

SCHOOL FOR ENVIRONMENT AND SUSTAINABILITY



EST MASTERS PROJECT 2021

GREEK PATHS OF CULTURE: REIMAGINING ANCIENT TRAILS IN THE RHODOPE MOUNTAINS

ECO-TOURISM

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ABSTRACT

The Rhodope Mountains are a medium-sized mountain range located in northern Thrace along the Greek and Bulgarian border. Long politically and biologically isolated, the area has been recognized to be one of the most biodiverse regions in the Western Palearctic. However, despite the high biological value and due to isolation and a lack of expertise and funds, this area still lacks any significant ecotourism development. To assist local communities in advancing their sustainable development goals, we developed educational and outreach materials for the Greek Paths of Culture project which has been spearheaded by the Greek Society for the Environment and Cultural Heritage (GSECH). The aim is to help cultivate among hikers and nature lovers a public interest for an ancient and well-preserved network of trails traversing the Rhodope mountains. These walking paths are an ideal way to promote ecotourism in the area as they provide a way for hikers to engage with the cultural heritage of the region while also enjoying its tremendous biodiversity. Our team built out biological information for an app that can be used by visitors to navigate the area and developed extensive educational materials which will serve to inform both locals and tourists about the history of the region. These deliverables contribute a new element to the already existing conservation development effort and highlight the importance of preserving cultural and environmental history in rural Greece.



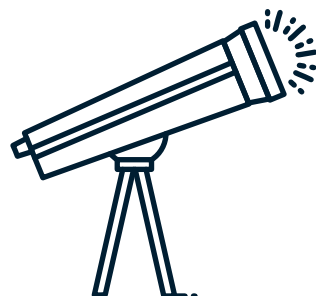
INTRODUCTION

Greece is well known for its innumerable islets, crystal blue waters, blue-roofed buildings, and the many archaeological island sites, yet the country itself is significantly more diverse and these elements represent but a small part of the varied landscape of this nation. Beyond the Aegean archipelago, and throughout mainland Greece, a long sequence of past civilizations is evidenced in a near endless number of lesser-known ancient structures and trails. This cultural diversity is easily matched by the country's rich biological diversity, which hosts the highest density of endemic species in the European continent. For example, in the province of Thrace -straddling the Greek-Bulgarian border- lies the Rhodope mountain range, which harbors exceptional levels of both plant and animal richness. Many of these species are endemic and only survive within this narrow region. Furthermore, this area also has an immense cultural significance in part because of an extensive network of ancient walking trails that crisscross the mountains.

However, being far from the tourism hub of the islands, this area of Greece does not get many visitors. The reason for this is a pronounced lack of infrastructure and human capital which is evident throughout this region and which is hindering local communities from benefiting from the unusual richness of cultural and biological sites. These things can be difficult to find if you are not already a native to the area. Today, the residents of Thrace are interested in preserving and documenting the cultural heritage of their area, but they need outside assistance and expertise in order to do so. They are also interested in building their economy through sustainable tourism which would be centered around the many sights to explore within the Rhodope Mountains.

BACKGROUND

The Rhodope Mountains are in a region with impressive levels of both native biodiversity and human cultural diversity; however, the region has remained significantly underdeveloped when compared to areas with similar levels of natural interest and historical significance. Greece as a country is heavily dependent on tourism. In 2019 it was estimated that up to 30% of the country's economy is directly and indirectly related to tourism (Bellos, 2019). Traditionally, the fast-paced growth of this industry in the area has come at the expense of the environment with many regions scaling up quickly in the number of tourists that visit, but also dramatically increasing the amount of environmental damage in the immediate area. This kind of accelerated degradation has been most notable in island communities due the significant impact that an influx of tourists can have upon a limited island space traditionally occupied by a much smaller population (Dimelli, 2017). Through a lack of planning, many areas go through a period of dramatic resource exploitation when tourism initially takes off. Instead, the residents of Thrace have expressed interest and are taking steps to increase sustainable ecotourism in their area, but building this industry in the region needs to be taken with great care for a number of reasons which are detailed below.



BIOLOGICAL SIGNIFICANCE OF THE REGION

The Rhodope Mountains run in an East-West direction along the Greek-Bulgarian border. While located only four hours west of Istanbul, a city of more than 15 million inhabitants, this is an exceptional biodiversity hotspot, harboring numerous plant and animal species unique to the area. Much of the mountain range is protected under various conservation arrangements, and these protected areas span a variety of ecosystems at different elevations. The significant diversity of different ecosystems, co-occurring along steep elevational gradients and on a relatively small area, is one reason for the high local species richness. The Nestos River traverses this mountain range from north to south before entering the coastal plain of Thrace and eventually emptying into the Aegean Sea. Along its lower reaches and before it forms the coastal wetlands, the river is flanked with the well-known Kotza Orman riverine forest. Representing only a small percentage of the original forest, it nonetheless represents one of the most important riparian forests in SE Europe and harbors many unique taxa. The Nestos River delta itself constitutes an important overwintering area for numerous migrating birds, as well as a significant breeding site for a diversity of resident species. At higher elevations, the Drimos Forest is home to one of the largest brown bear (*Ursus arctos*) populations in Europe, as well as a substantial wolf (*Canis lupus*) population (Hilbers, 2013). Due to the region's inaccessible terrain it has never contained dense human populations. The first larger roads into the region's high-elevation forests were not created until 1970. This remoteness has had a protective effect on the region's unique biological resources. Inner parts of the Frachtos Forest harbor old growth forest patches with trees that are at least 300-400 years old

(Brockhill, 2018). Much of the resident biodiversity remains undescribed: a number of new species of mosses and flowering plants have only recently been discovered within the mountains. Numerous species of endangered wildlife occur in the area including bears (*Ursus arctos*) wolves (*Canis lupus*), jackals (*Canis aureus*), souslik (*Spermophilus citellus*), otter (*Lutra lutra*), the spectacular Black Vulture (*Aegypius monachus*), and many other raptor species. Maintaining the presence of extensive wild spaces in the Rhodope Mtns. is critically important for many of these animals given that many have disappeared from nearly everywhere else in Europe.



Figure 1 : This image of a map using ArcGIS Pro showcasing the trails across the Rhodope Mountains.

