

Văcărești Nature Park - Urban Wetlands

Public Awareness

An Interactive Qualifying Project Report

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In partial fulfillment of the requirements of the Degree of Bachelor of Science by:

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Abstract

Văcărești Nature Park, formerly a communist waterworks project in Bucharest, Romania, gained national protection in 2016. This biodiverse urban wetland is currently at risk of invasive species, trash dumping, vandalism, arson, destructive development, and other hazards associated with urbanization. This pilot project utilized an online survey, remote interviews, and livestream observation to create a thorough stakeholder analysis detailing public perception and usage of the park. This was used to compile recommendations to the Văcărești Natural Park Association (VNPA) in order to influence future development and management. The team shared survey materials with the VNPA to facilitate further work with public perception and long-term public engagement.

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Table of Contents

Abstract	ii
Acknowledgements	iii
Authorship	iv
Table of Contents	v
Executive Summary	ix
Chapter 1: Introduction	1
Chapter 2: Background	3
2.1 - History of the Romanian Government	3
2.1.1 - Brief History of Romania Prior to World War II	3
2.1.2 - Interwar Views of Communism in Romania	4
2.1.3 - The Development of Romanian Communism	4
2.1.4 - “Socialism in One Family”	6
2.1.5 - Revolution	6
2.2 - Urban Planning and Green Space in the Post-Communist Era	7
2.2.1 - Recent Urban Planning History	7
2.2.2 - Park History	8
2.2.3 - Political Ideology and Environmentalism	9
2.3 - The Văcărești Ecosystem	9
2.3.1 - Plants and Animals	10
2.4 - An Argument for Green Spaces	11
2.4.1 - Environmental Benefits Provided by Urban Green Spaces	11
2.4.2 - Health Benefits Provided by Urban Green Space	12
2.4.3 - Economic Benefits Provided by Urban Green Space	12
2.5 - Environmental Protection Policy	13
2.5.1 – European Union	13
2.5.2 - National Romanian Policy	13
2.6 - Văcărești Stakeholders	14
2.6.1 - Schools	15
2.6.2 - Universities	15
2.6.3 - Ecotourism	16
2.6.4 - Property Developers	16
2.6.5 - Bucharest Residents	16
2.6.6 - Local Businesses	17
2.6.7 - Hospitals	17
2.6.8 - Local Authorities	17
2.7 - The Role of Green Spaces in Major Public Health Crises	18
2.7.1 - Green Spaces during COVID-19 Pandemic	18
2.8 - Case Studies: Potential Practices	18
Chapter 3: Methodology	20
3.1 - Outlining Objectives	20
3.2 - Stakeholder Assessment	21
3.2.1 - Surveys	21
3.2.2 - Interviews	22
3.2.3 - Long-term Stakeholder Engagement	22
	v

3.2.4 - Evaluating Park Usage via the Green City Lab Live Stream	23
3.2.5 - Evaluating Future Development Based on Information Gathered	24
3.2.6 - Project Website	25
3.3 - Ethical Considerations	26
3.4 - Timeline of Events	27
Chapter 4: Results and Analysis	29
4.1 - Online Survey	29
4.1.1 - Demographics of Respondents	29
4.1.2 - Visiting the Park	31
4.1.3 - What People Like and Dislike About the Park	35
4.1.4 - Conservation vs Infrastructure	40
4.1.5 - Compilation of Public Suggestions	42
4.2 - Live Stream Observation	44
4.2.1 - Park Usage and Temperature	44
4.2.2 - Park Usage and Military Ordinance 2	45
4.3 - Interviews	46
4.3.1 - Zoom Interview with Ryan Woods	46
4.3.2 - Zoom Interview with Stephen Mantoiu	47
4.3.3 - Zoom Interview with Cristian Ioja	47
4.3.4 - Email Interview with Mihai Razavan Nita	48
4.3.5 - Email Interview with Alexandra Damian	48
4.3.6 - Email Interview with Andreea Raluca Slave	49
4.3.7 - Email Interview with Walter Mugdan	49
4.3.8 - Email Interview with Gabriela Manea	50
4.3.9 - Email Interview with Florentina Ruiu	50
4.3.10 - Email Interview with Maria Duda	51
Chapter 5: Recommendations and Conclusions	52
5.1 - Recommendations	52
5.1.1 - Park Services	52
5.1.2 - Public Misuse	53
5.2 - Conclusion	54
5.3 - Future Work	55
Appendix A: Online Survey	57
Appendix B: Case Study Thessaloniki	59
Appendix C: Case Study London	61
Appendix D: Case Study New York City Coastal Wetland	62
Appendix E: Case Study The Pantanal	63
Appendix F: Important Links	64
References	65

List of Figures

#	Description	Page
1	Văcărești Park in Bucharest	8
2	Văcărești Park Satellite Imagery	10
3	Bucharest Sectors 4 and 5	11
4	Livestream View of the Park With Visitors	23
5	Livestream View of the Park With Visitors at Night	24
6	Project Website Homepage	25
7	Project Timeline	28
8	Survey Response Rate in March, 2020	29
9	Survey Respondent Ages	30
10	Survey Respondent Proximities to Park	30
11	Survey Respondent Locations	31
12	Survey Respondent Modes of Transportation	32
13	Survey Respondent Visitation Frequencies	33
14	Survey Respondent Park Activities	34
15	Survey Respondent Accompaniment	34
16	Local vs. Non-local Survey Respondent Park Usage	35
17	Survey Respondent Appreciation Buzzwords	36
18	Survey Respondent Dislikes Buzzwords	37
19	Trash Inside the Park	38
20	Reasons Why Respondents Believe the Park to Be Unsafe	39
21	Conservation Mindset Comparison by Age	40
22	Conservation Mindsets Among Survey Respondents by Age Histogram	41
23	Conservation Mindset vs Survey Origin	42
24	Survey Respondent Suggestions Buzzwords	43
25	Attendance Based on Time of Day and Temperature	44
26	Attendance Based on Time of Day Before and After Military Ordinance 2	45
27	Attendance Based on Temperature Before and After Military Ordinance 2	46

List of Tables

#	Description	Page
1	Initial Stakeholder Assessment Table	14
2	Goals and Objectives	20
3	Future Work	56

Executive Summary

Around the world, urbanization is taking a toll on natural systems. In Bucharest, the general population has been decreasing, however, analysis reveals rapid urban growth and sprawl. This phenomenon of suburbanization has been partially attributed to a lack of urban planning policy following the shift from Communism, and has been identified in numerous post-communist cities. For example, between 1990 and 2008 alone, Bucharest Sectors 4 and 5 experienced a 60% decrease in green space (Ioja, et al., 2010). Within Sector 4 is Văcărești Nature Park, an urban wetland which traces its roots to the Communist regime. Only gaining national protection in 2016, the park's 470 acres, home to hundreds of species, is at risk of invasive species, trash dumping, vandalism, arson, and development. Major progress has been made in the park courtesy of our collaborators, the Văcărești Natural Park Association (VNPA), however, steps still must be taken to gain support from the general public and the city government. The park is currently visited by many residents, researchers, school field trips, and tourists, but its wildness is still considered a threat by some. In order to influence future management and development plans, our group has conducted a thorough stakeholder analysis through interviews, an online survey, and park observation in order to provide the VNPA with quantitative and qualitative recommended measures of park utilization and public grievances.

The goal of this project is to compile the results from surveys and interviews to gain a thorough understanding of the public opinions of the park. Surveys from park visitors indicate general trends among the populace regarding their largest grievances, as well as their favorite aspects of the park. Interviews with local NGOs, students and faculty at local universities, and park experts in the US and in Romania, take this a step further, providing informed viewpoints on how to best strike a balance between what the general population may desire and what is best for the ecosystem.

Our research indicates that the majority of survey respondents enjoy the park because it is a unique space which allows them to interact with nature and experience tranquility in a bustling city. In order to support the park's services, many experts have suggested steps needed to help conserve the wetland ecosystem. Expert suggestions from researchers, teachers, and other NGOs included the management and removal of invasive species to ensure the longevity of native species. Other suggestions were aimed at increasing green infrastructure and visitor separation from wildlife through path maintenance and observation points. A recurring topic was safety in the park. Although steps have been taken to reduce the perceived problems of the park, they are still an apparent concern for many visitors. To prevent public misuse, the consensus of surveyed persons was to have an involved community. Through well-programmed activities throughout the day, channels for public communication with the VNPA, more interaction with city officials and police, and public education about park policies and projects, visitors will have a greater attachment to the space and there will be less room for negative activities.

To collect data regarding utilization, park attendance was catalogued for a month in a series of 30-minute intervals throughout the day. We identified and tracked multiple factors that could

influence park attendance: weather conditions, time of day, and the military ordinances associated with COVID-19. In addition, the data regarding what parts of the park people use, either along the perimeter path or inside of the park, were recorded. This information can be used to determine necessary infrastructure updates based on usage trends. Although we found a slight decrease in park attendance as military restrictions became more stringent, park attendance dropped less on warm and clear days. This may indicate that the park is an important asset to the city of Bucharest in events like the COVID-19 pandemic.

Because stakeholder engagement models recommend long-term engagement, we have provided raw data, analysis, and transcripts to our collaborator. The final deliverables include the collected data, the paper report, our project website, general future park recommendations, as well as an analysis system and our survey questions.

For more information please visit here: <https://phuongle5219.wixsite.com/urbanwetland-d20>

Chapter 1: Introduction

The International Panel on Climate Change (IPCC) has stated that as unregulated urbanization continues to increase, urban green spaces are destroyed (Revi et al, 2014). In many places around the world, green space has been on the decline, and in southern Europe, nearly 40% of city dwellers live almost half a kilometer from green space (Kabisch et al, 2016). Psychology journals have said that even living further than just 300 meters away from green space has been linked to significant declines in happiness, self-worth, and life satisfaction (Nauert, 2019). As more homes and businesses are required by people moving to cities and more buildings are constructed, green areas viewed as nonessential are often developed. This reduction in green space is also proven to have negative impacts on people and local communities (Maas, 2006). With correlations to decreased physical and mental health, the loss of green space around the world is a significant problem and needs to be addressed by competent planning and conservation of these important spaces

This issue is exemplified by the situation in Bucharest, Romania, where urbanization and a lack of centralized urban planning has demonstrably deteriorated natural landmarks (Ianoş, Sorensen, & Merciu, 2016). Urbanization and additional factors such as the Romanian Revolution, further exacerbate the loss of urban green space. The direct impact of Romania's break from its communist past on urban green space is a system consisting of a laissez-faire attitude toward urban planning. This allows landowners and developers to develop their land as they see fit, which has severely lowered the amount of green space across the city (Ioja, et al., 2010). Due to this laissez-faire attitude, the government is unable to react quickly and meaningfully in favor of conservation or environmentalism, and without evidence that it is needed may not even want to. Bucharest in recent history has also been undergoing a period of chaotic urban growth and expansion (Ianoş et al, 2016), and when paired with the past revolution, create a complex environment for urban green spaces to develop. This is especially true for the Văcăreşti Nature Park, an urban wetland which traces its roots to the Communist regime. Nearly three turbulent decades after that regime, the park joined many other pieces of nature across Europe and became officially protected by the national government, but this has proven to be mostly a symbolic title in part due to the lack of enthusiasm from the city government.

Văcăreşti hosts a dazzling array of biodiversity, ranging from over 100 species of birds, to fish, amphibians, and mammals such as foxes, bats, weasels and shrews (Mihai, 2013). Despite the park's biodiversity, it still has an uncertain future due to having limited protection from the government. As of today, the government does not physically assist in the management of the park, and without police oversight people are free to misuse the park by dumping waste or by living in the park illegally. The only protection the government provides is a declaration that no one will develop the land in the near future. The park's current caretaker, the Văcăreşti Natural Park Association (VNPA), picks up the slack provided by the government's inaction and is currently working to enhance promotion, clean the park, and protect the local biodiversity. Despite this, it is clear that one of Văcăreşti Natural Park's greatest struggles moving forward is gathering large

scale support for the park which will aid in persuading the government into taking a more active role in the park's protection and management.

The cataloguing of public opinion and evaluation of best practices for urban wetland conservation are both avenues by which the government could be spurred to action. This project aims to catalogue the multidimensional benefits of Văcărești park because this is one important way to shape its future. Most important for this goal is a detailed stakeholder analysis of the beneficiaries of the park, which will provide invaluable information for possible improvements in the future. Through expanding knowledge of the benefits of urban green space and hearing local opinions regarding Văcărești, the government may eventually find itself in a situation where in order to appease its constituents, it must evolve into taking an active stance in the management of the wetlands. This report will make use of the great many pieces of research that connect and correlate healthier lifestyles and moods with an increased amount of urban green space within a city. It will take research and apply it to the locale, which must itself be studied through a different lens than any existing case studies. By intermingling such large-scale research with stakeholder analysis and a cataloguing of public opinion, this project will produce a general set of recommendations for the VNPA. The deliverables provided will also allow the VNPA to continue gauging public support in hopes of eventually channeling that support into positive change within the government.

Chapter 2: Background

Urbanization across the globe has led to the destruction of urban green spaces. This is linked to declines in physical and mental health, causes disruptions of natural ecosystems, and heightens the effects of global climate change (Younger, et al., 2008). In Bucharest, shifts in government and the opening of the real estate market, paired with rapid urbanization has led to the loss of green space, especially in the southern sectors of the city. Parks like the Văcărești Nature Park need legislative support from all levels of government in order to ensure its long-term protection. This project aims to address these challenges by evaluating current stakeholder interests and needs, as well as forming long-term sustainable development plans for the park, with the intention of assisting the collaborator in garnering support for the integration of the Văcărești Nature Park into the city's overall urban planning. In order to fully understand the issues of dwindling green space, it is important to consider the historical background of Romania and Bucharest, its capital. Because Văcărești is located in the capital, many of the historical and political events of the last century have directly impacted the park, from Romania's entrance into the Second World War, to the Communist era, and in the last 30 years the country's recovery from totalitarian rule.

2.1 - History of the Romanian Government

According to historian Keith Hitchins, Romanian history is characterized as a struggle and "synthesis" between eastern and western influences (Hitchins, 2014, p. 2). Knowing this historical context will allow the team to better provide analysis into how environmentalism in Romania has been conducted over the past century, and how the nation has gotten to where it stands today. Questions regarding a difference in environmental policy by the past Romanian political regimes must be answered in order to move forward with new ideas and recommendations in the future.

2.1.1 - Brief History of Romania Prior to World War II

Beginning with the introduction of modern humans to Europe, the region now known as Romania has a storied history. For much of this history, Romania has balanced itself between Eastern and Western culture, and ideologies. The earliest known culture to control Romania was the Dacians, whose culture was thought to pre-date 440 BCE. This society traded with the Greeks and was influenced by their culture. The Dacian people also interacted with the Roman Empire, eventually being conquered and incorporated into Roman society. Romania was relinquished to invading Goth and Carpi tribes, being one of the first regions given up by the Roman Empire, around 271 AD (Hitchins et al, 2020). After this, Romania was influenced by the movement of the Bulgars into the Danube delta region. These people, the Pechenegs from Central Asia, and the Cumans from the Black Sea introduced Turkish dishes and culture, some of which can still be seen in Romanian cuisine today (Editors of the Encyclopedia Britannica, Pechenegs 2008). In the early middle ages, Romania was settled by additional peoples, such as the Saxons, who influenced Romanian culture through food, music, and language (Curta, 2006). As Romania entered the 14th and 15th centuries, Wallachian and Moldovian monarchs found themselves between the influence

of the Ottomans to the southeast and the Polish to the Northwest. They were eventually conquered by the Ottomans (Andea, 2006). Romania and much of the Balkan peninsula remained under the control of the Ottoman empire until the Russo-Turkish war.

During the 1830s and 1840s, the national political goals of Romania were to preserve the autonomy of the principalities of Moldavia and Wallachia. During this time, the Romanian government looked to other countries for support against the pressure of the Turks, getting most of their support from Russia (Hitchins, 1992). After a long period of Russian interference into Romania, the country closed itself off 30 years prior to the First World War, with the belief that Russia and other countries had taken advantage of them (Hitchins, 1992).

Nationalistic tensions in Romania led the country to enter the First World War early. The goal was to unify Romanian peoples that had been separated in previous wars, including Transylvania and Bukovina. However, hopes of unification were quickly dashed once the majority of the country was occupied by the Central Powers (Moses, 2018).

In the interwar period, the country worked to bring itself to parity with western countries. This began with experiments in liberal policies and government; the country shifted to a constitutional monarchy and then, just prior to the Second World War, to authoritarianism (Hitchins, 1992). Fascist, anti-Semitic parties in Romania, namely the “Iron Guard”, gained power; King Carol the Second attempted to first co-opt the group and then dismantle them. In response, the fascist parties began to pressure King Carol, eventually forcing him to abdicate in favor of these groups (Moses, 2018). An understanding of the history of Romania helps to explain why Romania was in a position to turn to Communism at the end of the Second World War and why Communism remained the system of government in the country for 42 years.

2.1.2 - Interwar Views of Communism in Romania

In the period following the Great Depression of the 1930s, philosophers and historians in Romania began to think about the differences between the ideals of capitalism and its failings for the average Romanian. At the same time, economists argued that the Romanian bourgeoisie had a growing crisis, and recommended a balance between capitalism and Communism which is characteristic of the nation itself (Hitchins, 1992).

Recruitment for the Communist Party was challenging in the countryside due to the ideological opposition of the peasants to Communism. This opposition took the form of aspirations to own their land, their devotion to religion, and respect for tradition (Hitchins, 1992). The Romanian Communist Party would not gain power until after the Second World War.

2.1.3 - The Development of Romanian Communism

During WWII, Romania could once again be characterized as being pulled in two different directions by the Eastern and Western spheres of influence. The Axis feared attacks on Romanian

oil fields and took the fight on the offensive. As they captured territory, the Romanians reluctantly found themselves at war with the Allies as well.

Once the Paris Peace Treaties were signed, Romania gained northern Transylvania as a part of its territory and found itself inundated with pressure from the Soviets. The Soviets continued their occupation of Romania after the war and they adopted a number of measures in order to consolidate their power. They confiscated Romanian industry and created joint Soviet-Romanian companies called SovRoms which served to exploit Romania further by taking precious resources away from the transitioning nation. (Hitchins, 2014, p. 225) Not only did Romania find itself being influenced externally by the Soviets, but from the communists in their own political system. One by one, the communists jailed party leaders and broke up parties altogether, which culminated in the forced abdication of the king in 1947. This began the Romanian People's Republic.

The Romanian Constitution of 1948 is the first to include the "Stalinist view" of property ownership and is the reason for the nationalization of many properties and businesses in Romania (Hitchins, 1992). Early targets of such nationalization were the homes and businesses of people considered to be the "exploiters" in the capitalist society, which included manufacturing magnates, bankers, and merchants among other wealthy groups. The constitution expressly forbade the nationalization of homes and properties of workers, civil servants, small craftsmen, and retirees. (Hitchins, 1992). Opposed to the western view of free market industrialization and capitalism, the authoritarian leaders of the Romanian People's Republic placed a major focus on industrialization and economic development. This new leadership seemed "intent on hastening the transition of a largely agrarian and rural country into one that was predominantly industrial and urban, [and] they committed almost all available resources to forced industrialization and the total collectivization of agriculture" (Hitchins, 2014, p. 240).

