area at Faliro Bay, at Saronikos Gulf, was also in the plans of junta. An element that should be kept in mind is that also during these years of military junta, the freedoms of citizens were suspended and their preferences or any kind of objections were not allowed to be expressed, otherwise strict penalties such as imprisonment would be imposed.

11.1.2 Democratic regime

The sudden increase of the environmental tone, when the democratic regime was restored after the military junta, in 1974, can be an indication of the real community's sensitivity towards rivers, when the express of opinion was not censored. These sudden changes at the tone are more obvious not only after the restoration of Democracy in 1974, but also after the Olympic Games in Athens. However, even during democracy, the protection of the rivers could not be fully secured.



Graph 11.2 Environmental tone evolution based on the articles tone , with special attention at time periods when people's free will could be expressed. Green bars: relative numbers representing the environmental tone of the articles compared to total number of articles of that year – Orange bars: years with no data for the rivers – Red dots: flood events – Blue line: moving average

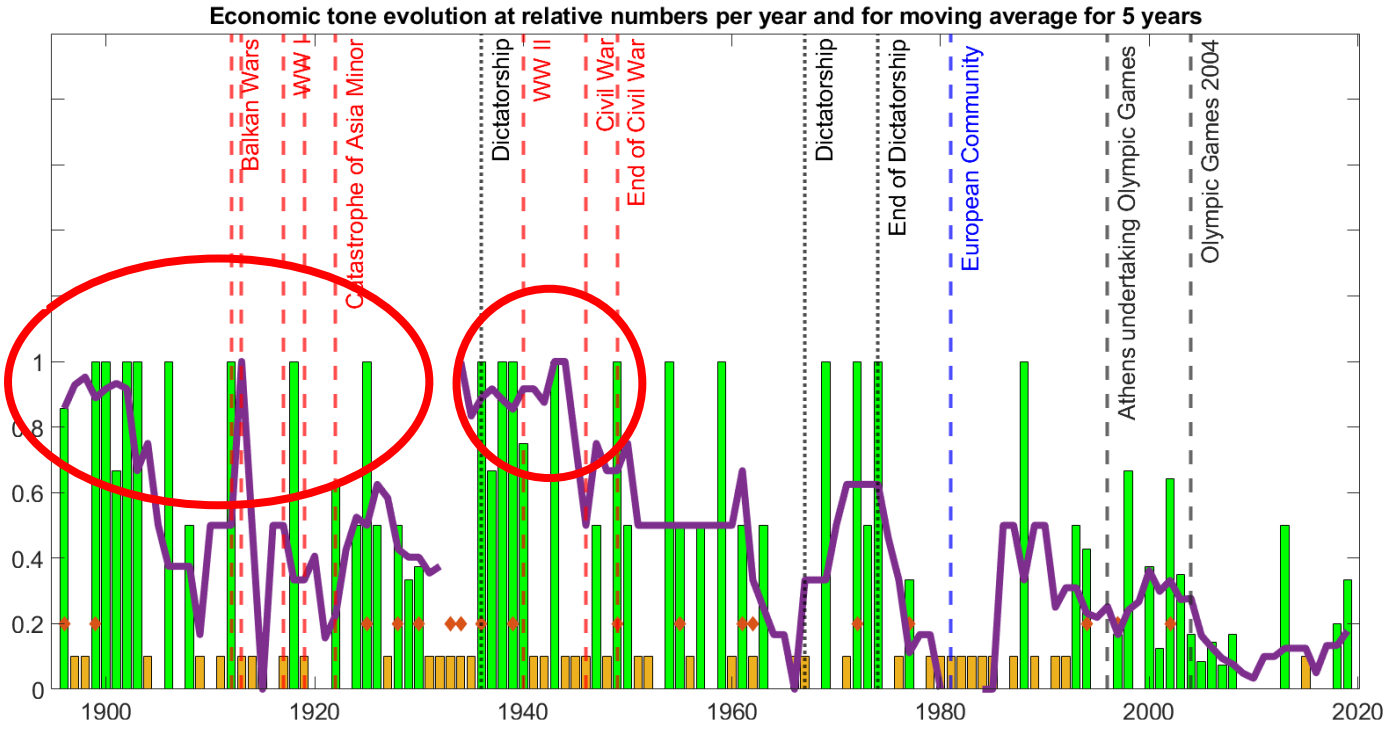
Major institutional interventions for protection of the rivers were made after the democracy was restored and after Greece became member of the European Union in 1981. More specifically, the first legislation intervention was in 1986 and it was generally referring to the protection of rivers and a law in 1994, was determining the protection zones at the banks of Kifissos. Despite these institutional interventions, the real implementation of the law was not feasible, since construction and industrial activities, along the banks of Kifissos, continued for years, despite being officially illegal.