CULTURAL AND HISTORICAL SIGNIFICANCE OF THE REGION

Beyond its biological significance, the region also contains a large number of areas of historical and cultural importance that deserve preservation as well. Many of the residents who live in the mountains are Pomaks, a unique group of people thought to have been relocated there during the Byzantine period to defend the border (Efstratiou, 1993). The isolated communities primarily used camels and horses to travel through the rugged landscape. Though there is evidence of habitation in the area since at least the Bronze Age, it has not been the subject of significant interest by archaeologists and very few archeological excavations have taken place here (Efstratiou, 1993). Remains of 4th century B.C. Thracian settlements have been found, as evidenced by large stone structures, burial mounds, and defensive walls. While the history of the area remains understudied, it is very likely that more careful archeological investigations will yield important findings about past habitation of the area. The architectural styles and building materials used in local buildings are often late masonry techniques used by the Byzantines for the construction of bridges in particular, and can also be seen in similar structures from this period in other geographic regions. For example, Byzantine engineers and architects when building bridges, used a segmental and two-centered arch approach. Such arches and tunnel chambers flowing through the body of the bridge were made to conserve building material and reduce the construction load on the arches. We see these same practices used today in most modern bridge construction.

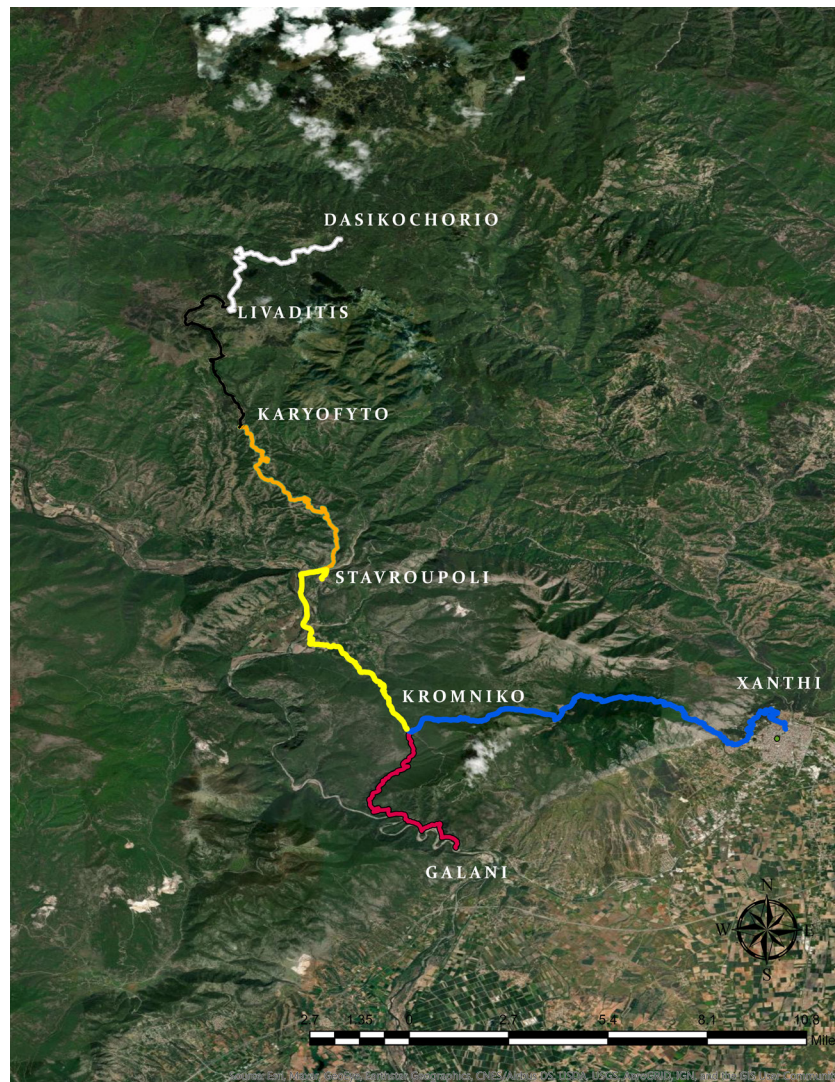
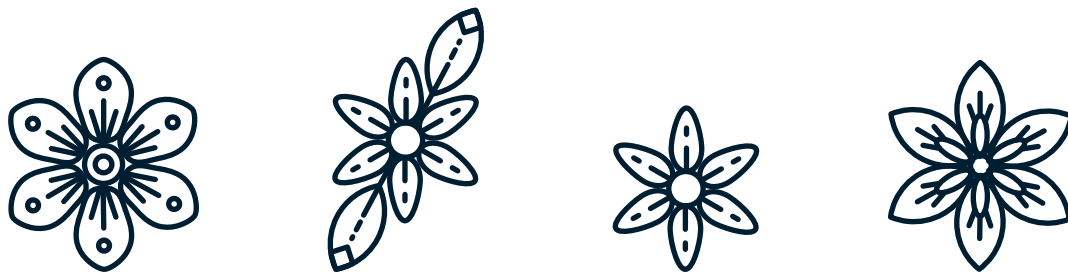


Figure 2 : This image of a map using ArcGIS Pro showcasing the trails across the Rhodope Mountains.

Given the poverty and general lack of economic opportunities, many inhabitants of the region are eager to find new ways of developing any type of economic activity including tourism. This is particularly noteworthy considering that the area has been completely bypassed by the massive tourism wave that many other areas in Greece have experienced. In a survey given to visitors about the favorability of designating the Rhodope Mountain area a national park, it was found that responses varied based on the amount of information a survey participant had access to (Machairis, 2005). Most visitors were unaware of the potential for park designation and 41% of the respondents indicated that they had poor knowledge of the landscape and

the species that lived there. The study authors recommended an expansion of education programs in the area to increase public understanding of the unique ecological treasures that exist there. Studies have found that visitors who visit regions specifically for ecotourism are more likely to take better care and generally contribute to more sustainable visiting practices (Fisher-Kowalkski et al, 2020). This study also found that producing educational materials and public programming aimed at increasing knowledge of how to best respect the local heritage and ecosystems is an effective way to increase local support for sustainable ecotourism development.