It is important to note that while there was heavy influence from the Soviet Union, the Romanian government under Gheorghiu-Dej maintained a level of independence and continually tried to fend off further domination. After the death of Stalin, the forced industrialization and collectivization that characterized the beginning of the Communist period continued with little care for losses in standard of living. Additionally, there were other changes with the death of Stalin. For one, as Khrushchev denounced Stalin, and as the tension between the Soviets and the West lessened, the Soviets began to withdraw troops and advisors from Romania. The nation found itself with slightly more independence and was able to once again reach back out to the west and reestablish old ties. Gheorghiu-Dej's hope was to reduce Romania's reliance on the economies of the east and to begin to enter western markets in order to continue decreasing their political dependence on the Eastern Bloc. Romania was once again seeking to find a balance between eastern and western powers. Despite the reshuffling, this action was by no means a turn towards western practices of free-market economics.

2.1.4 - “Socialism in One Family”

With the death of Gheorghiu-Dej, Nicolae Ceausescu assumed leadership. He sought to continue the authoritarian rule of Romania and also “demanded that Marxist-Leninist ideology be the guiding force throughout society: in the party at every level, in education, in youth and women’s organizations, publishing, the media, and literature and history and creative endeavors of all kinds” (Hitchins, 2014, p. 278). He insisted upon his party’s complete and unequivocal control over the nation. Corruption became more prevalent as the years went on and the party’s power slowly shifted to Ceausescu, essentially forming a dictatorship. Much of his newfound power was relegated to his family members, such as his wife, who he gave the second most powerful position in the government. This type of leadership led Ceausescu, and the close-knit group that surrounded him, to holding all of the governmental power in Romania, while slowly and steadily stripping power from the Communist party. Not only that, but those surrounding the dictator would typically only “give Ceausescu the advice he wanted to hear” (Hitchins, 2014, p. 279). Some would describe this regime as “socialism in one family,” which contrasts with the Stalinist version ‘socialism in one country’ (Hitchins, 2014, p.278).

2.1.5 - Revolution

In the 1980s, Ceausescu continued the forced industrialization of Romania’s largely agrarian economy. He began massive construction projects, and attempted to pay off his nation’s debts as quickly as possible. This decreased the standard of living in the nation, which in turn depressed Ceausescu’s support from both the Romanian public and the Communist party. The wages of the average Romanian worker stagnated and shortages of essential products were common. Additionally, as the Soviet regime continued to open up with the policies of Mikhail Gorbachev, Ceausescu doubled down and continued on his own path toward totalitarianism, following the example of North Korea (Moses, 2018).

Many of the external policies of Ceausescu alienated former allies who wanted reforms to the way the country was run. In December of 1989, widespread protests began after the secret police, the “Securitate”, attempted to evict and deport a Protestant minister and Hungarian national living in Timișoara, Transilvania. The encounter turned into a bloody protest when the neighbors of the reverend responded violently to the eviction; this protest left thousands injured or dead. (Ceausescu is Overthrown, 2012). These demonstrations spread to Bucharest, where they evolved first into a riot and then into a full revolution. Revolutionary fever had reached a boiling point. Much of the population was forced into nationalized housing built on seized land. In addition, the people of Romania had struggled through rationing of food, electricity, and oil which led to citizens freezing to death. As much as Ceausescu claimed that these things were not a problem, the Romanian people knew otherwise, and Ceausescu’s national address on the topic did not go over well. He and his wife were executed following a show trial on December 25, 1989 (Ceausescu is Overthrown, 2012).

2.2 - Urban Planning and Green Space in the Post-Communist Era

The development of environmentalism in Romania has been shaped by the nation's historical position between east and west. Through authoritarian rule in the mid-20th century to a sudden and drastic shift toward a capitalist system, the need to protect all green space has never truly and completely been addressed.

2.2.1 - Recent Urban Planning History

Directly following the end of the Communist Regime, the developing Romanian government was unable to institute new legislation to manage urban planning and found itself under constant bombardment by public land disputes. Since the Communist Regime had confiscated private land in order to develop communal infrastructure, citizens requested that the new government return to them their rightful land. As a result, the Romanian people today have a strong belief in their right to private property (Ioja et al, 2010). This had a lasting impact on urban planning within the city. Years of disputes have bogged the government down, preventing it from providing meaningful legislation that takes charge of the urban planning situation. This cultural valuation of private property in tandem with the government's inability to legislate urban planning, has allowed for the "property market [to exploit] the regulatory vacuum to generate rapid and chaotic urban restructuring" (Ianoş et al, 2016). In other words, these factors work cooperatively to allow Bucharest's population free reign to develop their land however they wish without facing any substantial pushback from the government. The common view is that individuals should be able to develop their land however they like because they are the ones who own it. Because of this laissez-faire system, this era has been described as a non-regulated and "uncontrolled urban sprawl type expansion" (Ioja et al, 2010). This policy of indifference by the government has continued to grow since 1989, which has resulted in high population densities and the presence of large, modern buildings looming over cultural landmarks. In response, local NGOs have spoken out against such construction; they believe that modern edifices adjacent to historical sites harms their cultural significance (Ianoş et al, 2016).

The lack of a central urban planning authority is also exemplified by the destruction of green space within the city of Bucharest. Parks, trees, and open space have been slowly removed as a result of unmanaged expansion. The protection of nature falls under the authority of the national government, yet the laissez-faire approach to urban planning within Bucharest has allowed urban sprawl to destroy green spaces. Green space to many people within the city is seen as a "luxury... if not a waste of space" (Ioja et al, 2010). This belief is common in southern and eastern Europe. These areas, including Romania, rank among the worst by the EU for amounts of urban green space. Almost 40% of city dwellers in southern Europe live more than half a kilometer away from any type of green space (Kabisch et al, 2016). This contrasts heavily with the Scandinavian countries, which have under 20% of city dwellers living that distance away from urban green space (Kabisch et al, 2016).

2.2.2 - Park History

The Văcărești Nature Park's history has been shaped by the current Romanian government's lack of a structured urban planning policy. Before the fall of the Communist Regime in Romania, a piece of land was selected by the government to become a body of water; it was dubbed the Văcărești Lake. The government's original plan was to use this area to help control river levels (Ianoș et al, 2016) and to eventually connect the city to the Danube river (Tribillon, 2016). The project was abandoned due to the fall of the Communist government in 1989. As the public scrambled to reclaim their land, there was minimal encroachment upon the Văcărești Lake. However, more recently many hoped to use this former Communist property for extravagant casinos or golf courses. Despite government inaction, all these plans fell through due to the 2008 financial recession (Bird, 2014). As a result, the land lay dormant and undisturbed for nearly three decades and nature slowly reclaimed the area which began to attract increasing amounts of wildlife.

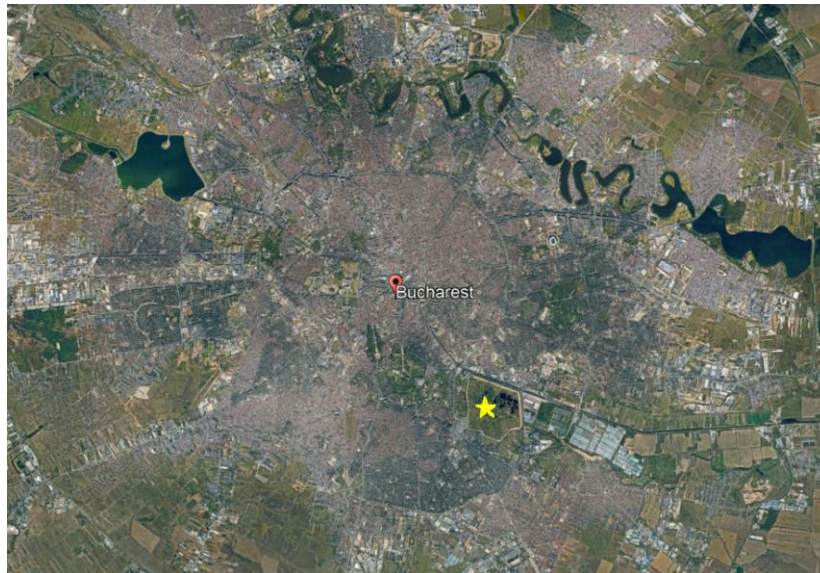


Figure No. 1, Văcărești Park in Bucharest (Starred), (Google, n.d.)

In 2013, a number of environmental activists came together and submitted a report to the Romanian Academy which catalogued the emerging biodiversity and wildlife in the former Văcărești Lake. With this data, the Romanian Academy recommended to the government that this wetland should become officially protected. Despite the clear documentation from the report and the Romanian Academy's recommendation, the government's lack of an urban planning authority has severely limited their ability to take charge of the vacant wetland. Ongoing land disputes regarding former Communist land has only exacerbated this and similar issues within the city. Because of this and a lack of funds by the municipal government and ministry of the environment (Bird, 2014), the wetlands remained in a legislative grey area. In the years following the study the area came to the attention of more environmental activists and the national government eventually declared that

Văcărești was to become a protected natural park. It could no longer be targeted by public interests for development and that there were no other valid claims of ownership besides the government's (Ianoș et al, 2016). This solidified the park's position and ensured that it would not be removed by land developers, but there are still a number of problems. One issue is that while areas such as the park are protected at the national level, protection is not clearly defined at the local level in the city; the municipal government does not provide for the park in any meaningful way.

As of today, the municipal government points to the fact that the park is officially under the oversight of The Ministry of Environment, Waters and Forests. The day-to-day operations of the park, initially disregarded by the municipal and national governments, are overseen by an NGO called the Văcărești Natural Park Association (VNPA). This association is made up of many of the activists who originally provided documentation of the park's biodiversity to the Romanian Academy. The VNPA is in charge of typical park functions, such as cleaning and protecting the park, as well as providing education opportunities for local schools. The gridlock that characterized the government after the fall of the Communist Regime still exists today and the Văcărești Nature Park has still yet to see many important physical developments. Activists, such as those in the VNPA, desire that the park be outfitted with more observation towers and pathways for the public. But, as stated, city planning over the last three decades has proven itself to be a complicated matter. The main goal of the activists today is to gain more direct governmental support for the park, which could take the form of land development assistance, as well as local police protection so that no one can take advantage of the park.

2.2.3 - Political Ideology and Environmentalism

From the all encompassing building projects of the Communist and authoritarian era to the urban sprawl and nonregulation of the capitalist system, it seems that environmental friendliness has not been a chief concern in the politics of Romania. The problems of one political system have been replaced with different problems from another. In the Ceausescu regime, forced industrialization, construction, and a move away from agrarian life posed a problem for the environment. In the current system, governmental indifference and urban expansion quashes the needs of the environment in favor of economic well-being. As of yet, neither system has been able to provide the protection that the natural environment needs in order to benefit the public and the overarching climate itself. The problem of the future will lay in understanding the past system in order to find and strike a balance in the new system between the paths to attaining economic exceptionalism and protecting the natural splendor of Romania.

2.3 - The Văcărești Ecosystem

Today, Văcărești Nature Park is the largest urban park in Bucharest, stretching 470 acres, and is suspected to be home to nearly 350 species of animals, over 330 types of plants, including many species whose populations are severely threatened (N. Marin, personal communication, 2020). Wetland ecosystems are notoriously fragile, so proper management paired observation of its health

is essential to its longevity. In the past 20 years alone, shifts in the landscape of the park are clearly visible. Organizations including Kogayon Association, Konika-Minolta Romania, National Geographic Romania, Bucharest Botanical Garden, Fieldherping Romania, and various Universities have been working to catalog the various species throughout the park. In the figure below, there is a clear increase in infrastructure along the perimeter of the park and surrounding neighborhood, as well as a clear decrease in water in the park. A decrease in water could also be linked to climate shifts. This suggests that long-term studies and monitoring are needed to better understand the population shifts and external pressures on the park.



Figure No. 2, Văcărești Park Satellite Imagery, 2000 (left) to 2019 (right), (Google, n.d.)

2.3.1 - Plants and Animals

Among the most prominent in the park are the roughly 170 species of birds, ranging in levels of protection and rarity. The Corncrake (*Crex crex*), Pygmy Cormorant (*Phalacrocorax pygmaeus*), Ferruginous Duck (*Aythya nyroca*), and Western Marsh Harrier (*Circus aeruginosus*) are among some of the more protected birds (Mihai, 2013). The presence of these birds are indicators of the overall health of the ecosystem as they will only be able to mate, nest, and thrive in a well-supported, stabilized ecological community. University of Bucharest faculty and students have been analyzing this correlation between Bucharest's urbanization and subsequent effects on the populations of birds, unsurprisingly finding that the city's increase in developed areas had severely weakened bird populations (Dragoș, et al., 2017).

There are also many mammals in the park including otters, bats, weasels, foxes, and shrews, but some of the mammals pose issues to the park. Stray dogs can disrupt small animal and bird populations and could be carriers of rabies. Since the fall of communism, the park also served as a squatting ground for the homeless and is believed to have housed as many as 200 people at some point ("Destination: Bucharest", 2019).

The Botanical Garden Bucharest has been working to identify and catalog the plant species in Văcărești. Since their work began, Mrs. Paulina Anastasiu and Mr. Gabriel Negrean have cataloged 101 taxa. It is estimated that nearly 80% of the species in the park are native (Anastasiu, et al., 2017). This is significant as most urban ecosystems tend to be lacking biodiversity and tend to favor non-native species. Such delicate ecosystems require increased attention as development ensues.

2.4 - An Argument for Green Spaces

Since the 1990s, rapid urbanization in Bucharest has led to a loss of urban green space. Sector 4 and its neighbor Sector 5, visible in figure 3, is where the Văcărești Nature Park is located. These sectors have experienced the greatest loss of green space, totaling at over 60% between 1990 and 2008 alone (Ioja, et al., 2010). Urbanization, also classified by increased population densities and industry also leads to heightened exposure to anthropogenic pollution, and the fast-paced nature of things contributes to stress and anxiety disorders. Not only does the loss of green spaces mean a loss of habitat, it disrupts the natural passageways organisms and pollinators use to move within the city and from the city to more rural areas, which can affect the success of food production and seasonal migrations. Further detriment of urban green space in Bucharest would drastically affect native populations and change the ecosystem makeup of the area forever. In order to protect the remaining urban green space in Bucharest and influence future redevelopment endeavors, the direct and indirect monetary benefits of green space must be understood.



Figure No. 3, Bucharest Sectors 4 and 5 - October 2000 (left) and October 2019 (right), (Google, n.d.)

2.4.1 - Environmental Benefits Provided by Urban Green Spaces

Urban areas, like Bucharest, with an abundance of ‘grey space’, or developed areas, are at risk of experiencing concentrated effects of climate change and ecosystem shifts due to the Urban Heat Island Effect. Urban Heat Islands can lead to temperature inversions which trap particulates and

pollution beneath a layer of dense, cool air. Not only do green spaces break up the mass of paved surfaces, but they are also temperature and humidity regulators, carbon sinks, air purifiers, water filters, and nutrient cyclers. (Younger, et al., 2008).

Green spaces also help combat noise and light pollution. Light pollution is especially harmful to birds and amphibians. Amphibians have a much greater ability to detect light and it is believed that “prolonged exposure to bright lights affects their hormones, skin coloration, thermoregulation, and reproduction” and sensory pollution has proven to change migration patterns in birds (“Night Skies”, n.d.). Excess anthropomorphic pollution has also proven to affect many species’ behavior and endocrinology, which in turn affects their reproductive ability and modifies the makeup of ecosystems. Furthermore, unnatural blue light has been linked to altering the circadian rhythm in humans (Halfwerk & Slabbekoorn, 2015).

2.4.2 - Health Benefits Provided by Urban Green Space

Physical health tends to increase with availability to green space because of the availability of recreation and physical activity. A study of a city in China which evaluated the relationship between urban green space and physical health found that, “in neighbourhoods with a Green Space Ratio lower than 28%, residents had a higher risk of physical inactivity, overweight or obesity, hypertension and stroke [and in] neighbourhoods with a Green View Index lower than 15%, residents had a higher risk of physical inactivity, overweight/obesity, hypertension, dyslipidemia and stroke” (Leng, et al., 2020).

Less visible are the mental health benefits of urban green spaces. The World Health Organization (WHO) has identified mental health as an emerging issue and even estimates that mental health and other non-communicable diseases will be the leading cause of deaths in the year 2021 (Maund, et al., 2019). Additionally, WHO reported in 2011 that in Romania, “neuropsychiatric disorders are estimated to contribute to 19.9% of [diseases]” (“Mental Health Atlas, 2011). Widely accepted by mental health professionals, that Attention Restoration Theory (ART), established in 1989, has claimed that, “natural environments can provide cognitive benefits through the restoration of the capacity to focus or direct attention” (Maund, et al., 2019). Expanding upon this, researchers in 2019 conducted a six-week study following changes in mental health of individuals before and after spending time in wetland areas. Their results demonstrated, “significant improvements in mental health across a range of indicators, including mental wellbeing, anxiety, stress and emotional well-being”. The Nature-based Health Intervention process (NBI) also reported several cases of “improved physical health and reduced social isolation” (Maund, et al., 2019).

2.4.3 - Economic Benefits Provided by Urban Green Space

Another aspect of urban green spaces that can be overlooked is their impact on the local economy. Using the Hedonic Pricing method, researchers have been able to confidently correlate proximity to green spaces and increased property values. One study found that even just a “one percent increase of the distance to the nearest large park [resulted in a decrease of] 1.5% of the average

price of a square meter” (Czembrowski & Kronenberg, 2016). This study also concluded that, “greenery sells”, as the “apartment buildings recently built next to medium-sized parks, [with the] highest prices [in their study, focused] on green surroundings in all kinds of advertisements (Czembrowski & Kronenberg, 2016). The use of the parks as advertisement clearly shows the property developers recognize the presence of a consumer market to buy/rent housing in proximity to green spaces. In addition to increasing property values, green spaces can attract customers to local businesses, draw in additional revenue for the city through ecotourism, and provide revenue through hosting events.

2.5 - Environmental Protection Policy

Environmental Protection policy is a topic that varies vastly from country to country, and often changes depending on the city or region. Due to the large amount of variance in policy, it is important to note the local laws and regulations which the park and association exist within to inform the project. This gives the project a local perspective and prevents projects from missing key contexts.

2.5.1 - European Union

Because of the many clear, documented benefits provided by green spaces, their protection is of the utmost importance for society today. For Europe, the overarching authority for environmental protection is the European Union. The EU exerts its influence by working with its members to create plans for the entirety of the European continent to follow. The protection of our environment is one of the EU’s most important duties, and one of their tenets is that the problems of the future are too large for any one nation to tackle alone. Through working together toward a common future, countries can have a much more positive impact on the planet. Such strategies include the preservation of biodiversity and the mitigation of climate change. In terms of the power structure of the EU, member states are dedicated to following the EU’s plans and carrying them out to the best of their abilities. The members are obligated to meet the EU’s goals, and in many cases are urged to exceed them. In addition, it must be noted that the EU does not have the sole power to legislate for the protection of the environment. This is one of the many shared legislative responsibilities of the EU and the member states. The countries of Europe must work in tandem with the EU to support each other’s rulings. The EU also provides loans and grants to groups who are acting toward their specific goals, and this is especially prevalent in the field of environmental activism.

