GREEN BUCHAREST:
NATURE IN THE CITY

AABID PEERMOHAMMED, AINSLEY POOLE,
MICAELA TOURTELLOT, SYRENA PRYTKO

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COLLABORATOR:
PARCUL NATURAL
VĂCĂREȘTI

Green Bucharest:
Nature in the City

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Written by:

Aabid Peermohammed
Ainsley Poole
Micaela Tourtellot
Syrena Prytko

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Report Submitted to:

Community Partner:

Dan Bărbulescu
Parcul Natural Văcărești

Faculty Advisor:

Professor Lorraine Higgins
Worcester Polytechnic Institute
Professor Yuri Bosin
Worcester Polytechnic Institute

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Contributions

Aabid Peermohammed
Aabid (far right) is a junior at WPI pursuing a BS in Mechanical Engineering. Aabid acted as our team's editor and manager of the focus groups.

Ainsley Poole
Ainsley (far left) is a junior at WPI pursuing a BS in Biomedical Engineering and a minor in Gender Sexuality and Women's Studies. Ainsley acted as our team's history researcher and the team manager.

Micaela Tourtellot
Micaela (center right) is a junior at WPI pursuing a BS in Electrical and Computer Engineering. Micaela acted as our team's researcher on apps and editor.

Syrena Prytko
Syrena (center left) is a junior at WPI pursuing a BS in Electrical and Computer Engineering and a minor in Physics. Syrena acted as our team's graphic designer and wildlife researcher.

Abstract

Though the residents of Bucharest have a variety of parks at their disposal, previous studies indicated that they are not fully aware of these green spaces. This project focuses on two green spaces in particular: Văcărești Natural Park and Băneasa Forest. In collaboration with the Văcărești Natural Park Association, a nonprofit citizen group dedicated to protecting and educating about nature parks, we aimed to outline a mobile application to educate the public about these spaces. Through surveys and a literature review, we determined that the public of Bucharest would find features educating about wildlife, trails, maps, and events most helpful in a nature app and incorporated those into our outline before gaining feedback through focus groups and surveys with park volunteers.

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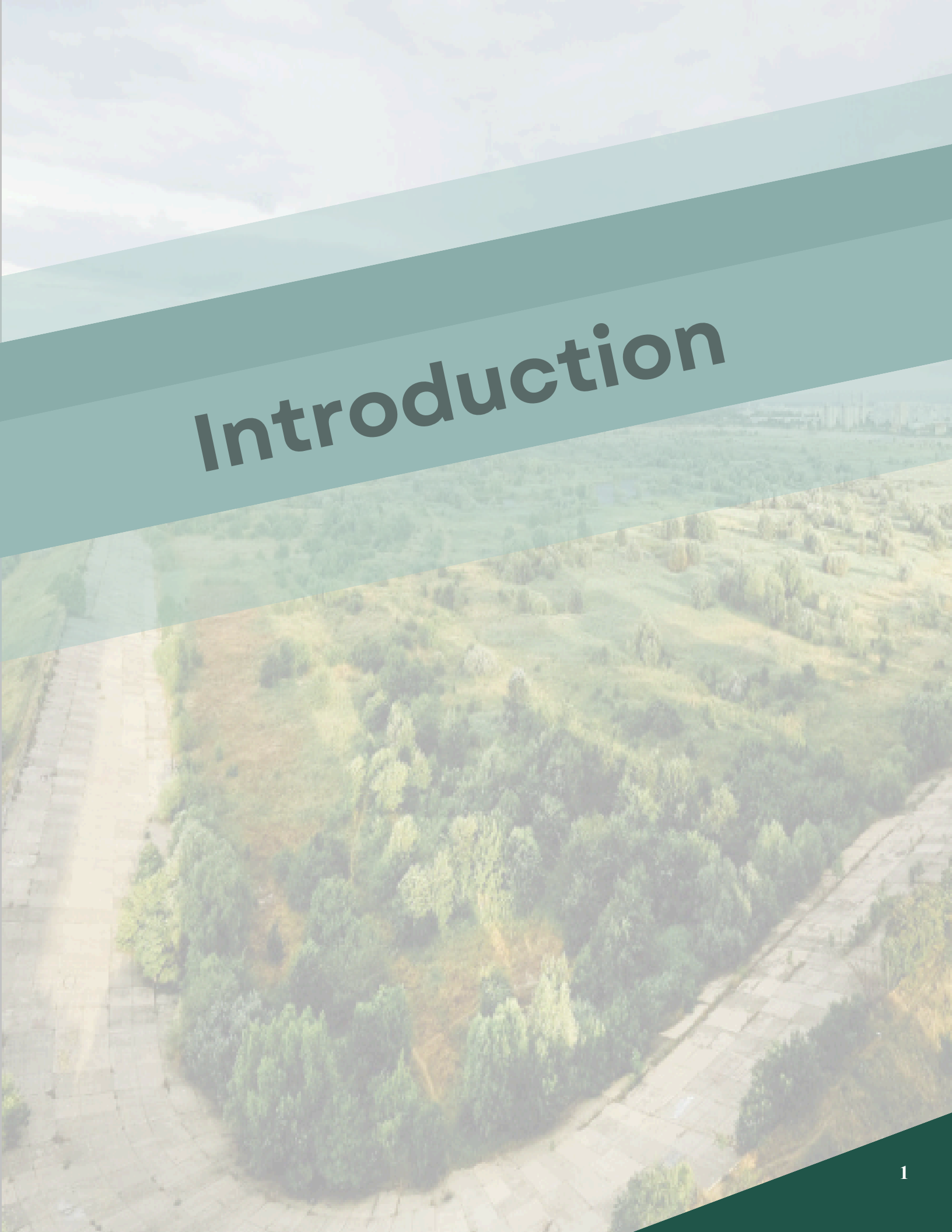
Introduction



Green spaces in urban areas provide a multitude of benefits to the population of that city. Time spent outdoors has been proven to promote better mental well-being (Bratman, 2019). These green spaces also introduce plant life which has been shown to reduce high levels of carbon dioxide (CO2), thereby improving air quality in the cities ("How much CO2", n.d.). Nature parks in urban areas promote physical health as well by giving residents access to a place for exercising. Lastly, green spaces have remarkable social and economic benefits, as these spaces encourage community engagement and increase the value of the land.

Văcăreşti Natural Park (VNP) and Băneasa Forest (BF) are two of the largest green spaces accessible to the public of Bucharest. VNP houses a variety of plant and animal species making it one of the most biodiverse places in Bucharest, and BF has a habitat with similar biodiversity (Anastasiu, 2017; Buzoianu, 2017). The Văcăreşti Natural Park Association (VNPA), a nonprofit citizen group that maintains the park, wants to promote knowledge of the numerous benefits of these parks through the development of educational materials for locals.

The VNPA hosts nature activities, cycling events, and programs for children and families, with the intention of increasing public engagement with the park. The Association wants to expand awareness of these park activities and assets and cater their educational efforts to the specific interests of Bucharest residents. Specifically, they want to design content about these green spaces in an engaging app.

Our project goal was to outline a mobile application for VNP and BF to promote their biodiversity and ultimately raise local residents' awareness of these green spaces accessible to Bucharest residents. To accomplish this, our first objective was to determine the knowledge and opinions that Bucharest residents have in relation to VNP and BF. We wanted to ensure that we understood how users and non-users of these spaces perceived them, allowing us to get a better idea of their knowledge and interests in the park. Our second objective was to identify existing popular park apps and their educational elements. Our third objective was to determine which features found in Objective 2 would be most beneficial for the people of Bucharest. Finally, our fourth objective was to determine public interest for the app outline.

Background

Benefits of parks

Parks provide a considerable amount of benefits including psychological, social, economic, physical, and environmental benefits. First are the **psychological benefits**. Since COVID-19 in Romania, there has been a spike in the number of people battling mental illnesses (Vancea, 2021). One method of improving a person's mental health is spending time outdoors. In fact, Byeongsang Oh (2017), studied the efficacy of forest therapy on people's mental health. Forest therapy is direct exposure to forests and other natural areas in an attempt to better one's mental health (ibid). Oh found that the patients who participated in forest therapy, showed decreased "tension-anxiety, depression, anger-hostility, fatigue, and confusion" (ibid). Another study integrating forest therapy into Cognitive Behavior Therapy (CBT) showed that patients made further progress than those who participated solely in CBT (Sonntag-Öström, 2015).

There are also numerous **social and economic benefits** to having nature parks in urban areas (The Recreation and Park Commission for the Parish of East Baton Rouge, n.d.). Economic development for a community can be gained from having natural parks since having an attractive neighborhood entices people to live there, and increases the value of the land (American Planning Association, 2002b). Natural parks in urban areas also aid community development since they draw people together in a comfortable environment, helping bring the community closer (American Planning Association, 2002a). Nature parks offer children a place to explore, learn about the natural sciences and join community activities (American Planning Association, 2003). All of these benefits not only serve their own separate purposes but also serve to create better social equity in urban areas by giving everybody equal opportunity to access these green spaces (National Recreation and Park Association, n.d.).

Physical activity is critical to long term health (Warburton, 2006). There are also short term benefits, including improved sleep quality, decreased anxiety, and increased academic performance for children (Center for Disease Control and Prevention, 2023). In urban areas, it may be difficult to find spaces for fitness activities. Parks can provide **physical health benefits** in that they offer a space for people to do things like go for a run, do a workout, or go

on a bike ride. Access to parks can be a determinant in whether someone gets more or less physical activity. An article from the National Library of Medicine (Larissa Andrade, 2021) showed that having access to free or low-cost recreational facilities was associated with people meeting the American Heart Association's physical activity guidelines. When people get access to parks, they are more likely to reap the benefits of increased physical activity, such as reduced obesity, reduced osteoporosis, lower blood pressure, enhanced child development, etc. (Foderaro & Klein, 2023).

Green spaces in urban environments bring tremendous **environmental benefits** for both urban locals and the native species that live there. The World Health Organization stated that urban greenery is beneficial since it helps to improve "carbon capture and storage and improved water quality" ("How can we assess", n.d.). Urban vegetation reduces the impacts of climate change and helps reduce air pollution which is of value to cities with increasing air pollution ("Why greener cities", 2022). The restoration of local green spaces is crucial because it lessens the negative effects that society has on the environment. Ecological restoration is a vital component of this process, as it involves the development of a carefully planned strategy to enhance green areas. Michael L. Morrison, an ecological restoration researcher, has written several books based on his research for this topic (2009). The main takeaway that Morrison emphasizes to readers is to recognize the immense proportion of planning involved in ecological restoration. He hopes that his book will serve to outline the stages of the process thereby making the process simple enough for everyone to partake in (ibid).

Văcărești Natural Park

VNP is a nature park located four kilometers south-east from the center of Bucharest and covers approximately 190 hectares of land. A map of the park can be seen in Figure 1. Due to the area's high biodiversity, it has governmental protections as the only official Nature Park in Bucharest. The land is currently owned by the government of Romania but the upkeep is done by the VNPA, founded in 2014 by Dan Bărbulescu.

Figure 1: Vacaresti Forest trails retrieved from The Globalworth Foundation (n.d.)

History

In 1988, the communist leader of Romania, Nicolae Ceaușescu, took over the area that is currently known as VNP to build an artificial lake (Anastasiu, 2017). When the lake finished construction in 1989, it was filled with water, and cracks in the foundation allowed the water to seep into the ground below (ibid). This caused the lake to be abandoned just before the fall of the communist regime later that year (ibid). The foundation of the lake currently acts as a wall around the park (ibid). After the fall of the communist regime, all land use legislation was voided and no new legislation was put in place (Ianoş, 2016). The government simply did not know what to do with the numerous unfinished communist building projects, so they left these areas alone. This caused the area that is currently known as VNP to be abandoned and completely unused from 1989 to 2016 (ibid; Simion, 2016; Anastasiu, 2017). In 1990, the previous owners of the land before Ceaușescu attempted to get their land back, but were unsuccessful (Simion, 2016). In this time, the small portion of human interaction allowed the wildlife in the land to flourish, and because of this biodiversity, the area was declared a nature park in 2016, receiving its name as well as government protections (ibid; Anastasiu, 2017). A timeline of these events can be seen in Figure 2.

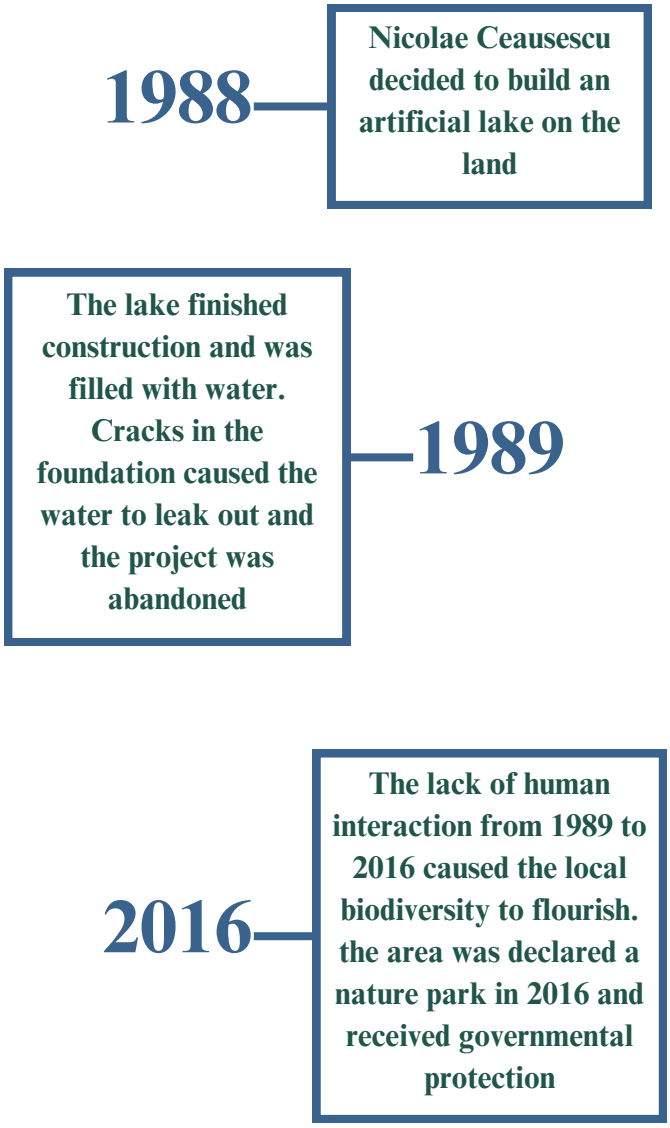


Figure 2: Timeline of events for the land that makes up Vacarest Natural Park (Anastasiu, 2017; Simion, 2016)

Previous study on park accessibility

As explained in the benefits section, there are a vast amount of benefits of having and going to green spaces in urban areas. Identifying what people like and dislike about parks in general will help to understand why these green areas seem to have been underused. In 2021, the VNPA conducted a study regarding the accessibility of the park through intercept surveys conducted in areas around the park. 151 people responded to the questionnaire that was sent out, 80% of whom had visited the park (ibid). When asked what made them choose the park, 43% of the

people cited biodiversity as their main reason. 16% of the participants who have visited also had trouble finding the entrance to the park, with the majority of people citing lack of signage as the main reason (ibid). 20% of participants said they were not able to find their way through the park easily, lack of markings being the main reason (ibid). Based on the information collected in this questionnaire, the simple implementation of additional signage in the park could make the park accessible.

Of the 20% of people that have not visited the park, the most common reasons are lack of time at 29% of responses, and lack of information about the park at 23% of responses (ibid). Figure 3 shows a graphical representation of this data. When asked what could be done to improve the park, people stated increased developed and accessible routes in the park as the most common solution at 42% of responses (ibid). Improved signage was the second most common response at 29% of responses (ibid). This data can be seen in Figure 3.