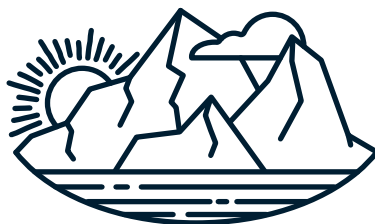


GREEK PATHS OF CULTURE PROJECT

The Greek Paths of Culture project was spearheaded by GSECH in 2010 to create an infrastructure of ancient trails that are supported with maps and educational materials. At this time, there are nine areas in Greece that have trails designated as ‘Greek Paths of Culture’, including: Marathon, Patmos Island, Sikinos Island, Mountainous Corinthia – Psari, Arcadia – Menalon Trail, Aegina Island, Epidaurus, Lesser Cyclades Islands, Thrace – Xanthi and Samothrace Island. In the future, similarly designated trails are planned for Delphi, Tinos Island, and Lefkada Island. To date, GSECH has cleared and marked nearly 700 km of trails and in 2019, the organization received a European Union Prize for Cultural Heritage for this initiative (GTP, 2019). The jury noted that “The project blends the philosophy of well-being with history, heritage, biodiversity and landscape, and underscores important linkages between culture and nature. The old tradition of experiencing landscape on foot, in contrast to modern means of mobility, is referenced and the landmarks along the paths are carefully chosen to enable the exploration of both culture and nature. The different aspects of tangible and intangible cultural heritage assets are experienced in a holistic approach to cultural landscapes” (Neoskosmos, 2019). This growing infrastructure of trail networks is evidence of GSECH’s significant investment in this endeavor and signals a permanent commitment to conservation in these regions.

These trails are uniquely poised to tap into the increases in trekking tourism which is rapidly gaining in popularity across Europe (GTP, 2019). Developing the towns alongside the trails in a sustainable way requires careful consideration of the existing cultural traditions

businesses within the area. When fully implemented, Trails of Culture such as the Nestos-Rhodopi Trail increase ecotourism interest while providing more opportunities for locals to develop or expand their businesses to engage with new visitors (GTP, 2019).



SCOPE OF THIS PROJECT

Our team worked alongside GSECH to develop educational materials centered around the biodiversity and cultural heritage within the Rhodope Mountains of Northern Greece. We explored the areas of cultural significance, and completed extensive research on the animal and plant species living in the region. We took a holistic approach in our observations of the landscape, taking into account both its cultural importance, as well as its biodiverse ecosystems.

The materials created as a result of this project are primarily aimed at helping community members and tourists better understand the cultural and ecological wonders of the region. Our research aims to boost ecotourism, increase environmental awareness, and to eventually create jobs in a rural, marginalized community. The information gathered is also going to be used for an app (currently in development) and will be used to teach local school children about the ecological significance of the region. Throughout our time working on this project, we have collaborated with Professor Johannes Foufopoulos, who is a Greek native. He has assisted us in Greek translation, client meetings, and the technical side of species identification.

A lack of infrastructure in the remote regions of Greece prevents those living in these areas from engaging in ecotourism and is a major barrier for those looking to visit. The Greek Paths of Culture project was created to help tackle this perennial issue by both reestablishing the ancient trails, and raising public awareness among key audiences to the biodiversity in the Nestos-Rhodope region. Our client is looking in particular to create a social outreach program alongside the trails project with the aim of making both locals and travelers aware of the cultural and biological significance of the region. The organization currently lacks the capacity to create these materials and this is why they sought additional help in compiling and synthesizing the information needed to create these materials.

RESEARCH METHODS

Throughout the course of our research we had weekly meetings with our client. Our client suggested that the participatory design process of the proposed Integrated app, as well as the educational materials and digital renders, would help promote ecological revitalization, a sense of agency in realizing community benefit, and a positive image of the community while promoting ecotourism. Functionally, the research and meetings with our client would serve necessary community purposes, such as preservation of trails, showcasing nature, and attracting visitors as a landmark they had not once known about. The design of our materials would also effectively serve the Hellenic Society's full constituency of supporters, tourists, and residents. This design work aimed to emphasize a conceptual relationship between local ecologies and education in response to the small amount of information previously available to the general public.

Our research questions included the following:

- What educational tools would best highlight the biodiversity and cultural significance of the Rhodope Mountains?
- How can GIS maps improve tourism and encourage preservation within the Rhodope Mountain region?

Because of the ensuing COVID pandemic, our eventual course of research ultimately diverged in key ways from our initial plans. Originally, we identified key target stakeholder groups and schools for educational outreach. We then developed a planned series of data collection methods that would be based on our direct experience hiking the trails. Once back from a week of hiking the Nestos-Rhodope trail, we were planning to have identified stakeholder groups that would benefit from promoting ecotour-

the area. These stakeholders tentatively included: staff, board, volunteers, local schools, visitors, neighbors, and community members. Our original schedule of research and participatory design activities to engage identified stakeholder groups was as follows:

1. Design workshop: Meet with local schools to discuss what they see as important and what needs to be met to help promote their region.
2. Literature review and precedents visits to the surrounding area.
3. Supporter survey: develop a survey for community members to fill out while also promoting ecotourism in the Athens area.
4. Staff design workshop: Hellenic Society staff and volunteers would take a day to help us understand what is needed to really revitalize the area.

However, the COVID pandemic did not allow us to travel to the country so much of this process had to be simplified. For example, instead of working within GSECH's office in Athens we conducted work remotely and did not have the benefit of translators for our literature review. This undoubtedly limited the amount of information we were able to locate surrounding the area. The surveys that we had planned to administer in order to gain more insight into local perspectives were unable to be completed due to a lack of familiarity with those living in Xanthi and the language barrier.

LIMITATIONS

Our project was significantly impacted by the Covid-19 pandemic as our original research scope called for extensive work within the country to better understand our research area and to collect data from locals. This became impossible when U.S. citizens were barred from entering the country for most of last year. Not being able to meet with the local communities in the area and experience the mountain range for ourselves, presented significant challenges in obtaining the level of information needed to create compelling tourism and educational information about the area. In addition, because neither of the student participants spoke Greek, it was impossible to have access to the limited amount of relevant regional information that was available on Greek websites. An additional limitation was the time zone difference between ourselves and our client. It was sometimes difficult to schedule a meeting that worked for all parties as Greece is seven hours ahead (Greece is in the Eastern European time zone while we were in the Eastern Time Zone). This, alongside various differences in national holidays impacted our ability to meet effectively.



DELIVERABLES & IMPACT

Our primary deliverables are a compilation of educational materials that will be used to facilitate historical preservation and encourage sustainable tourism throughout Thrace and the Rhodope Mountains region. Initially, our task was to catalog species of the region and prepare them for integration into the app being made for the trail system. These species descriptions were created with already existing data, but we also conducted a significant amount of additional background research which allowed us to add multiple layers with species and historical information. We expect that this depth of information will better assist present and future exploration of the area by tourists and locals.