2.5.2 - National Romanian Policy

The part of the Romanian national government in charge of environmental protection is the The Ministry of Environment, Waters and Forests. This wing of the government is active in its endeavors and has produced many reports in recent years. According to Romania’s Sixth National Communication on Climate Change and First Biennial Report, Romania is committed to the EUs

goals and is actively reducing its carbon footprint, as well as protecting important natural areas like the Danube Delta. This report catalogues a large number of protected areas including “79 scientific reservations, 13 national parks... 190 natural monuments, 671 natural reservations, 15 natural parks, 3 biosphere reservations, and 273 sites of communitarian importance” (The Ministry of Environment, Waters and Forests, 2014). Holistically, the national Romanian government is active in its duty to the environment and takes this role very seriously, but at the local level in Bucharest, there is less environmental advocacy. This is not because of general apathy towards the environment, but because of the numerous factors regarding the country’s recent history and the state of urban planning within the city as discussed earlier.

2.6 - Văcărești Stakeholders

Stakeholder	Current Use	Predicted Desires
Residents	General recreation	Recreation infrastructure
Research Institutions	Conservation plans	Wild space for research
Primary and Secondary Schools	Curriculum programs	Safer infrastructure for student use
Property Developers	Park increases residential property values	Land to develop or improvements to raise property values
Ecotourists	Volunteer and community interaction	Park interaction and community service programs
Businesses around the Park	Increase traffic around business	Draw more people to the area through recreation infrastructure
Hospitals	Improve patient morale	Views of nature, accessible for light exercise
Local Authorities	Part of jurisdiction	Follow their constituents’ desires

Table No. 1, Initial Stakeholder Assessment Table

The Văcărești Nature Park has a direct impact on the people of Bucharest, as it has altered the local economy, education systems, and tourist habits. It helps combat the urban heat island, noise pollution, and improve public health. Local stakeholders, and the public opinion they represent, have the power to shape land usage, park infrastructure, and even public legislation. Connecting to the stakeholders is vital for assessing the overall impact of the park while encouraging involvement with the park.

2.6.1 - Schools

Green space is a valuable educational resource that is utilized by public schools in Bucharest. In elementary school, green space is used to encourage physical activity through play. This activity helps improve overall physical health and the development of motor fitness. In middle and high schools educational programs are designed around conservation and access to nature. According to a 2014 survey of Bucharest public schools over half (52.6%) had at least one program that used green space as a teaching tool (Ioja et al., 2014). These programs are used in biology, geography, and environmental science curriculums and equate to 20 hours of educational material per class per year. Field trips also increase the educational possibilities. The Văcărești Nature Park has already established several educational programs which include biology and ecology lessons for local schools (D. Barbulescu & N. Marin, personal communication, January 23, 2020).

These programs allow for the schools to directly impact the park and give the park a valuable role in the education of young members of the Bucharest community. In the past, a few programs have successfully included schools in local green space. One example is the *I Have My Own Tree!* Project, organized by a local conservation group through Bucharest University (Grigoruta & Semen, 2008). This project, aimed at elementary students and their families, uses field trips to gardens and parks as well as educational materials distributed to schools to teach young children about ecology and conservation. The overall goal of the program was to educate and encourage children and families to go to parks (Grigoruta & Semen, 2008). A program with local schools that is geared towards educational classes and field trips is proven to increase the interest of schools and students in the park (Torkar & Krašovec, 2019). Supplementing the programs already in place at Văcărești as well as increasing the number of schools involved would increase the involvement of educational institutions in the future of Văcărești Nature Park.

2.6.2 - Universities

While schools utilize parks like Văcărești for educational and recreational activities, universities use the park for research. Online databases are full of papers written by university students and professors about climate change, animal behavior, and conservation methods. Typically the main partners for conservation projects are NGOs, park authorities, and universities. In Bucharest specifically, the University of Bucharest is one of the most influential partners in analyzed

conservation efforts (Rozyłowicz et al., 2017). This is due to universities' technical and research abilities. The university performs research and conservation projects in the park and, in return, the park receives assistance with drafting best practice and conservation plans. These plans are published in papers that are readily available online. Researchers and universities are interested in the opportunities at the park, the wildlife and conservation methods are worth studying (Rozyłowicz et al., 2017). An assessment of the current research opportunities in Văcărești park and the development of research programs in the park will engage more universities. Opening the park to research will increase the university interaction and stake in Văcărești.

2.6.3 - Ecotourism

Ecotourism and travelers visiting the park provide a source of income for the city as well as volunteers for parks. The young traveler, between the ages of fifteen and twenty-nine, is particularly interested in improving the places they visit. They make up twenty percent of the tourist industry and spend more time in their destination than any other demographic (Hornoiu et al., 2019). This means that ecotourists could contribute to the local economy more than any other travelers. Văcărești Nature Park has a program to allow for volunteer activities (D. Barbulescu & N. Marin, personal communication, January 23, 2020). These out of town volunteers are excited to participate in conservation programs in an effort to contribute to the park and they are highly likely to return (Hornoiu et al., 2019). Programs should be developed to include the ecotourist, increasing their involvement in the park will benefit both Văcărești and Bucharest. They will improve the local economy and provide voluntary conservation services for the park (Hornoiu et al., 2019). If programs are in place to attract the young ecotourist, Văcărești and Bucharest can reap the benefits from this group of stakeholders for years to come.

2.6.4 - Property Developers

Property developers have a great interest in Văcărești Park. Whether it be developing the land the park occupies, as it is a substantial amount of space, or investing in developing properties on its edges, developers invest in the land in and around the park. Measures should be taken to convince local property developers of the value the park adds to their land, this is the best argument to maintain the protected status of Văcărești. Green space has been proven to increase the property value of surrounding residential spaces, furthering the push for residential development (Kim et al., 2019). This effect encourages development around parks without impacting the park itself and is a main argument for conservation in the development sector. Since property developers are directly involved in developing the community, they have the power to decide to use best practice suggestions and are a powerful voice for conserving the park.

2.6.5 - Bucharest Residents

The residents of Bucharest are also primary stakeholders in the park. They are not only economically impacted by the park but their health is impacted as well, even if they never step foot in it (Chen et al., 2020). They work in the schools, real estate, and tourism industries as well

as visiting the park for education and recreation. They are also a primary source of volunteers for the park. The best way to connect the public with the park and gain long-term public support is to give them a say in the future of the park (Zogby et al., 2017). Surveys, interviews, and public meetings are all useful tools to gather public opinions which can be used to improve park infrastructure and programs. More engagement with the park could also increase neighborhood pride, which in turn decreases crime and ensures protection of the park.

2.6.6 - Local Businesses

Aside from the wider economic benefits of tourists visiting Bucharest for Văcărești Nature Park there are benefits to be gained by the businesses located directly outside the park. Visitors to the park have the ability to pass shops while traveling to the park and exercising on the perimeter of the park. This increased foot traffic has a positive impact on local businesses; it increases the public's knowledge of the businesses. The park has also led to increased residential and commercial development in the sector (Kim et al., 2019). The increased demand and real estate availability has facilitated the founding of new businesses and the expansion of old ones (Kim et al., 2019). The businesses also impact the Văcărești Nature Park; local businesses who want to positively contribute to Bucharest volunteer in the park (D. Barbulescu & N. Marin, personal communication, January 23, 2020). This provides benefits for the park, the community, and local businesses.

2.6.7 - Hospitals

The hospital located right outside Văcărești Nature Park utilizes the park to improve patient morale and health. Green spaces, like Văcărești, have been shown to improve the mental and physical health of the people who use them (Leng, et al., 2020). The physical benefits are derived from being in the park while the psychological benefits do not require the same level of interaction. The hospital can utilize views of the park to improve patient morale and mental health (Maund, et al., 2019). Light exercise in the park can be helpful for patients with more mobility, assuming there is appropriate infrastructure to maintain the safety of all involved. The environmental benefits of Văcărești Nature Park also have a positive impact on patients; the park improves the air quality which is especially beneficial for patients suffering from respiratory diseases (Younger, et al., 2008).

2.6.8 - Local Authorities

It has been shown in the United States, Brazil, and England that authorities act to appease their constituents and remain in office (Brownstein & Panner, 1992). The same occurs in Bucharest. Local authorities, in a professional context, value the park as a means to appeal to their constituents. Văcărești Nature Park is located between a residential and economic area. The park has benefits for both groups of constituents; parks improve the quality of life for residents near them and Văcărești Nature Park is a tourist draw that improves the local economy. In order to gain the support of the sector population, local authorities volunteer in Văcărești Nature Park and help

support park conservation (D. Barbulescu & N. Marin, personal communication, January 23, 2020). The support of local authorities is extremely helpful when attempting to gain the support of city officials and other authorities (Brownstein & Panner, 1992); it adds credibility to the project and also showcases how important the project is to city inhabitants who are the constituents of the overall Bucharest government.

2.7 - The Role of Green Spaces in Major Public Health Crises

The 2019-2020 Coronavirus pandemic has taken a major toll on countries worldwide. From deaths, economic downfalls, cancellation of schools, travel crises, job losses, the permanent closure of independent businesses, closing of restaurants, and even government sanctioned lockdowns, COVID-19 has had sweeping effects on lifestyle. As of March 2020, the CDC and medical professionals recommended a tactic of ‘social distancing’. Social distancing and city or country-wide lockdowns are an attempt to “flatten the curve” or slow the spread of the virus in an attempt to buy more time for hospitals flooded with patients and medical professionals working on cures and vaccines. Self-quarantine and social distancing procedures will not guarantee an individual safety from contracting the virus, but it greatly decreases the likelihood of transmission.

2.7.1 - Green Spaces during COVID-19 Pandemic

As gyms are shutting down and self-quarantine leads to a sedentary lifestyle, more people have been looking to green spaces to stay active. In Bucharest, military ordinances and local governments have been advising against congregating in large groups, and some parks have been closed (D. Barbulescu, personal communication, April 2020). Văcărești, however, because it is a nationally controlled park, remains open and is one of the few places residents can enjoy.

2.8 - Case Studies: Potential Practices

Our group was able to find many case studies which tackled the issues we are facing in this project but chose to focus on four sites. Looking at these case studies, located in Appendix B, C, D, and E, we were able to pull out many commonalities and identify methods which could be applied to our project.

One practice that has been useful in other parks is surveying local residents and stakeholders for opinions. These opinions can be used to direct the development of the park. In the case of Thessaloniki, they surveyed the locals to collect suggestions on how the urban green space situation could be improved (Zogby et al., 2017). In Paraguay, the school teachers were surveyed for feedback on the education program development (Claus et al., 2018). By collecting surveys from the public, we could obtain and analyze information, feedback, and concerns about the park, which will assist us in determining the best practices for the park that pleases the majority of the public.

Another practice that could be applied to our project is educating the public about wetland

conservation. In the London Wetland Center, programs and workshops with various activities were implemented aside from the traditional classes for students to make sure that the park visitors are educated about the impact of the park (Harden, 2011). In Benjamin Aceval, Paraguay, a teaching program was implemented in the school system with wetland maps and field trips in order to raise awareness in students (Claus et al., 2018). This education aspect could be further implemented in the park development to hold events, field trips and classes to encourage the general public awareness.

In addition, collaborating with other organizations was seen to be good practice. To conserve the ecosystem in the Pantanal and the New York site, the locals have been working with various NGOs to prevent further destruction of human activities (Harris et al., 2005). Thessaloniki site had a similar approach by working with other organizations to improve the green space models in the city (Zogby et al., 2017). Thus, it would be preferable for us to cooperate with other organizations in Bucharest to improve the park further.

Lastly, one method which many sites employed was cooperating with government officials to pass more legislation to promote conservation. In New York, they cooperated with State and Federal partners to revise wetlands mitigation guidance, created a wetlands mitigation banking for public projects, and strengthened wetland conditions (“New York”, 2012). For the case of the Pantanal, the locals and the NGOs worked with the government for passing conservation laws and influenced the industries to take responsibility for waste processing before dumping them into the water of the wetlands (“Pantanal Programme”, 2019). This method, however effective it might be, is deemed to be difficult for us to implement due to the complexity of the political system in Romania.

With these common approaches and the researched background, we gain more insight to what our project looks like and be able to devise a method to help develop Văcărești Nature Park to fit the expectation.

Chapter 3: Methodology

3.1 - Outlining Objectives

As urbanization continues to increase very rapidly in Bucharest, the long-term vitality of the Văcărești Nature Park is at risk. Our group has identified four goals which will help direct our project towards making recommendations for the park to work towards sustainable development. These goals were developed into research questions, from which our methodology was also developed.

Overall Project Goal	Overall Research Question	Overall Activity Plan
Quantify and qualify strengths and weaknesses of the park through stakeholder analysis and technical interviews	How have public and private groups successfully merged conservation and recreational use?	What we will do to assess and implement public park use while maintaining conservation efforts?
Project Objectives	Subsidiary Research Questions	Methodology Plan
(1) Understand the usage of the park and various perceptions	<ol style="list-style-type: none"> 1. What is the impact of Văcărești on public health? Local economy? Education? 2. How can we compile public opinion regarding Văcărești? 	<ul style="list-style-type: none"> • Surveys and Interviews • Livestream Observation • Stakeholder Assessment
(2) Evaluate the role of the park in health crises	<ol style="list-style-type: none"> 1. How is the park used during COVID-19? 2. Have military restrictions altered park attendance? 3. What is the role of various spaces during health crises? 	<ul style="list-style-type: none"> • Livestream Observation • Interviews
(3) Compile expert opinions on park management, green infrastructure, and community interaction	<ol style="list-style-type: none"> 1. What methods have they used to ensure stakeholder involvement? 2. How did infrastructure and public opinion contribute to the success of other parks? 3. How do experts view the current status of the park? 	<ul style="list-style-type: none"> • Case Study Review • Stakeholder Assessment • Interviews with other park managers, city planners, and specialists
(4) Define overall public expectations and grievances	<ol style="list-style-type: none"> 1. How does the public view the park? 2. What do they like about it? Dislike? 3. What do they want to see in the future? 	<ul style="list-style-type: none"> • Stakeholder Assessment • Survey

Table No. 2 - Goals and Objectives

3.2 - Stakeholder Assessment

The first step in gaining public support for a project is assessing current opinion. This has provided a necessary foundation that will help to determine the necessary plan of action for future development, education, or policy change. Common methods for assessing opinions include surveys, interviews, and focus groups. Due to increased restrictions to reduce the spread of the coronavirus, we were limited to online surveys and interviews to reach stakeholders and experts. An additional method used is observation of park visitors, which is less direct than the other methods discussed but provided additional information regarding numbers of visitors, utilization, and usage of the park.

3.2.1 - Surveys

One of the primary methods of garnering data was through the use of a survey. The survey, located in Appendix A, was distributed online in order to encapsulate the general public's views of the Văcărești Nature Park. No in-park surveys were planned at the time of this report due to the global health crisis regarding the coronavirus. We hoped to discern the demographics of visitors and the ways they prefer to enjoy the park. We asked a number of questions regarding likes, dislikes, as well as people's primary use of the park. Examples of park use include physical activity, social events, or nature observation. The survey also provided more information from people who may not use the park as often. It is also important that the survey included a variety of questions about the positive and negative aspects of the park to be as inclusive as possible (Zogby et al., 2017). Asking someone why they do not visit the park is just as valuable as asking someone why they do choose to visit. Having knowledge of what the public dislikes has provided a clear path for improving the park. The information gathered from this survey has been synthesized and then instituted to aid the VNPA in designing improvements that are tailored toward those who use it the most. Also, the procurement of this data allows the VNPA to make a stronger case to the government regarding the current lack of support for the park.

The main challenges associated with surveys are related to distribution and formatting. Distribution that is limited to in-park delivery would contain bias because the opinion of the park visitors may not be representative of the general public; everyone who fills it out will have already visited the park. In comparison, online survey distribution can target the population which does not visit the park (Zogby et al., 2017) A combination of distribution sources increases the reach of the survey, the response rate, as well as allowing for greater diversity of responses. However, we must note that using the Văcărești Park Association's pages to distribute the survey may have also created bias in responses, as it reaches users who already follow or visit those pages or are friends with users who do.

In regard to the formatting of the surveys, care was taken in order to ensure accurate, unbiased responses. Questions were worded to prevent misunderstandings and were constructed in such a way as to not lead responses. One of the major causes of concern with these surveys was that the

questions may be answered incorrectly due to misinterpretation, but this was avoided by ensuring accuracy in both English and Romanian.

3.2.2 - Interviews

Due to the coronavirus pandemic, we were limited to conducting email and Zoom interviews. These types of interviews are easier to coordinate than face-to-face interviews, but they yield less information (Heath et al., 2018). To overcome this challenge, more interviews were performed on both local groups and many around the world. Information from local businesses and NGOs helped to give a more clear picture of the situation in Văcărești, and more concrete information about similar situations around the globe provides a wealth of information for VNPA to use as they wish. Research suggests that group interviews should be avoided as much as possible; people are less likely to share their true feelings when observed by people they know (Chen & Levkoff, 2016). The best way to ensure full, honest participation in interviews is to conduct private interviews using the method that makes the participant the most comfortable. The interview questions must be vetted as carefully as survey questions. The phrasing of a question can ensure a clear, appropriate answer. This will make the information collected more relevant and valuable in the long run.

Interviews were conducted with umbrella organizations and Romanian NGOs to gather information about desired park development. During these interviews, representatives were asked how the park impacts their organization and how they think the park could be improved. This provides insight into personal accounts of park visits as our team was no longer able to visit the park ourselves. For the interviews of organizations outside of Bucharest, the focus was placed on similar parks, their maintenance and stakeholder interaction, sustainable development, and how businesses or organizations interact with green spaces. Interviews conducted with non-Romanians related to general park management as well as finding useful data that may relate back to Văcărești Nature Park. This information does not precisely relate to park infrastructure solutions or improvements, but will help give the VNPA some additional context about ways other organizations have solved similar problems. This could include things regarding public outreach and interaction, or the formation of partnerships with different organizations.

3.2.3 - Long-term Stakeholder Engagement

Coordination between the community and the VNPA is crucial. Numerous studies have found that, “involving communities in the design and implementation of development initiatives increases ownership and sustainability [and those changes are] more likely to be successful and permanent when the people it directly affects are involved in initiating and promoting it” (Kutegeka & Roba, 2012). In addition to initial community collaboration during the planning stages of the projects, the long-term communication with the community is necessary to maintain trust and support. We recognized that our group has only short-term involvement with the stakeholders and the VNPA, so upon completion of our project, we provided our collaborator with the tools and information to

allow for continued stakeholder interaction. In addition, the survey can be reimplemented annually to track shifts in public sentiments. This will assist them in the future as they continue to make plans for infrastructure and management updates.

3.2.4 - Evaluating Park Usage via the Green City Lab Live Stream

In addition to surveys and interviews, our group wanted to evaluate the ways that COVID-19 has affected park utilization. The park was observed through the Green City Lab live stream throughout the week and at varying times. This livestream features a 24-hour video of the northwestern portion of the park. This data was not used to draw conclusions about regular/annual visitor data as the park was only observed for a short period of time, collection dates overlapped with various military restrictions, and the view only encapsulates a portion of the park. Increased self-isolation and social distancing restrictions could potentially cause a decrease in park visitors, but the shift to working from home and gym closures could have also contributed to an increase in visitors. The limitations of the live stream to a corner of the park as well as the lack of a baseline number of visitors prevented our group from making development recommendations based on the usage data we collected. This information, however, can be used to compare to park usage number once the virus threat has decreased in order to better understand the impact the virus had on park utilization, and provide an argument for preserving such spaces for use as safe recreational opportunities during pandemics.

As can be seen in Fig. 3 below, park visitors were identified and catalogued. The number of visitors, their location (perimeter of the park or inside the park), the day of the week, weather conditions, the time, and any major military restrictions were recorded. Once data collection ended, we quantitatively analyzed the number of visitors by these variable time windows and weekday vs weekend. Additionally, as the pandemic progressed and restrictions increased, we looked for trends in the data to reinforce the theory that the park is used for safe recreation.