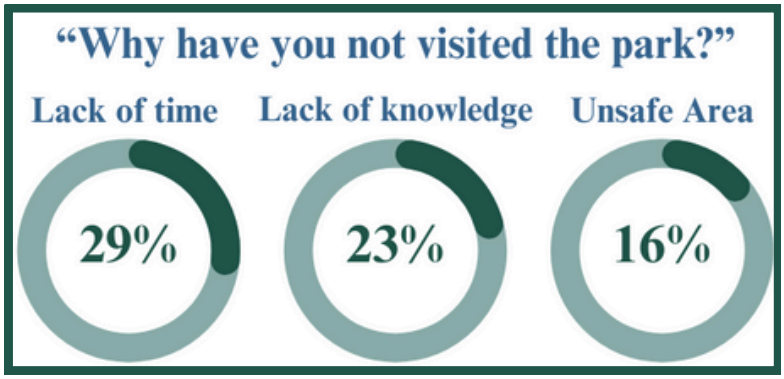


Figure 3: Results in percentages of one question of a survey done by the VNPA asking people who have not been to the park why they haven't gone.

Social events in the park

Visitors to the park frequently engage in leisurely pursuits, including trail walking, birdwatching, and biking. These activities are available throughout the year to all visitors. From time to time, the park organizes events for the local community to participate in and enjoy, including running competitions, educational programs, litter cleanup, and planting indigenous plants.

The Sun Challenge is an annual running event that is held through the park's nature trails. The race helps support visitation as well as to gather donations for park resources such as floating homes for the animals in the lake (Trandafir, 2022; Sun Plaza. n.d.). The park also has hosted an event for Green Week, an annual program for the promotion of education on climate change in Romanian schools. (Anon, 2022). In 2022, students visited the park and created "insect hotels" to learn about insect species and native flora (Jacob, S, 2022). Another event that the park holds is the Great Barrier project, which is part of the national initiative Romanian Plants for Tomorrow (Figure 4). The park first held the event in 2020 and by 2023 they had organized a group of over 1,000 volunteers and planted over 2 million trees. They hope to continue holding this event to achieve their goal for the "gradual development of a green corridor to surround the Văcărești Natural Park" (România Planteaza, n.d.).

The park association uses their social media accounts, like Instagram, to help promote the beauty of their space and the events that happen there. Currently, their Instagram is filled with a variety of images of the park. The photos, taken by a professional photographer, highlight the wildlife in the park, as well as the volunteering events that happen in the park. They provide great detail about the wildlife and events in the park, however, they do not provide in-depth information about trials and the habitats in the park, which we hope to address in this project.

Figure 4: Volunteers at The Great Barrier event of 2024 from the @parculnaturalVăcărești Instagram.

Plants

The park features a large variety of flora that makes up the bulk of all identified flora within the city of Bucharest. Floristic research conducted by the University of Bucharest from 2012 to 2016 identified 331 species of plants, where 80% were native and the remaining 20% being alien species with few of those alien species being invasive (Anastasiu 2017). The most common families of plants and the number of specific species within each family are shown in Figure 5, and a complete list of native plants within the park can be found in Annex 1 (native) and Annex 2 (alien) in the study done by Anastasiu in 2017.

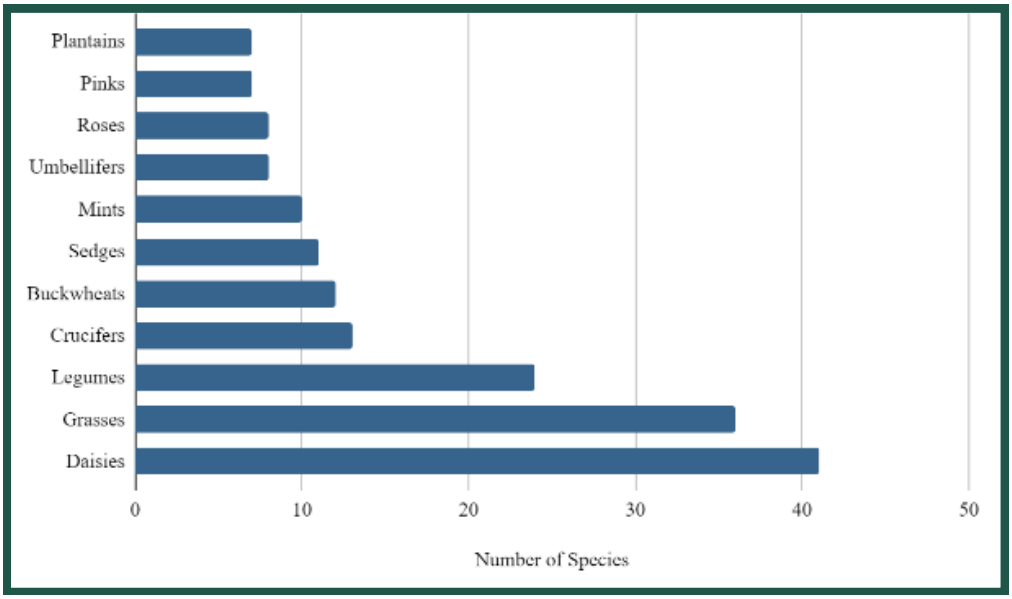


Figure 5: The most common 11 families of native plant species in the park and the number of species in each family (Adapted from Anastasiu, 2017).

A tree survey done in 2021 by Bogdan Mihalache stated a total of 29 different species of trees of 18 different genera occupy the park. Table 1 shows each of these 29 species of trees and how common they are within the park. Of these 29 species, approximately 69% are native to the area and only 31% are exotic (Mihalache, 2021). In the same study, Mihalache also states that of those 31%, only two species of trees are considered invasive: the Tree of heaven and the Boxelder maple. It is important to note, that the only trees that were considered for this study were mature trees with a diameter of over 30 centimeters (ibid).

Habitat

The 190 hectares (469.5 acres) that make up VNP contain 11 unique habitats, each containing different plants, vegetation structure, and soil moisture, according to a habitat mapping done in 2020 by Vladimir Boc. The plants in these habitats can be broken down into four different categories: plants that require low soil moisture, moderate soil moisture, high soil moisture, and live in the water (ibid). Figure 6 shows the distribution of each of these categories of plants in VNP. In relation to this park, there are four levels of vegetation structure. Groves are considered small groups of trees, dense groups are considered areas of very closely packed trees, isolated groups are considered sparse groups of trees, and steppe communities are considered flat grassy plains. The location of each of these areas can be seen in Figure 7 (Boc, 2020).

Species Name	N
White Willow	1183
English Walnut	667
Cherry Plum	529
Field Elm	429
Tree of Heaven	383
White Mulberry	248
Corkscrew Willow	233
Boxelder Maple	215
Grew Poplar	178
Russian Olive	109
Green Ash	105
Hackberry	77
Black Poplar	68
Raywood Ash	62
Honey Locust	56
Weeping Willow	39
Black Mulberry	21
Sweet Cherry	19
Apple	15
Black Locust	8
Common Hawthorn	7
Elderberry	7
Peach	6
Sycamore Maple	4
Southern Catalpa	3
Blackthorn	2
Grey Willow	2
Norway Maple	1
London Plane	1
Total	4676

Figure 5: The most common 11 families of native plant species in the park and the number of species in each family (Adapted from Anastasiu, 2017).

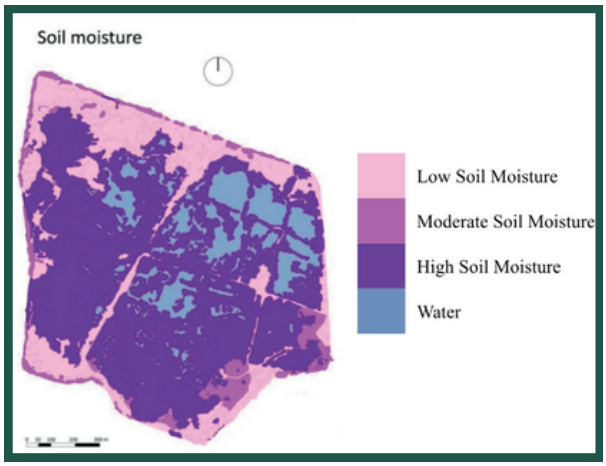


Figure 6: The location of each level of soil moisture in VNP (Adapted from Boc, 2020)

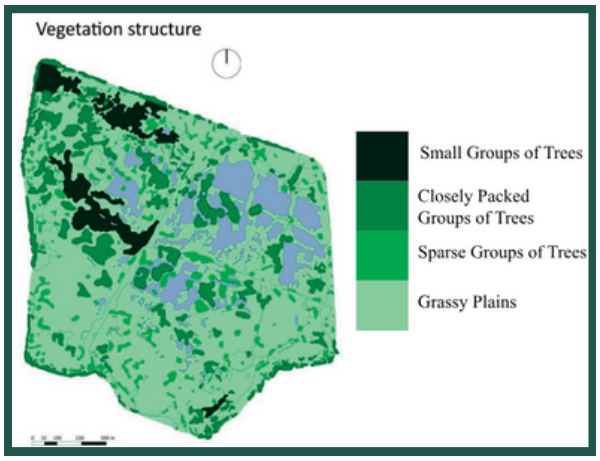


Figure 7: The location of the four levels of vegetation structure in the park (Adapted from Boc, 2020).

The 11 habitats based on soil moisture and vegetation structure are mapped in Figure 8. The majority of the park contains grassy plains with the three grassy habitats inhabiting 63% of the park (Boc, 2020). This means that plants like grasses take up the majority of the park, not trees. Closely packed trees are the second most abundant within the park, taking up 14% of the land (ibid). Though it is the second most abundant habitat, it takes up four times less land than the grassy plains do. The third most abundant habitat is the aquatic habitat, containing plant life such as duckweed and occupying around 12% of the land (ibid). Finally, the small groups of trees and the sparse trees are the two least abundant habitats in the park occupying 6% and 5% respectively (ibid).

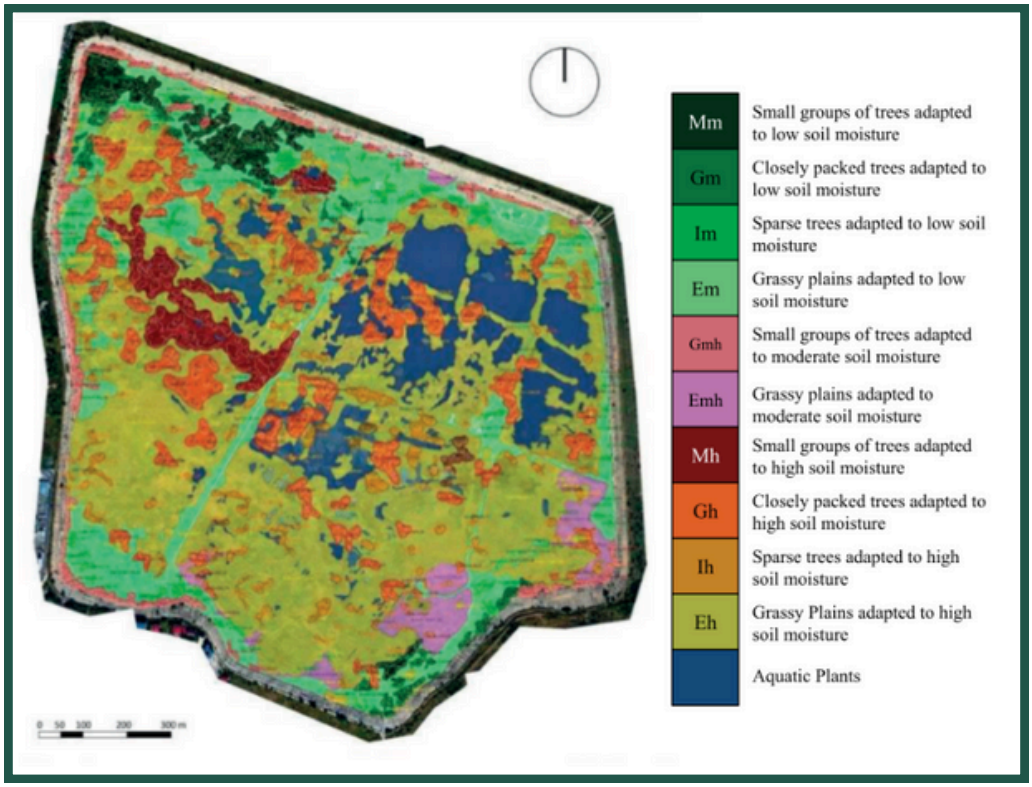


Figure 8: The distribution and quantity of 11 unique habitats in VNP (Adapted from Boc, 2020).

Wildlife

Văcăreşti Nature Park is home to a wide variety of birds, mammals, amphibians, insects, reptiles, and fish. Migratory animals, such as the Great crested grebe, use the park as a temporary home during their migration period (Văcăreşti Natural Park, n.d.). The park plays a crucial role in supporting their migration patterns and meeting all the necessary requirements to house them during their stay. Other animals like the Common kingfisher benefit all year long from the diverse ecosystem in the park. As stated on the Parcul Natural Văcăreşti website, the park also houses different species that are strictly protected in Romania under the International Union for the Conservation of Nature (IUCN) Red List (ibid;"The IUCN Red List", n.d.). This red list is a record of how close a certain species is to being extinct. It includes various species from the park such as Great crested newt, European tree frog, and the European mink, see Figure 9. One of the summer migratory animals, the Red-footed falcon, is listed as Critically Endangered species (CE) by the IUCN, which is one rank below extinct in the wild on the red list (Westrip, 2022). The park uses the collected donations for supplies, such as nesting boxes, to increase the population of endangered species like the Red-footed falcon (Văcăreşti Natural Park, n.d.).

Figure 9: The Eurasian mink taken from the @parculnaturalVăcăreşti Instagram.

In addition to the several birds, mammals, and reptiles in the park, Văcăreşti Natural Park is also home to approximately 135 species of insects, 56 of which have either a worldwide or European protection status, according to an insect study done by the park in 2018. Two of the most endangered species of insect in the park are the Moss carder bee, a species of bumblebee that is classified as vulnerable by the IUCN, and the Tufted marbled skipper, a species of butterfly with the status of near threatened by the IUCN (Văcăreşti Natural Park, 2018). The species of insects within the park belong to eight different orders which can be seen in Table 2.

Order	Examples	Number of Species
Homoptera	Aphids/Cicadas/leafhoppers	4
Heteroptera	True bugs	6
Orthoptera	Grasshoppers/Crickets	11
Odonata	Dragonflies/Damselflies	12
Diptera	Flies	16
Coleoptera	Beetles	22
Hymenoptera	Ants/Bees/Wasps	25
Lepidoptera	Butterflies/Moths	39

Table 2: The 8 orders of insect found and the number of each species order (Văcăreşti Natural Park, 2018)

Băneasa Forest

BF is approximately 14 kilometers north-west from the center of Bucharest and contains 800 hectares of land and it faces deforestation issues from developers in Bucharest (Parc Natural Văcărești, n.d). A map of this area can be seen in Figure 10. This area is home to a great number of different types of wildlife including different plants, animals and specifically a large variety of frogs (ibid).

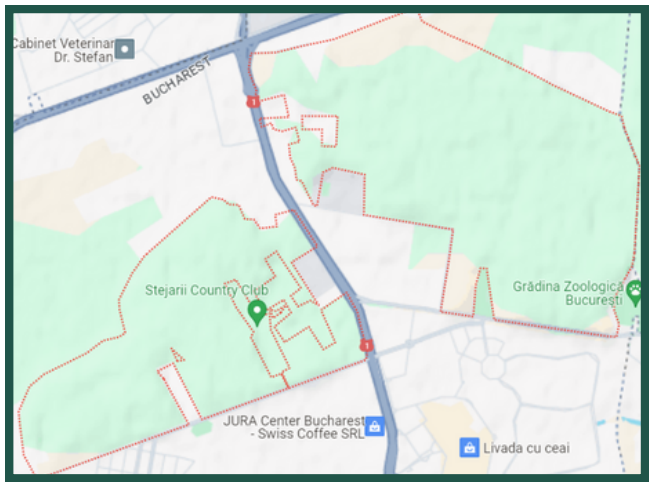


Figure 10: BF retrieved from Google Maps (n.d.).

History

In 1921, 50 hectares of BF were allotted as a recreational park, and subsequently in 1930, 100 additional hectares were allotted for park space (Grigorescu, 2017). The Council of Ministers in 1954 decided that most of the functions of forests should be to provide "leisure and recreational opportunities for Bucharest" (ibid). As a result, the forest has become a target for deforestation to make room for these leisure opportunities, with some organizations who own areas of the forest having plans to build luxury villas and various real estate projects (Jurnalul Național, 2007). After the fall of the communist regime in 1989, land allotments were made and some were given to people who claimed to have taken part in the 1989 revolution (IZI Travel). In March of 2020, former Environmental Minister Costel Alexe announced that multiple forests close to Bucharest including BF will have the status of protected areas, banning logging in these areas (Romania Insider, 2020). The forest today still remains with this status, despite 63% of the land being owned privately (ibid).