In 2000, the European Water Framework Directive was introduced, but became part of the national legislation not earlier than 2003. Meanwhile, Greece was selected to host and organize the Olympic Games of 2004 and therefore great infrastructure projects took place. However, the project of covering Kifissos and constructing part of the National highway above it, was included in a special legal regime, where objections could not be made due to the emergence need of constructing projects for the Olympic Games. Also, already existing environmental legislation was overlooked or it was adjusted to the needs of the projects. Moreover, what is significant in the case of Kifissos is that the government, which was democratically selected, was the one that tried to underestimate the ecological importance of the river, by declaring to the European institutions that Kifissos could be considered a sewer pipe. However, a major aspect, that differs in this case, is the fact that citizens could express their oppositions by their representatives and refer to the European institutions about the intentions of the government to characterize Kifissos as sewage. Even if it was late to stop the project of coverage, the tool that the Directive was giving to people made the state reconsider its position towards the river and adapt a more environmentally friendly approach after the Games and officially consider Kifissos as river and not as sewer pipe.

So, as it can be seen, even at a well-established democratic regime, the protection of the rivers cannot be fully secured through laws, unless a legal safety net exists for blocking decisions against the good ecological condition of the rivers. However, the introduction of the Water Framework Directive and its full harmonization and establishment in the Greek law system, made it a useful weapon for the protection of the rivers, like in the case of diversion of Acheloos river, where a long litigation effort takes place in order groups of citizens to block the execution of the project.

11.2 Community's sensitivity from newspaper articles' tone evolution during war periods

In general, the community's sensitivity, during war periods, was more towards the economic aspects of the rivers. Indication of this tendency can be considered the fact that, during war periods, the majority of the articles, related to Ilissos and Kifissos, were towards the economic development of the rivers. The majority of rivers' infrastructure projects were decided and partially executed before the wars and during war periods were left incomplete, which caused concerns to the residents, who wanted to secure the productive activities in the city.



Graph 11.3 Economic tone evolution based on the articles tone with special attention at time periods with wars with red circles. Green bars: relative numbers representing the economic tone of the articles compared to total number of articles of that year – Orange bars: years with no data for the rivers – Red dots: flood events – Blue line: moving average

During the liberation wars in the 19th century, Athens, as the capital of the newly established country, was expanding continuously and the main concern of the people, as it was depicted by the content analysis of articles of that period, was towards the economic development in relation with the rivers. The protection of the city against floods and the use of sand for the construction of the streets, were important issues related to rivers management, apart from the use of the rivers for irrigation purposes or as sewer pipes to discharge wastewater.

During the Balkan Wars, the World War I and Catastrophe of Asia Minor, when there were articles at the daily press about the rivers, they were mostly related to the concerns of people about the effect of the rivers to their properties at cases of possible flood events and the space management at the rivers' banks, that was influencing the expansion of the city and flood defense strategy.

In the period of World War II and the Civil War, the tendency of community's sensitivity was also towards the economic development, since residents concerned for the economic development of their areas, around the rivers and the mentions about these issues were more than those for environmental sustainability of the rivers. People were expressing their concerns about the configuration of the areas around the rivers and the development of these areas. After the World War II and during the Civil War this trend was continued, but the concern for sanitation of the rivers started to become vivid as well.

11.3 Memories of rivers and rivers' management decisions

Concerning the relation between memory and rivers' management decision, it was found at the daily press, that the memories of past good aspects of the rivers were an important part in the memory section. The amount of positive nostalgic memories dedicated to Ilissos was recorded to be much greater than the respectively amount dedicated to Kifissos.

It was observed that the memory mentions about of the historical value of rivers, related to certain locations along them, was remaining vivid during all these years. The overwhelming majority of mentions of the historical value of Ilissos was about descriptions of the areas around Ilissos, related to the ancient years and connected to the description of the walks that the ancient philosopher Socrates used to make next to Ilissos. Also, the good memories included references of past good environmental condition. In many cases these references were about periods that the writers had not witnessed themselves. Many of these references were also from the ancient period, based on historical testimonies, but there were also references from periods that the writers experienced themselves and they were mainly describing the good environmental condition close to the springs.

The nostalgic way for referring to past aspects of the river, connected with positive features, was a strong motivation to press for taking extra measures for the protection of the environment, criticize the actions of the authorities towards the rivers and reconsider the features of the rivers and their rehabilitation. This was observed at cases, when there were objections for covering Ilissos from the academic part of the society in the 1930s, but also at the case of proposals for uncovering Ilissos, especially at locations that historically were important and create linear urban park in the years after the Olympic Games.

Flood memories and bad environmental conditions were used usually as mean to compare the progress of projects and criticize the government's ability to make the projects in a reasonable period. Current flood events were closely connected to the variations of the community sensitivity.

11.4 Pendulum swing

From the analysis of the evolution of the community's sensitivity, indicative of peoples' preferences, there was a significant twist observed at articles' tone, from purely economic development interest to more environmental sustainable attitude towards the rivers during the study period, from 1896, when newspaper data started being available and until 2019.