Figure No. 4, Visitors in the Park, From: the Green City Lab Livestream

In addition to recording the time and day of week information, the weather and light conditions were documented. Using the weather conditions, we looked for trends in park attendance and utilization. We assumed that park attendance will decrease in low light and adverse weather conditions, so making notes of such allowed us to filter the data and remove possible outliers. Additionally, the quality of the video decreased as the sun set, so the reliability of data collection diminished. To combat this, we did not collect data past 8pm. Nighttime visitors also sometimes carried flashlights or had bike-lights which helped us identify them, but visitors without lights were difficult to identify.

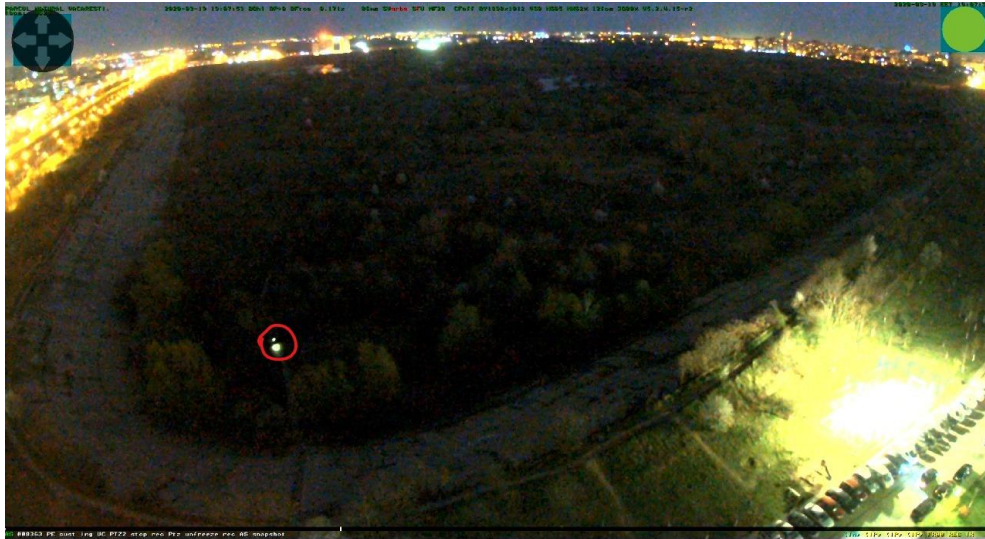


Figure No. 5, Visitors in the Park at Night, From: the Green City Lab Livestream

3.2.5 - Evaluating Future Development Based on Information Gathered

Proper utilization and implementation of the information gathered through the interview, observation, and surveying processes can help facilitate the long-term sustainable development of the park. It is impossible to fit the needs of every stakeholder completely, so in order for us to identify which needs carry more significance, we must fully understand the commonalities between the wants and grievances of the various groups of stakeholders (Cuganesan & Floris, 2020). It was also important for us to evaluate which development options are feasible; various constraints such as budget, time, materials, and the needs of the ecosystems limit the potential development options the park could decide to work towards. Also, because we are outsiders providing recommendations, the insight gained from interviewing and surveying the local residents and NGOs added a level of credibility and acceptability to our recommendations (Turner, 1982).

After collecting the information from the surveys, interviews, and observations, our group synthesized the data to understand the current usage and utilization of the park as well as its shortcomings. The surveys and interviews specifically, helped us understand the various reasons

a potential visitor might choose not to come to the park. Other feedback gathered has provided us with what types of changes the public wants to see. Additionally, the categorization of activities in the park and numbers of visitors, gained through the online surveys and limited observations, allowed our group to identify which areas of the park that had higher utilization and would benefit from an increase in park infrastructure. At the same time, the areas of the park that had less non-academic visitors were identified as areas to conserve.

3.2.6 - Project Website

In order to make our project and its findings more accessible to the public, we created a project website. This included information about our team and the VNPA, as well as our studies, methods, and findings in blog format. The website also featured a dedicated tab for questions in the “Contact Us” section.

In order to develop the website, we decided to use Wix as our platform. This is due to its multifunctionalities, as well as its diverse means and tools of creating an interactive way to convey our project to the general public, while still being a free service. In addition, it also provides a simple user interface that enables people with little background in coding design the website.

The main reasons for developing our website was to engage a larger audience in our project and create a longer lasting impact. Having the website in tandem with our report makes it more accessible for the public, and provides a place to view our studies, logs, and results in an interactive manner. The website also serves to link our project with other teams from the Bucharest project center. It is beneficial for our collaborator and their associated organizations to have access to our work, and also gives our project more visibility to the WPI community as well as any NGOs with similar problems as Văcărești Nature Park. This could in turn help the park gain attention, and raise awareness of potential solutions.



Figure No. 6, WPI Urban Wetland Group Website Home Page,
<https://phuongle5219.wixsite.com/urbanwetland-d20>

3.3 - Ethical Considerations

This project studies humans and has the potential to alter the ecosystem of the park. It concerns green spaces with a fragile ecosystem and has a cultural barrier, so our group stayed aware and attentive to various ethical considerations. Because of this, our group has outlined several overarching ethical goals of which we abided by throughout the entirety of our project.

1. Uphold the ethical standards enforced by the Institutional Review Board (IRB) for ethical conduction of interviews, surveys, and observation.

Although our project topic was generally low risk for information gathering and interviewing because we offer confidentiality to the public, were not recording names or identifying information in surveys, and offered levels of confidentiality to interviewees, it was still our group's best interest to protect the individuals who choose to participate in our study. We recognized that their participation in our research is voluntary, and that they are using their own time to help our project. In return, we did our best to safely store information collected and be as transparent as possible about the purposes of our research.

2. Keep a global conservationist mindset when evaluating infrastructural decisions.

Compassionate conservation is known as the practice of evaluating the intentional effects of humans on the animals in the spaces, however, our group strove to follow *consequentialist conservation* as it, more broadly, covers those impacts found in compassionate conservation, but also the non-intentional effects of human behavior and anthropomorphic pollution (Hampton, et al., 2019). As Romania is still urbanizing and developing very quickly, their national priorities when it comes to conservation may differ from those of other countries. Because wetland conservation is affecting the global scale, however, it was in our best interests to maintain wetland conservation as a higher priority than the infrastructural development in the park.

3. Consider the unspoken needs of the ecosystem.

The public and other stakeholders can vocalize their grievances, whereas the park's organisms rely on spokespeople and environmentalists to fight for their protection. Because of this, our group used the global environmental consensus surrounding proper wetland conservation techniques to ensure the well-being of the park's organisms.

4. Recognize the cultural differences between the US and Romania and work to address them in the project.

Because different cultures may have different ways of solving problems, or recognize varying problems to begin with, it was our responsibility to attempt to best understand the problem statements in the perspectives of our collaborator and the local residents to make

our final report useful for them. This was best accomplished through two ways. Firstly, through thorough background research, then supplemented by interviews and surveys. In addition to this, our group had to stay attentive to word choice, both in our report and when communicating with locals.

3.4 - Timeline of Events

To ensure our project objectives were met and a coherent final deliverable would be presented to our collaborator, our group created a Gantt chart which outlined the dates that each aspect of our methodology was performed. Data collection and interview sourcing was extended to the end of the project term, however these materials collected towards the end of the term were not included in our conclusions and instead simply given to our collaborator.

Chapter 4: Results and Analysis

From March 19th to April 19th, we collected survey responses, conducted interviews, and observed park usage in 30-minute intervals. In this time frame we obtained 237 survey responses, completed 10 interviews, and observed the park for a total of 78 hours.

4.1 - Online Survey

An online survey, located in Appendix A, was published using Qualtrics on March 17th. This survey was distributed using an anonymous link posted to our collaborator's Facebook page on March 20th. This Facebook post is responsible for the initial peak in responses of 216. Also, the Facebook post received 49 shares, 148 likes, and 9 comments.

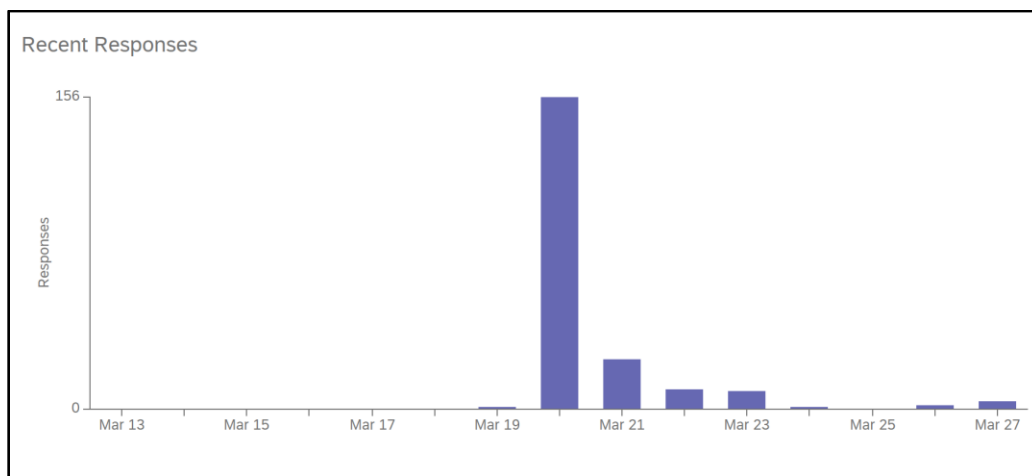


Figure No. 8, Peak in responses due to Facebook post

A second Facebook post was published on April 7th, which asked individuals to take our survey if they had not yet t. This post also contained a thank you video produced by our group. The second post prompted an additional 21 responses. The data below is based off of 237 responses collected between March 20th and April 10th.

It must be noted that because all of the survey respondents were retrieved from either Facebook followers of the park, or those who typically browse the park website. Due to the nature of this project, groundwork was not possible. With this in mind, it is important to understand that the views espoused by survey takers may not be entirely representative of the general Bucharest populace, but of the park's more ardent supporters.

4.1.1 - Demographics of Respondents

The first set of questions in the online survey were demographic-related questions. This allowed us to better understand our survey audience as well as understand differing views based on age group or area of residence. We recognize that respondents who live near the park might have

opposing viewpoints to those who travel to it, as park usage varies in part due to proximity. Those who reported that they do not live near the park generally responded that they rarely visit the park, this makes sense as those who live further away from the park will need to travel more to get to the park.

The age of respondents, shown in the figure below, demonstrates that the majority of our respondents were between the ages of 26-45. To prevent the collection of data of a minor, a selection of 'Under 18' terminated the survey.

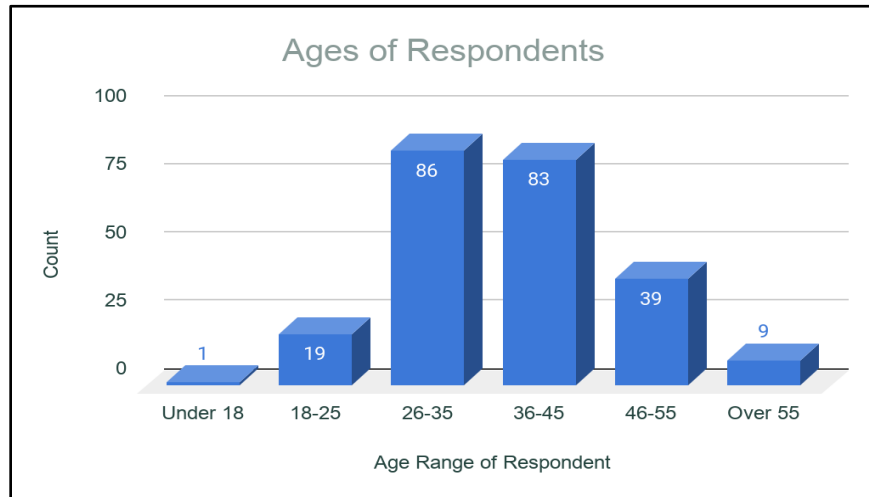


Figure No. 9, Age range of respondents

The respondents were also asked where they live. A definition of distance from the park was not provided intentionally, as we wanted to measure the number of respondents who claim the park as being part of their own neighborhood. We believe these respondents might have a more personal connection to long-term developments in the park.

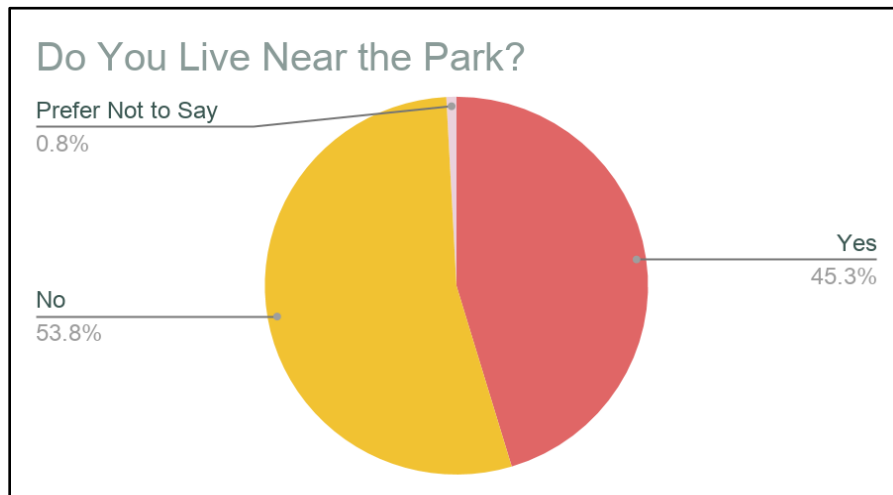


Figure No. 10, Where the survey respondents live

The respondents who do not live near the park were asked to provide more information about their whereabouts, which can be found in the figure below.

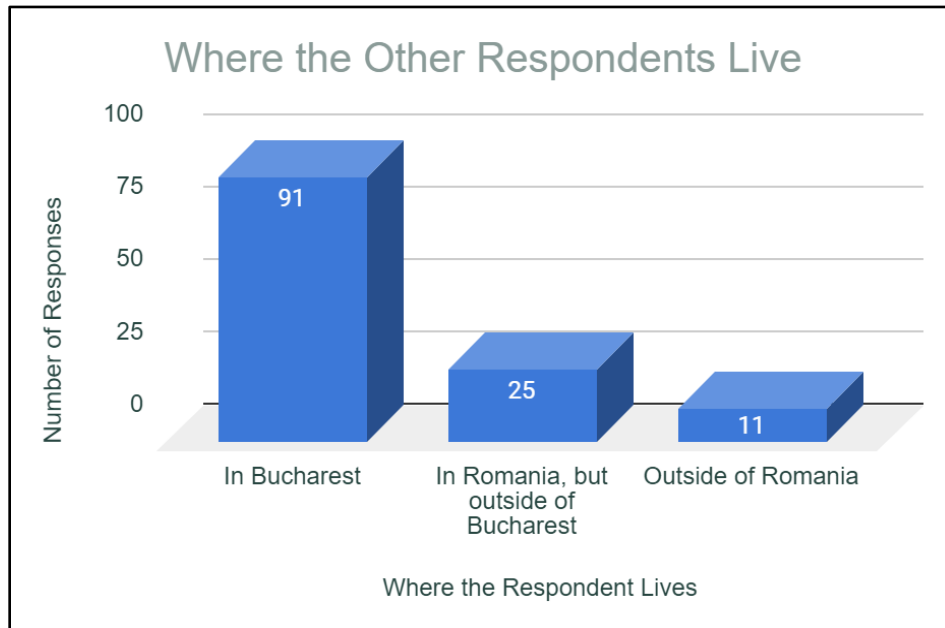


Figure No. 11, Spread of residencies

4.1.2 - Visiting the Park

Understanding the usage of the park is also essential in developing management plans and infrastructure recommendations. These survey questions targeted methods of transportation, frequency of visits, as well as the type of activity in the park. The types of activities done in the park provide an insight into the necessary infrastructure updates. Infrastructure can be used to promote desired activities that are currently less popular, as well as sustain the already popular, desired uses.

Method of transportation was necessary information to collect as it provided insight into the infrastructure needed to sustain current park usage and also allow for growth. For example, large percentages of visitors using personal vehicles could indicate future parking scarcity. The type of transportation can also act as an indicator for which activities visitors will do in the parks; people who bike to the park will typically use the park for biking as well.

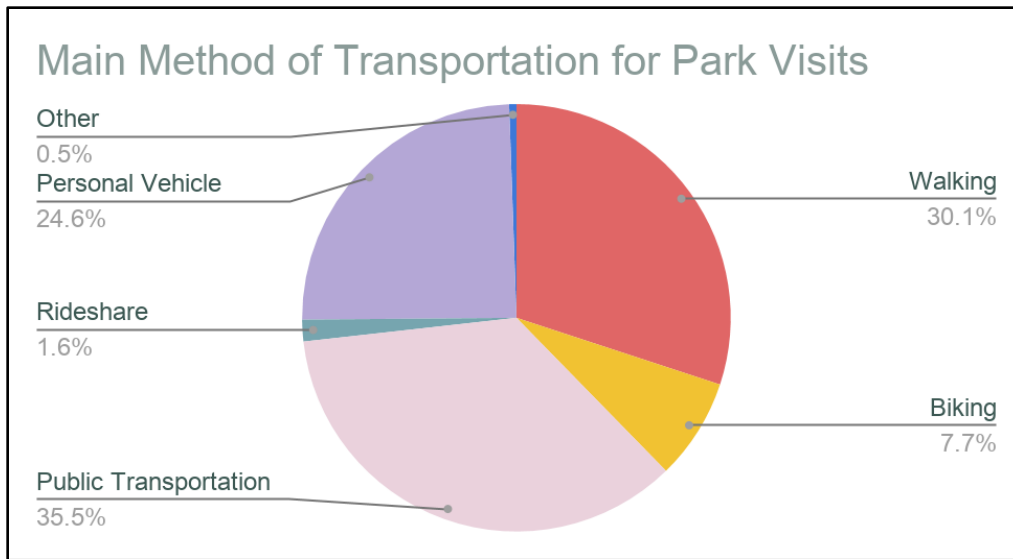


Figure No. 12, Method of Transportation Respondents Use for Park Visits

The figure above indicates that the majority of the park visitors utilize public transportation, rideshare, walk or bike. As the park is located in a residential-urban area, parking is limited, so a lower percentage of visitors bringing personal vehicles means the park can support higher levels of visitor traffic. The VNPA has witnessed an increase in visitor traffic since gaining protection in 2016 and increased public attention, so lower levels of vehicle traffic would ensure long-term sustainment. We do recognize, however, that the majority of the population walking to the park would be visitors who are residents in the neighborhood, so as overall park attendance increases, the total number of visitors walking to the park would not stay proportionate to the graph above, and the VNPA should expect an increase in vehicle traffic. Additional construction of apartment buildings along the perimeter of the park could add additional parking strain, so permit programs and short term parking may want to be considered to keep spaces available for park visitors.

The information collected about how often respondents visit the park also provides insight into the pool of people surveyed. The majority of survey respondents do not visit the park regularly. This could be due to the survey not reaching the pool of people who regularly use the park, or it could be an indication that the park is not accessible or attractive compared to other parks in the area for daily use.