Alongside these species descriptions we produced educational materials primarily aimed at those who want to visit the region, but also for the benefit of the locals in Thrace. Local business owners will be able to use these materials within their businesses to advertise the region to potential tourists and customers. We produced the materials in English, but they will be translated into Greek by GSECH for greater distribution, as well as for integration into their existing online platform.

Examples of the educational materials that were created include youth-focused worksheets aimed at increasing exploration of the area that could be used in local schools about the unique biodiversity in the region. Children in younger grades may complete a scavenger hunt that encourages them to observe the unique species of the region, while also learning about the characteristics of various kinds of species. Older children can learn about how littering negatively affects the region while also considering ways that they could make positive contributions through organizing cleanup and trail maintenance events.

We have measured our success based around the feedback that we gained from GSECH. We utilized their input every step of the way to en

EDUCATIONAL RESOURCES

sure that we were producing a product that is useful to them and to the people of the Rhodope Mountain region. We anticipate that after our materials are translated into Greek, they will be used for multiple audiences including local schools, eco-tourists, and in advertisements for GSECH. This project was unique in that large amounts of data had already been procured by GSECH which eliminated the need to collect it ourselves. That being said, we standardized our process by conducting a deep review of the other materials that GSECH has produced including: other GIS maps for past Greek Paths of Culture projects, tourism information materials, and the app that this information will ultimately be integrated into. The approaches used to develop the materials were extensive. Using ArcGIS Pro we developed maps for the Rhodope mountains. These created maps in ArcGIS Pro allowed us to visualise 2D and 3D data alongside each other, by having multiple maps, scenes, and a mix of visualisations to provide different perspectives on the same data; these combinations allowed us to really showcase the Rhodope mountains while being stationed remotely. The transition to virtual learning was difficult but the access to this software was necessary to complete the research.

Our contributions are as follows:

- We reviewed literature on successful ecotourism models within remote regions of Greece which informed our approach in the creation of locally oriented education materials.
- We collaborated with our client to create environmental education materials for children that do not overlap with materials that have already been created for the region.
- We conducted spatial analyses in order to create the map of the trail system.

APPLICATION INTEGRATION

When we initiated this project, our client GSECH had already begun collaborating with an outside company, Cyberstream, to develop an app for this network of trails. Once finished, this digital application will include detailed hiking maps integrated from all of the Greek Paths of Culture sites as well as personal pages for each trail system. Within these pages users will be able to find information about the length of different trail sections, local restaurants, campsites, and more. One area in which we assisted Cyberstream was by curating a list of species whose information could then be uploaded into the application. The addition of over 40 plant and animal species within the app will contain a wide range of ecological information that visitors can access while hiking the trail or when searching for particular trails that host certain species. Within each species account we gave information about its phenotype, diet, habitat, and common behavior. A photo that best represents the species can be found alongside each one as well.



Figure 3: This image of a Woodchat Shrike (*Lanius senator*) is just one of the species that is identified and described within the app's fauna category. Source: Blake Matheson.

This app will increase familiarity with the region and address the need for easy access to educational tools while hiking the trails. Initially, the app will contain information in both Greek and English with the possibility of expanding to other languages if needed. In the future, this information can then also be accessed offline, therefore ensuring that tourists without mobile internet access will be able to utilize the maps and resources while in the park. The app will have the largest collection of GPS trail maps for the Ancient Trails in the Rhodope Mountains. While using the app, users will be able to discover these historic trails in any way they see fit. This will include the capacity to find a hike, mountain bike ride, or trail run that's well matched for their fitness and experience level.

The goal of our work with the app is to allow students, local community members and tourists to participate in interactive learning along the trails. Through the use of this technology, our work with Cyberstream has the aim of promoting a deeper understanding of ecosystems along the trail, developing creativity, as well as promoting self-directed and immersive learning. As the information about species diversity becomes more engaging and productive, such developments widen the exposure that users have with technology.

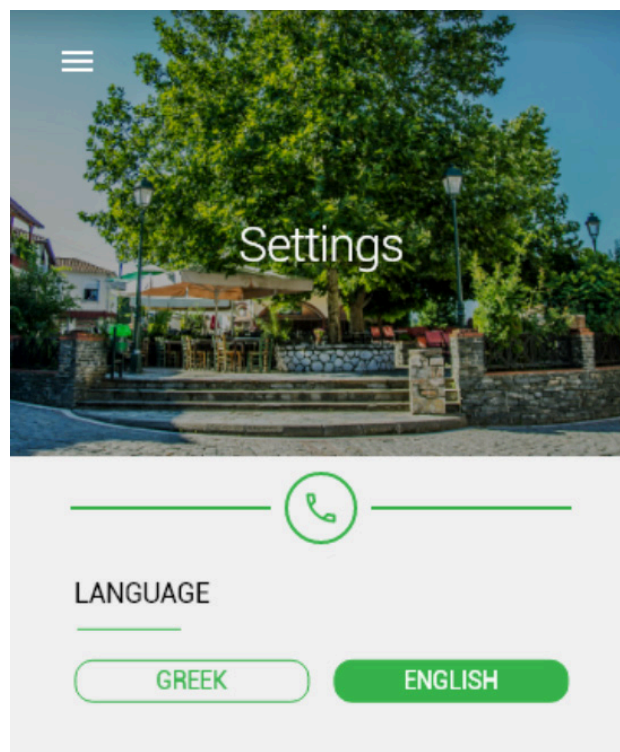


Figure 4a illustrates the adaptability features of the app where users can choose their preferred language.



Figure 4b illustrates the home page of the Greek Paths of Culture App for the Nestos-Rodopi trail. Information about the area, trail coordinates, and an interactive map can all be found here.