Plants

The Băneasa Forest ecosystem is home to a rich diversity of plants including a number of species of shrubs and trees, both native and alien (Legutko-Kobus, 2023). Species of shrubs including Hawthorn, Blood, and Horn fill the in-between spaces of the forest (ibid).

Some of the most common species of native tree within the forest include the Oak tree, the European elm, and various species of Linden (ibid). Linden trees are the dominant species in the forest (Vicol, 2017). A few species of trees that are not native to the area have adapted to the climate and call Băneasa Forest their home (Legutko-Kobus, 2023). These species include the Acacia tree, the American maple tree, the Tree of heaven, and the Pennsylvania ash tree and are mostly located at the edges of the forest (ibid). Our team met with Radu Dragomirescu, a member of the Văcăreşti Natural Park Association team, who revealed to us that the association predicts, in 20 years, approximately 80% of the forest will be taken over by these invasive trees since they mature quicker and produce a larger quantity of seeds than native plants.

Wildlife

Băneasa Forest is home to a wide variety of mammals, most commonly hedgehogs, wood mice, foxes, weasels, and squirrels (Legutko-Kobus, 2023). Other animals, including deer, moles, martins, and wild boars, also live in the forest but get scared by visitors so they are often less prevalent (ibid). The forest also has a wide variety of common perching birds including the Eurasian golden oriole, Eurasian chaffinch, and the Eurasian blue tit, see Figure 11, that can be heard singing their songs in the forest, while other birds, like the Eurasian jay, Great spotted woodpecker, and the Common buzzard are also observed in the forest. Other species such as the Long-eared owl, along with a significant proportion of bats within the park, are nocturnal, thereby only being observed during late hours in the forest. Some of these birds located in the forest are on the IUCN Red List, so their protection in the forest is integral in their conservation worldwide (Bucharest Birding, n.d.).

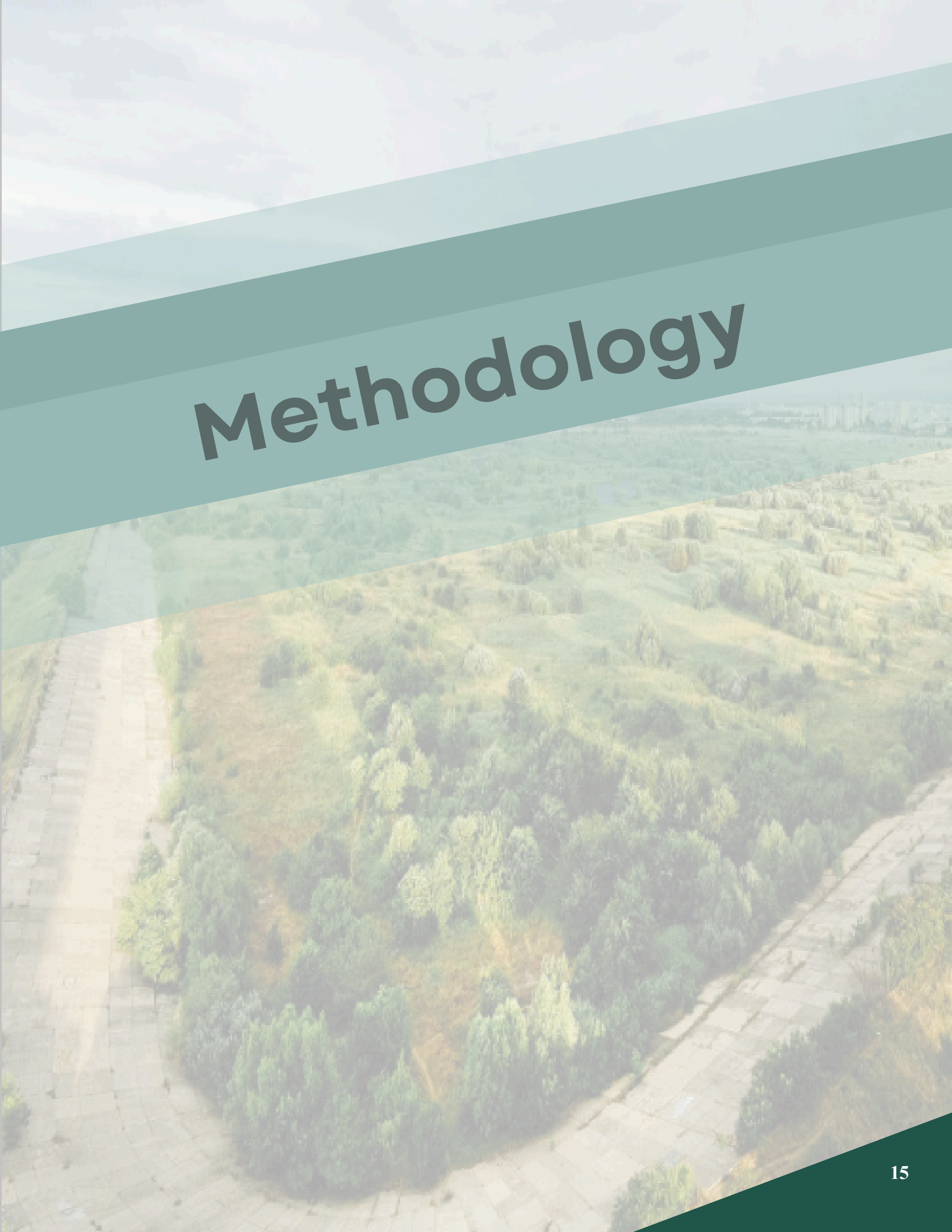
Figure 11: Eurasian blue tit
(Eurasian Blue Tit, n.d.)

There are a remarkable amount of reptiles and amphibians observed in the forest. There are "Six species of frogs, two species of newts, four species of lizards, and two species of snakes" that can be found in the forest (Legutko-Kobus, 2023). Some specific species of reptiles and amphibians that we learned about through informative signs within the forest include the European Green Lizard, Grass Snake, and the Agile Frog.

Finally, there have been outstanding studies and research done on the insects that live in the forest. There are 52 species of stink bugs that belong to the Heteroptera order including the Tortoise bug and Brown marmorated stink bug (Cristina, 2017). There are also 42 species of Oribatid mites and 24 species of gamasid mites that have been identified in the forest (Mogîldea, D, 2008). Educational signs within the forest also listed a number of butterflies that can be observed in the forest including the Peacock butterfly, Red admiral butterfly, and the Common glider.

In summary, parks in urban areas are immensely important for the wellbeing of the inhabitants of the city and the city itself. VNP and BF are perfect examples of these green areas in Bucharest, Romania. The information found in this section was used to formulate content for an app designed for VNPA to educate the public about these two parks.

Methodology



The goal of this project was to outline a mobile application to educate the residents of Bucharest about VNP and BF. The objectives and associated methods used are outlined in Figure 12.

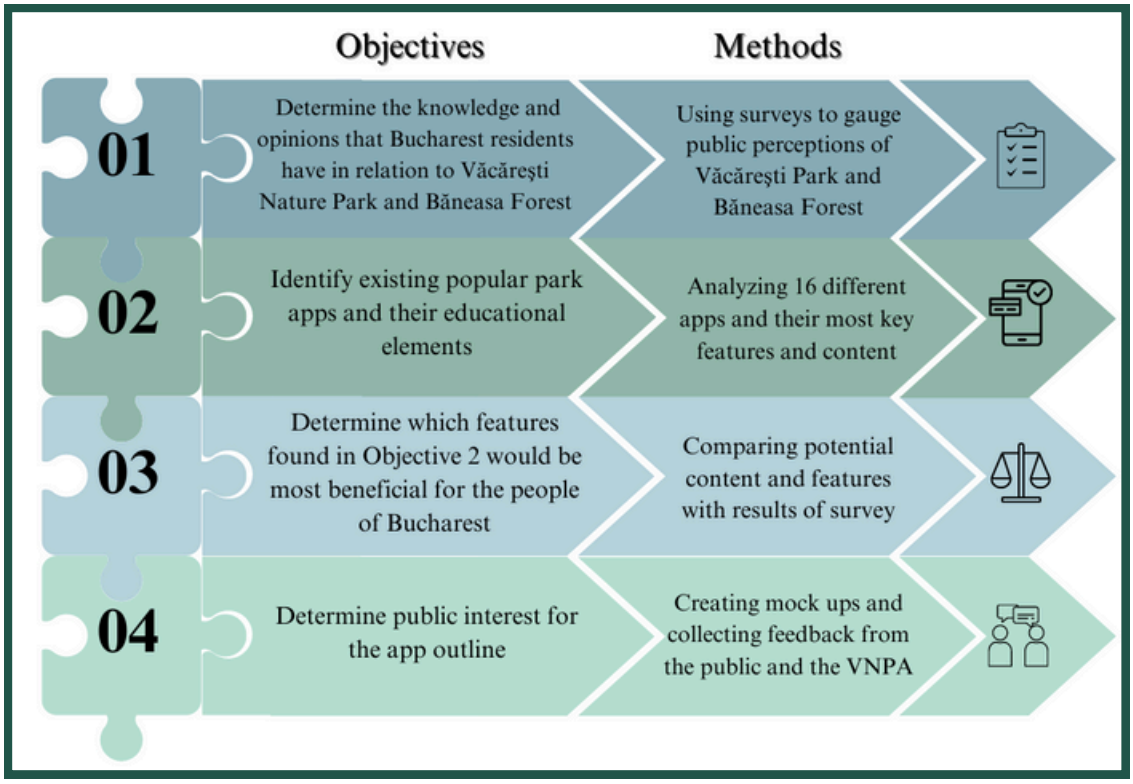


Figure 12: Objectives and methods that will be used to accomplish the goal.

Methods for objective 1: Using surveys to gauge public perceptions of Văcărești Natural Park and Băneasa Forest

Bucharest residents' knowledge of, interests in, and opinions about VNP and BF were identified through a survey that was sent out to the VNP newsletter as well as promoted on their social media. In addition, intercept surveys were conducted in four areas around Bucharest: The University of Bucharest campus, small parks around the city, a local mall, and the Botanical Gardens.

The survey results were used to determine what aspects of the park we focused on in our app. We asked whether participants knew about these green areas, how often they visited if at all, what activities they engaged in, and what aspects of these spaces they enjoyed or did not enjoy. We also asked what kinds of information they would like to know about these areas in the future and if they would consider going to the park.
A small description of each location was displayed before questions asking what information they would like to know about. The consent form that was displayed at the beginning of the survey is outlined in Appendix A and a full list of questions that were asked can be seen in Appendix B.

Methods for objective 2: Analyze 15 different apps and their most key features and content

The team analyzed 15 nature-based mobile applications to understand which features, content and design elements were most common. The apps were downloaded and used to the best of our abilities. These features were then coded to determine those most commonly used.

Methods for objective 3: Comparing potential content and features with results of survey

The team used the findings from the survey to determine what people want and need to know about the park and forest and what they are interested in. We then determined which of the features we learned about from our analysis of park apps might address their interests and needs to use in the development of the mock up of general content and features for the app.

Methods for objective 4: Creating mock ups and collecting feedback from the public and the VNPA

We created mock-ups of an app based on the results of the survey and the app content analysis, and then presented our mock-ups to the public and the VNPA. The mock-up contains various screens of the app as well as some of the features obtained in Method 3. A survey was sent to the public through the VNPA social media pages, where participants were asked to give suggestions and feedback on the various screens in the mock-up, as well as design choices. The mock-up was revised based on this feedback to better suit the likes of the people of Bucharest.

This revised mock-up was then shown to the VNPA through a focus group. In the focus group with the VNPA, four main topics were discussed: initial impressions of our app content, features, layout of the application, and areas of improvement (see Appendix D for specific prompts). Revisions were made to the app outline based on feedback from the VNPA, and a final outline was presented to them.

Results

Survey results

In total, we received 173 responses from the survey across all platforms: 122 responses from social media, 10 responses from intercept surveys in parks, and 41 responses from intercept surveys at the University of Bucharest campus and a local mall. There were 74 participants between the ages of 18 and 30, 82 participants between the ages of 31 and 50, and 17 participants above the age of 51. This means that our data was slightly skewed toward a younger population as only about 10% of responses represented people older than 51 years old.

What did participants know about VNP?

Eighty-eight percent of our participants have heard about VNP, however, that data may be skewed in the positive direction because the majority of our participants came from the VNP social media. Excluding social media respondents from the survey results brought the percent of those who heard about VNP to 72%. Though such a large number of people had heard about the park, over half of the participants had either never been to the park or had only gone once in the last year. When participants were asked what they knew about VNP, the most common answer stated that they knew where the park was located. The responses were coded into 14 categories which are defined in Table 3 and a full outline of coded responses can be seen in Figure 13.

> **Participants had either never been to the park or had only gone once in the last year**

Coding Category	Explanation
General Information	The participant was aware of things like the location and setup of the park.
Animals	The participant was aware of the multitude of animal species within the park, some naming birds or insects.
History	The participant was aware of the history behind the park including that it was originally an artificial lake.
Protected	The participant was aware that the park has governmental protections.
Plants	The participant was aware of the multitude of plant species within the park.
Delta	The participant was aware that the park is a delta.
Threatened	The participant was aware of one or more threats to the park including fires and littering.
Wild	The participant was aware of the lack of human intervention on the land.
Biodiversity	The participant specifically said biodiversity rather than just stating plants and animals.
Events	The participant was aware of one or more of the events that occur in the park.
Trails	The participant was aware of the trails that can be hiked in the park.
Appearance / Scenery	The participant was aware of how the park looks, for example “The park is beautiful”
Peace	The participant was aware of the peaceful nature of the park compared to the city surrounding it.
Nothing	The participant didn’t know anything about the park other than it exists.

Table 3: Coding categories used and their explanations.

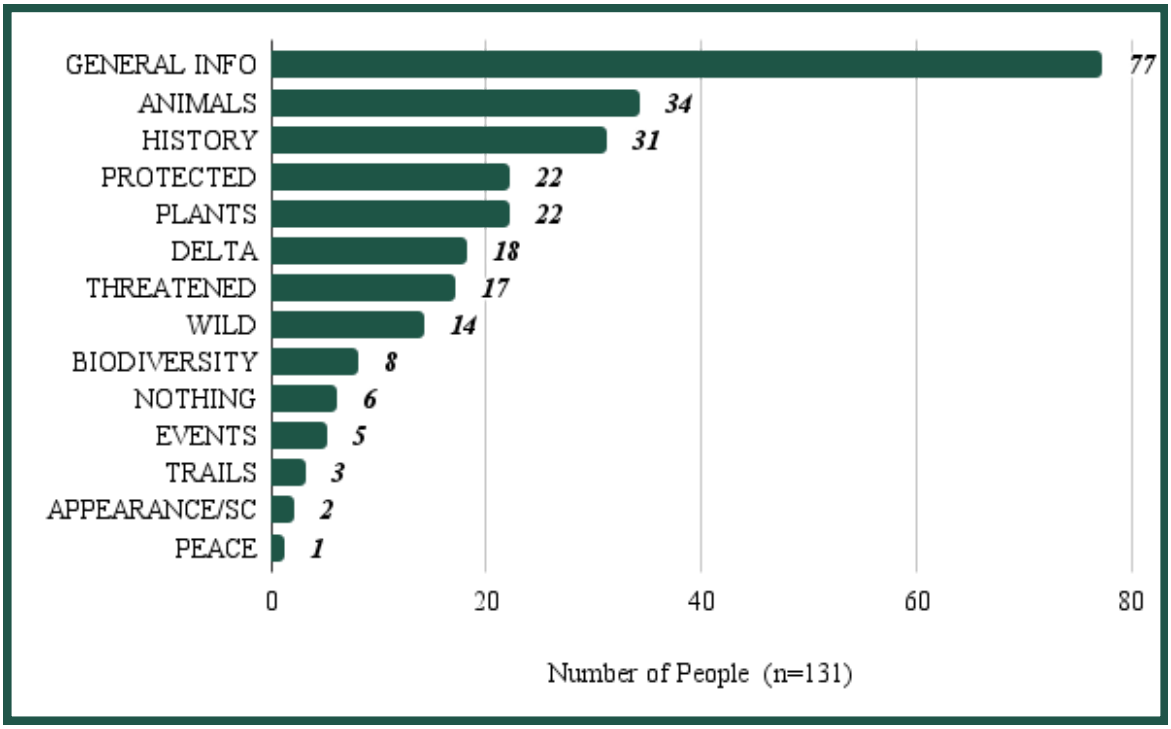


Figure 13: Survey responses for a question asking participants what they know about VNP.