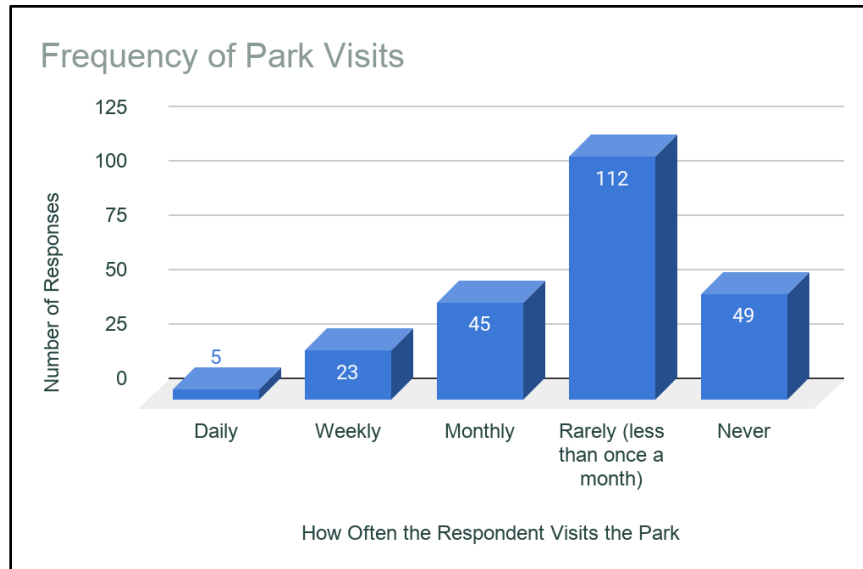


Figure No. 13, Frequency of Park Visitation

The respondents who reported that they never visit the park were redirected to a follow-up question, to determine their reasoning. Common responses include long distance, a lack of security in the park, and a lack of knowledge about park facilities.

Question 6 of our survey asks respondents to select all of the activities for which they use the park. The large number of responses for nature observation and physical activity are representative of the two mindsets we have identified previously; the conservationist and the visitor who yearns for a more structured park. The large number of visitors using the park for physical activity and nature conservation suggests the park would benefit from infrastructure changes that would support those activities. The lower number of responses for educational trips could be due to the fact we were not surveying those generations still in school, so a low response rate in that regard does not necessarily indicate that the park is not serving an educational purpose.

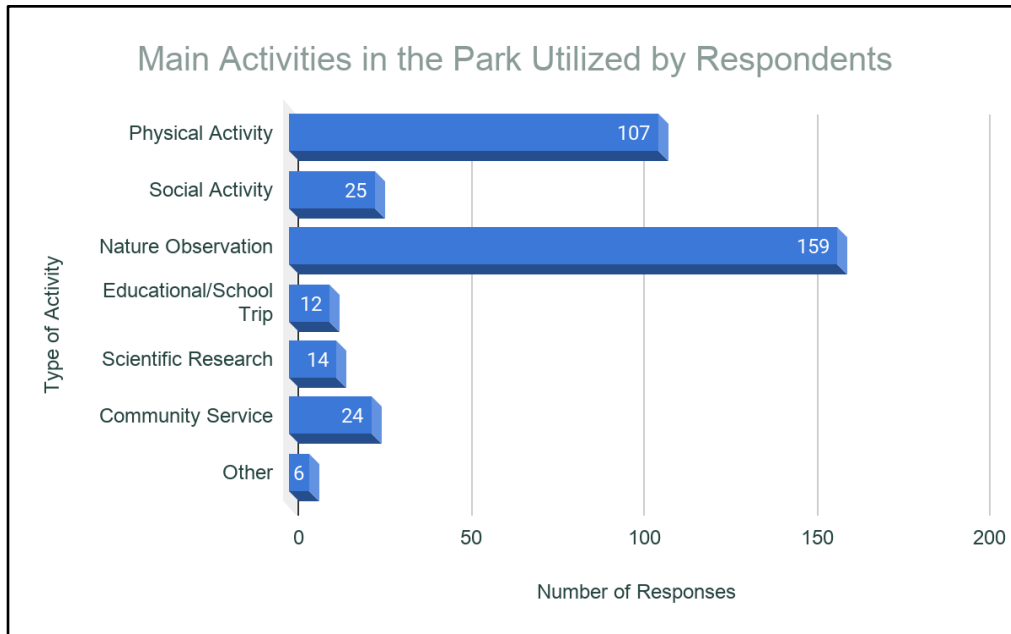


Figure No. 14, Activities Utilized in the Park by Respondents

Similar to the type of activity utilized in the park, understanding whether respondents are bringing children to the park can also help us identify the need for various infrastructure improvements. Children require more specialized infrastructure than adults and adults visiting with children are more concerned about safety than those visiting alone. In this figure, it can be seen that many of the respondents don't bring children to the park (58.5%) or simply that this demographic does not have children. This information could address that it is necessary for the park to develop more infrastructure and safety if they want to expand the park towards children.

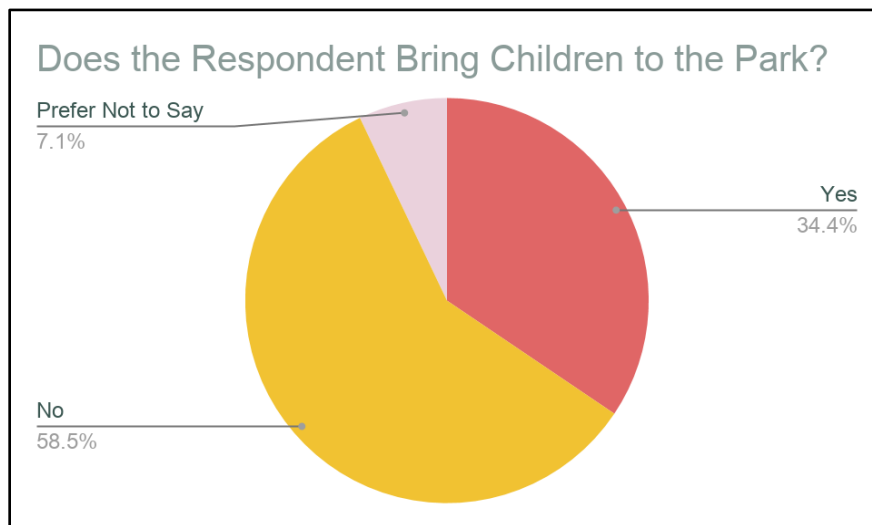


Figure No. 15, Percentage of Respondents That Bring Children to the Park

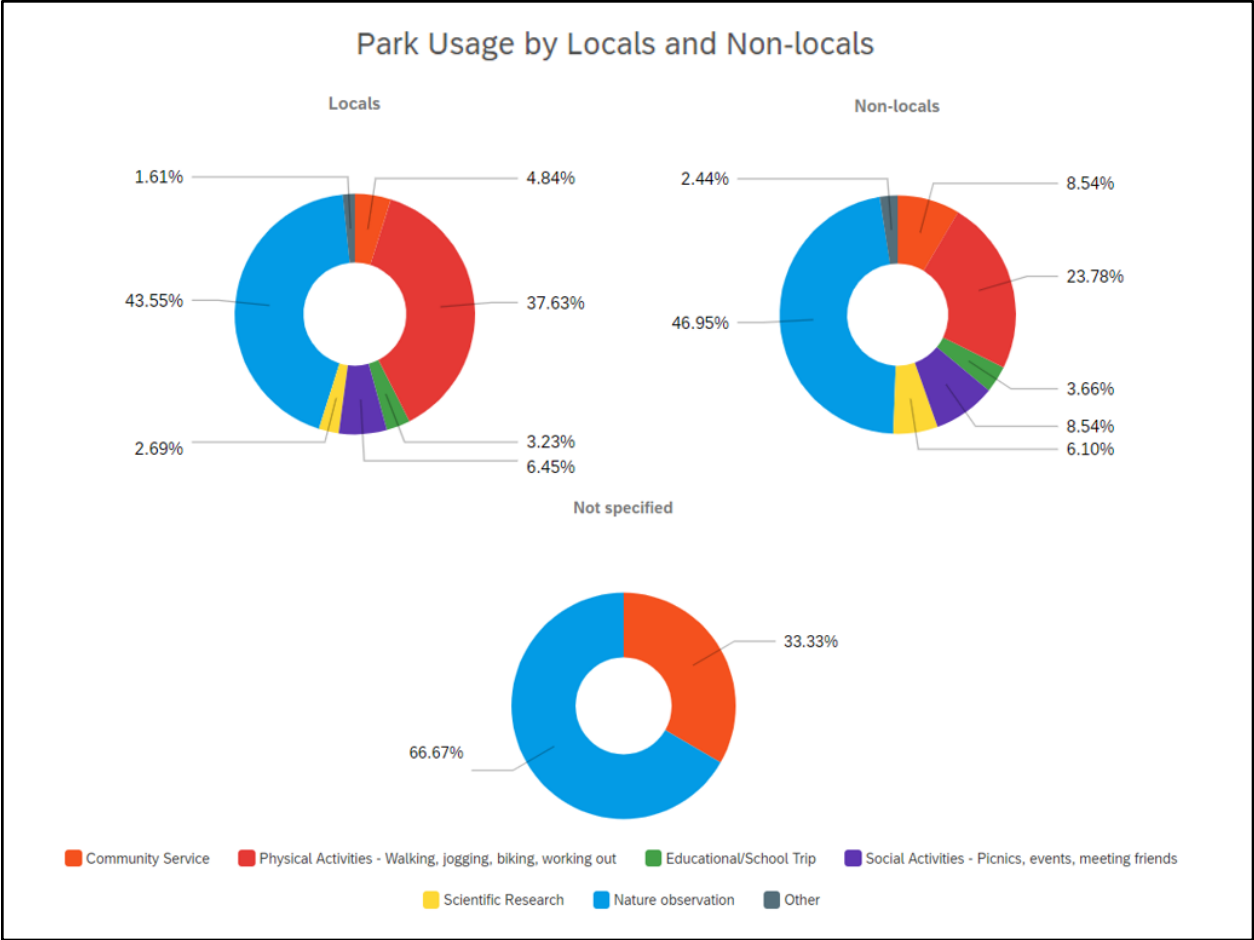


Figure No. 16, Park usage data comparing locals versus non-locals

Figure No. 16 compares the breakdown of the park usage by locals and non-locals. Of the data we gathered, the primary reason for visiting the park is nature observation, with 43.55% for locals and 46.95% for non-locals. The second most common usage is physical activities, having 37.63% of the local respondents and 23.78% of the non-locals. Based on the data above, the locals utilize physical activities in the park at a higher rate than the non-locals compared to other activities in the park. Respectively, the non-locals seem to favor nature-related activities at a higher rate than locals. There is a slight variance in the percentages of the less common activities between the locals, consisting of social activities (6.45%), community service (4.84%), educational (3.23%), and scientific research (2.69%), compared to the non-local respondents, with community service (8.54%), social activities (8.54%), scientific research (6.10%), and educational (3.66%), respectively.

4.1.3 - What People Like and Dislike About the Park

Questions 9 and 10 of the survey were free response questions that asked what people like and dislike about the park. The responses were analyzed for groups of keywords that summarize the

main opinions. Responses included a variety of opinions that were grouped into several keywords, the response was counted for each keyword mentioned.

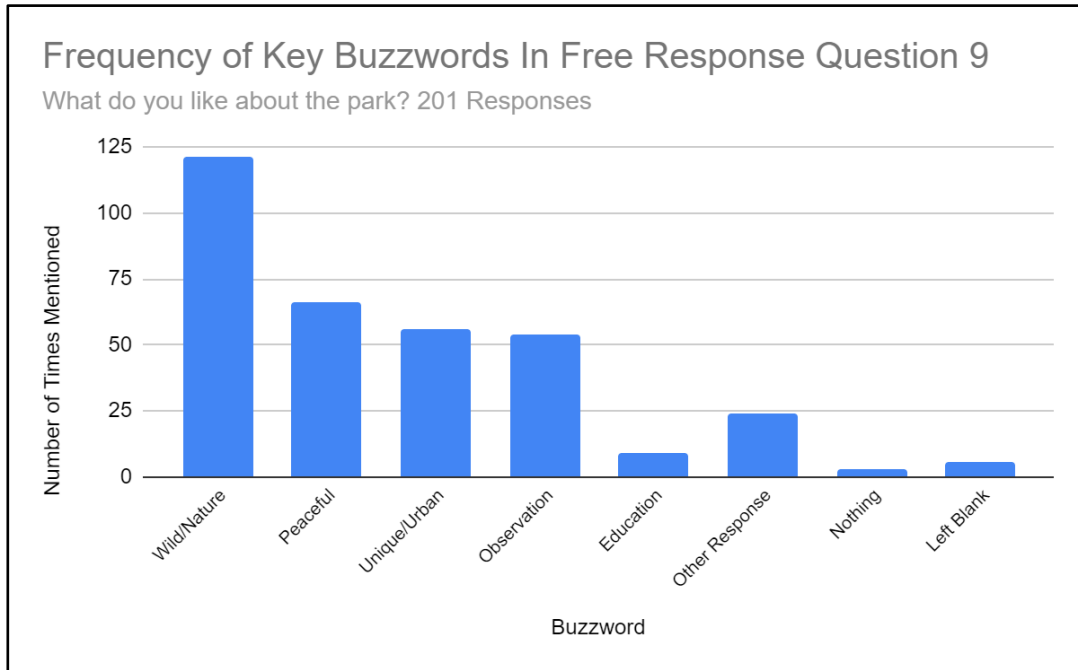


Figure No. 17, Frequency of Key Buzzwords in Free Response Question 9

The first free response question asked, “What do you like about the park?” Of the people who took the survey, 201 provided responses to this question. The vast majority of survey respondents expressed excitement in their descriptions of a “wild, beautiful place” where nature had reclaimed an abandoned area of Bucharest. They like the landscape and the open feeling of the park that makes Văcărești Nature Park seem at odds with the city scape around it. The respondents expressed joy at the fact that nature can endure in such a densely populated city. The second main opinion is that the park offers people “silence, nature, [and] the feeling you’re [escaping] from Bucharest”. It is used by many people to unwind and relax; a common description of the park was “tranquil”. Others responded with passion for viewing the biodiversity in the park, including the foxes, otters, birdlife, and plantlife. A few respondents said that they use the park for recreation, such as biking and walking, however these responses were rare in comparison to the answers for the aforementioned categories. Many respondents appreciate abstract aspects of the park; improving on these areas will not be direct.

Interestingly, a few respondents felt the need to set Văcărești Nature Park apart from other parks in the city. This was mentioned often enough to require a separate category for the keyword Unique/Urban. The park was seen as unique for a variety of reasons including biodiversity and its urban location. One person said of the park, “You get to see wildlife, which is not so common in regular parks in Bucharest. It is also rough, i.e. looks and feels wild, not many people around”. It

seems that the things that people enjoy most about Văcărești are the very same things that set it apart from typical parks.

The responses to question 9 highlight that any future changes to the park should aim to maintain the natural feel of the space. This can be accomplished by minimizing development and ensuring that any infrastructure added complements the natural feel of the area. The final buzzword was geared towards educators and parents. The lack of people who like the educational aspect of the park shows either that our survey missed that group of people or that the educational programs in place at the park need to be more publicized or expanded to include more people.

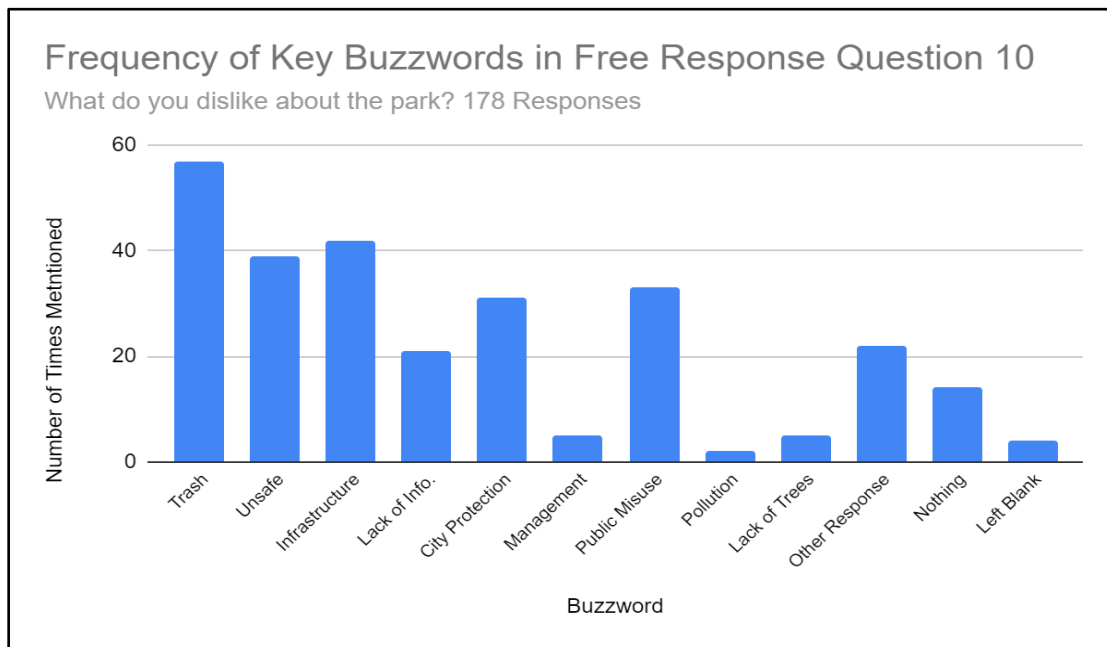


Figure No. 18, Frequency of Key Buzzwords in Free Response Question 10

Question 10 asked respondents what they disliked about the park. These responses were more detailed and diverse than those of question 9 which required more buzzword categories. The survey also revealed that even though the VNPA has cleaned the park recently, the majority of respondents disliked what they view as a large amount of trash within the park. In many people's opinion, it ruins what they enjoy most about the space; the fact that it is a natural area removed from human activity. The park cannot be used as an escape from the city if some people treat it like a garbage heap. One respondent wrote:

Sometimes, it's dirty, because people dump garbage along the trails. Other visitors are noisy and disrespectful, i.e. smoking and throwing cigarette butts, even if smoking is completely forbidden. The very little infrastructure that was put in place by the NGO which administers it is already partially destroyed by humans (i.e. signage, trash bins, bird observatories, there is even graffiti on the signs along the trails). Also, there is a lot of pollution and construction in the area around the park, which impacts wildlife (noise, toxic air, etc.). Occasional fires break out (sometimes, people

start them [intentionally]), and they damage or completely destroy some of the trees. To sum it up, I would say this park exists despite humans, not because of them. The efforts to preserve it are offset by the ignorance, greed and stupidity of the majority of Bucharest's residents.



Figure No. 19, trash at the edge of the park. Provided by Maria Duda from BAZA, debaza.ro

Out of 179 respondents to this question, 55 of them expressed that littering and trash was their biggest grievance regarding the park. Suggestions included increasing the signs around the park that inform the public about park rules, more trash cans in the park and embankment, and some sort of official security, like the police, to monitor the area around Văcărești Nature Park. Others expressed additional concern over the lack of certain pieces of infrastructure, such as benches and paved paths. In the chart above, infrastructure suggestions include improvements to current infrastructure, complaints about damaged infrastructure, and ideas for new facilities. One respondent wrote that they would desire “Several clearly defined paths; more access points to the park; redevelopment of the edge of the dam; the imposition of cleanliness, especially on the edge of the [embankment]”. This is clearly indicative of one of the problems originally encountered by the VNPA. While many people wish to see the park maintain its wild state, some would enjoy additional provisions such as paths, benches, and public restrooms. The main takeaway from that category is that infrastructure that encourages appropriate park usage would be appreciated such as an official sign at entrances, path maintenance, and accessibility for handicapped visitors.