Until the beginning of the 21st century, the articles were oriented towards the economic development of the areas around the rivers. This development was connected to the rivers, either by using them as sewer pipes for household wastewater and industrial effluent or abstracting rivers' bed sand for constructing Athens's streets or using the rivers' banks as free space, for building houses or industries or covering the rivers and making streets over them. Even when legislation did set some boundaries for river protection, the owners of the industries, located at the riparian zone of Kifissos, had declared their unwillingness to move away from the rivers, for at least a certain period of time, showing a clear attitude towards the economic exploitation of the rivers, even against prevailing community's attitude for protecting Kifissos. Moreover, the floods, related to Ilissos and Kifissos, made the rivers be considered, occasionally, as threat for the safety of the city. The fear of damaging the infrastructures and people loosing their properties, turned peoples' interest towards the protection of the economic development of their area.

Important tipping point, for the orientation of the articles towards the environmental protection and sustainability of the rivers was the accession of Greece in the European Community in 1981. This tendency of articles became more obvious after 2003, when the European Water Framework Directive 2000/60 became part of the Greek legislation and after the Olympic Games in 2004, when the urgent need for constructing infrastructures for the Olympic Games was no longer an issue. This environmental protection tendency was related to peoples' concerns for the environmental condition of the rivers, the quality of their water, the condition of the banks, how well the environmental legislation was followed and by making public plan suggestions for rehabilitation and reopening the rivers at certain locations and the condition of the springs or the estuaries, coming to spotlight as part of the delta rehabilitation project.

The way the community's sensitivity evolved can verify a pattern observed in other sociohydrological systems, such as the Murrumbidgee River Basin, where since humans values changed towards the natural surroundings and people wanted to adapt a more environmentally friendly attitude towards the water system and a swing at the community's preferences was observed. (Van Emmerik, et al., 2014) (Roobavannan, Kandasamy, Pande, Vigneswaran, & Sivapalan, 2017)(Kandasamy, Sounthararajah, Sivabalan, Chanan, Vigneswaran, & Sivapalan, 2014) Similarly, at the Dommel Basin, a pendulum swing was observed from development and controlling water resources to protecting and restoring them after almost 100 years. (Mostert, 2018) and the other cases in Australia, China and USA.

However, it shouldn't be neglected, that in general, the interventions to the rivers were related to increased urban space needs and flood protection of private properties and public infrastructures, inevitably related to the safety needs of people and state. The driver of the main changes, until the beginning of the 21st century, were the increased urban space needs for streets, residential areas, industrial zones, flood protection and sanitation. The way these needs were interpretated from the state, which was responsible for the projects, was related to the policy and politics of each period, the current technology and the available budgets, which is not taken into consideration in this study.

Abrupt incidents, like wars and sudden political regime changes, had caused short-term changes in the evolution of the community's sensitivity. These sudden shocks at community's sensitivity were restored after peace or more liberal condition were again the prevailing regime at people's life and in the long-term the pendulum had a more smooth transitional swing from one condition to the other, that also lasted longer, without wavering from one position to the other, with the change of community towards environmental protection being slow, but clear.

Also, the fact that there have been many years, that there haven't been mentions regarding the rivers in the newspaper articles, it shouldn't be regarded as periods were river related projects or activities around them had stopped. Life next to the rivers had a continuity, but it was a matter of the press of that period either to mention subjects related to the rivers or not and if there was a significant incident related to flood or unprecedented pollution event, the press would have mentioned it.

12 Conclusions

The aim of this research was to detect and explain the main human interventions that affected the evolution of Ilissos and Kifissos basins, which are the largest basins in Athens. For the purposes of this research the human aspect was studied under the light of sociohydrological analysis, by taking into account the social and political history of the country and the urban planning evolution of the city with respect to river management. The time frame of this research was defined from 1834 to 2019, covering the modern history of the city and the country.

Sociohydrology is a discipline that enables the researcher to study the interconnection of cities and rivers, since it regards people as an inherent part and not as an outer part or boundary condition of the system under study and therefore is regarded as the most suitable approach for these issues. Understanding the dynamics between rivers and cities is useful for decisions making processes for water management long-term plans. Regarding the hydrological part, there has been a lot of progress studying it in the water management field. However, peoples' behavior, under various socio-political circumstances and the effect it has on the evolution of a basin, requires further investigation.

For the purposes of this study, it was decided to investigate the influence of human factor at the evolution of the basins, by thoroughly examining the two case studies of basins in qualitative way, in order to acquire in depth understanding of the way they evolved, by paying attention at details and exploring correlations among events and conditions. Therefore, for the needs if this research, a historical analysis and a content analysis were conducted.