Though 72% of people knew about the park when questioned, 58% of people said they knew the location of the park, 47% of those people stating they only knew the location. Less than half that number of people knew about the second most popular category of animals. These findings support the idea that people are under-educated about this park and justify the need for this app by the VNPA.

What did participants like about VNP?

Participants mentioned eight different things they liked about the park in this open ended question, which are listed in Table 4. Figure 14 shows how frequently these were mentioned.

The feature most commonly mentioned by our participants when asked what they like about VNP was the wild and natural state of the park. Many also value the peace and quietness of the park compared to the city environment. One participant described it as “an oasis of peace and nature in the middle of the city.”

> **an oasis of peace and nature in the middle of the city**
>
> **- anonymous surveyor**

Coding Category	Explanation
Nature / Wild	The participant liked the lack of human intervention within the park.
Location	The participant liked that the park is located in the middle of a crowded city.
Animal	The participant liked to observe the animals in the park, many specifically stating birds.
Peace	The participant liked the peaceful nature of the park including quietness and the sounds of nature.
Plants	The participant liked observing the plants within the park.
Water	The participant liked the lakes and other bodies of water within the park.
Fresh Air	The participant liked the less air pollution that could be smelled within the park.
Shade / Cool	The participant liked the lower temperature that the trees in the park provide during the summer.

Table 4: Coding categories used and their explanations.

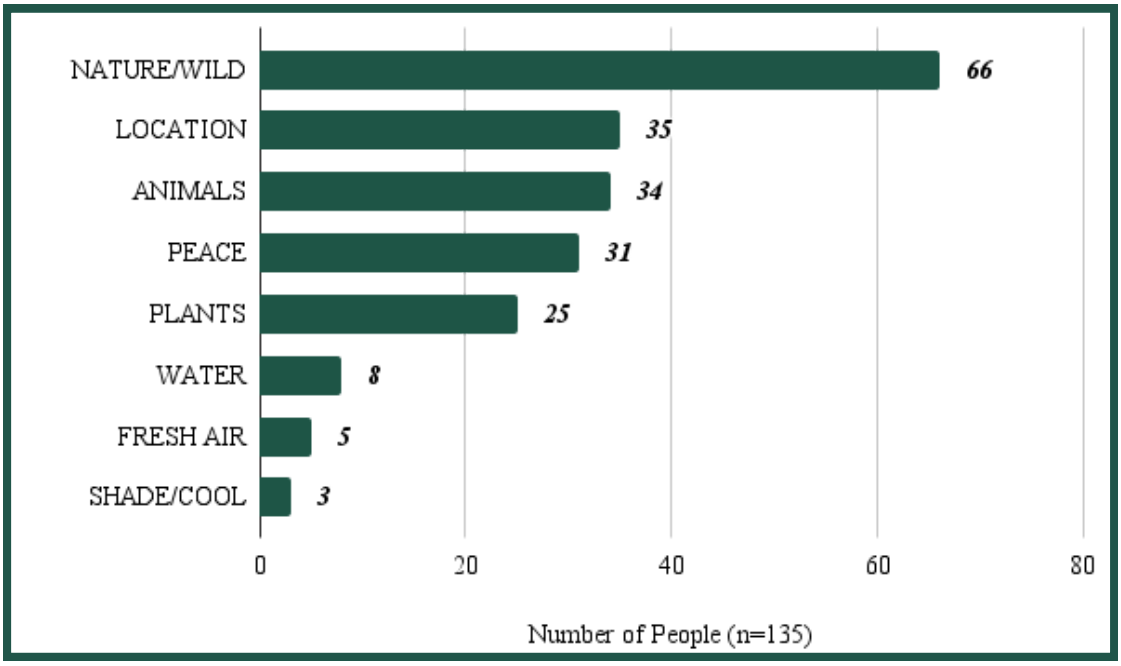


Figure 14: Survey responses to a question asking participants what they like about VNP.

About half of the respondents stated that they like the fact that the park is natural and wild compared to the city around it.

What suggestions did participants have for VNP?

Participants' suggestions revolved around eight topics, defined in Table 5; The frequency with which these were mentioned can be seen in Figure 15.

The most common suggestion the participants had for the park was to increase security. This included a wide range of concerns such as fires, dogs off leash, and homeless people. Many people suggested security guards without providing a specific reason. One participant even went as far as to say "Get the street people out of there, who are said to be setting fires in the delta... although we all know, in our hearts, that someone else is orchestrating such gestures of greedy and narrow-minded people."

Coding Category	Explanation
Security	The participant suggested that the park be better protected against things like fires, stray dogs, and homeless people living there.
Park Maintenance	The participant suggested things like cleaning and plant /tree maintenance.
Keep it Natural	The participant suggested that the natural ambience in the park should not be changed from its current state. Nothing added and nothing removed.
More Amenities	The participant suggested things like more trash cans, benches, and paths.
Fewer Amenities	The participant suggested taking away amenities to make the park more natural including not paving the sidewalks and removing concrete.
More Education	The participant suggested that there needs to be more information about the park readily available to the public.
More Events	The participant suggested that there needs to be more events held within the park.
Better Accessibility	The participant suggested that the park needs to be more easily accessible including working on the entrances.

Table 5: Coding categories used and their explanations.

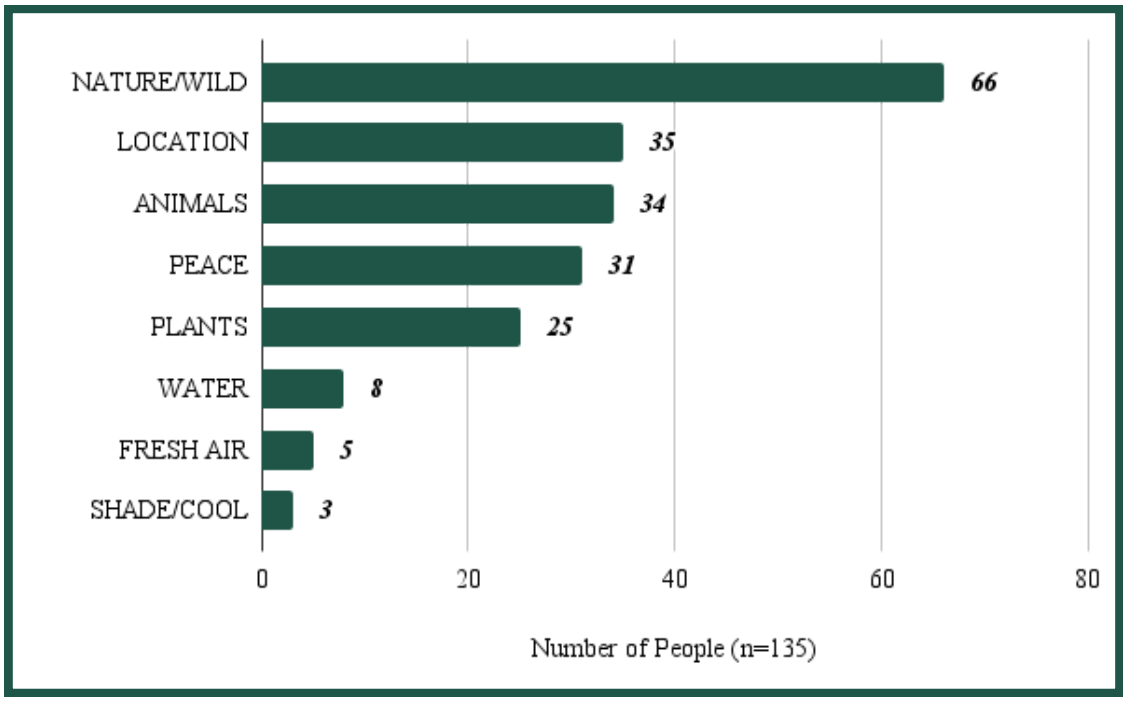


Figure 15: Survey responses to a question asking participants what suggestions they have for VNP.

One reason protection and maintenance may have been mentioned frequently was because of the massive fire that occurred in VNP on March 20, 2024, the same day our survey was sent out–Videos of the fire were spread on social media causing many people to specifically mention it in the surveys. Since this event was in the front of people's minds, it may have caused them to bring up security more often than before. Though examples of security were found in all survey groups, fire was only specifically stated from the respondents found on social media. Nonetheless, these concerns further demonstrate how the participants value the natural aspect of the park as they want to protect it from destruction of all kinds.

> **Get the street people out of there, who are said to be setting fires in the delta... although we all know, in our hearts, that someone else is orchestrating such gestures of greedy and narrow-minded people**
>
> **- anonymous surveyor**

What did participants do at VNP?

We asked participants what activities they participated in while in VNP. The majority of respondents participated in walking and observing wildlife while in the park. A chart outlining the percentages of common answers to this question can be seen in Figure 16.

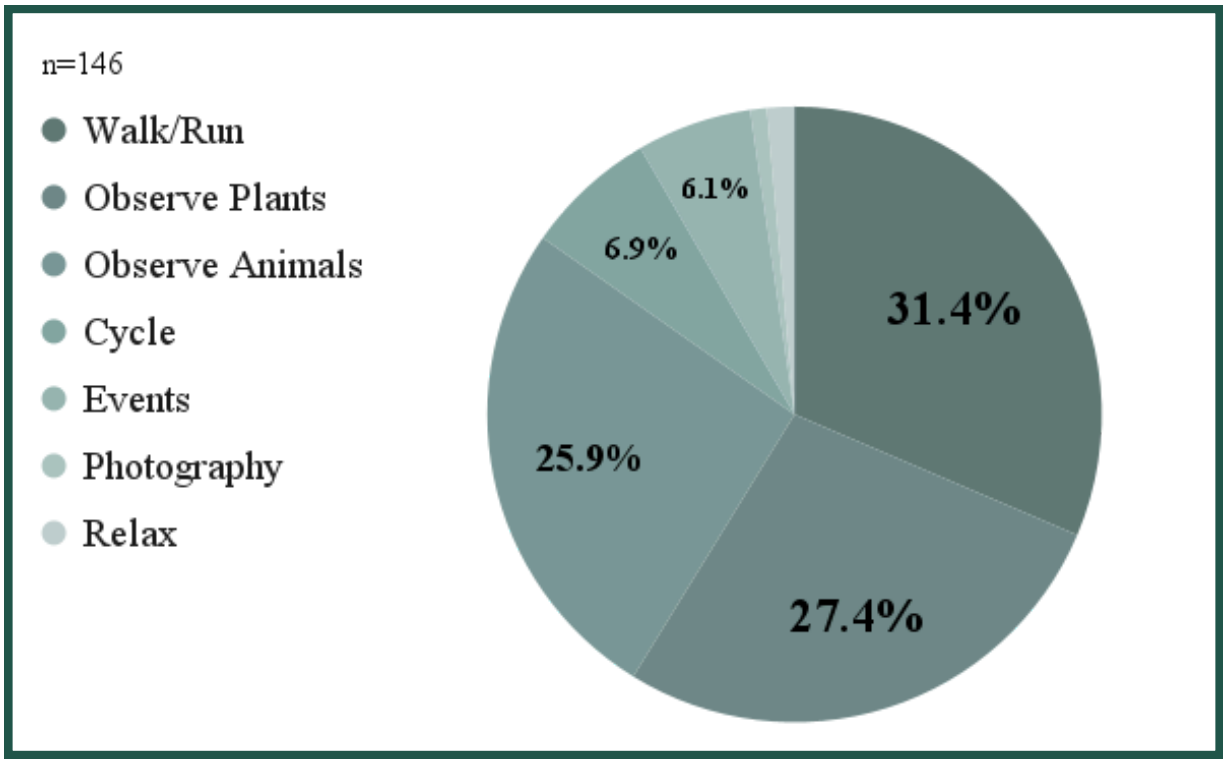


Figure 16: Survey results from a question asking participants what they do while at VNP.

The largest categories from this question are walking/running, observing plants, and observing animals so our app will include features that would inform people about the wildlife and trails that can be walked.

What did participants know about BF?

Ninety-one percent of participants had heard about BF, however, like with the data for VNP, that number is likely high since the majority of participants were found on the VNP social media. If the people responding through social media are not taken into account, 82% of people had heard about the park. Seventy-seven percent of people who had heard of the forest had either never been or had only been once in the last year. When asked what they know about BF, participants most commonly said general information including location of the forest. A close second is participants saying they knew nothing about the park. Even though more people have heard of BF, they do not know any detailed information about the forest. These responses were coded into 11 categories, detailed in Table 6, and a full outline of coded answers can be seen in Figure 17.

Coding Category	Explanation
General Information	The participant was generally aware where the park was located.
None	The participant knew nothing about the forest.
Deforestation / Threatened	The participant was aware of some of the threats to the forest such as deforestation and real estate developers.
Nature / Wild	The participant was aware that it was a forest or specifically commented that it was wild.
History	The participant explained part of the history of the forest.
Recreational	The participant was aware the forest was used for running, walking, cycling or they specifically said recreational activities.
Animals	The participant was aware of animals living within the forest.
Plants	The participant was aware of plants/trees that are in the forest.
Zoo	The participant was aware of the Zoo that is near the forest.
Trails	The participant was aware of the trails within the forest.
Events	The participant was aware of events held within the forest.

Table 6: Coding categories used and their explanations.

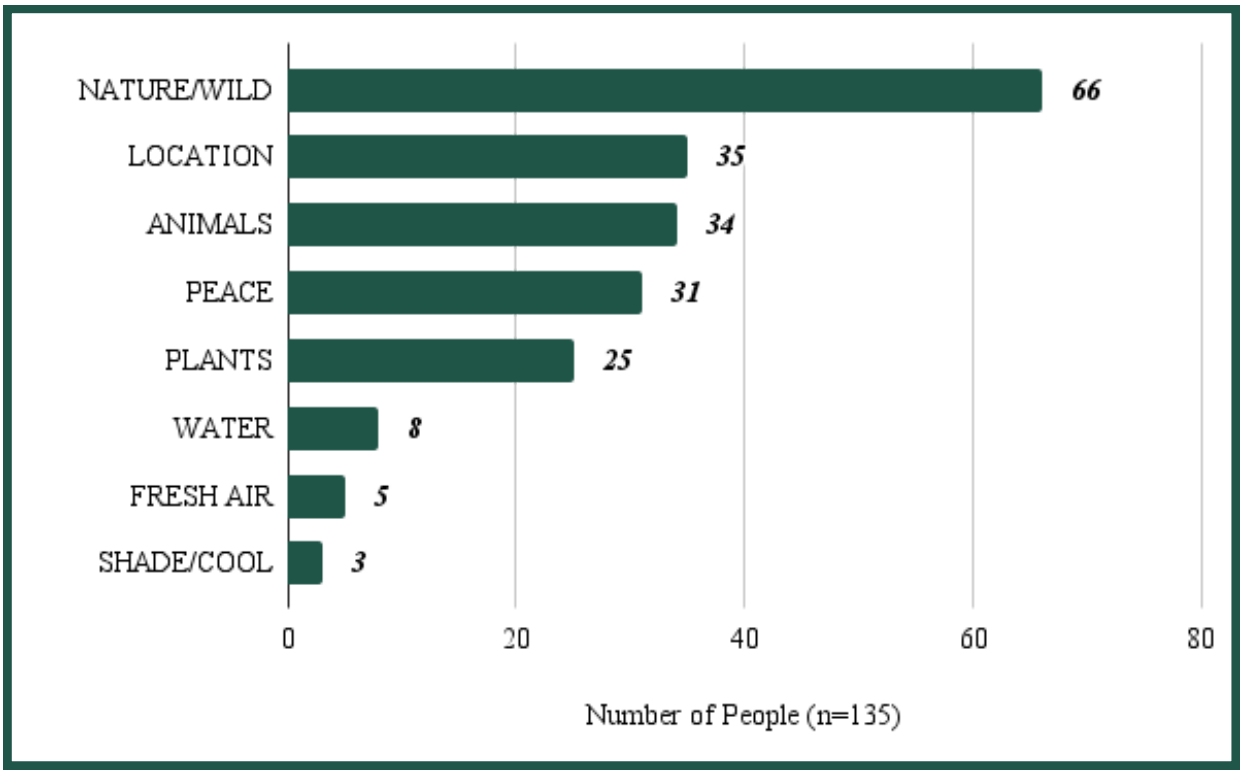


Figure 17: Survey results from a question asking what participants know about BF.