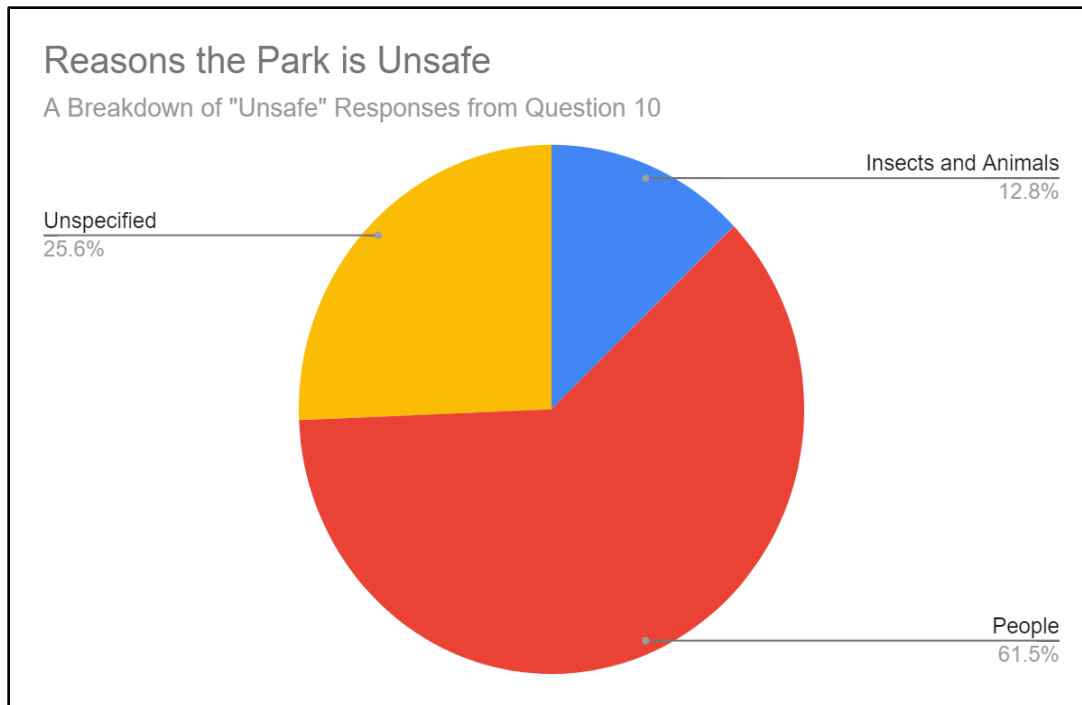


Figure No 20, Breakdown of "Unsafe" Responses from Question 10

Official security was also suggested to address the complaints about park safety. A few visitors expressed concerns not only on the dangers posed to the park, but to themselves due to this missing aid. Additional concerns were expressed over people illegally living within the park without repercussion and public misuse. Public misuse includes trash dumping, drug and alcohol use, and arson within the park or on the embankment. The other complaints either pertained to safety in general or to animals and insects within the park. Of the latter, a majority of complaints referred to ticks and other insects, but a few respondents did mention worries of wild dogs chasing them.

The less concrete complaints relate to information, or lack thereof. Three buzzword categories sum up the lack of interaction: information, city protection, and management. Information is responses that comment on either a lack of personal knowledge of Văcărești or a public lack of knowledge. Management is a lack of understanding of the management of the park and the VNPA. City protection officially relates to any city interaction in the park; this includes police protection and legislative protection as well as increasing the knowledge of public officials about the park. On the topic of increasing public knowledge of the park, some respondents commented that they want the park to remain a sort of neighborhood secret. They do not want more people visiting the park because they believe increased attendance will decrease their enjoyment of the park.

Survey question 6 was directed toward people who do not typically visit the park and asks them for their opinions. The question looked to find dislikes of the park, but also revealed other issues, such as the fact that some people are not aware that the park is open to the public. Some also responded that they are unaware of the valid entrances to the park. Responses to this survey

question also support the view that a significant number of people believe the park is not reasonably safe. Nearly 20% of respondents to question 6 answered that safety concerns were the reason that they do not visit the park.

These answers reveal interesting information about park visitors' opinions and desires. The results indicate that people very much enjoy being able to go to a place which is secluded from the larger, busier world of the city. The likes of park visitors, such as the appreciation for the natural, wild, and quiet state of the park directly correlate with their dislikes. Their grievances address issues that detract from the aforementioned quietness and ‘tranquility’ of the park. The presence of trash and noisy people ranks at the top of the list for dislikes of the park. Going forward, to appease park visitors, a recommended strategy for the VNPA is to play to these perceived strengths of the park. Doubling down on the peace and quiet in the park by providing certain infrastructure updates, such as a fence, or as one respondent suggests, a natural barrier made of trees and vegetation, will appease their ardent, environmentalist supporters, as well as the majority of people who are simply looking for an escape from the city.

4.1.4 - Conservation vs Infrastructure

The survey asked respondents to rate their views and vision for the park on a sliding scale of “Conversation vs Infrastructure”. The results of this question are shown in the figures below.

AS of 4/10/2020		Q2.1: What age range do you belong to?					
12:52 PM EDT		Total responses	18-25	26-35	36-45	46 - 55	Over 55
Q2.11_1: Which of the following best fits your current view of Vacaresti Nature Park? The park should...	Total Count	204	17	66	79	35	7
	1 - Most conservation focused	42.70%	40.00%	32.60%	49.40%	52.50%	44.40%
	2 - Somewhat Conservation Focused	18.40%	25.00%	20.90%	16.90%	12.50%	22.20%
	3 - Neutral	7.90%	10.00%	5.80%	8.40%	12.50%	0.00%
	4 - Somewhat infrastructure focused	9.20%	10.00%	9.30%	12.00%	5.00%	0.00%
	5 - Most Infrastructure focused	7.10%	0.00%	8.10%	8.40%	5.00%	11.10%
Average view of Infrastructure vs Conservation by age range on a 1-5 scale		2.1	1.9	2.2	2.1	1.8	1.9

Figure No. 21, Comparison of View of Conservation mindset by Age Range.

The data shows that out of 204 respondents who responded to question 11, the majority favor a conservation focus on the park, with 61.10% stating that they want the park to focus on conservation in some way. A majority of each age group falls to the conservation side of the question. This is a result that generally seems plausible, as the survey was disseminated through the VNPA’s Facebook page. Members of the Facebook page are more likely to support the park and conservation methods than the general public. The VNPA Facebook page attracts a greater number of conservation minded individuals than the general public.

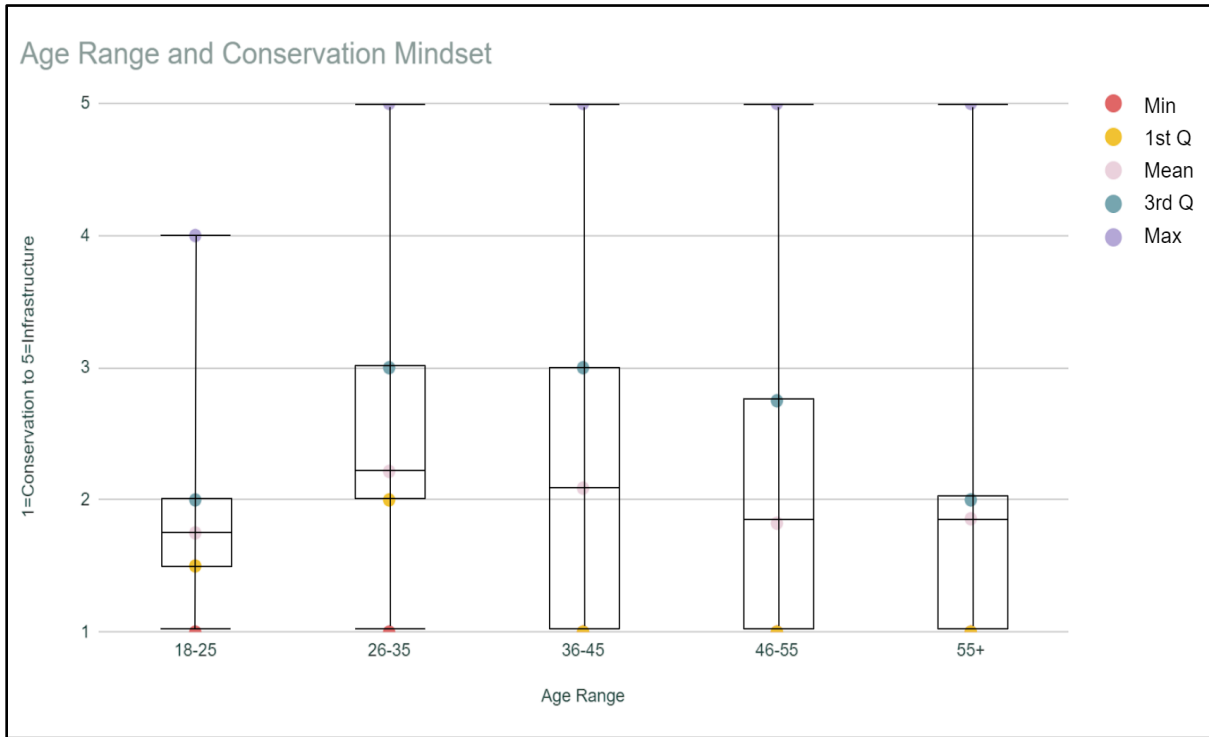


Figure No. 22, Histogram of Conservation Mindsets

In another visualization of the same data from the chart above, this data demonstrates that different age ranges, particularly older supporters have different commitments to conservation. While the mean response for all age groups lies within conservation, there are some major outliers that suggest that outside of direct supporters of the park, wider opinions exist which extend to the other side of the spectrum. This shows that some Bucharest residents would want the park to be developed to have more robust infrastructure.

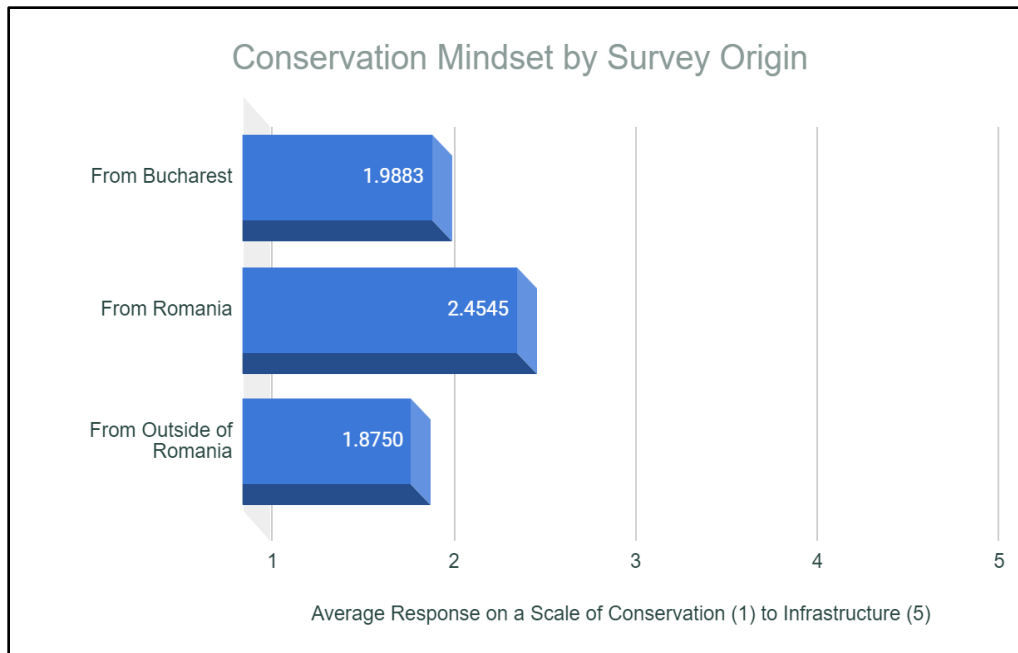


Figure No. 23, Average Conservation Mindset Score by Survey Origin

Another important factor in the rating of conservation mindsets is location. Respondents to the survey hailed from many places, which is evidence of the VNPA’s distributed support and connections internationally. Interestingly, the overall conservation mindset, reported by respondents, varies significantly. Respondents that are from Bucharest have an average response of 1.988, which translates to a medium interest in a conservatory focus for the park. Those that responded that are from Romania but not Bucharest have a much more neutral view, with an average response of 2.454. This suggests that respondents are either unsure of conservatory focuses on the park, or have a larger interest in seeing infrastructure in the park. The final group, those outside of Romania, consist of supporters. This group is the most supportive of a conservatory mindset, with an average result of 1.875, suggesting that these people might want to keep the park as is, or that they want the park to remain as wild as possible, as indicated in several free responses. It is important to note that this group is likely biased toward conservation as it is likely that people who follow a park’s Facebook page are going to be more interested in the park as a conservation project, rather than a park for physical activity as locals might see it.

4.1.5 - Compilation of Public Suggestions

The most interesting responses were provided to question 12. This free response question asked respondents what would increase their enjoyment of the park. As with questions 9 and 10 the responses were analyzed for keywords which were categorized and graphed.

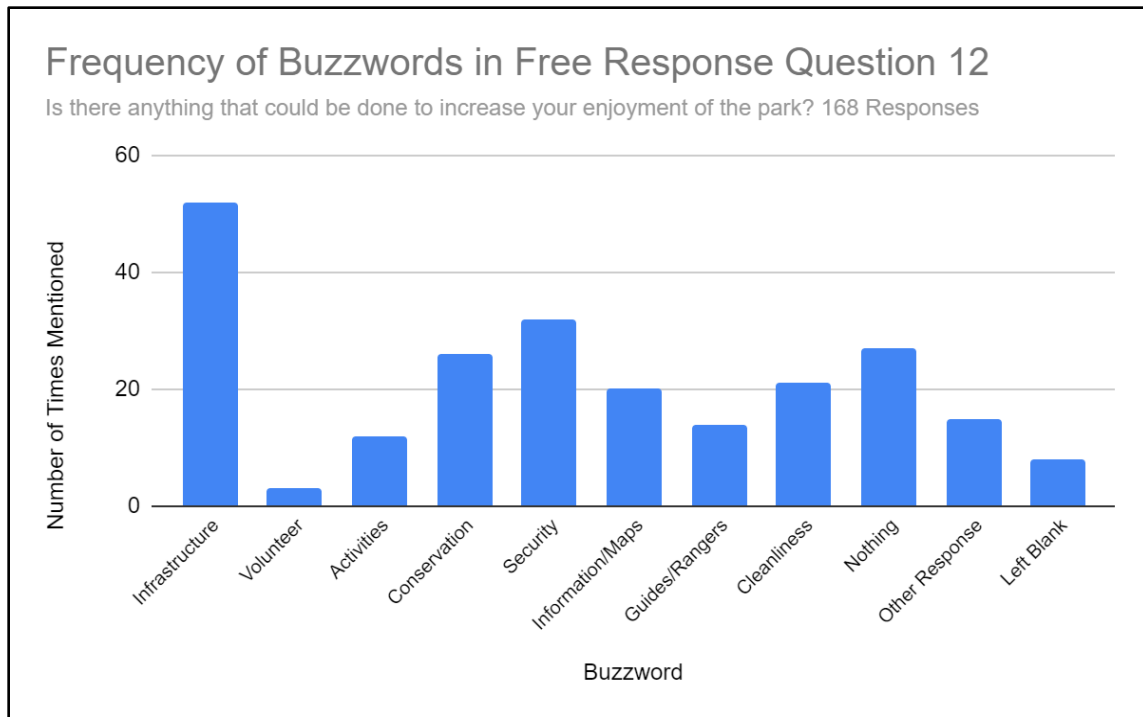


Figure No. 24, Frequency of Key Buzzwords in Free Response Question 12

Question 12 was used to gain suggestions to address the complaints mentioned in question 10. The main suggestion was improving park infrastructure - chiefly, the people want more trash cans. Other suggestions include more guides or rangers in the park to assist with information, signs and maps informing visitors of rules, trails, and wildlife, and increasing park security. There were also a lot of remarks related to conserving the area through planting native species or protecting animals. Some of these suggestions included more volunteer, education, or community engagement activities to allow the public to interact with the park in a productive way and help with conservation. The community wants to be involved with the park either through schools, volunteering, or guided activities in the park. In the follow up question, “Do you have any other questions, comments, or suggestions?”, one respondent specifically asked for information about volunteering in the park. Like in the previous question, there were respondents who wanted to limit access to the park. One suggestion, included below, shows how seriously people take park safety and wish to maintain the tranquility of the park.

As few groups of visitors or groups as possible are made up of a maximum number of 10 people. Visits to be carried out at reasonable times (not at 8-9 in the morning and not on weekends). There's a lot of noise, especially when they're kids!

The park visitors who go for the tranquility of the area are nervous about improvements increasing park attendance and they reiterated this fear in question 12. They are also concerned that more people will negatively impact the ongoing conservation efforts. We also asked participants if they had any comments, questions, or suggestions. This was intended to be used to improve the survey

however most of the responses were a reiteration of answers to question 12. A full list of free responses can be viewed through the link in Appendix F.

4.2 - Live Stream Observation

Using the Green City Lab live stream of the park, our group members observed the northeast corner of the park in 30-minute intervals for a period of three weeks. The data we present, therefore, is just representative of that portion of the park and does not represent overall park attendance for those time frames. We evaluated variables such as weather conditions, temperature, day of the week, and time of day on park attendance. We began the data collection before COVID-19 restrictions were put in place, so curfew, health concerns, working from home, gym closures, and other factors all affect the data.

4.2.1 - Park Usage and Temperature

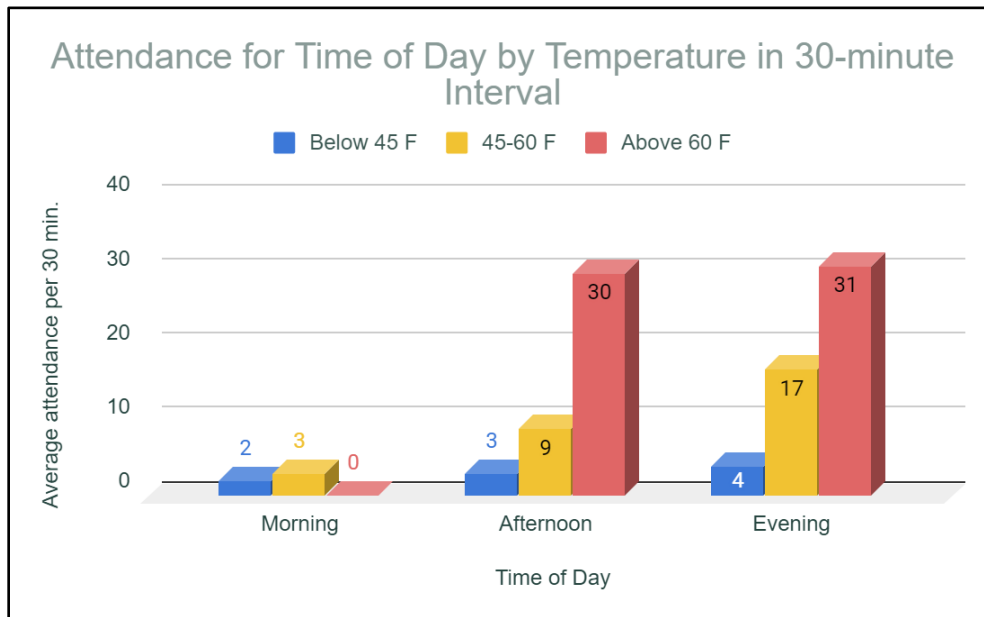


Figure No. 25, Attendance Based on Time of Day and Temperature

The above graph illustrates the entirety of our data from March 19th to April 19th. Based on the data above, there is almost no attendance in the morning from 6 AM - 11 AM regardless of temperature, and there is substantially more attendance in the afternoon from 11 AM - 4 PM and evening from 4 PM - 7 PM. It is also shown that there is a more significant turnout when the temperature is warmer, above 60° F. In addition, the turnout is diminished when the temperature is below 45° F, and less than 5 people can typically be seen in the park during the 30-minute period.