The historical analysis allowed the exploration of the evolution patterns of Ilissos and Kifissos basins and the determination of correlations among city's development characteristics and rivers' management actions and decisions, over the study period. The historical analysis method was based on the systematic record of information related to the social and political evolution of the city and the country, the urban characteristics of the city and the main interventions to the rivers, throughout the time frame defined for this research. The technical data were searched at technical monographs and reports, mainly focused on projects and technical modifications and interventions, applied to the rivers course, banks and bed and altered their natural flow. Concerning the social data, the political regime evolution, in terms of whether it was democratic or not and the urban development data, were searched mainly at historical books and sites related to the modern history of Greece and Athens.

The content analysis focused on the record of the evolution of community's sensitivity and memory in relation to the evolution of Ilissos and Kifissos basins. The content analysis method was based on systematically analyzing the presence of the words of Ilissos and Kifissos in newspapers and Athens municipal acts during the study period. A database with research items regarding Ilissos and Kifissos as water bodies was created from this research, excluding research items irrelevant to Ilissos and Kifissos as water bodies. The community's sensitivity evolution was tracked by the evolution of the articles' and acts' tone, either towards environmental sustainability or towards the economic exploitation of the rivers and the memory was tracked by the references for the rivers for periods prior to the articles' and acts' publishing date. During the coding procedure, the articles and municipal acts were analyzed at thematic categories through a coding system, which were easy to handle and that allowed the exploration of the relations between them and revealed the changes at the evolution the human aspects under study.

12.1 Outcomes

The main research question of this research was about

How did the human factor influence the evolution of Athens basin in the last 200 years, from a sociohydrological point of view?

This question was analyzed through the sub-questions that revealed not only the basic technical interventions at the basin, but also the way people interacted with the rivers in terms of development, under the frame of sociohydrology.

The research questions were used, in order to investigate the parameters that affected the regime at the basins are the following:

1. *Which human interventions have changed, significantly, the hydrological regime of Ilissos's and Kifissos's, since Athens became the capital city of Greece until nowadays?*

Ilissos and Kifissos, the main rivers of Athens, have undergone significant changes, from 1834 to 2019. In general, during this study period, both basins were influenced by the development of the urban fabric and the increase of the impermeable surfaces, due to the intense urbanization and the development of economic activities at the riparian zone of the rivers. In particular:

The main interventions at Ilissos river started in 1834, the year that Athens became the capital city of the newly established country of Greece. A major intervention applied at Ilissos, since the first years Athens became the capital city, was the sand extraction projects, taking place at the river's banks, permitted by the municipality authorities of that time, in order the sand to be used for the construction of the city's streets. Moreover, in 1905, it was decided to divert Ilissos from its natural riverbed and create a separate estuary for this river, regarded as the most appropriate solution for the flood protection of the areas close to Kifissos estuary. Until that time, Ilissos was a tributary of Kifissos and in order to decrease flood discharge of Kifissos and avoid inundation phenomena, the authorities decided to create two different rivers, so that the amount of water to be distributed between the two riverbeds. Also, due to malaria incidents during the first years of the 20th century in Athens, it was decided in the 1930s to cover, almost completely, Ilissos and allow its flow underground, into concrete pipes, satisfying also the increased needs for flood protection and for free spaces for the construction of streets and residential buildings.

Kifissos management projects started in 1900, after severe flood events in 1896. Main interventions started to be reported in the mid1930s and until the 1950s and they included the construction of part of the sewage system of the city along Kifissos and the partial channelization of the river within the urban fabric of Athens. Also, flood control projects were another important type of interventions implemented to the river throughout the years. Moreover, the installation of the first steam power plant in Greece, operating from 1869 until 1982, for the production of electricity, using the water of Kifissos, gave a more economic exploitation orientation of the usage of Kifissos. Towards that direction contributed as well the fact that in 1940, the industrial zone of Athens was selected to be installed along Kifissos, but without the necessary treatment facilities for the effluents, which were directly discharged to Kifissos. Additional to these projects, the idea of constructing a highway over the river, decided in the mid of 1970s, was finally implemented with the construction of part of the national highway over the river before the Olympic Games of 2004. All these interventions deteriorated Kifissos ecological condition. The first attempts to protect the river were the legislative initiatives for creating protection zones around Kifissos in the 1980s and 1990s, which were enhanced by the harmonization of Greece, in 2003, with the European Water Framework Directive 2000/60, for the protection water bodies.

2. *Which, sociohydrologically examined, human factor influenced the evolution of the basins?*

Ilissos and Kifissos basins are located in the city of Athens and from the beginning of the study period, they were regarded as part of the city's environment, inevitably, connected inextricably with the humans of this city. The way people interacted with the rivers was examined through the sociohydrological analysis, since this field considers humans and rivers as two systems that continuously interact. According to the sociohydrological studies at other river basins, human factors that were find in common and had influential role at the evolution of the basins, were the political regime and society's characteristics, the memory of people and the community's sensitivity, regarded as core for the feedback between the society and the environment and more specifically the rivers. So, the humans not only influence, but are also influenced by the hydrological regime of the rivers.