Similarly to the data for VNP, many people only knew general information about the forest. However, many more people stated they know nothing about BF than VNP. This further justifies the need for an app to more efficiently educate people about these green spaces.

What did participants like about BF?

According to the responses from our survey, the two most liked things in the forest are the nature and peace of the forest compared to the city surrounding it. These responses were coded into 15 categories, defined in Table 7, and a full outline of coded responses can be seen in Figure 18.

Coding Category	Explanation
Natural / Wild	The participant liked that the forest exists and the nature within it.
Peaceful / Relaxing	The participant liked the quiet and peacefulness of the forest.
Scenery	The participant liked the forest's appearance.
Plants	The participant liked the trees and plants within the forest.
Location	The participant liked the location of the forest within the city or close to their home.
Fresh Air	The participant liked the fresh air in the forest compared to the air in the city.
Trails / Training	The participant liked the trails within the forest or their ability to train in the forest.
Biodiversity	The participant liked the biodiversity of plants and animals within the forest.
Recreation	The participant liked the recreational activities they could do within the forest, for example, walking and running on the trails.
Environmental Benefits	The participant liked the environmental benefits of the forest to the city (such as assisting in creating cleaner air.)
Memories	The participant liked the memories they had made in the forest.
Water	The participants liked the water features within the forest such as the Băneasa River.
Cool / Shade	The participant liked the biodiversity of plants and animals within the forest.
Events / Services	The participant liked the events held in the forest or the services that the forest offered.
All	The participant liked everything within the park, indicating that by writing “all.”

Table 7: Coding categories used and their explanations.

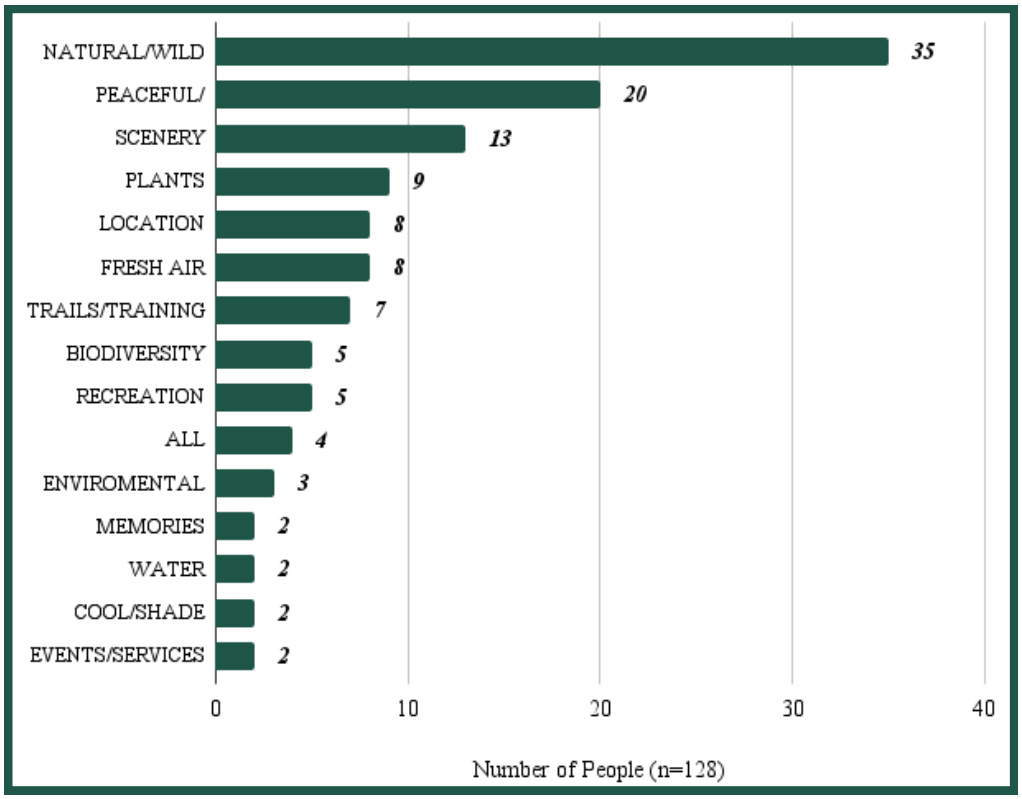
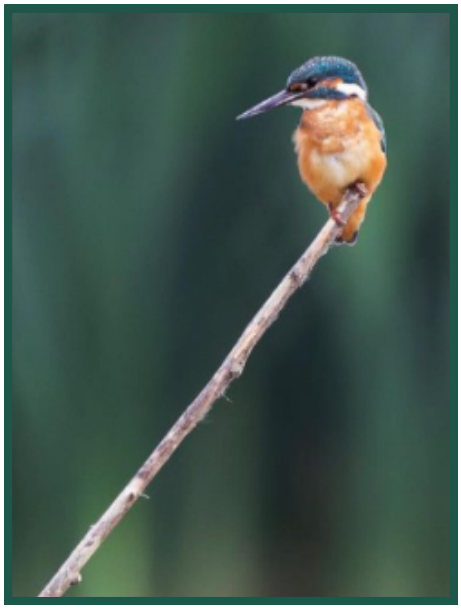


Figure 18: Survey results from a question asking what participants like about BF.

Over 50% of the responses asking about what people like about BF talk about the atmosphere of the park rather than specifically liking the nature of it like in VNP. People see BF as a more scenic place than VNP, likely because VNP was in ruins for such a large period of time.

What suggestions did participants have for BF?

When asked what suggestions they have for the park, many concerns came up referring to protection and maintenance of the park as the top three categories fall into that classification: Government protection, cleaning, and no deforestation. The responses were coded into ten categories, defined in Table 8, and a full outline of responses can be seen in Figure 19.



Coding Category	Explanation
Government Protection	The participant wanted BF to gain governmental protections similar to VNP.
Cleaning	The participant wanted the trash that is in the park to be cleaned up.
No Deforestation	The participant wanted the trees in the forest to stop being cut down for real estate development.
Keep it Natural	The participant wanted nothing to be added to or developed in the park to keep it as natural as possible.
More Amenities	The participant wanted things like benches and trash cans added to the forest.
Matintenance	The participant wanted the plant life in the forest to be maintained so it would not block the paths.
Planting	The participant wanted more trees and plants to be planted in the forest.
More Education	The participant wanted information about the forest to be more accessible to the public.
Management	The participant wanted the park to be better managed.
Events	The participant wanted more events to be hosted in the forest.

Table 8: Coding categories used and their explanations.

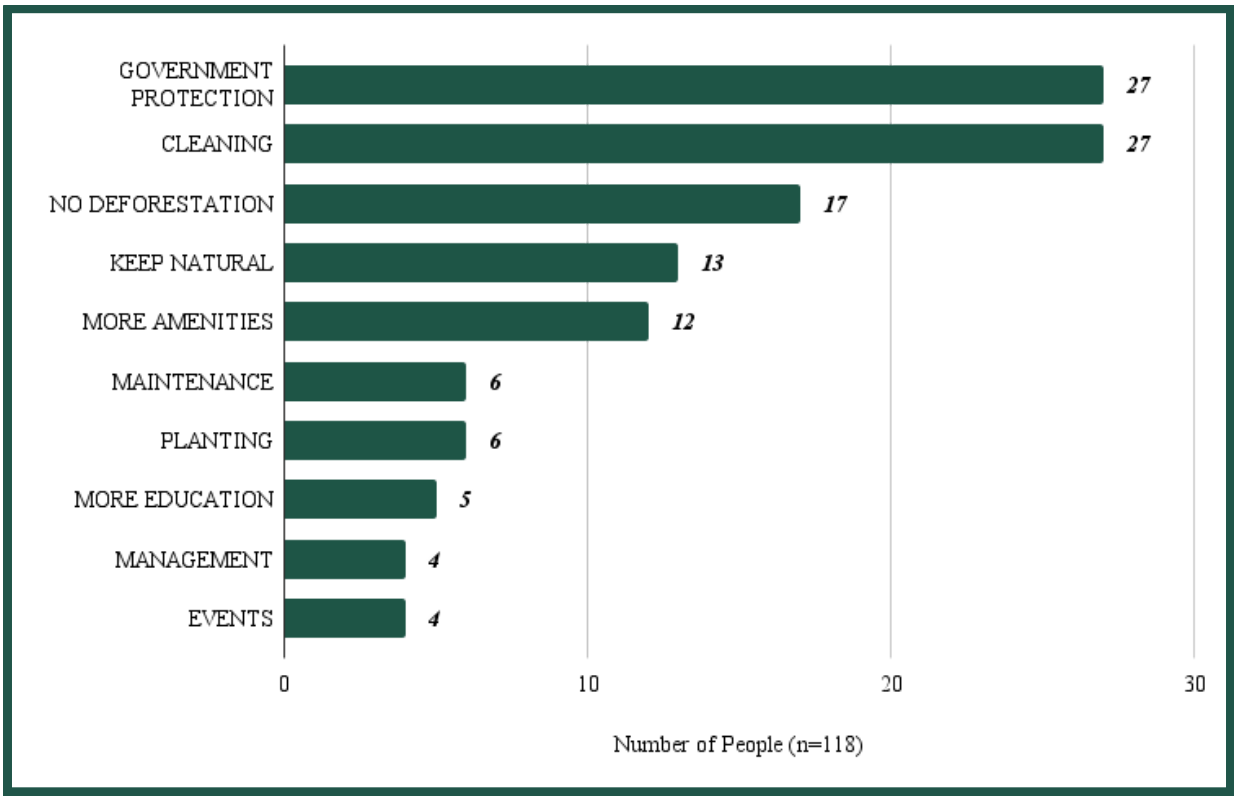
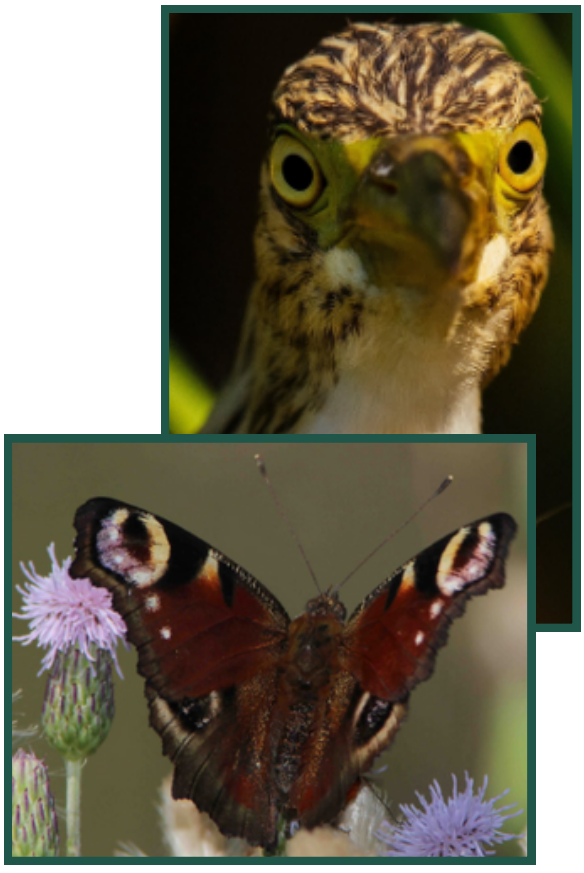


Figure 19: Survey results from a question asking participants what suggestions they have for BF.

About 70% of responses had something to do with maintaining the forest, whether it be through receiving governmental protections, cleaning, or stopping deforestation. Even though people may not know as much about this forest, they know that it is threatened and needs to be protected just the same.



What did participants do at BF?

For the last question specific to BF, participants were asked what activities they participate in while at BF. The majority of people stated that they partake in walking in the park or observing some sort of wildlife within the park. A full outline of responses can be seen in Figure 20.

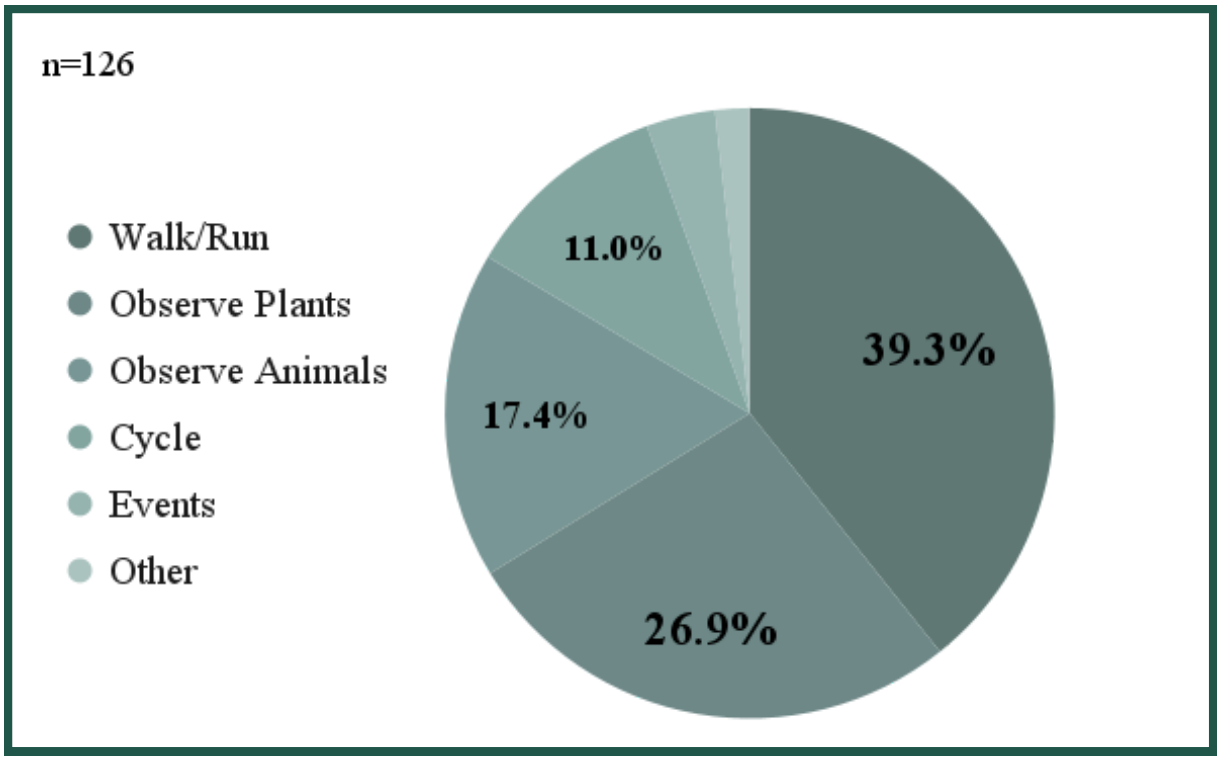


Figure 20: Survey results from a question asking participants what activities they do while in BF.

Similar to VNP, walking and observing various types of wildlife make up over 80% of the data collected which confirms the need to include informative features about wildlife and trails to the app design.

What did participants want to learn about BF and/or VNP?

Finally, the most important question for our analysis, we asked participants what they want to learn about VNP or BF. The results were very close with all categories being within 6% of each other. The top five categories, and the categories we included in the initial design of the app, were animals, plants, events, trails, and maps. History, general information, and nothing are the three least common categories taking up less than a quarter of total results. The percentage of responses can be seen for each category in this question in Figure 21.