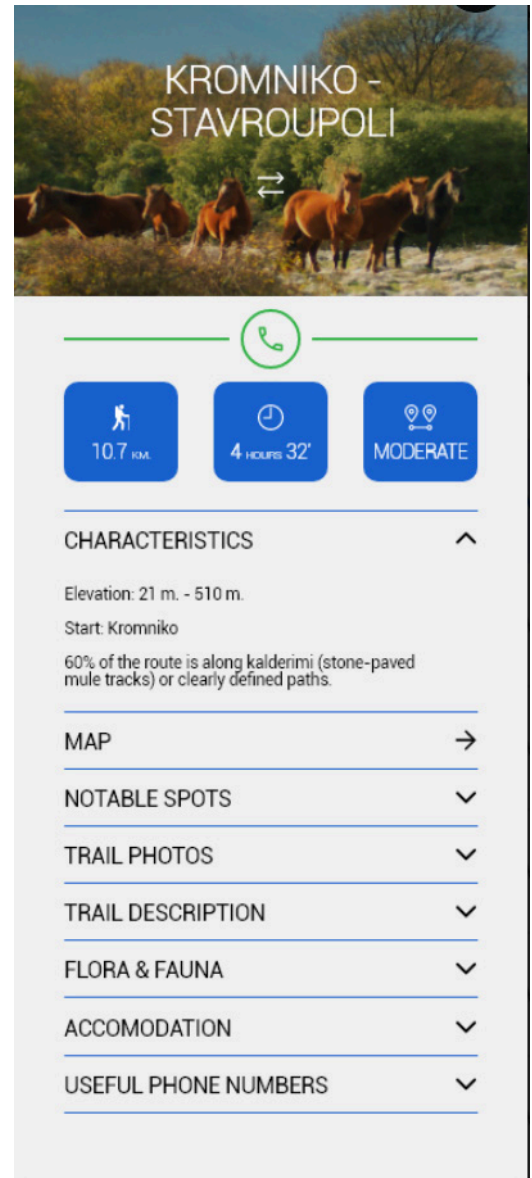


Figure 4c illustrates how users can identify which portion of the trail they would like to hike. Difficulty ratings are accompanied by the number of kilometers and estimated amount of time that it may take to complete.

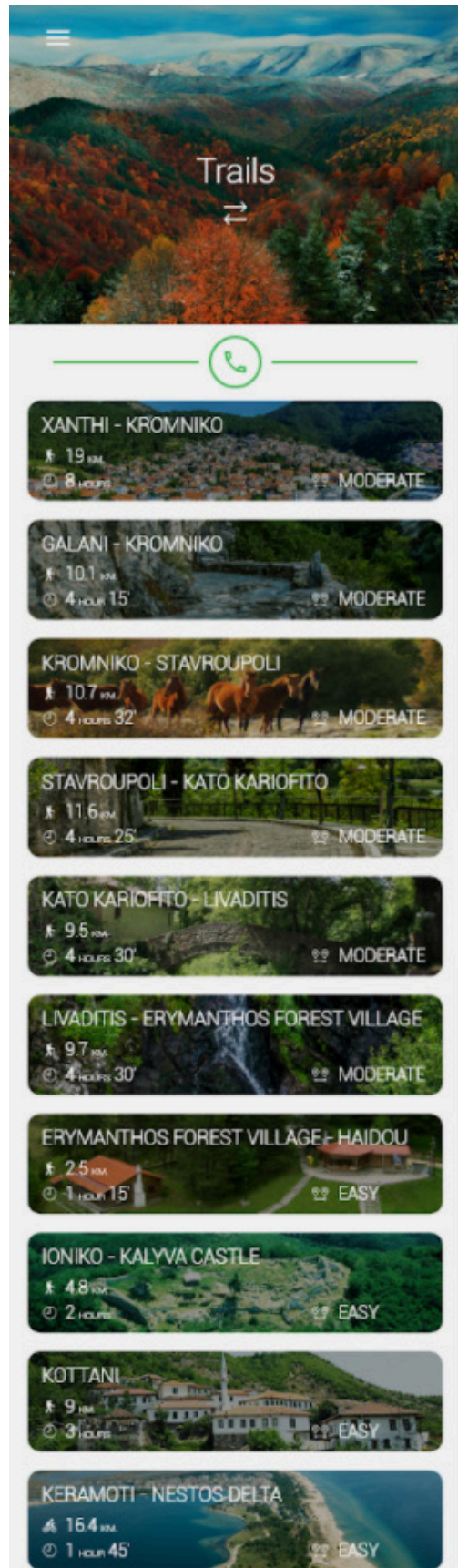


Figure 4d Shows the information that can be found within each trail section. Flora and Fauna allow travelers to identify and gain a better understanding of the animals that they may encounter.

SOCIAL MEDIA RESOURCES

In a year where so many events have been conducted virtually, the importance of having a robust social media presence to market organizations has become very apparent. As of 2021 there are an estimated 3.23 billion internet users, 80% of which visit a social media site at least once per month (Fornillos, 2021). Social media is used for news, learning, and finding new content on a daily basis, and is far from simply being a tool used to connect close friends. The use of social networking sites to digest media (photos, texts, and videos) concerning social responsibility has been shown to increase environmental awareness in viewers (Severo et al. 2019). GSECH is interested in expanding its social media presence and one of the chief ways that they hope to do this is through outreach on sites such as Facebook and Instagram. For this project, we focused on utilizing the species descriptions that we had already created to highlight specific animals and particular places along the trail in which a visitor can find them. Choosing engaging colors and GSECH-branded images will help create a streamlined social media approach that is consistent across platforms. We expect that these files will allow the organization to reach a wider audience and create more interest in their Paths of Culture project particularly for the Nestos-Rhodope area.

We created a series of social media posts that highlight species within the area and ones that focus on individual animals that can be found within the Rhodope Mountains. The primary platforms that our posts were intended for are Facebook and Instagram. Screen size was taken into consideration and font size was adjusted accordingly to account for those who may be using a mobile phone to view content. For Facebook posts, we created sets of species posts that advertise different ecosystems alongside the trail. These “species sets” allow viewers to see the wide variety of animals that can be found within the area. These posts have a photo of each animal to facilitate identification in the field and are accompanied by a short de-

scription of its common behavior or diet. Far from serving as a simple identification tool, these posts are also meant to pique interest in hiking along the trail.

For Instagram, posts have less text due to the smaller viewing window for users (most view the app's content on phones, not on computers). The suites of posts created for Instagram follow a similar style as the Facebook posts, but instead of focusing on multiple animal species, they focus on one particular organism per post. A short bio about each animal gives the viewer just enough information to have a sense of what this animal does, although the underlying hope is that they will then want to visit the area to see it for themselves.