4.2.2 - Park Usage and Military Ordinance 2

Military Ordinance No. 2 was the first ordinance to limit unofficial gatherings of citizens to no more than three people who do not cohabitate. Military Ordinance No. 1 only limited official events over 100 persons, businesses, and travel which did not have major implications for park attendance. Subsequent Military Ordinances have increased restrictions on informal meetings and leaving home. We decided to analyze before and after Military Ordinance No. 2 as opposed to these other Ordinances because they are extensions of the second Ordinance and did not have the drastic impact of Ordinance No. 2, nor were they as severe.

The figure below analyzes the effect of the military ordinance on the park visitation on two similar days. Since Văcărești Nature Park is nationally protected, measures taken by the city of Bucharest to close parks did not impact its operation and only the Military Ordinance is studied here. The two days chosen were Friday, March 20th and Sunday, March 29th. These days had similar temperature trends in that they stayed within 5° of each other throughout the course of the day. These days were categorized, under our system, as warm days, and were ~40° F in the early morning and reached a temperature of ~70° F by the late afternoon.

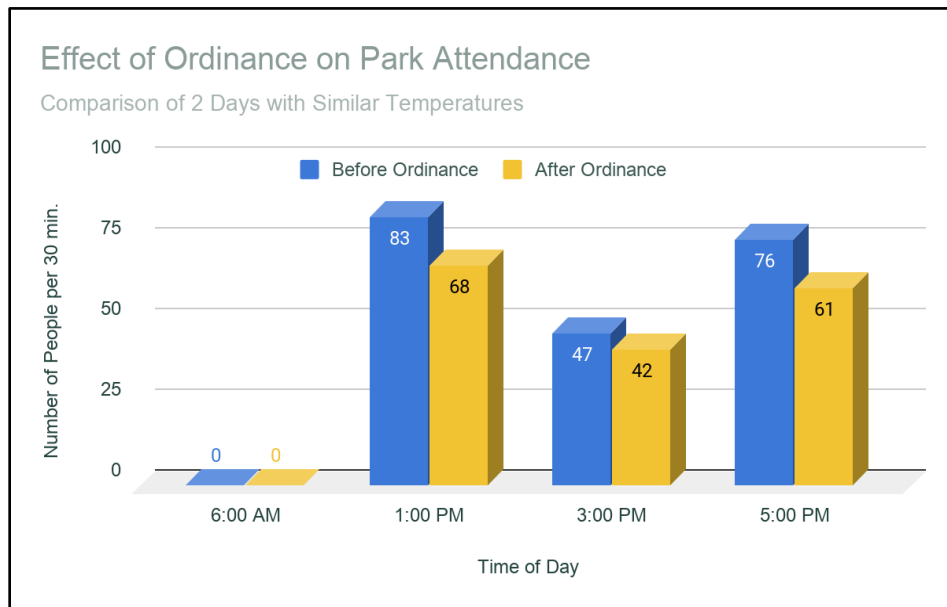


Figure No. 26, Attendance Based on Time of Day Before and After Military Ordinance 2

The ordinance seems to have had some effect on the overall park attendance despite not being closed to the public. This however, can be further analyzed by the graph below in Figure 27, which illustrates the changes in visitor traffic before and after the ordinance by temperature groupings. The contrast is most stark in the warm day data, as the visitor traffic drops by more than half.

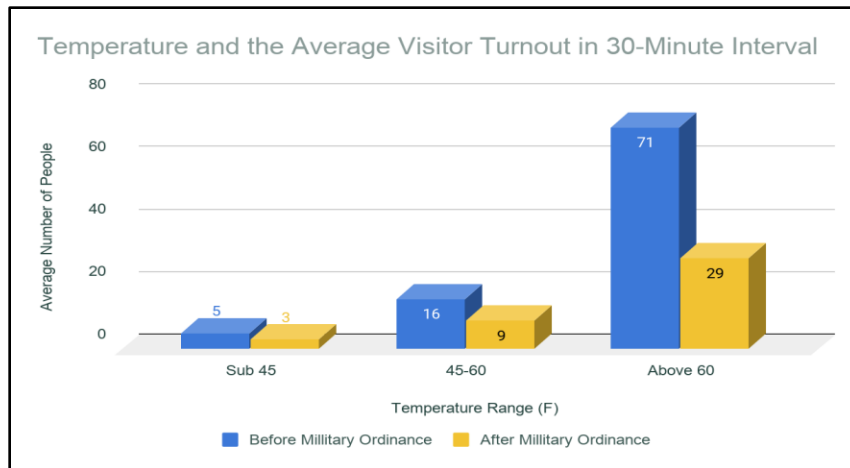


Figure No. 27, Attendance Based on Temperature Before and After Military Ordinance 2

4.3 - Interviews

All interviews took place over email or zoom and were arranged through email. Introductory emails were sent out to 58 individuals and organizations with contacts obtained through research and recommendations from our collaborator. Individuals and organizations were sourced for both Bucharest and US contacts, however, they all act as representatives of various stakeholder groups or are experts in their fields. Of those 58 introductory emails, we received 28 responses including 24 who agreed to doing interviews. Of those, we received final responses from 10 interviewees. A compilation of transcripts and interview recordings can be accessed through a link in Appendix F.

4.3.1 - Zoom Interview with Ryan Woods

An interview with Ryan Woods, the Commissioner for Boston Parks and Recreation, was conducted over Zoom on March 25th, 2020. Ryan Woods has a long history of working in Boston Parks and Recreation and started his career running community meetings. He is now overseeing Boston’s 287 Parks Department Employees and 331 properties. In this interview, group members discussed Boston’s stakeholder communication methods, communication between organizations, park upkeep and maintenance procedures, urban green space protections in place, as well as future development plans for Boston and NYC. Woods also talked about achieving a balance in cities between urban development, history, and green spaces. One potential issue our group has recognized over the course of this project is a divergence in stakeholder opinions; the park also has a long history of different development plans. Today, as the park is nationally protected and is no longer at risk to developers, the spectrum of stakeholder opinion spans from investing in infrastructure to make it more of a community park to investing in conservation strategies and wetland management. Mr. Woods, who started with Boston Parks and Rec by running community meetings, provided guidance by stating, “you can’t make everybody happy [...] you just gotta know that you're doing the right thing for the right amount of people - that you're trying to do the best thing for the greatest need” (R. Woods, personal communication, March 2020).

4.3.2 - Zoom Interview with Stephen Mantoiu

Stephen Mantoiu, the Director of Asociația Wilderness Research and Conservation Programul in Bucharest, was interviewed over Zoom on April 2nd. Stephen and the Asociația Wilderness work with bats and other animals in the park. He also acts as a part of a consultative council for the VNPA. In this interview, group members discussed the collaboration between Asociația Wilderness and the VNPA, the quality of animals treated from the park, as well as Mantoiu's first-hand description and experience with the park. Stephen noted that the park is a great place for birds, but the small mammals he has taken from the park are often in rough shape (S. Mantoiu, personal communication, April 2020). Because the ecosystem is still relatively new, the park does not have all of the safeguards and stability small mammals need to thrive. Although foxes and otters are present in the park, they are essentially trapped because of how detached the park is from outside nature, whereas birds can fly away as they choose. In addition, he reports that the small mammals are sometimes found dead on the roads surrounding the park. The fires set in the park have caused significant harm to the animals. Stephen also noted the trash dumping in the park which was consistent with those responses of other interviewees and the survey respondents.

4.3.3 - Zoom Interview with Cristian Ioja

Professor Cristian Ioja, from the University of Bucharest Regional Geography and Environment Department, was interviewed via Zoom on April 13th. Professor Ioja has done research regarding green infrastructure and has also worked with Văcărești. To prepare for the interview, Professor Ioja presented the group with a chapter about the planning and use of Văcărești Nature Park from a paper he collaborated on entitled "Bridging the people-nature divide using the participatory planning of urban protected areas" (C. Ioja, personal communication, April 2020).

The interview itself was focused on how different stakeholder desires are used in the park planning process and how Văcărești can balance the needs of the nearby residents and the needs of the flora and fauna. Professor Ioja also provided insight into the fires in Văcărești.

... in Romania, in the rural area, there are many people that consider that if you [burn] the wetlands, you clean them. In the next year, the mosquitoes will not have the consistent population...

This indicates that the fires we assumed were arson could have cultural motivation. A culturally motivated burning can be prevented with education while arson cannot be prevented without the assistance of law enforcement. The other main takeaway from this interview was the importance of education in balancing social and ecological infrastructure. He said that there has been a shift in education since the Communist era, "If I compare what they do in the school of my daughter or my son, it is completely different than what I learned in the school". Education is placing a greater emphasis on conservation than in previous generations in part due to the end of Communism in Romania.

I learned in the Communist time that you need to control the nature, you need to use all the resources from the nature, you need to assure the progress of the society. Now the idea is you need

to be careful with the insects, you need to be careful with the birds, you need to be careful with the plants.

This education of the younger generation will lead to a greater appreciation for the potential of areas like Văcărești. Professor Ioja said that currently Văcărești needs a lot of restoration for the ecosystem to become anything exceptional but with work, planning, and education it has the potential to become a wonderful green space in Bucharest.

He suggested that the land should not be left completely natural; invasive species should be removed and land should be developed for community engagement. The extent of this engagement has not been fully decided but some ideas provided by Professor Ioja include an educational lab or community garden. The goal of these spaces should be to promote education and appropriate use of the land.

The final suggestion provided by Professor Ioja was for the city of Bucharest as a whole. Currently Văcărești Nature Park is a “trap for animals”; they get stuck in the park because there is not a safe way for them to leave. He recommends that Bucharest develop a green pathway through the city to allow animals to enter and exit safely. The area around Văcărești Nature Park includes a power plant, a landfill, a green house, and a wastewater treatment plant. This means that the foxes or other animals trying to leave Văcărești head towards the residential area or main roads. Decreasing the interaction between animals and people in residential areas will increase the safety of both the residents and animals. A safe path out of the city will allow the animals to move outside of Văcărești without heading into residential areas.

4.3.4 - Email Interview with Mihai Razavan Nita

Professor Mihai Razavan Nita, from the University of Bucharest and the Center for Environmental Research and Impact Studies, was interviewed over email. Professor Nita specializes in green infrastructure and ecosystem services and has done research on green space networks in Bucharest. In this interview, group members emailed Professor Nita about using park infrastructure to balance the needs of Bucharest residents and conservation. The park has “the potential of forming the core area of the green space network in Bucharest” (M. Nita, personal communication, April 2020). This network has been mentioned by other experts however, implementation will be challenging due to the lack of urban planning legislation and enforcement in Bucharest. Associations like the VNPA will have to continue working hard to overcome the conflicting stakeholder needs and bureaucratic red tape that currently prevents an overarching urban plan for the city of Bucharest.

4.3.5 - Email Interview with Alexandra Damian

Alexandra Damian is a Communications Officer for WWF Romania, with a background in education and communication. The email interview with Alexandra gave insight into finding the balance between accessibility throughout the park and conservation, as well as personal insight into the strengths and weaknesses of the park. Alexandra notes that, “having access to public green

spaces in cities like Bucharest is a great benefit for the community” (A. Damian, personal communication, April 2020). She also talks of the potential the park has to expand its educational influence if additional rangers were to strengthen their existing programs and events.

4.3.6 - Email Interview with Andreea Raluca Slave

Andreea Raluca Slave, a PhD Student in the Faculty of Geography at University of Bucharest, was interviewed over email in late April. In the interview, group members discussed her perception of the park and how to balance conservation and community.

Her descriptions of the park were consistent with public opinions we gathered through our survey in that she addresses both the importance of “maintaining the connection between people and nature” in urban areas, but also the apparent need for the park to “become a safer place for the visitors” (A. Slave, personal communication, April 2020). Additionally, regarding balancing conservation and development, she notes that the park provides a unique opportunity for education and organized activities. With willing participants and properly managed programs, these activities can educate the public regarding conservation and the services that the park provides. This is necessary to achieve the balance between conservation and infrastructure which is so hard to reach.

4.3.7 - Email Interview with Walter Mugdan

Walter Mudan is the Deputy Regional Administrator at US EPA Region 2 and the President of Udalls Cove Preservation Committee. Mr. Mugdan was interviewed over email in late March. Udalls Cove was chosen because of the similarities to Văcărești; both park associations struggled gaining property ownership and protection early on, and both deal with trash, dumping, and invasive species. Advocacy work for Udalls Cove began in 1969, and luckily for them, this was a time when national and state environmental protection legislation was gaining attention. The park’s creation “was well received by local residents and, ultimately, by local politicians” (W. Mugdan, personal communication, April 2020). However, they are still dealing with property ownership issues as, nearly 50 year later, there are still 2 acres of privately owned land within the park’s boundaries. This shows that Văcărești’s ownership issues are not entirely unique.

Similar to Văcărești Nature Park, Udalls Cove had also had issues regarding waste dumping, and has since “focused [their] attention on improving the park infrastructure by removing rubbish, removing waste concrete, establishing and maintaining trails, and building foot bridges over streams and wooden walkways over perennially muddy sections of trail [as well as installing] split rail fencing and wooden guard rails along the boundaries between the park and adjacent streets”. These updates, as well as some nesting boxes have cost the committee roughly \$250,000 over the past 20 years, supplied by donations and grants. The trash and perceived unsafety of Văcărești Park are a major concern for park visitors, so a similar approach may prove useful for securing more support and future funding, particularly the membership system mentioned.

Mr. Mugdan also provided helpful insight into how the Udalls Cove Preservation Committee ensures the needs of the local community are met. In the interview, he noted that, “We try to achieve some diversity in our Board of Directors membership, so that different parts of our community are represented.” This tactic is well reflected in Văcărești’s use of a consultative committee. Additionally, to be able to collect direct feedback from residents, both Udalls Cove and Văcărești Nature Park utilize Facebook pages.

4.3.8 - Email Interview with Gabriela Manea

Professor Gabriela Manea, from the University of Bucharest’s Department of Regional Geography and Environment, was interviewed over email. She has done research in sustainable tourism and planning, and has published a paper about Integrative Management in Bucharest, using Văcărești as a case study. The interview with Professor Manea covered the topics in her publication, how to approach divergent stakeholder interests, how to find the balance between adding infrastructure and ecosystem conservation, as well as her first-hand experiences with the park.

Through her publication, she has become very familiar with the park, to which she refers, “a green-blue oasis, to which nature itself contributed” and “a natural breach, in the middle of a metropolitan area, in a continuous expansion, with a high density of houses, inversely proportional to the oxygenate-blue-green surfaces” (G. Manea, personal communication, April 2020). The diversity of activities utilized in the park contribute to the park’s uniqueness, but also some of its problems. Professor Manea recognized several target groups; the families with young children who are interested in nature and treat it responsibly, the teenagers who predominantly use the park for physical activity and delinquent opportunities, and the groups interested in environmental appreciation (ie sport fishing and bird watching), and also those responsible for dumping and setting fires to the park. Manea urges that “the park administration should find solutions to identify the perpetrators of vandalism and drastically sanction them.”

Additionally, in discussion about the balance between conservation and development, Professor Manea speaks about how much the VNPA has done to protect the wildlife, but exclaims that no matter what you do it can be difficult because, “unfortunately, there are still visitors who circumvent the rules set by the park administration.”

4.3.9 - Email Interview with Florentina Ruiu

Ms. Florentina Ruiu is an English teacher at School 113 in Bucharest. School 113 has tried to organize outings at Văcărești Nature Park for their students. Ms. Ruiu believes that these outings are important because they allow students to learn about their home, nature, and the importance of volunteering and supporting their passions (F. Ruiu, personal communication, April 2020). She has attended educational events at Văcărești and said that expanding these programs to include more than flora and fauna would be a great way to increase the educational value of Văcărești. Currently geography and science classes utilize the park as an educational tool but Ms. Ruiu sees value for history classes and younger children as well. She also mentioned that in order for teachers

to feel comfortable visiting the park with students they would need at least one ranger to assist with teaching about the area. This interview provided us with valuable insight into the educational uses of the park as well as a better understanding of the local opinions of the space.

4.3.10 - Email Interview with Maria Duda

Maria Duda from BAZA was interviewed over email. BAZA is an NGO in Bucharest comprised of a multidisciplinary team working towards making Bucharest a more livable city. Maria and the rest of the team - Matei Bogoescu, Alexandru Belenyi, Irina Niculescu Balenyi, Stefan Hillerin, and Raluca Niculae - come from diverse backgrounds of architecture, urban planning, filmmaking, law, art, and teaching, which prepares them to tackle community issues and achieve more holistic solutions. In the interview with Maria, group members discussed urban regeneration in Bucharest, the role of green spaces in communities, evaluating community needs, as well as Maria and the team's visit to Văcărești.

In Bucharest as a whole, Duda and her colleagues had recognized the need for urban research long before their NGO's establishment in 2016. The period of urban regeneration in Bucharest has opened up a lot of potential, but Duda warns that the city's "lack of data makes it vulnerable to faulty development" (M. Duda, personal communication, April 2020). The city's unique culture also can make community projects hard; "importing methods, projects and ideas from other cities does not work on Bucharest's cultural context - we need to evaluate on site each bit of street, interact with its users and negotiate its development". This makes it especially important for BAZA to evaluate community needs for each project. Like Ryan Woods from Boston Parks & Rec, Duda notes that "[you] cannot satisfy everybody all the time or at the same time." It is important to listen, understand, and evaluate input. With experience and attentiveness, "the professional has the tools to decide, and the empathy to understand the consequences of the decision."

Maria and her students traveled to the park in 2016, so the infrastructure has since been updated, but she describes her trip as entering the park through a crack in the fence as to, "no surveillance, no information board, [and] no maps." She describes, "several marks of human trails - wrappings, garbage sacks and plastic bottles thrown around the rim," but, "the delta however seemed extremely peaceful, although noisy with birds and insects - like a distant world, reminding [her] of The Zone in Tarkovsky's [movie,] Stalker". The group continued around the park, passing through another broken fence and "an uninterested bodyguard that asked [them] nothing". Duda recognizes the work that the VNPA and others have done to elevate the park since then, but she still worries for the surrounding area as communities there have been "chased away, and their land used for building very dense high rise blocks of flats. The whole area is now surrounded by high opaque fences and the entrances guarded by police cars."

Chapter 5: Recommendations and Conclusions

5.1 - Recommendations

Through this research, we have found that the park remains an important landmark for the city of Bucharest. Its uniqueness and its diverse wetland is what makes it so special to park visitors. Moving forward, we have identified two distinct sections of recommendations for the VNPA entitled park services and public misuse. Park services relate to direct actions the park takes to preserve the environment, as well as to make park visitors happy. This would include the upkeep of park infrastructure and ensuring the park ecosystem remains safe and includes ways to improve going forward. Public misuse is related to the ways the public could damage the park, as well as public perception of these behaviors, and includes ways to offset and make human impact on the park more positive.