Memory, an intrinsic factor of human behavior and indicates the way people used to interact with water bodies in the past. The memory affects the relation of people with water bodies in present time, as this human characteristic is linked to risk awareness, and is connected to adaptation response to floods, environmental problems or enjoyable aspects of the rivers.

The prevailing national political regime at the basin represents the degree to which the government responds to the community's wishes. In societies with democratic regime and regular elections, it is expected that people's preference is taken into consideration at government's decision, whereas at totalitarian regimes, this response is lower or even nonexistent, due to corruption and different government's interests compared to the citizens. At basin level, the river infrastructures emerge from the needs and interests of the different local social groups and the engineered solutions within the urban context can trigger conflicts on political and ideological basis, since infrastructures can be considered as a mean of political pressure.

Community's sensitivity is related to the degree of threat, people assume, that their quality of life is under, at cases where the prevailing norms are distributed. The society is more alert when the changes are directed to factors prone to deteriorate their quality of life and is less sensitive to changes of particular factors, when the quality of life is not considered to be under threat. At basin level, the changes of the hydrological variables can impact economy, society and environment and therefore people are concerned about them. So, the more sensitive a society is, the more likely is to take environmentally friendly measures. On the other hand, if the sensitivity level of the society is low, then it is more unlike to make any action.

3a. Which elements of river's presence in the city remained vivid in the memory of the public opinion and how did they influence the trajectory of the rivers?

The elements of the rivers that remained more vivid in the memory of citizens, as they were depicted through the articles, are connected to the presence of the rivers as landmarks and as natural elements of the city's environment and they differ significantly between the two rivers. The memories were distributed between positive and negative ones. The memory mentions were regarded as positive when they were related to the historical value of the rivers or when mentions about past good environmental conditions of the rives were included in the text. As negative memory mentions were regarded those about past flood events and their consequences, such as property damages and losses and casualties and mentions about past bad environmental conditions that rivers used to have and people still remembered them.

In particular, for Ilissos, the historical memories and the memories of the good environmental condition of the river were more often mentioned in the newspaper articles, in relation to the other kinds of memories determined in this research. In total, there were 146 memory mentions related to Ilissos river. The positive memories were about 60% of the total memories about Ilissos and were supported by testimonies about the importance of the banks of Ilissos, as holy and cultural location for the ancient Greeks and about the good environmental condition that Ilissos used to have at that time. Moreover, there were also testimonies from the 19th and 20th century that praised the picturesque environment of the river, mainly at the upstream parts. On the other hand, the proportion of memories, related to sanitation and flood problems and memory mentions of degraded environmental conditions at Ilissos banks, was covering about 40% from the total memory mentions related to Ilissos.

For Kifissos river, there were in total 211 memory mentions in the newspaper articles. The negative memories about Kifissos were almost the ¾ of the total memories for this river and were about past bad environmental conditions of river's banks or water, incidents of continuous pollution from industries located along the river and past devastating flood events, that affected residents' life. On the other hand, the historical memories of this river and references about past good environmental conditions covered about the ¼ of the Kifissos's memory mentions. The historical testimonies, about the importance of Kifissos, were not that well-known or were not reported from significant writers, like in the case of Ilissos. Regarding the testimonies of good environmental conditions, these were usually referring to the springs of the river and not at the part of the river within the urban fabric.

The kind of memories that people had about the rivers was used to either criticize or express peoples' disapproval for the type or the progress of certain type of projects or were used to express peoples' approval for projects that would bring back the positive aspects of rivers. In the case of Ilissos river, the historical memories of Ilissos and the memories of the picturesque environment, related to the ancient years of the city and the significance of this river for the ancient Athenians, was used as basic argument at proposals for uncovering parts Ilissos river in the 2010s. In the case of Kifissos, the bad memories of devastating flood events and bad

environmental conditions, made the residents, living near the river, demand for flood protection measures at periods that heavy rainfalls were more prompt to happen again. That was the case when sudden summer heavy rainfalls caused flood events and then in autumn, period where the rainfalls start again, people, afraid for new floods, were asking for extra protection by cleaning the banks from garbage that could block the flow of the water in the river bed and cause floods.

3b. What was the effect of the country's political regime of at the decisions concerning the management of Ilissos and Kifissos?

The national political regime is indicative of the degree to which a government responds to the community's wishes, in the sense that at democratic regimes, peoples' preferences are taken into consideration at government's decisions and on the other hand, at the totalitarian regimes, the authorities can ignore community's preferences at the decision-making processes over the management of resources.