Globally, the amount of time using mobile internet has increased since the beginning of the pandemic (Fornillos, 2021). GSECH can use this opportunity to engage with new users and entice visitors to the region for post-pandemic treks. In building out the social media presence, consistency will be a key part of GSECH's strategy if they hope to increase social media engagement across their platforms. Cross-posting between Instagram and Facebook will allow them to interact with a greater number of users across platforms which should increase the variety of ages they reach.



Masked Shrike

A white and buff underbelly with black striped wings and facial features, this small bird prefers open woodlands. This is an Asian specialty that barely reaches Europe in Thrace. It breeds in early summer before flying south to Africa for overwintering.



Figure 5a and 5b Show the variety of bird species that can be found within specific ecosystems along the Nestos-Rodopi trail. These images and posts will be used to advertise the trail on social media.



Chukar

The black and white striped, chicken-sized Chukar tends to hang out in more open areas in grasses or shrubs. Instead of flying away from danger, they prefer to quietly walk away a strategy aided by their camouflage color.



EASTERN COPPER BUTTERFLY



A small butterfly easily identified by the orange parts of its wings speckled with black spots. The outer ridges are dusky brown. Most active on sunny days, they can be found in most environments..



With a red cap and black and white striped wings, this small woodpecker is hard to miss. They stick to forested areas with a greater number of dead trees - all the better for harboring the insects they love to feast upon.

Middle Spotted Woodpecker



If you catch sight of these elusive creatures, count yourself lucky! They prefer areas with a bit of vegetation cover to better aid them in slipping through the Drimos forest. They typically feed on small to large mammals.



Gray Wolf



Today's Animal Spotlight:

ROE DEER



THIS SMALL, GREYISH BROWN DEER HAS SMALL WHITE PATCH ON ITS RUMP/TAIL AND SIMPLE FORKED ANTLERS. IT PRIMARILY CONSUMES GRASS, LEAVES, AND SMALL BERRIES. THEY BLEND INTO THE FOREST QUITE WELL AND TYPICALLY TRAVEL IN GROUPS.

Figure 6a - 6d
Show the variety species diversity located within the region. These helpful spotlight guides can showcase quick but important facts used for on and off the trails.

ANIMALS TO SPOT IN AND AROUND DRIMOS FOREST



Capercaillie

This very large ground bird differs greatly between sexes with the showy males being a glossy black, and the females a blend of browns. They live in deep undisturbed forests where they feed on berries, buds, insects and seeds.



Eurasian Otter

This territorial mammal can be found swimming in rivers and other moving bodies of water. Their diet mainly consists of fish and they will sometimes use rocks to crack open mussels and other shelled creatures that they eat.



Gray Wolf

If you catch sight of these elusive creatures, count yourself lucky! They prefer areas with a bit of vegetation cover to better aid them in slipping through the forest. They typically feed on small mammals and are fearful of humans.



Roe Deer

This small, greyish brown deer has small white patch on its rump/tail and simple forked antlers. It primarily consumes grass, leaves, and small berries. They blend into the forest quite well and typically travel in groups.



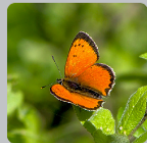
Greek Tortoise

Living up to 125 years, this tortoise is relatively small and typically weighs under 4.5 kgs. They have yellow, black and brown markings on their shells and primarily feed on dandelion shoots and other leafy plants.

Figure 7a and 7b

Showing the variety of species that can be found within specific ecosystems along the Nestos-Rodopi trail. Images are educational tools and fun resources for users while on the trails.

BUTTERFLY SPOTTING IN THE EASTERN RHODOPES



Grecian Copper

Bright orange wings rimmed in black with a small tinge of white set this small butterfly apart from others. It is primarily found in temperate forests.



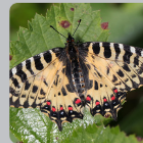
Eastern Copper

A small butterfly easily identified by the orange parts of its wings speckled with black spots. The outer ridges are dusky brown. Most active on sunny days, they can be found in most environments.



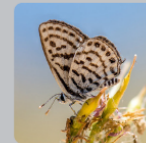
Anamalous Blue

This butterfly is small with gray and brown wings. It's most commonly seen during the months of July and August. They prefer hot, grassy areas with many flowers.



Eastern Festoon

Large yellow wings with characteristic black and red markings distinguish this butterfly from others. They can be seen flying from March - July depending on the warmth of the area and prefer mountain areas with a nearby water source.



Little Tiger Blue

A small butterfly that, with wings closed, has light blue wings with black spots throughout. When open, a shinier blue color can be seen along the top half. Find them on rocky slopes and dry scrublands.

BIRD SPOTTING IN THE NESTOS GORGE





Chukar

The black and white striped, chicken-sized Chukar tends to hang out in more open areas in grasses or shrubs. Instead of flying away from danger, they prefer to quietly walk away a strategy aided by their camouflage color.



Rock Nuthatch

This light-gray bird can be identified by the black stripe over its eye and its thin pointed beak. It prefers barren, rocky areas where it can be seen searching steep surfaces for insects and other small invertebrates.



Hoopoes

This striking orange, black and white bird is difficult to miss due to its large feathered crest. This insect eating bird does most of its foraging on the ground and prefers more open areas when searching for food.



Masked Shrike

A white and buff underbelly with black striped wings and facial features, this small bird prefers open woodlands. This is an Asian specialty that barely reaches Europe in Thrace. It breeds in early summer before flying south to Africa for overwintering.



Syrian Woodpecker

Black and white wings, with a smudge of red on its head and bottom are the distinctive features of this bird. Often found around dead trees or open woodlands and can be seen hopping from branch to branch.

Figure 8a - 8c
Birding resources for those in the area. A few other birds with detailed descriptions used for the development of educational materials and ecosystem awareness.

BIRD SPOTTING IN THE NESTOS RIVER DELTA





Black Stork

You can find this bird fishing in shallow waters along the shore line. It has black feathers with a white breast and a bright orange beak and legs. Usually solitary, it hunts during the day and this is the best time to spot it.



Spur-winged Plover

This small bird breeds exclusively in Cyprus and Greece so Early April and May give one the best change of seeing young birds. Spot the plover searching for insects and worms in shallow water or along muddy banks.



Ring-necked Pheasant

With Striking red, green, and brown plumage, this large bird can be found within the grasslands along waterways. It eats a variety of insects, small reptiles, and plants. Their calls are loud and can be hard from a distance



Bee-eater

As expected, this beautiful blue, red, orange, and yellow bird mainly eats bees, wasps, and hornets. They nest in colonies, usually along the sandy shores of rivers so this is the best place to look for them.