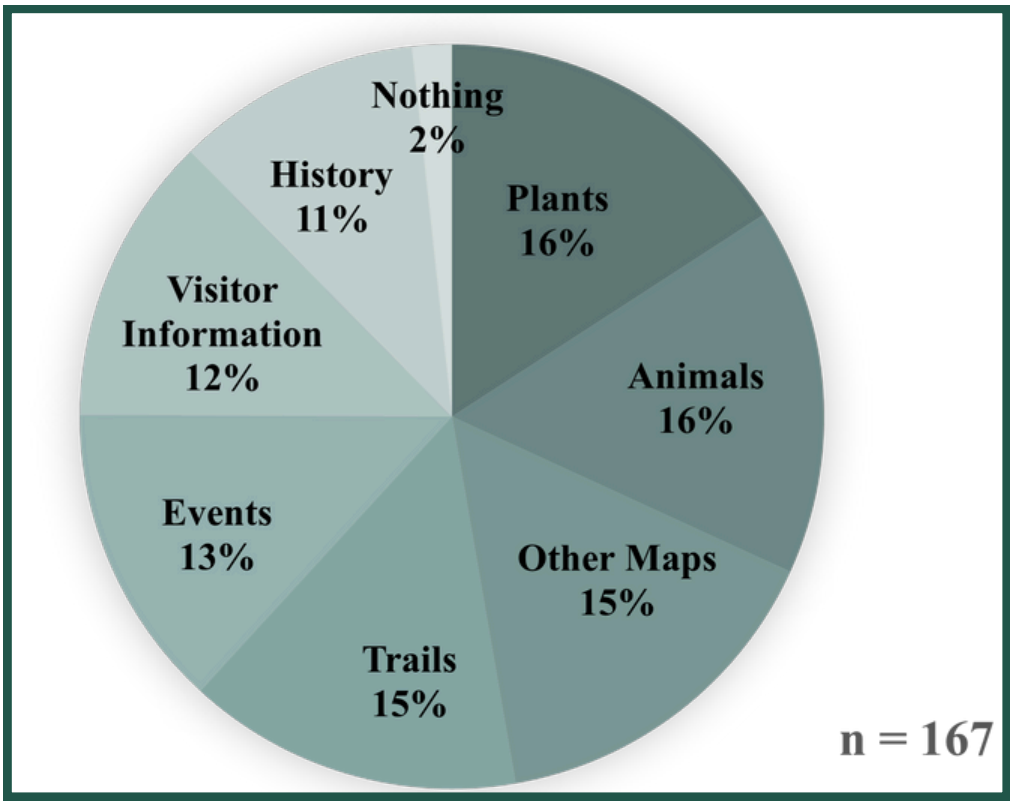


Figure 21: Survey results from a question asking participants what they want to learn about VNP and/or BF.

These findings were the first step to reaching our final goal of creating an app outline. Our next objective was to research nature park apps and find the most common features within nature park apps to continue working towards our final goal.

Features common in other nature app examples

Some nature apps have been successfully implemented worldwide, both for National Parks and general green spaces. To identify common features we might later consider for our app, we analyzed 16 of these apps, shown in Figure 22.

Figure 22: The 16 apps researched.

Figures 23 and 24 display eight prevalent features and examples of content found in these apps.

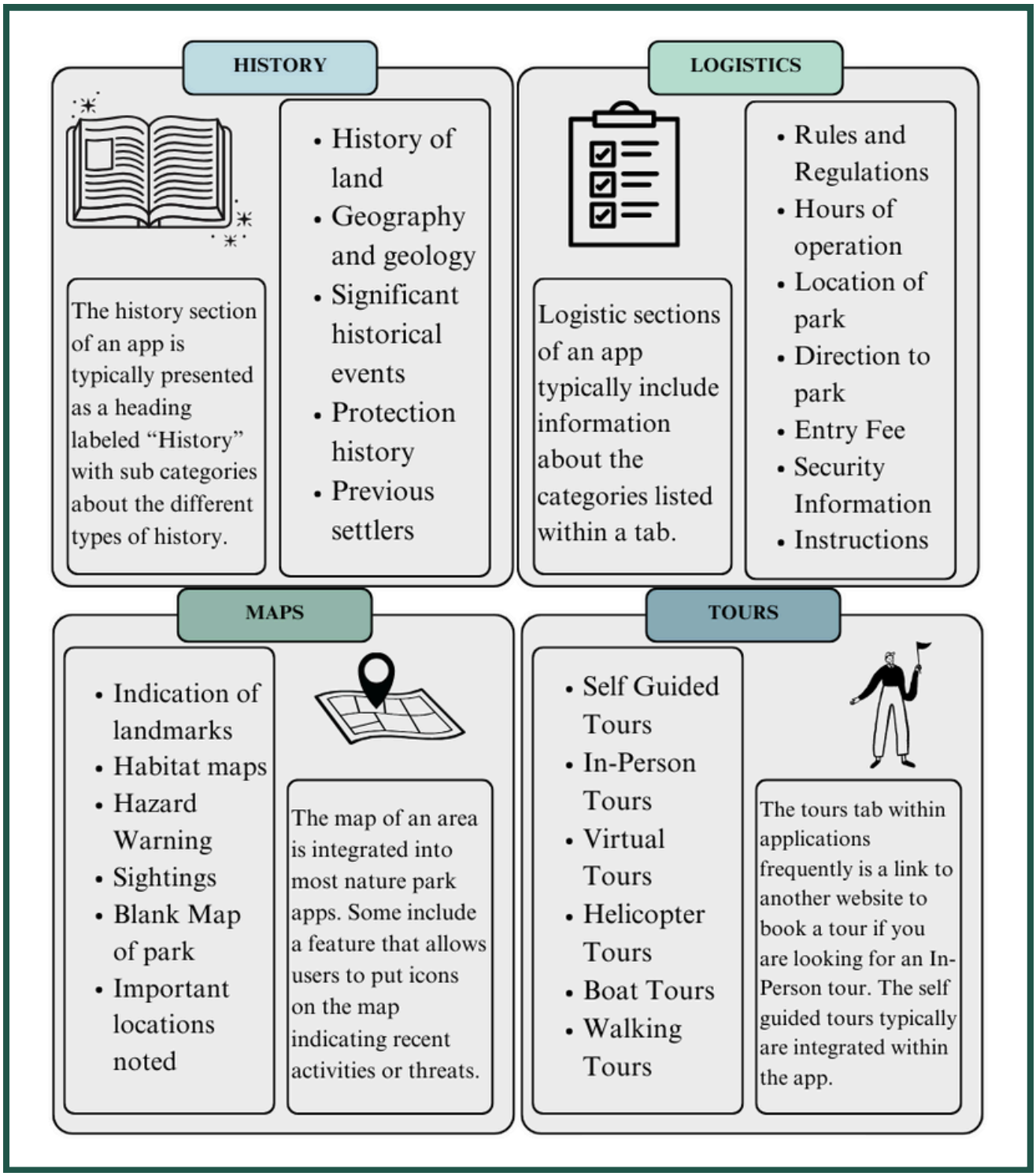


Figure 23: Prevalent features in the analysis of 16 different nature apps

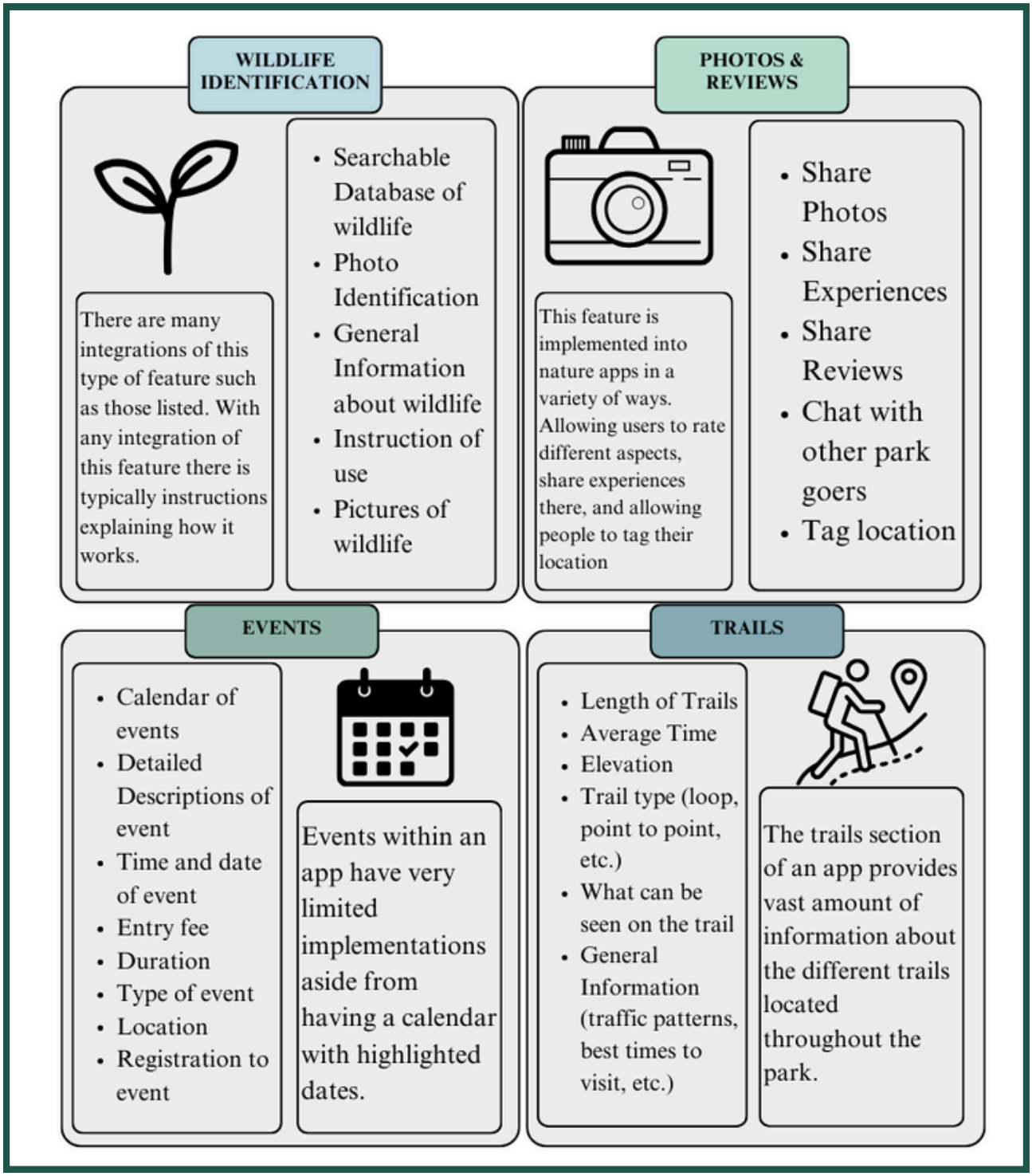


Figure 24: Prevalent features in the analysis of 16 different nature apps (pp. 2)

One design aspect of particular interest on these apps is gamification which can be seen in Figure 25.

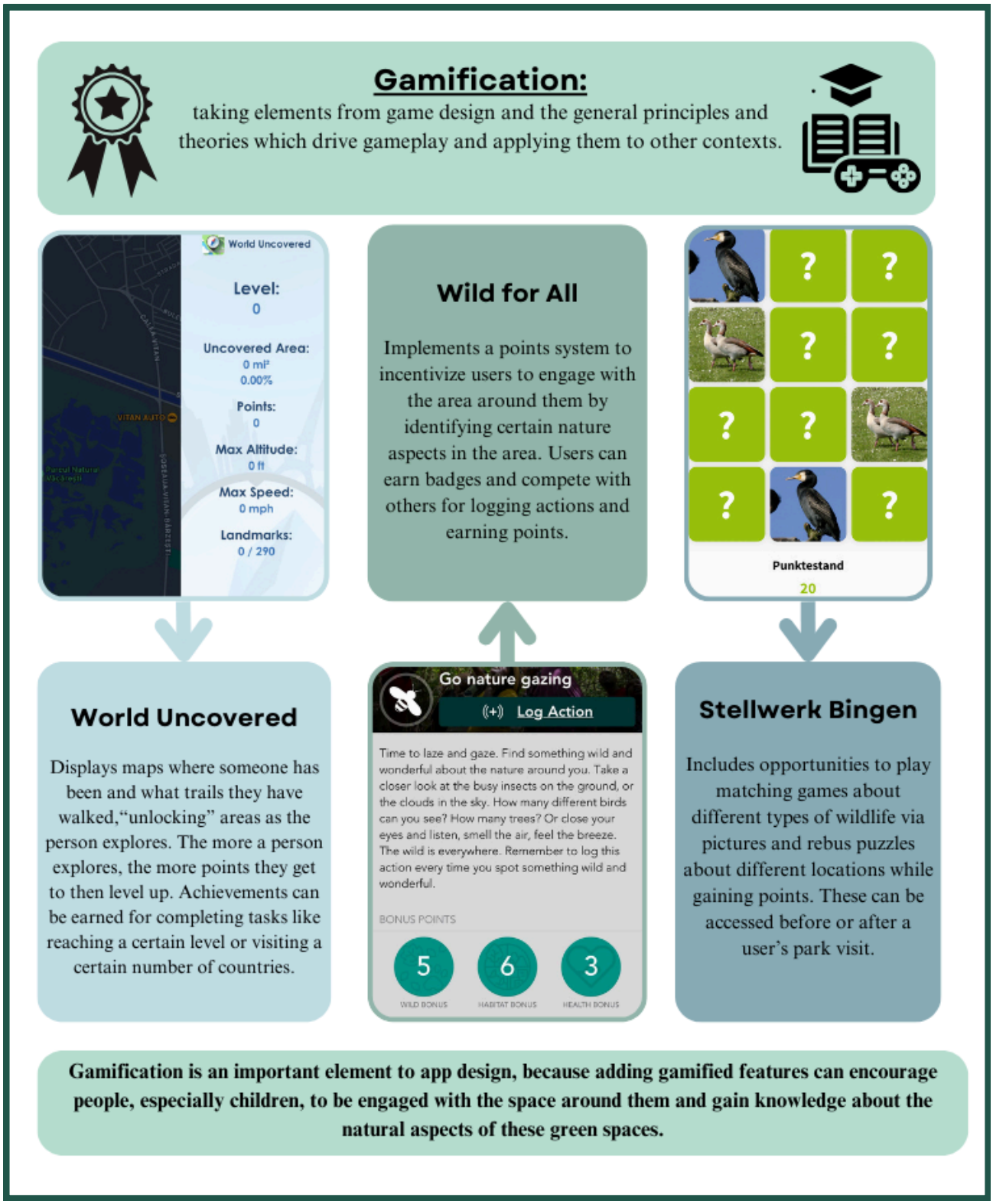


Figure 25: Gamification Explanation and examples

Figure 26 shows the coding process used with the apps to keep track of which apps incorporated specific features. The most common features among these apps were maps and logistical information such as the examples listed in Figure 23.

APP	History	Logistics	Maps	Tours	Wildlife Identification	Trails	Events	Photos & Reviews	Gamified Features
Grand Canyon National Park	☑	☑	☑	☑	☐	☐	☐	☐	☐
Yellowstone National Park	☑	☑	☑	☑	☐	☐	☐	☐	☐
AllTrails	☐	☑	☑	☐	☐	☑	☐	☑	☐
National Park Service	☐	☑	☑	☑	☐	☑	☑	☑	☐
World Uncovered	☐	☐	☑	☐	☐	☐	☐	☐	☑
OuterSpacial	☐	☐	☑	☐	☐	☐	☐	☑	☐
Parc Naziunal Svizzer	☑	☑	☑	☑	☑	☑	☐	☐	☐
PictureThis	☐	☐	☐	☐	☑	☐	☐	☐	☐
Picture Bird	☐	☐	☐	☐	☑	☐	☐	☐	☐
Picture Insect	☐	☐	☐	☐	☑	☐	☐	☐	☐
Stellwerk Bingen	☐	☐	☐	☐	☐	☐	☐	☐	☑
Chianti Sculpture Park	☑	☐	☑	☐	☐	☑	☐	☐	☐
Wild For All	☐	☐	☐	☐	☐	☐	☐	☐	☑
Latest Sightings	☐	☑	☑	☐	☑	☐	☐	☑	☐
Parco Nazionale Del Vesuvio	☐	☑	☐	☐	☐	☑	☐	☐	☑
iNaturalist	☐	☐	☐	☐	☑	☐	☐	☐	☐

Figure 26: Apps and their various features

App features based on survey results

As discussed in our above results, we found that most of our survey participants were interested in the wildlife, trails, maps, and the events that take place in the parks. Our team focused on incorporating these categories as the main components for the app and used the researched results from the above method to identify these features in apps on the market today. The main apps we looked at for these features are listed above in Figure 22.