The political regime, under which many important decisions for the future of Ilissos and Kifissos were taken, usually did not allow the express of the free will of the residents of Athens. Important intervention applied at Ilissos in the 19th century was the sand abstraction projects for the construction of streets in the city, decided and applied by municipal authorities which were not democratically voted. During the 20th century, due to political instabilities, there were some totalitarian regimes found in the political history of Greece, with most of them lasting a few days. However, two periods with totalitarian regimes were the most long-lasting ones and were the most influential for the trajectory of the two rivers. These were the dictatorship of Ioannis Metaxas in the 1930s and the military junta in 1967-1974. In the period of dictatorship of I. Metaxas, established before the World war II, in the 1936 and lasting until the participation of Grece in the World War II, in 1940, the covering of Ilissos was decided, in parallel with the creation of streets and avenues over it. Similarly, during the period of military junta in the 1964-1974, the idea of building part of the national highway over Kifissos was introduced and also the idea about building and establishing cultural and economic activities at embankments at the estuaries of the rivers, was also applied. However, even during democracy, there were periods where the urgency of certain type of projects, made the state bypass the typical legal procedures, in the expense of the environmental sustainability of the rivers. That was the case during the preparation period of the Olympic Games of 2004, which took place in Athens and part of the National highway over Kifissos was constructed.

After Greece was accessed in the European Union and having a stable democracy, an important tipping point for the water resources management, was the harmonization of the national legislation with the European Water Framework 2000/60 in 2003, which played, since then, important role in the rivers' management of the country. After the Framework became part of the national law system, citizens' intervention at projects plans became a recognized right and there have been cases that people raised their objection on major interventions at rivers and succeeded their alteration, like in the case of Kifissos, which was considered by the state as sewer, but due to citizens intervention at European authorities, the state was obliged to consider Kifissos as river.

The characteristic that was found in common at the case of Ilissos and Kifissos with other basins, where rivers' management was twisted towards the environmental restoration and sustainability, was the fact that in the majority of the cases, a qualitative description of the evolution of the basins revealed that the driving force, for actions towards environmental restoration, was peoples' preferences. However, the successful implementation of projects towards environmental sustainability was influenced by the kind of political regime and the degree the preference of the people was taken into consideration.

It was found that in countries, where the decisions for the water resources management were taken with democratic procedures, the projects about the restoration and protection of the environment and the rivers, were more likely to be successfully applied. The case of the Murray-Darling Basin in Australia, where Murrumbidgee River basin is a sub-system and the case of Kissimee River Basin in Florida, USA, are two examples where, according to the data provided at the papers describing the twist of the management, the community's preferences, for environmental protection or restoration of the natural flows of the river orientation, where taken into account for the trajectory of the basin. These environmentally sustainable decisions where taken after grassroots movements and public debates, that influenced the decision makers and the legislators and drove the governments to change the policies and take

actions. Similar, is the case of Dommel Basin in the Netherlands, where the participation at the water boards in order to decide about the river, apart from landowners, was enriched also with other stakeholders, like the citizens and the industry.

A case of 'pendulum swing' at a river basin under non-democratic conditions, is the case of Tarim basin in China. Even though in the papers, dedicated to this 'pendulum swing' there are references mentioning that people became more environmentally concerned and therefore projects started to be applied towards that direction, these projects were characterized just as emergency measures to reverse somehow the degradation of the basin, but they were not measures with sustainable orientation. It was very little attention given to the information mentioning that after the authorities took into consideration the degradation of the water and environmental condition of the basin, the water that was saved, by various projects, for environmental restoration, ended up to irrigated farmlands and not for restoration as it was supposed to and people remained wishing to more environmental sustainable policies to be applied in the future.

3c. How did the environmental awareness and community's sensitivity evolve among the residents of Athens in the last 200 years, related to the management of Ilissos and Kifissos river?

The evolution of community's sensitivity was represented by the evolution of the tone of the newspapers' articles and Athens municipal acts, either towards the environmental sustainability of the rivers or towards the economic development of the areas next to the rivers. The tendency towards environmental sustainability indicated the willingness of people to express and promote their concerns about the environmental condition of the rivers, by either maintaining parts of the rivers at good ecological condition or rehabilitating them in cases the natural flow and the good ecological condition were disturbed. On the other hand, a tendency towards the economic development indicated the willingness of people to protect their properties from the floods and disregard the ecological value of rivers in order to promote their needs for space and water usage.

In the newspapers' articles, it became clear that at the beginning of the study period the tendency of the articles was towards the economic development of the areas next to Ilissos and Kifissos and little attention was given to the ecological sustainability of the rivers. The main concerns were about flood protection of the city and covering the rivers for creating streets above them. However, this trend declined towards the end of the 20th century and was almost switched towards the environmental sustainability in the 21st century. This tendency became obvious by the attention that was given to environmental problems, water quality issues and rivers' banks disturbances, which were more often mentioned at the press. Also, ideas about rehabilitating parts of Ilissos by uncovering it at certain locations and presenting plans for configuring the estuaries with focus on the ecology of the area, where also reported in the articles. The municipal acts, since they were time limitations due to data losses and since the basin has undergone significant administrative changes, revealed only economic orientation attitude towards the rivers on behalf of the municipality in the first 100 years and a few rivers' mentions with environmental orientation, with only some acts announcing initiatives for monitoring general environmental indicators in the last 30 years.