Pygmy Cormorant

This water loving bird can be found diving into the water to catch it's favorite food- fish. A medium build with glossy black feathers, these birds are never far from water and oftentimes hunt within a group.

BIRD SPOTTING IN THE RHODOPE MOUNTAINS





Capercaillie

This very large ground bird differs greatly between sexes with the showy males being a glossy black, and the females a blend of browns. Find them in deep undisturbed forests where they feed on berries, buds, insects and seeds.



Golden Eagle

A mix of brown and golden feathers make this large raptor easy to identify. They mainly hunt for mammals, birds and reptiles in the morning or afternoon, but spend most of their time perched at high spots watching the landscape.



Middle Spotted Woodpecker

With a red cap and black and white striped wings, this small woodpecker is hard to miss. They stick to forested areas with a greater number of dead trees - all the better for harboring the insects they love to feast upon.



Griffon Vulture

This huge, brown and black feathered raptor can be seen soaring high above foothills and mountains where they search for dead animals on which they feed. Once nearly extirpated from the area, their numbers are now on the rise.



Hazel Grouse

This shy bird can be difficult to spot amid the dense forests in which it likes to live. They primarily feed on plants and small insects. Listen for the male's Ti ti ti call to identify ones closely.

DIGITAL RENDERINGS OF HISTORIC ARCHITECTURE

Architectural visualization is critical in conveying the importance of a, past, present and future project. It can be difficult for people who are not architectural experts to look at blueprints and visualize a three-dimensional (3D) structure. Although digital 3D renderings are new, various other forms of renderings have been around for centuries. Indeed, people have used drawings, paintings, and physical models to help detail construction methods for as long as 4,000 years.

Digital rendering of significant historical and archeological structures is particularly important for public outreach, historical research, and even reconstructive work. The Chapel of Notre Dame in Paris is currently being rebuilt after a catastrophic fire. Notre Dame used to welcome millions of visitors a year and is one of the most photographed buildings on the planet. This photography, and especially high-resolution imaging, turned out to be vital in the present reconstruction process. Following the fire, photos were digested with artificially intelligent algorithms using photogrammetry to create accurate maps and 3D models. In architectural work architects can determine right away how the entire construction process will go if they have access to this type of information. Innovative technologies used in historic architecture can as a result be of tremendous help. Nonetheless, it is important not to get too carried away, rendering can become romanticized and start to take on an appearance of their own. It is therefore imperative that every effort is made to keep these renderings true to the original look.

In a world in which an ongoing pandemic has confined millions to their homes and unable to travel, digital renderings of important historic sites, can provide an alternative way to see and experience the planet. Augmented reality (AR) or virtual reality (VR) are further tools that can help experience a place. The underlying software can take elements of the real

world, and combine them with a digital render, to create rich representations of reality. AR is already being used in the retail sector to show how furniture might look in a person's home before they buy it, as well as to virtually visit future architectural building sites. Following the same principle, one can use this approach to let a user visit a historical site instead.

As a result, such software can allow a visitor to take a virtual walk into an archeological site, and experience it not only the way it is at present, but also in the intact form it was built originally. In our case, we focused on the historic stone bridge over the Kompsatos River, which was built in the 17th–18th century near the site of Polyanthos in the southern Rhodopes. The use of digital rendering in VR/AR now allows users to experience the site from many locations and could be used for teaching or public outreach. The challenges of designing a site off a picture can prove to be difficult. Oftentimes lack of perspectives and details can make it hard to design around. The overall aesthetics of a basic render extends to ways in which these sites are able to engage the mind. Iconic structures can make cities easily recognisable along with historical monuments. We wanted to do the same for the ancient trails and that is why we set our focus on Kompsatos 17th–18th c. Bridge Polyanthos Rhodope. This bridge gave some understanding of what the area and ecotourism was already like in the area. Operating tactically and incrementally, the rendering of the Kompsatos bridge aims to promote the built environment and cultivate a sense of place.





Figure 9a and 9b
Renderings of the Kompsatos 17th–18th c. Bridge Polyanthos Rhodope

EDUCATIONAL RESOURCES

Children are one of the key audiences for almost any historical or cultural program, as they are typically both eager to learn and receptive to educational campaigns, provided of course they are structured age-appropriately. Until now, GSECH has not been able to produce educational materials aimed at children. This is a significant omission as the children who live in the area are likely to be using the paths for recreation or for a class field trip at some point over their lives. Having ready to-go materials focused on various aspects of the cultural and biological significance of this area is essential, as it will allow teachers to more easily integrate The Greek Paths of Culture project into their lessons. At the same time such materials can help raise a deeper ecological awareness among youth in the region. Indeed such knowledge appears to be uneven at best. A study around environmental knowledge in Greek Kindergartners found that, while by the end of their first year in school they had gained an early understanding of the role that different species play in nature, however, they failed to recognize fungi and plants as important as animals like birds and bears (Melis et al. 2020). These findings indicate that from an early age, children are making meaning of the world around them, yet a lack of information surrounding certain species could lead to a knowledge deficit. Similarly, a study on secondary students in Central Greece found that while most students viewed the environment positively, they felt that there were not enough opportunities within their schools to learn about it (Ntanos, 2018). Of the students surveyed, 25% percent indicated that they possessed a “low level” of environmental knowledge which shows an immense need for learning opportunities related to ecological education.

Increased environmental awareness and respect is one of the primary goals of GSECH’s environmental endeavors, and this is often most easiest achieved through appropriate environmental education in school. A re

cent study on the environmental literacy of middle schoolers found that students who had a greater amount of environmental awareness through their school curriculum displayed more positive environmental attitudes and behaviors (Ari and Yilmaz, 2016). Similarly, environmental programs that focus on saving water have been found to be most effective when parents and children are engaging together in water conservation activities (Keramitsoglou et al. 2011). This highlights the importance of providing environmental education activities that engage families, not just children. Along these lines, a study conducted in rural Greece on the attitudes of secondary students (ages 13-16) towards tourism showed that while students supported nature based tourism, they didn't understand how sustainable, rural tourism differed from other models found in Greece (Politis and Chatzigeorgiou, 2015). Knowing that the development of the Nestos-Rodopi trail could significantly increase tourism in the area, it is advisable that GSECH, in conjunction with the local government, develops educational tools that can be used to increase knowledge of what sustainable tourism can look like in Xanthi.