Since one of the top attractions our participants mentioned was the wildlife, we decided to incorporate one of two wildlife identification features. The first was a photo identification tool where the user would take a picture of a plant or animal and then have the app identify it through a database, similar to Picture This. The second approach was based on the Parc Naziunal Svizzer app and allows a user to describe the plant or animal by height, color, species or other key identifiers or to search them by name to gain more information about it.

The second most common response to what the user would like to learn is information about maps, specifically habitat maps and wildlife population maps, see Figure 21. We looked into the app Latest Sighting for its map functionality. This app allows users to report where and when they saw a particular animal which then appears on a map that can be viewed by other users. Many surveyors' main suggestions for VNP and BF was security, so we wanted to implement a function that the user would be able to see and report any hazards in addition to animal sightings to others on the app. From the suggested responses in the survey, many believe that

key points, such as entrances, should be highlighted to make them easier to locate. To address these comments we incorporated another feature that would mark these places on the map.

The third popular response when asked what they wanted to learn was information about trails. This correlated to the activities question as the largest quantity of people said they enjoy walking, running, and cycling in the park. For this feature, we looked into the features from All Trails and Parco Nazionale Del Vesuvio. These apps inform users about the length of the trail, time it should take to complete the trail, elevation changes, and difficulty of the trail. Based on the survey, people wanted to learn more about all the various trails within the parks, so we aimed to provide them with that information, along with the specifications above.

Finally, participants wanted a way to learn about the events in the park, such as marathons and volunteering events. To address this, we referenced the NPSA and how the app organized their events onto a calendar and also allowed users to click certain days to obtain more information on specific events. An interesting response we got from our surveys was "...more events to be held here (besides Sun Challenge and photo tours; activities with kids)" which highlights that they know some of the events held in the parks but do not know of all of them. An event section within an app would help remedy this by giving users easy access to information about events and the ability to sign up for them.

To create more engagement with the user, we wanted to implement a badge and rewards system similar to Stellwerk Bingen and Wild for All. This would encourage users to continue exploiting and learning about the parks to earn more badges and compete with friends.

All of these features were put into an app mockup made in Figma. The page sections included are those explained above as well as a home screen section allowing users to select which park they would like to know more information about. Figure 27 shows a list of the sections that we designed and received feedback on.

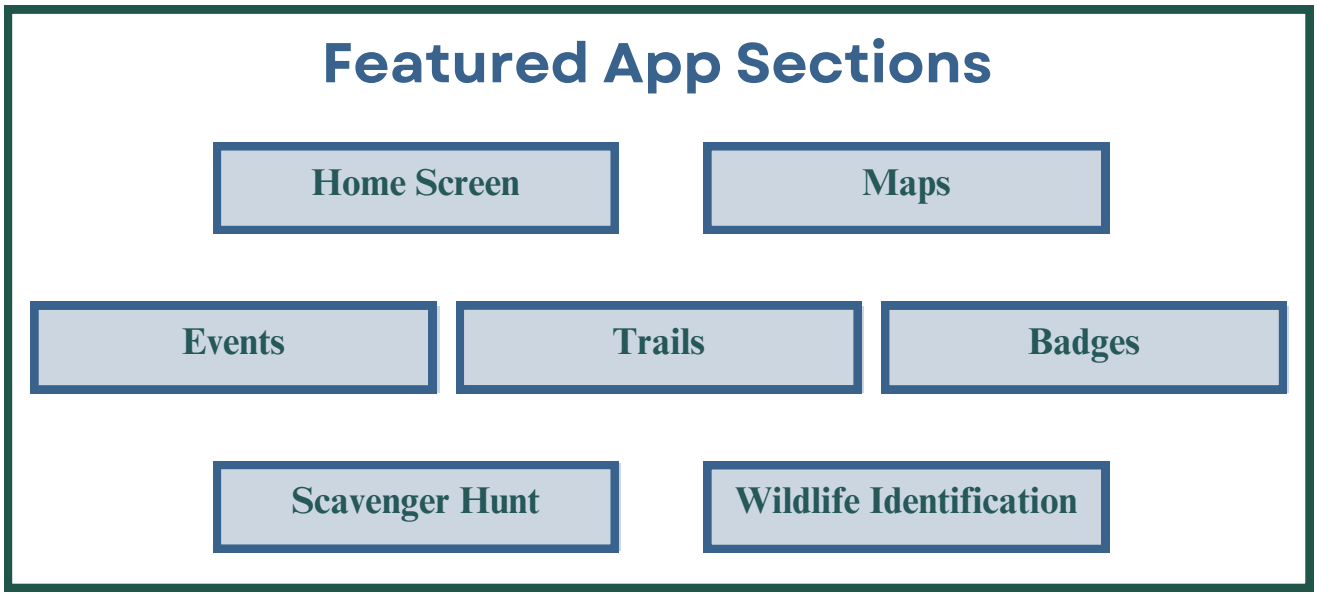


Figure 27: List of pages shown to focus group

Although it is helpful to have an app to educate people about the park, it should not take away from the nature experience by having them look at their phone most of the time. A concept of an application to supplement a park goers experience was developed by Professor Ferdig from Kent State University. Professor Ferdig explains this concept, and says that the app does not "detract from the nature experience" (Vanhoose, 2016). This is critical to the development of a mobile application for a nature park, because it requires a balance between how much interaction happens in the app versus with the park. If users spend too much time on the app, they will miss the physical experience of being in nature, but if they spend not enough time, they may miss valuable information and engaging content about the park that the app offers during a user's park visit. This was taken into consideration when implementing interactive elements into the app, so that users can stay engaged with the area around them. Therefore for interactive activities within the app we decided on a scavenger hunt which keeps users engaged in their surroundings rather than matching games or interactive designs that will keep the user on the app for the whole duration of their visit.

Online survey and focus group mock-up feedback

An online survey was sent out on Thursday, April 11, 2024 in the VNP Instagram page. The consent form displayed at the beginning of the survey can be seen in Appendix C and the questions asked can be seen in Appendix D. Online survey respondents had suggestions for the different features in the app mock-up, ranging from app instructions for certain features to stylistic improvements. The majority of participants said that they obtain their information about green spaces in Bucharest through social media, and none of the participants mentioned a website or mobile application.

A focus group was also conducted with the VNPA to collect additional feedback on the mock-up and see if there was any information that they would like added to the outline.

Home Screen

Participants liked the layout and design of the section and how it seemed easy to navigate. One suggestion was to include a map of Bucharest showing the locations of the different green spaces in the city, and the functionality to view a map of Bucharest with the various green spaces was added based on this feedback. Another suggestion was to have a larger emphasis on the different park buttons rather than the "donate" and "volunteer" buttons, which was also revised.

The VNPA had positive feedback on the ability to add additional green spaces to the app and having information on the different green spaces in one centralized application, which would allow sustainability for the app in the long term.

Wildlife

For the icon of this section, one participant noted that there was a lack of connection between the leaf icon and the animals that are included in the section in addition to plants. This was modified to include an icon with both plant and animal elements. When presented with the two design options, participants preferred option 1 with photo identification, saying that it would appeal to people who may not be as familiar with identifying wildlife. However, some participants mentioned that it would still be useful to have the search database for people to look up specific species. In the animal/plant description, one participant suggested having the name shown in color. Another suggestion was to show the location in the park where the specific animal/plant is commonly found.

The VNPA requested having a link in the wildlife section to iNaturalist, a nature app that already has photo identification as well as a searchable database for various wildlife. They noted that this would make it easier to implement these features compared to coding them as built-in features of the app. Based on this feedback, a linked button was added to this section to take the user to the iNaturalist database.

Trails

Participants liked how intuitive the trails section was, noting the ability to see their location in real time. The implementation of badges was also liked among participants, with one participant saying that they "provide motivation for the user." The idea of tracking the number of burned calories while on a trail was mentioned as well. However, this feature is already in other fitness applications, and would not align with the goal of educating users of the green spaces in Bucharest.

A suggestion from the VNPA was to notify users of an incoming information board as they were approaching them while on a trail. This would benefit the user two-fold: it would orient the user on their current location and progress on the trail, and prevent them from possibly missing the board while traversing the trail. A screen was added to the outline to show notifications that the user will receive when approaching an information board.

Maps

Many participants liked the maps section as well as the reporting system. One suggestion was to make the reporting process more detailed, so that the user can include comments about the report like specific location and/or details of the report. To add this functionality, a text field was added in the reporting screen for the user to add additional details about the report. In addition, the concept of a scavenger hunt appealed to participants, and one participant suggested being able to access other features of the app without losing progress in the scavenger hunt.

The VNPA liked the hazard and wildlife reporting system, and a suggestion was made to have more specific options for hazards rather than letting users report hazards in an open text field. A drop-down menu of hazards was added based on this feedback. In addition, being able to see the location of informational boards was requested, which could be added to the "locations" map toggle.

Events

The events section was well liked by participants, with one saying it would be "very useful" and that they would enjoy this feature to "learn about events in a timely manner."

The VNPA noted that this section was easy to navigate and that having this section would be useful for users to be more informed about planned events in the park. When clicking on a date to learn more about a volunteering event in particular, the VNPA suggested having the sign up form linked to the volunteer button to make it easier for users to access the form.

Badges

Out of the 4 options presented for the badges section, option 2 was the most popular. One participant suggested having the level of the user as well as their number of badges on the screen. Another suggestion was to include how to earn certain badges under each badge so that users can know how to earn them. As a result of this feedback, the badges screen was redesigned to show the level of the user and instructions for how to earn certain badges that the user has not earned.

In contrast, the VNPA found the badges to be a novel idea, and were unsure of how interactive it would be with park goers. They mentioned the system that some United States parks use with physical stamps in stamp books for parks, which they may consider adopting for the green spaces in Bucharest.

When asked how the information in the mock-ups should be publicized, all of the participants chose a mobile application over a website.

Deliverables

We created a mockup of a mobile application which can be seen in this chapter. This mockup includes information about wildlife identification, trails, maps, events, badges and a home screen about general information such as how to get to the park and where the park is located in relation to Bucharest. All of these features and content are shown in figures 28 through 34.