4.How did the planning system of Athens, with respect to rivers' management, evolve?

At the evolution of the urban planning of Athens, rivers were an important element that was influencing the urban fabric extension. At the plans of the city, even since the first years after Athens became the capital city of Greece, the areas dedicated to the open spaces were decreased, compared to the initial idea, under the pressure of residents for more private spaces and that also influenced the available free spaces at the riparian zones of the rivers.

As years went by, due to refugees and immigration arrivals in the 20th century and due to the urgent residential needs of these people, they inhabit at the rivers' banks, as the only free spaces that they could find and created new neighborhoods, increasing in that way the

impermeable areas next to the rivers. Moreover, industries were allowed to be installed at the rivers' banks, with governmental decisions, however, polluting them and using them as wastewater discharge system.

Also, as city was expanding, the space needs for streets and better urban drainage, made the authorities cover the streams and use them as sewer system and on top of them construct streets and avenues. In the 1960s, the migration of populations towards Athens and abroad continued. The attempt of the political system to establish a welfare state, according to European standards, was violently interrupted in 1967 with the overthrow of democracy and the imposition of a 7-year military dictatorship. At the period of dictatorship (1967-1974), the urban fabric became more dense due to legislation initiatives of the dictatorships, that degraded the urban environment. The post-dictatorship political period was characterized by successive efforts to modernize and reform the Greek spatial planning system. In the direction of the inclusion of spatial planning and urban planning in the Constitution were many legislation initiatives.

Nowadays, there is tendency to protect rivers and there have been proposals reported to uncover Ilissos, at least close to historically important locations and rehabilitate the estuaries areas. Greece adapted some of the urban planning systems developed in western European countries concerning the environmental protection, with delay and with some differences at the way and the extent to which these trends were applied finally in Athens compared to other countries, due to the special socio-political characteristics of the country.

5.Which sociohydrological theory or pattern can be verified or falsified according to the evolution of Ilissos and Kifissos basins?

What can be concluded, from the way the residents of Athens expanded the city and treated the rivers, is that they did not leave the city and the riparian zones of the rivers, despite the devastating flood events which they had to face from time-to-time. They expanded the city of Athens and made a series of flood control projects in order to secure their properties, by covering parts or whole the rivers and giving another aspect of the 'levee effect'. The city continues to maintain this type of projects, constructed over the rivers and the residents have not yet selected the 'adapt' option of applying 'building with nature' solutions regarding the city's rivers, which is a new design philosophy that has started being applied in other cities in Europe.

The scheme of human behavior that can be verified at the sociohydrological system of Ilissos and Kifissos is the 'pendulum swing', according to the change observed at community's sensitivity, from economic development to environmental sustainability orientation within the 200 years of the study period, like in other sociohydrological studies in basins in Australia, China, USA and the Netherlands, where the 'pendulum swing' was also observed. The 'pendulum swing' of community's sensitivity was revealed by the qualitative investigation of the tone of newspapers articles, following the evolution of the two basins and that was a kind of information that only by thoroughly analysis could be explored, since mainly the in-depth analysis could reveal the detailed variations of the community's sensitivity in relation to policy, social and political changes, that influenced peoples' attitude towards rivers. People started being more concerned about issues related to the environmental condition of the rivers and topics like environmental legislation, penalties for pollution incidents, initiatives for clearing rivers' banks, proposals for uncovering historically important parts of the rivers and applying redevelopment plans at the estuaries reveal the twist form the strict economic exploitation of the rivers.

12.2 Limitations

Certain research choices could be regarded as limiting factors for the quality and quantity of the data collected for this study.

For example, the choice of the newspaper might be a limiting factor, in terms of orientation and number of available articles that can be included in the final database. By taking into account other studies, which used newspaper articles as source of data for the orientation of people towards water resources, the number of newspapers, covering the same historical time period, was more than one and they represented widely the left and right parts of society.

In this research, the newspapers, as source of information for the evolution of the community's sensitivity, were selected based on the time frame and the continuity they were published in order to avoid time gabs and also in order to increase the homogeny of the research outcomes in terms of the political frame represented. Due to the extent of the study period, the time frame had to be covered by three newspapers, published consecutively and it was intended to be close at their political positions, selected to be in the middle of the political spectrum. For example, the choice of newspapers belonging more to the far-left party could influence the articles related to the rivers, which could be more critical towards the governmental actions, since the political parts from this spectrum were in general at the opposition. By selecting in this study one newspaper at each period, this could limit the number of articles that might be available for a certain topic. Moreover, the fact that there were periods that the press was censored, was also taken into account at the analysis of the articles.