5.1.1 - Park Services

Our interviews suggest that wetlands, and Văcărești Nature Park in particular, are at risk of damage due to invasive species. Some recommend seeking out and removing invasive species while improving upon the numbers of native species, as well as providing more infrastructure for the community. This includes things like small gardens or rest areas, which could partly replace the void left by the removal of invasive species and improve upon both community engagement as well as the amount of native vegetation. Planning is crucial to the success of any planned ecosystem or infrastructure changes. Any specific idea must be well thought out when it comes to the health of an ecosystem, and impacts must be carefully weighed to ensure that there are no unexpected repercussions of specific measures.

The balance between community infrastructure and maintaining the wild feeling of the park has been one of the most striking conundrums of this project. How do we provide more infrastructure that people desire, while working to further conservatory goals and practices? The answer lies in the details. Our survey yielded interesting answers, with one person going as far to say that there should be a natural vegetation barrier around the outside of the park. This suggestion is certainly worth entertaining as its adoption poses interesting results. A natural wall around the park provides more protection from outside interference and noise pollution, and gives a more uniform look to the area. Questions regarding the locations of entrances could be quelled with the inclusion of endpoints in this wall, providing very clear entrances with signs and other postings nearby. This plan would require a great deal more thought regarding the types of species included in this wall, as well as the careful weighing of the time, money, and effort required to make such a large plan work. In addition to a large scale plan, a simpler, initial step could be to install more wooden pathways that lie on top of or are raised above the natural terrain within the park. This could both decrease visitor impact on the ecosystem and provide more clear paths and trails for visitors of the park.

Another key perspective to keep in mind is that not every decision can make everyone happy. As Mr. Ryan Woods stated in his interview, it is important to tailor each decision toward the greatest amount of need, and sometimes that may be the park's ecosystem whereas other times it could be the public who use the park. This sentiment has been reiterated in a majority of our interviews where we posed the question of dealing with conflicting stakeholder viewpoints. In this case, the main priority for the park is ensuring its long-term ecosystem well-being. In addition to making the public happy, the VNPA must consider the park organisms in their decision making process. So, as some stakeholders may prefer additional infrastructure be added to the park, it must not come at the cost of ecosystem health.

In addition to infrastructure improvements that can be made in the park, interviewee Walter Mugdan suggested a potential strategy for funding that his organization, Udalls Cove, uses in order to help finance their projects. Their membership program allows "units", meaning a person, couple, or address, to give money to the foundation in return for "perks", whether it would be special events, t-shirts, stickers, etc. While not a primary goal of the project, the information may prove useful and may help to leverage the large number of supporters the park has online and would be a useful supplement to the grants the VNPA is already seeking.

5.1.2 - Public Misuse

While public misuse is a broad category, all the solutions proposed in interviews and survey responses relate to security or education. The public must either be taught the acceptable uses of the land or be prohibited from abusing the space. However, both suggestions are challenging to implement and maintain. The optimal ideal suggestion, proposed in interviews, is a combination of the two; education of the public to try and promote appropriate behavior and security improvements to prevent abuse.

Educating the public is easier said than done. According to our interviews, conservatory mindsets are now more prevalent in children than in decades past due to changes in the educational curriculum. Therefore, any public education campaign must target the population who has left the education system and are misusing the park or those who might follow their negative example. Some suggestions to increase public awareness include more signs detailing park policies as well as increasing community engagement through in-park programs. Some suggestions mentioned training for adults to become volunteers, guided tours, a community garden, and educational events for adults. Programs catered toward adults allow for participants to invest themselves in park protection and operations, while conveying the environmental value of the park. These programs would decrease littering and improve the park in the eyes of the public but they are unlikely to stop convenience-based misuse. Convenience littering can be attributed to visitors who seek out the park for recreation and events, differing from the individuals who go to the park specifically to misuse it. This leads to the downside of community engagement and educational programs in the park; it is likely that the only people reached by these programs are not the people seriously abusing the park. The VNPA already has programs in place to improve community engagement, and while

expanding these programs is worthwhile, it seems unlikely to seriously decrease the extreme cases of public misuse of the park. Increased engagement, however, can instill a sense of shared responsibility which will decrease littering based on convenience. Programmed activities also leave less room for negative activities to occur, as those perpetrators abuse odd hours and unpopulated space to commit such actions. The only way to tackle the extreme park misuse is through city and/or police protection.

Education can also tackle the aspect of public perception. Our survey results found that trash in the park is still perceived as a major issue for many visitors despite the efforts of the VNPA and volunteers to clean it up. We believe that some visitors may have had previous experiences with the park that have influenced their current-day opinions, so education about the park's progress could help to update these views. Long-term, annual surveying for these viewpoints could provide the VNPA with feedback for how they are communicating these objectives and milestones to the public.

The other suggestion, security, poses a similar challenge. Many survey responses suggested the city police be involved with securing the area or fencing in the park. They reference the great work done by the rangers and the VNPA but are quick to point out that the security is spread thin, allowing for the abuse of the space. Our interviews provided slightly different results. It was generally accepted that the park needs more security however the green infrastructure and environmental experts all said that a fence was not an appropriate solution. A traditional fence would limit animal motion into and out of the park which could lead to problems of overpopulation, disease, and more negative human-animal interactions. Involving the local police would take a lot of time and must begin with interaction from the city government. Even if this was easily possible, the size of the park and the open nature of the space make it impossible to have people watching all entry points at all times.

The best option for the park moving forward is a balance of education and security. Education should be provided to the population that wants it; increased community engagement coupled with a reporting system would increase the number of people monitoring the park. Community engagement also increases a sense of responsibility within visitors and would prevent abuse based on ignorance of park policies. The eventual security goal should be assistance in the form of increased ranger numbers, cameras, or city police. This merging of voluntary education with practical security should help decrease the occurrences of public misuse without compromising the conservation efforts or public enjoyment of the space.

5.2 - Conclusion

The goals of this project were to understand the usage of the park, understand the value of the space in health crises, compile expert opinions, and define overall public expectations. Through the completion of this project, we have achieved, or made meaningful progress towards completing each of these goals. In this process, the information we collected has allowed us to make

recommendations to the organizing body of the park, the VNPA, as well as identifying future areas of project work.

Through observing the VNPA's live stream, as well as analyzing data collected from our online survey, we were able to understand the ways people use the park. From our data, most people visit the park for the purpose of nature observation as well as exercising. In addition, we found that the attendance rate of the park is highly dependent on the weather. Our data also suggested that most of the visitors want to see the park developed for conservation instead of recreational infrastructure.

Due to the COVID-19 pandemic, we thought it was important to take advantage of the unique learning opportunity and apply it to the research methodology. We decided to analyze how people in Bucharest continue to use Văcărești Nature Park as a place to go outside, exercise, and get fresh air, when they otherwise would have been confined inside. While not the central focus of our research, it provides useful context to how people utilize parks during a crisis.

With our 10 completed interviews, the team managed to make meaningful progress in compiling the ideas and opinions of learned experts regarding parks and conservation. This data helped to inform our recommendations and will be useful for the VNPA to be able to consult in the future to make decisions that impact park visitors and the ecosystem. Public opinions of the park were also gathered through an online survey posted to the VNPA's Facebook page. We understand this biases our responses in favor of the park and the VNPA, however this data does provide valuable insight into the appreciations and grievances of the public. Through this survey we concluded the park was most enjoyed for its wild and natural landscape in the middle of a city but pollution and safety concerned most visitors. Although the VNPA has done great work improving the park since its inception, the public still finds problems in how Bucharest citizens abuse this space.

5.3 - Future Work

We hope the partnership between WPI and the VNPA continues and leads to future IQPs. In an effort to achieve some of our initial goals, which were abandoned due to the coronavirus pandemic, we have developed a table outlining future work for other students, the VNPA, and local government officials. Hopefully this plan will assist with protecting Văcărești Nature Park for years to come.

Future Goal	Suggested Plans	Responsible Party	Notes
Survey the Park for Improvement Locations	Look for locations of: -Infrastructure updates -Invasive species -Clean ups -Specify park usage by location	-Future IQP Groups -VNPA Rangers	This could also be a time for groups to gather sound recordings or images to make their project more interactive.
Expand the Reach of Surveys and Interviews	- Door to door surveying - Surveying park visitors - Reaching out to more international associations	-VNPA -Future IQP Groups	This may require a translator and may be very time intensive, but will help to improve the data from our survey.
Security Improvements	Research methods of: -Improving the current security -Community reporting systems -Alternate security options	-VNPA -Sector Government -City Government	This project would overlap with increasing the interaction of the city government as police assistance is not possible without their support.
Public Education Programs	Promote awareness through: -Expanding educational programs offered -Designing specific programs for adults about conservation	-VNPA -Future IQP Groups	Could help with preventing littering, criminal activity, and improving public perception.
Increase City Government Interaction	-Create way for city and NGO to interact, -Create pathways for communication	-VNPA -Sector Government -City Government -Ministry of Environment	There are a number of challenges here, the main one being American college students do not have the understanding or authority to enact any change.
Membership Programs	-Buy-in programs to bring in additional funding -Creates a more involved group of the public	-VNPA -Future IQP Groups	More information available in Walter Mugdan's interview. Reference Elm Park Conservatory IQP for more ideas.

Table No. 3, Future Work

Appendix A: Online Survey

We are a group of students from Worcester Polytechnic Institute in Massachusetts, United States. We are conducting a survey to better understand the utilization of Văcărești Nature Park to influence future development endeavors. We strongly believe this kind of research will ultimately enhance the management of Văcărești Nature Park and improve the visitor experience.

Your participation in this survey is completely voluntary and you may withdraw at any time. Please remember that your answers will remain anonymous. No names or identifying information will appear on the questionnaires or in any of the project reports or publications. This is a collaborative project between the Parcul Natural Văcărești and WPI, and your participation is greatly appreciated. If interested, a copy of our results and the published report can be provided at the conclusion of the study.

For more information about this research or about the rights of research participants, or in case of research-related injury, you can contact: gr-urbanwetlandsiqp@wpi.edu, or Professor Kent Rissmiller, Tel. +001 508-831-5019, Email: kjr@wpi.edu, or, Gabriel Johnson, Tel. + 001 508-831-4989, Email: gjohnson@wpi.edu

1. Do you live near Văcărești Nature Park?
 - a. Yes
 - b. No (please specify: _____)
 - c. Prefer not to answer
2. What age range do you belong to?
 - a. Under 18
 - b. 18-25
 - c. 26-35
 - d. 36-55
 - e. Above 55
 - f. Prefer not to answer
3. How often do you visit Văcărești Nature Park?
 - a. Never **Go to Question # 7**
 - b. Rarely (less than once a month)
 - c. Monthly
 - d. Weekly
 - e. Daily
4. Do you bring children to Văcărești Nature Park?
 - a. Yes
 - b. No
 - c. Prefer not to answer
5. What are your reasons for visiting Văcărești Nature Park? (Select all that apply)
 - a. Physical Activities - Walking, jogging, biking, working out
 - b. Social Activities - Picnics, events, meeting friends
 - c. Nature observation/Educational/School Trip
 - d. Scientific Research
 - e. Community Service

- f. Other: _____
6. What is your main method of transportation to Văcărești Nature Park?
- Personal Vehicle
 - Rideshare - Taxi, Uber
 - Public Transportation
 - Walking
 - Biking
 - Other: _____
7. What are the reasons that you do not visit Văcărești Nature Park? (Select all that apply)
- Safety concerns
 - Lack of interest
 - Inconvenient (please specify: _____)
 - Other: _____
 - Prefer not to answer
8. What do you like about the park?
- _____
9. What do you dislike about the park?
- _____
10. Which of the following best fits your current view?
- Be developed to promote conservation
 -
 - Neutral
 -
 - Be developed with more infrastructure
11. Is there anything that would increase your enjoyment of the park?
- _____
12. Do you have any other questions, comments, or suggestions?
- _____

Appendix B: Case Study Thessaloniki

Thessaloniki is a sprawling, densely populated city in northern Greece. It was redesigned after a devastating fire in 1917 with an extensive urban plan. The city would boast neighborhoods divided by socioeconomic level, a downtown, and green space. This plan, however, was abandoned four years later due to two major development pushes.

The first development wave was in 1922. A sudden influx of refugees from Asia Minor arrived in Thessaloniki. The sudden demand for housing and infrastructure led to a building spree on any available land with limited government oversight. The majority of this building occurred on farmland outside of the city. The lack of government enforcement of building codes means that most of the structures created during this period were poorly made and closely packed.

The second urbanization push was post-WWII. The government tried to industrialize in order to improve the floundering economy. This second wave was funded privately so, once again, the government had very little said in the overall urban plan and many buildings were constructed with no regard for building codes. There were also a series of laws passed in the subsequent twenty years that made it easier to build in the center of the city.

The lack of government oversight in these building waves leads to a densely packed city with no overarching plan and limited green space. In Thessaloniki, there is 2.5m² of green space per resident. The European average is 8-10m² and the World Health Organization recommends 9m² of green space per resident. The government and residents of Thessaloniki realized this lack of green space was impacting the health and wellbeing of the city and took steps to improve. The main step was joining the Rockefeller Foundation's 100 Resilient Cities. Another was involving the local residents with the green space updates; this grassroots park movement increased the public stake in the park. By making the locals stakeholders the government ensured support for the project and continued public interest in the parks.

In 2017, a team of students from Worcester Polytechnic Institute went to Thessaloniki with the assistance of Perrotis College to assess the public opinion of the green space. They created an examination system for the parks in Thessaloniki as well as a survey and interview system. The examination system allowed the team to objectively review the amenities present in the parks rating things like walking paths, trashcans, and wheelchair accessibility on a scale from one to five. This scaling served as a way to note the difference between a lack of amenities and run-down amenities. The surveys and interviews brought the public opinion into the assessment system. The survey was distributed over social media so even residents who did not frequent parks were able to share their opinions, this ensured an even sampling of the population. The interviews were conducted solely with English speaking park visitors as the team did not speak sufficient Greek. This led to a bias, the only people interviewed attended the parks. The phrasing of the questions

was incredibly important. The team asked what people liked about the park and what they disliked, this ensured that they received information on the good and bad aspects of the public spaces.

This study found that residents of Thessaloniki used the parks mainly for socialization, physical activity, and a break from their stressful lives that improved their mental health. The residents also said that they would like their parks to be cleaner, safer, and with more vegetation. The main fear is that the parks are being used for drug deals or other crimes, they are covered in graffiti, and most parks have limited trees and grass. These updates were presented to the city along with methods of improving the parks in the direction specified by the public. They also stressed the importance of continued investment in green space to protect the health of the public and the parks.

Appendix C: Case Study London

Created in the late nineteenth century, this 105-acre wetland park called London Wetland Center (then was known as Barn Elms Reservoirs) is located adjacent to the River Thames in south-west London. Due to the non-compliance with EU regulations, the place became redundant and a financial burden.

The Reservoir potential was recognized in the 1980s by Sir Peter Scott, who negotiated to secure the land from Thames Water Company, but then he still needed the funds. Eventually, he ended up selling a small section of the site to Berkeley Homes for £11 million, with the additional £5 million from donations to help develop the site.

Later, the site was developed in 1995 with sustainable planning regulations, including policies such as not allowing spoils to be removed from the site, breaking up the concrete lining for paths and car parks, sorting and remixing 1.6 million cubic feet of soil, contouring water bodies, creating landscapes and islands, introducing 300,000 aquatic plants and vegetation communities, and utilizing wildlife space and reconstructed bird hides. In addition, the center paid attention in education to the future generation by developing conservation-theme playground, pond dipping zone and interactive exhibits, as well as organizing daily special events for the education of the youth.

As a result, wildlife of the site is well developed and sustained, with some key species colonizing the land. Furthermore, the site played a key role in the reintroduction programs of various species. The site became one of south-east England's top sites, cultivating the attention of the citizens.

Appendix D: Case Study New York City Coastal Wetland

In New York City, the wetland area plays an important role in contributing to the city's waterfront, with the area ranging from 5,600 acres to approximately 10,000 acres. It was reported New York City has lost 85% of the coastal wetland in the past century as well as 90% of the freshwater in wetlands. In addition, the land parcels were degraded due to human activities. Therefore, the research team implemented methods to restore and maintain the wetlands in New York, through four methods: protection, mitigation, restoration, and assessment.

In the protection process, the team planned to improve public management to have the vulnerable wetland parcels strengthened. In addition, the researchers increased wetlands acquisition efforts by working with government officials to increase wetland acquisition efforts. Finally, they updated the Waterfront Revitalization Program to enhance wetlands protection.

With mitigation, the researchers worked with State and Federal partners to revise wetlands mitigation guidance. They also planned to create a wetlands mitigation banking or in-lieu fee mechanism for public projects.

For restoration, they planned to complete the city-funded restoration projects in various wetland sites such as Meadow Lake, Yellow Bar, and Turtle Cove. They also created a natural conservancy area by combining public resources and philanthropic funding. Lastly, the team worked with State and Federal partners to complete and implement the Comprehensive Restoration Plan.

Finally, in the assessment process, the researcher improved wetlands mapping in New York City, as well as monitored tidal wetlands and analyzed the potential impacts of sea-level rise. Furthermore, they assessed the conditions and functions of New York City wetlands and developed a research agenda to address wetlands challenges.

Appendix E: Case Study The Pantanal

Located in Brazil and stretching through Paraguay and Bolivia, the Pantanal is the largest wetlands in the world. With an area of 187,818 ha, it is the home for an abundance of spectacular vegetations and animal lives. In addition, the Pantanal is considered to have a cultural value in these countries, especially in Brazil. In 1993, The site was declared a Ramsar Wetland, before being designated a UNESCO Biosphere Reserve in 2000. Furthermore, in 1981, the Pantanal Matogrossense National Park was designated by Federal Decree No.86.392 with such a diverse biosphere.

However, the recent increase in human activities posed a threat to the already fragile ecosystem. Overexploitation, deforestation, and pollution has taken a toll on the environment of the Pantanal.

Therefore, various organizations have been trying to restore the Pantanal's biological diversity and promote awareness. One of the organizations who has been conducting this is the WWF. Since 1998, the Pantanal has been developed by the locals as well as the WWF to maintain the hydro-biological and facilitate sustainable development and environmental management on the Upper Paraguay River Watershed.

To approach the problem, they first identified the impacts and risks with climate change and developed adaptation strategies by making the information available to the key stakeholders. Then, they helped design and implement the Municipal Plans on Land Use Regulation. To deal with the process of pollution, the team tried to influence the corporate policies of the steel and iron companies to take responsibility for water contamination in the process of iron production. In addition to these, they also worked on purifying water, air, and maintained soil fertility for the site. As a result, the site is now home to a wide range of flora and fauna, with the hydro-biological diversity improving. With this improvement, the site continued to contribute to the nations' economy through tourism.

Appendix F: Important Links

Link to Interview Transcripts and Recordings: [Completed Interviews](#)

Note: Not all interviews were expanded upon in this paper; transcripts of responses received after April 24th were included in the above folder.

Link to Raw Observation Data: [Livestream Observation](#)

Link to Raw Survey Free Response Answers: [Questions 9, 10, and 12](#)

Link to Urban Wetlands Project Website: [Urban Wetlands D20](#)

Link to Final Presentation Video: [Presentation Video](#)

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