Figure 28: Home Screen pp 1

Figure 29: Home screen pp 2

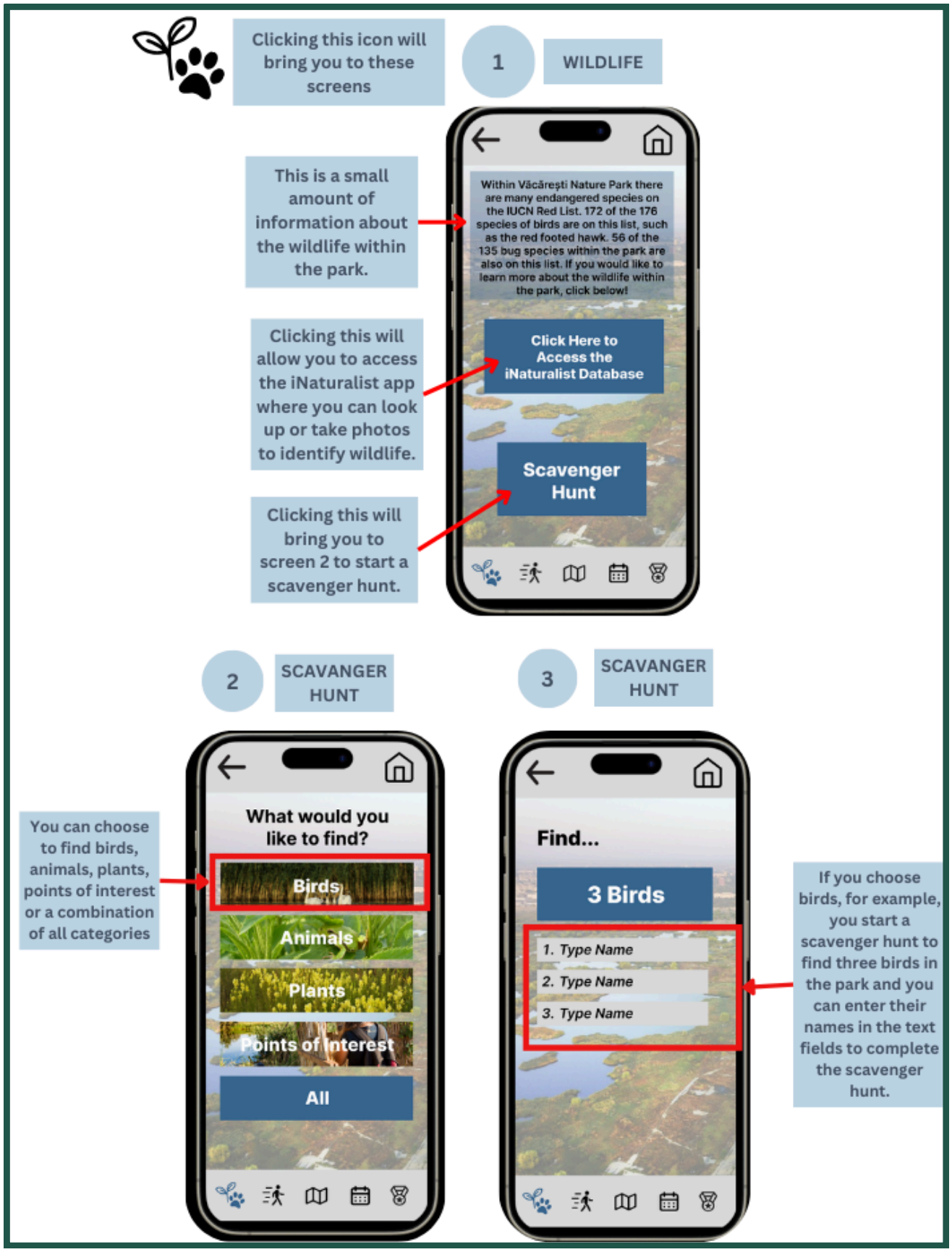


Figure 30: Wildlife Identification & Scavenger Hunt

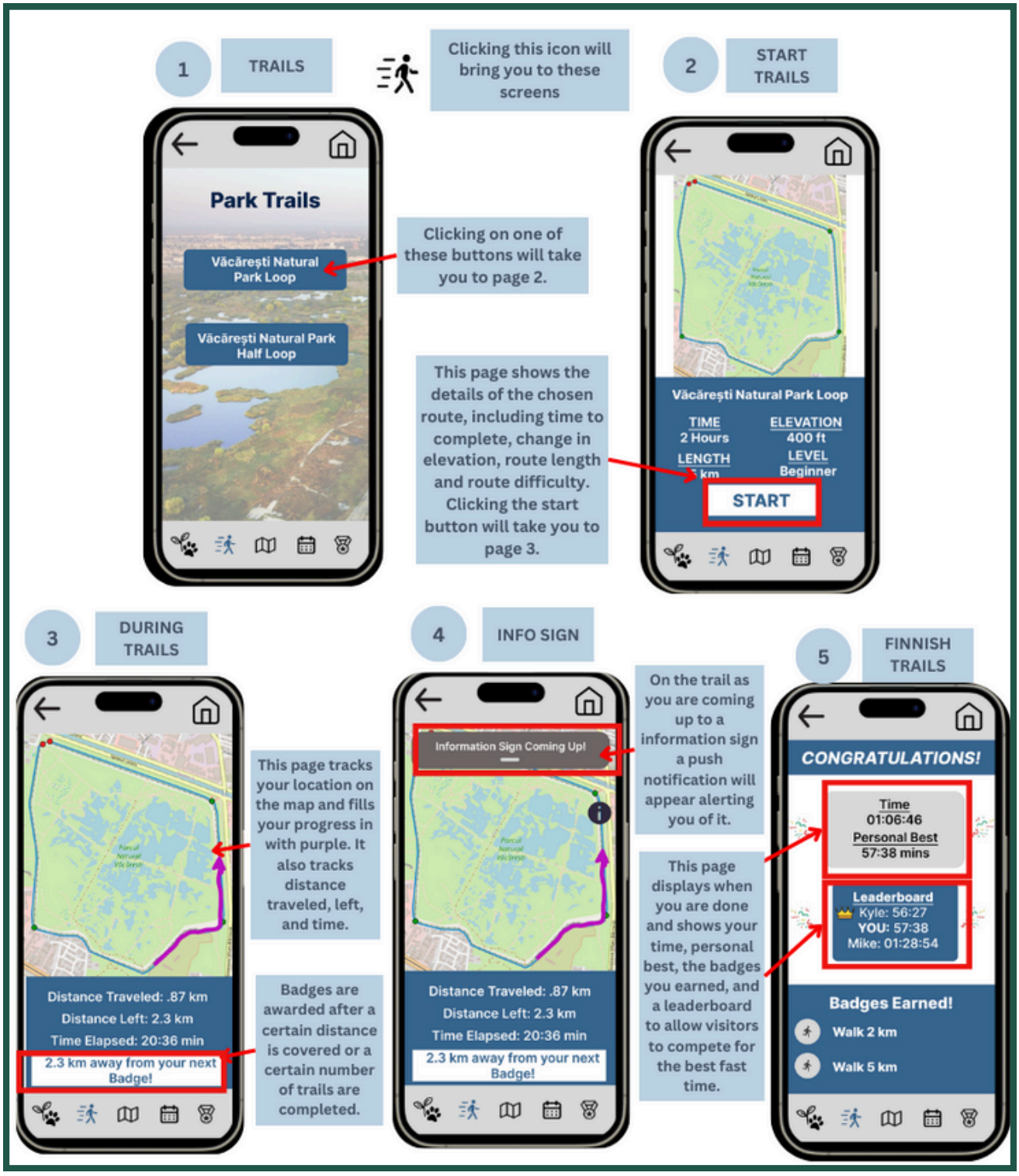


Figure 31: Trails

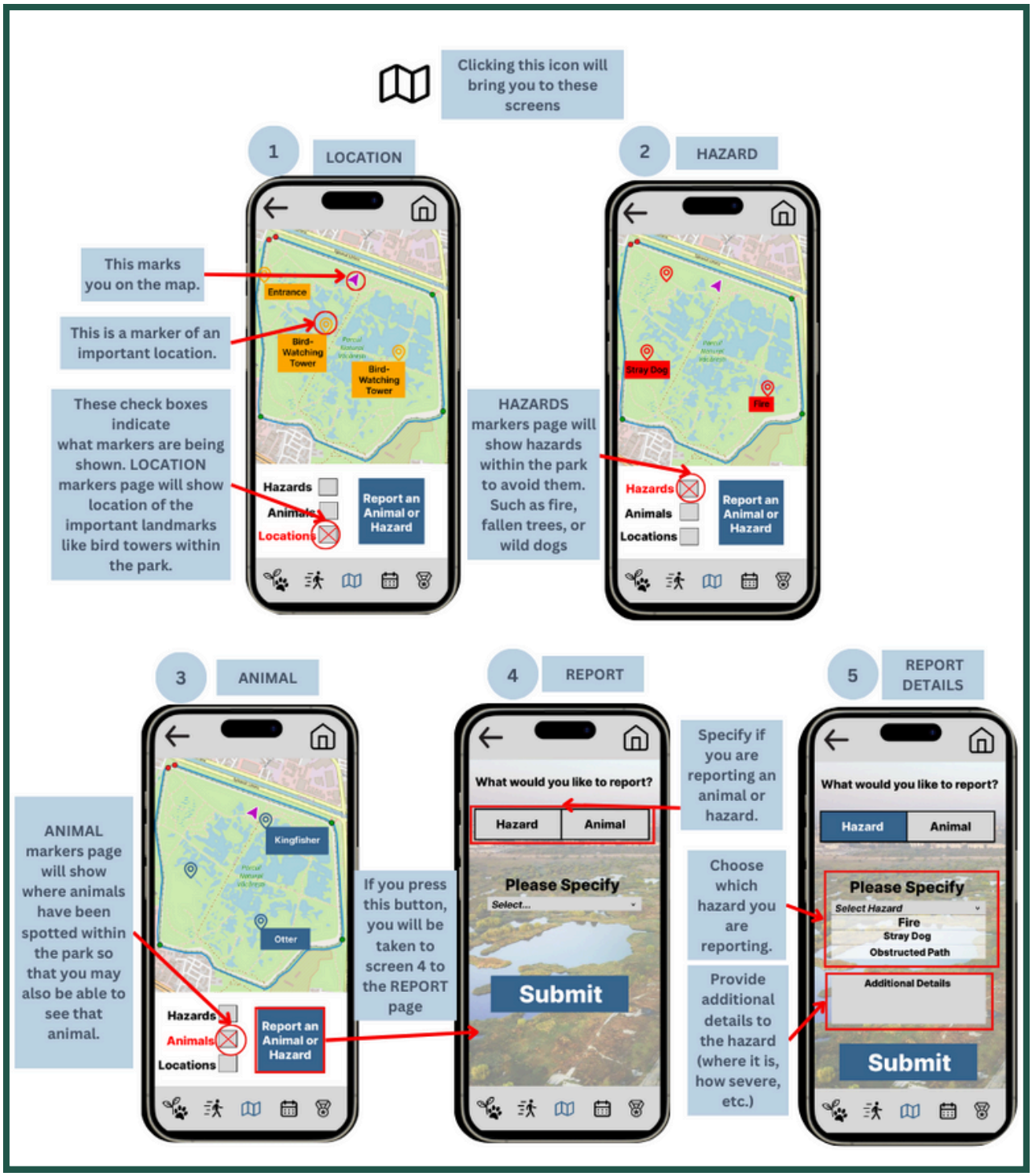


Figure 32: Maps & reporting system

Figure 33: Calendar of events & event descriptions

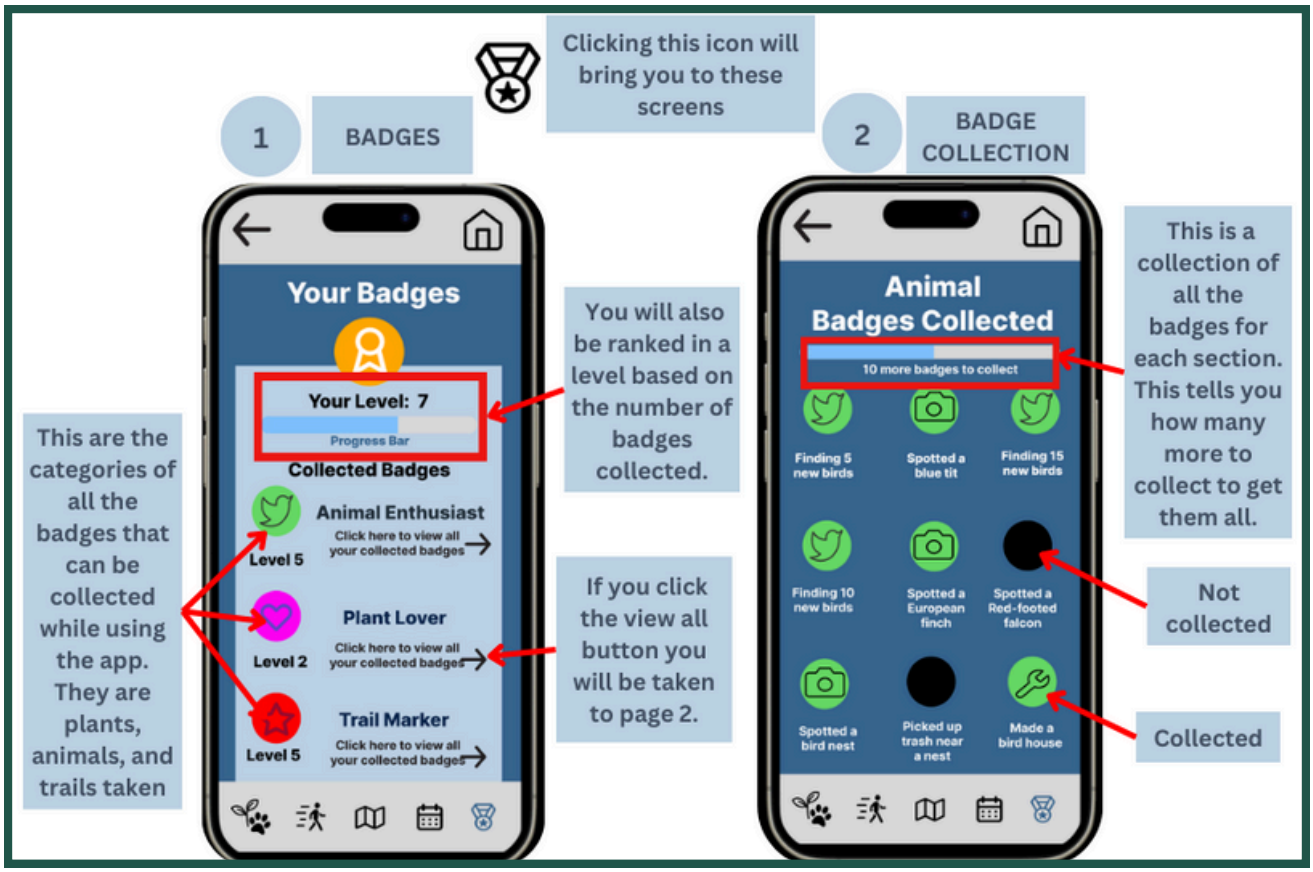


Figure 34: Badges

Conclusion & Recommendations

Through analysis of nature apps, intercept surveys, and online surveys, we were able to create a workable outline that will help the VNPA create a mobile application to educate the public about their green spaces. We collected data about what people know and want to know about these green spaces as well as the activities and park features that most interest them, drawing on features of other nature apps to meet their needs. Our focus was on educating visitors about the wildlife and plants and on helping them navigate the park's trails. With feedback on mock-ups, we refined our initial outline and provided explanations and a low fidelity version that will help developers create the app. This chapter also includes additional recommendations for the app–useful features we did not have time to flesh out in the timeframe of this project.

In the future, we would recommend making the scavenger hunt list what to find in the park rather than having the user input the names of what they found. For example, the app would provide the user with names or pictures of 3 birds and the user would go around and take pictures of each. Once they complete the scavenger hunt they would earn a badge. This method may be easier to use since not everyone who goes into the park can easily identify things within the parks. We would also recommend adding a map that shows where certain animals can commonly be found in addition to the animal reporting system. Next we would recommend adding a map of the different habitats that can be found in the park and what identifying features each habitat has. Finally, this outline could be expanded if the VNPA would want to add more parks to the app in the future.

In the end, we believe there is a need for this app. Many of the responses in our survey indicated that people were misinformed or uninformed about the park, and those who already ise the park would welcome additional information the app would provide. Developing this app will increase local engagement in the park and may be a useful asset for those already enjoying the park.

QR Code to the Figma Outline

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Appendix

Appendix A

Consent Form for Văcărești Nature Park Survey

Project Title: Green Bucharest: Nature in the City
Thank you for taking the time to take our survey. We are a team from a university in Massachusetts, United States and we are working with the Văcărești Natural Park Association to understand what Bucharest residents think about the parks and forests near the city and what they might like additional information on. We will use the results of this survey to design an app residents can use to learn more about Văcărești Natural Park and Băneasa Forest. This survey will take around 5-10 minutes to complete and will be risk free. We will not be collecting any personal or identifying information, unless you want to participate in a follow up discussion; in that case, we will get your email and contact you but will not share it with anyone else. The results of this survey will be published in a written report but your identifying information will not be used.

If you have any questions or concerns, you can contact us at wpiparks@gmail.com

Appendix B

1. Do you consent to filling out this survey? (Y/N)

If no, the survey will end

2. Do you currently live in Bucharest, Romania?(Y/N)

If no, the survey will end

3. Are you over 18 Years of Age?(Y/N)

If no, the survey will end

4. Have you heard of Văcăreşti Natural Park? (Y/N)

If no, the survey will skip to question 10

5. What information do you know about Văcăreşti Natural Park? (Long Answer)

6. In the last one year, how many times have you visited Văcărești Nature Park? (Short Answer)

7. What do you like, if anything, about Văcărești Nature Park? (Long Answer)

8. What suggestions, if any, do you have for Văcărești Nature Park? (Long Answer)

9. What do you do at Văcărești Nature Park? (Select all that apply) (Run / walk / cycle / participate in events / observe plant life / observe wildlife / volunteer / other)

10. Have you heard about Băneasa Forest? (Y/N)

if no, the survey will skip to question 16

11. What information do you know about Băneasa Forest (Long Answer)

12. In the last 6 months, how often have you gone to Băneasa Forest?(0/1-3/4-6/7-12/13-24/25+)

13. What do you like, if anything, about Băneasa Forest? (Long Answer)

14. What suggestions do you have, if any, about Băneasa Forest? (Long Answer)

15. What do you do at Băneasa Forest? (Select all that apply)(Run walk/cycle/participate in events/observe plant life/observe wildlife/volenteer/other)

16. Would you like to learn any information about the following related to Băneasa Forest and/or Văcăreşti Natural Park? (Select all that apply)(Plant life/wildlife/events/maps(hiking trails)/maps(other)/history/ general information/Logistics (Ex. Park hours, rules, regulations)/nothing/ other))

17. Would you consider going/going again to Văcăreşti Natural Park? Why or why not (Long Answer)

18. Would you consider going/going again to Băneasa Forest? Why or why not? (Long Answer)

19. Would you be interested in participating in a focus group? (Y/N)

20. If yes, please use the best email to contact you at. (Short Answer)

Appendix C

IInformed Consent Form for Văcărești Nature Park Feedback Survey
Hi! We are a team from a university in the United States and have previously collected data about green spaces in Bucharest. The results of this survey will be used to refine the outline of the application we will create from this research.
It should take around 10-15 minutes. Thank you for your time!
By completing this survey, your email will be entered to win a 40 lei Starbucks gift card.

If you have any questions or concerns, you can contact us at wpiparks@gmail.com

Appendix D

1. How do you usually get information about green areas in Bucharest? (Website, mobile application, social media, other)

Home screen

This section contains questions about the home screen (1), loading screen (2), and application home screen (3). The donation and volunteer buttons will link to the APNV website.

2. What do you think of the design of this section? Would you change anything?
3. Is this section missing content? Is there anything that seems unnecessary?

Wildlife identification options:

The two options are: a photo identification function/a species identification function using a database.

Screen 1: Photo ID. You'll take a photo of the species you want to identify, and information about it will appear. Screen 2: Shows the database where you will search for the species, the information will appear on the page.

4. Which design do you like the most? (Option 1, Option 2)
5. What do you think of the design of this section? Would you change anything?
6. Is this section missing content? Is there anything that seems unnecessary?
7. What do you think of the design of this section? Would you change anything?
8. Is this section missing content? Is there anything that seems unnecessary?

Trails

This section starts on screen 1, showing the different options you have in the park. Once one of them is clicked, it will go to screen 2 which shows the route and its details. When the start button is clicked, screen 3 appears, showing a timer and how far you are/how far you've gone on the course. Once that's done, screen 4 shows your time, record times, and the badges you've earned over time.

9. What do you think of the design of this section? Would you change anything?
10. Is this section missing content? Is there anything that seems unnecessary?

Maps

When the map icon at the bottom of the screen is clicked, the section starts with a blank map where you can see the information of that area (hazards, species, etc.). Screen 1 shows an

Appendix D

indicator of where you are on the map, as well as indicators for other places, such as park entrances. You can also report direct sightings (what species you have seen) or possible hazards by holding your finger for a few seconds on the location on the map and entering the necessary information displayed on screen 4.

11. What do you think of the design of this section? Would you change anything?
12. Is this section missing content? Is there anything that seems unnecessary?

Treasure hunt

You can play with this option when you are in the animals section. The home button on screen 1 is highlighted. There are options for what you might want to search on screen 2, or a whole category if you don't have a preference. The hunt (3) will proceed by entering the name of what it finds in the "Type name" box. This information will be recorded and used as a way of keeping track of the park's wildlife population.

13. What do you think of the design of this section? Would you change anything?
14. Is this section missing content? Is there anything that seems unnecessary?

Badges

Badges will be a collection of achievements that the user can collect. Some badges will be things like rare birds spotted or for completing different trails.

15. Which design do you like the most? (Option 1, Option 2, Option 3, Option 4)
16. What do you think of the design of this section? Would you change anything?
17. Is this section missing content? Is there anything that seems unnecessary?

Events

You will be able to find on the calendar (shown on screen 1) the days when events will take place. You will be able to click on the day and an information panel will appear (shown on screen 2) with the option to click on the volunteer button at the bottom which will take you to the APNV website.

18. What do you think of the design of this section? Would you change anything?
19. Is this section missing content? Is there anything that seems unnecessary?
20. If this draft were to be published in the future, how would you prefer to see it? (App, Website)