Another parameter that could influence the data used, was that fact during this study period, the administrative changes at the basins were significant and the local societies were organized into new neighborhoods, consisting smaller new towns with their own administrative municipalities. So, the opinions of local societies on river projects could also be found at local newspapers and local municipal acts, apart the ones of Athens municipality. These newspapers and acts could represent populations with different proximity to the rivers and at upstream and downstream areas of the rivers, facing different problems in relation with the rivers and therefore having probably different opinions about them. So. the usage of nationwide newspaper might misrepresent the opinion of smaller groups of societies.

Another limiting factor is the fact that for very specific issues of past events, it is not possible to take peoples' opinion and record their attitude in a way to match exactly the research requirements, since conducting surveys and questionnaires for issues dozens of years ago is not possible. So, it was necessary to compromise with the information available and adapt to that.

12.3 Recommendations for further research

There are aspects of this research that would worth to investigate more, in order to further understand the contribution of the human factor in the evolution of the hydrological systems.

For the case of Ilissos and Kifissos basin, it would be very helpful to explore archaeological evidences and studies, like statues and marble plates in the National Archaeological Museum, the Epigraphic Museum etc., since Ilissos was also a god and people used to make statues to honor them and also find marble plates with the name of Ilissos is them and with directions for not polluting the river from tanneries. Also, Ilissos was often mentioned at ancient pieces of historical scripts like in Platon, Pausanias and many others, since, during the content analysis of the newspaper articles, it was very often mentioned that there have been testimonies that describe good ecological condition of the river and get from them information about the flow discharge and water quality. Also, it would worth to incorporate with the archeological authorities and explore the holy locations that existed next to the river and evaluate the historical importance of the locations that could be brought back to light by uncovering the river Ilissos.

Moreover, gravures and paintings at the beginning of the 19th century and photographs of later years, could be used to give an idea of how the rivers were, before the intense human interventions. They can provide information of the everyday life of the residents next to the rivers and give a clear view of how the city's and basin's topography was. Also, songs' lyrics, with references of the rivers and of significant locations at the rivers' banks, could also indicate what people were considering for the rivers, as it was very common in the folklore mentality to include rivers and locations' names in the songs.

Also, in order to evaluate how much the malaria breaks out in Athens influenced the river management decisions, further research at the municipal archives of Population's Death Register are proposed. In case the number and the causes of death and the address of these people were recorded, then the proximity to the river, along with the number of people who were living close to the river and died due to malaria, could also be an indication about how much pressure did this situation exert at the decisions about covering the river and might explain, partially, why certain decisions for the river were taken. So, it could be useful to include the sanitation of the river as another influencing factor and try to find whether peoples' health and sanitation, which are urging factors, trigger decisions towards environmentally sustainable solutions or towards technical solutions.

In a wider context, it would be interesting to investigate the evolution of basins across the planet, at different time periods and under various political regimes, which could give more information about the effect of the political regime on water management. For example, investigating the evolution of basins in European countries, under totalitarian regimes before the World War II, could be a research starting point in order to compare it with the case of Ilissos in Athens, for the same period. Totalitarian regimes in Europe could be found in Spain, by the dictatorship Franco from 1939 to 1975, in Portugal by Salazar, from 1926 until 1974, in Germany, under Hitler from 1933 to 1945, in Italy by Mussolini from 1922 to 1943, in the Soviet Union under Joseph Stalin and others from 1923 until 1989, at the People's Republic of China under the control of Mao Zedong from 1949 until 1976, in Albania, Romania, Chile and many other countries with different kinds of regimes, where the will and preferences of citizens could not be freely expressed. Similar comparison could be made nowadays among basins at different countries, with different corruption and political regime.

Also, the effect of memories, on the qualitative characteristics of water management decisions related to specific water system, could be another field for further investigation. The kinds of memories which are the prevailing ones for a water system, can play significant role for its future, since might force authorities to revoke a decision about its use. For example, historical memories of a river that has been covered and the nostalgia of its glory past, might trigger decisions to uncover it or flood memories can persuade residents about flood defense strategy proposed by the authorities.

Another idea for research, that could contribute to extent our knowledge on the sociohydrological field, includes the investigation of the effects of past 'black swan' events on the hydrological regime and on the management of water systems. As 'black swan' events could be regarded events that include hazards that are of high impact, but rare frequency and are either man-made or natural, like wars or pandemics.

Also, the Urban Planning and the evolution of the land development is a field that could reveal useful information on the relation of people with water resources, especially at urban environments, since it is the practical result of legislation initiatives and peoples' acts related to water resources and it illustrates, with clear evidences, like satellite images, how much environmental sustainable is relation of people with water resources.

Also, since in many sociohydrological studies rationality is regarded as granted and is assumed in advance, it would be interesting to include in future research, economic indicators, legislation and governmental decisions that could help to evaluate the rationality of the water management decisions. Moreover, the values and norms of a community regarding the economic development and environmental sustainability, influence the decisions for water resources management, but are difficult detected in past periods. However, the values and culture of people in past periods is difficult to be detected and despite the socio-psychological literature, they cannot be easily be embedded in socio-hydrological historical studies.

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