Educational materials for GSECH need to center not only around observation and appreciation of the natural environment in the area, but also encourage positive sustainability practices such as cleaning up trash and preserving natural resources. Not only will teachers be able to use these materials to supplement their regular coursework within classrooms, but families visiting the area could also use these materials to engage their children during and ahead of their visit. Scavenger hunt and information packets with the copy of the trail maps could be given to tourists with children as a way to engage them in environmental literacy. The creation of naturalist clubs within schools in the Thrace region could be a jumping-off point for many students as they turn a critical eye towards environmental education. Currently, these materials are in English, but they will also be translated into Greek by GSECH to ensure a wider range of distribution and an increased level of utility. The worksheets themselves are free form in na-

ture to allow a more organic observational understanding of the environment. Children may complete a scavenger hunt of common natural objects and species found in the area or sketch out their observations to prompts. The ultimate goal with these materials is to encourage children to think about how the ecosystems within the Rhodope Mountains function and how they are connected to these systems as well.

Name: _____ Date: _____



What is your favorite part of the Nestos-Rhodopi Trail?



Things to see on the Nestos-Rhodope Trail


Name: _____ Date: _____

Trace the words then write them in the space next to it.



NAME: _____ DATE: _____

Scavenger Hunt on the Nestos-Rhodope Trail




The park is filled with fun things to do and see, can you find everything on the list? Draw what you see!

<input type="checkbox"/> A butterfly	<input type="checkbox"/> A pointed leaf
<input type="checkbox"/> A small bird	<input type="checkbox"/> A yellow flower
<input type="checkbox"/> A mammal	<input type="checkbox"/> A flying insect
<input type="checkbox"/> A body of water	<input type="checkbox"/> A crawling insect
<input type="checkbox"/> A trail sign	<input type="checkbox"/> A tree with peeling bark



Find one other thing not on the list and draw it here!

.....



NAME: _____ DATE: _____

Nestos-Rhodope Ecosystem: Sketch Walk

An ecosystem is any area that has a variety of creatures living in the same habitat. Along the Nestos-Rhodope trail there are many different kinds of ecosystems from the grasslands, to the mountains and more! This space is shared by many insects, birds, mammals, fish, and plants! Walk along the trail and see if you can find examples of these different types of creatures and plants that make these ecosystems a great place to live.

<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
A flower	A bird	A flying insect
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
A leaf from a tree	A crawling insect	A _____



CREATE A NATURE MURAL

Name _____ Date _____

The Nestos-Rodopi Trail is home to many different plants and animals. If you were to draw a mural that had scenes from the ecosystems what would you choose to draw? Draw your ideas for a new art piece that could decorate the walls of a local wall.

How would you feel if this artwork were painted in your community?

Why did you choose the species and landforms that you chose?



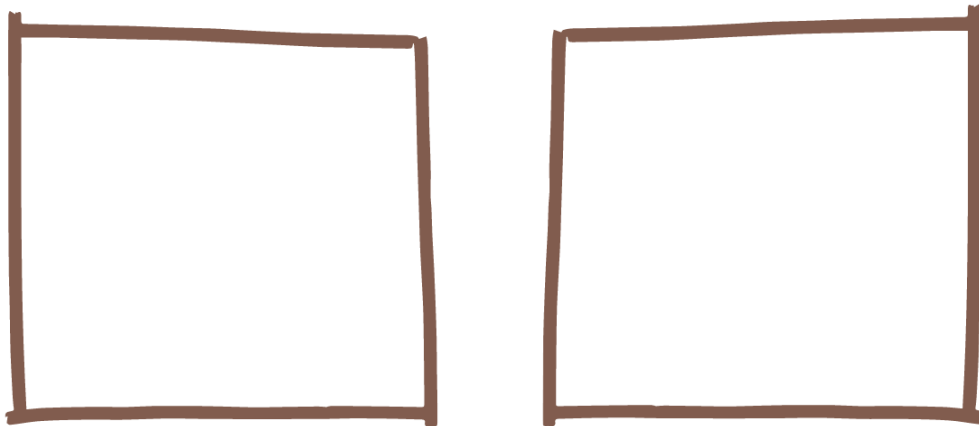


ELLINIKI ETAIRIA
Society for the Environment
and Cultural Heritage

Animal Research Project

There are many animals that call the Rhodope Mountains home. Choose an animal that lives in our area and write about where it lives, what it likes to eat, how you can spot it in the wild (physical characteristics), and two cool facts. Draw two images of your chosen animal in it's habitat in the space below!

Draw your animal in its habitat here.



WHY IS THE NESTOS RIVER IMPORTANT?

The Nestos River runs through the Rhodope Mountains and empties into the Aegean Sea. The river is home to many different types of fish, insects, birds, and other animals. Think about how the river contributes to our community of Xanthi and how it is very important to the Rhodope Mountain ecosystem.

Draw pictures or write your answer below in response to the questions.

Have you seen the river after a big rainstorm? What did you notice?

Why is it important to keep the river clean? What could happen if too much litter is put in the river?

Why is the river important to wild animals?

What ideas do you have for how you and your family can take care of the river?

Name _____



CONCLUSION

Through our 18 month-long collaboration with GSECH we have learned a great deal about the incredible Rhodope Mountain region and those that live there. Conducting a project such as this became exceptionally challenging as we could not travel to the region. Essentially one is asked to write in depth about an area that cannot be visited. The elimination of our research trip to the region forced innovation on our part. For instance, instead of taking photos of the area ourselves, we connected to locals within the region who allowed us to use their photos for advertising materials. Similarly, instead of visiting Xanthi in person and speaking with the locals there, we toured the town through Google maps and set up zoom meetings to better understand how locals interacted with the Nestos-Rodopi Trail. This area of Greece, though less frequented by tourists than other parts of the country, is rich in cultural history and biodiversity. The number of animal and plant species is exceptionally high and as a result, this landscape is critically important for the conservation of many species. Both the preservation of these unique species, as well as the important cultural heritage sites, is a task that will be facilitated through a robust and multi-faceted environmental educational campaign, such as the one spearheaded by GSECH. It is our hope that with the addition of the educational materials and marketing products that we created, the Nestos-Rodopi trail will attract an even greater number of visitors looking to enjoy and learn about this unique region.

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