

# Agritourism as a Strategy of Remote Island's Development: The Case Study of Kasos

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In rural, depopulated areas, agritourism, as a development model, could serve the goal of non-exclusively seasonal tourism while creating additional economic opportunities for the locals who are mainly engaged in agriculture. Kasos is an isolated island of the Dodecanese, Greece, preserving interesting elements of the authentic agricultural practices and architecture like terraces serving the island's agricultural cultivation, mills and mitata, and small stone-built creameries.

Kasos served as a case study of AEI program (Sustainable Development of Less Developed Regions and Isolated Areas by Creating New Touristic Resources and Products through Analysis, Documentation and Modelling of Cultural Assets using Innovative ICT Applications, project code: T2EDK-01278). For this island that lies within the wider region of Rhodes, it is possible with the appropriate development of new touristic resources and products through the advancement of the

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This research has been co-financed by the European Regional Development Fund of the European Union and Greek national funds through the Operational Program Competitiveness, Entrepreneurship and Innovation, under the call RESEARCH – CREATE – INNOVATE (project code: T2EDK-01278).

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ACM 1556-4711/2025/12-ART56

<https://doi.org/10.1145/3691347>

unique architectural, cultural, and environmental assets to orient towards them special parts of the touristic flow from Rhodes, creating new touristic activity by increasing the residence beyond the daily or short time tourism, as it stands for now.

For the analysis of the study area, research in local archives and communication with the municipality and local stakeholders was conducted. Thus, both the special features of the island and the needs of the local community were identified, organized, classified and presented in GIS maps. The implementation of a GIS for Kasos Island aims to provide a comprehensive representation of the different aspects of the island, providing useful information for policy-making and the development of strategic cultural and agrotourism plans to the local authorities and stakeholders.

According to the integrated plan for Kasos by AEI program, the island could preserve its special rural identity while revealing its cultural and environmental assets and attracting external economies within an agritourism model. In this work, we present AEI's integrated plan for Kasos that refers to the island's agricultural character, to the existing trail network as well as to the restoration and adaptive reuse of important architectural assets that could serve to the overall revealing of Kasos history and cultural reserve.

CCS Concepts: • **Human-centered computing** → **Visualization theory, concepts and paradigms**; • **Applied computing** → *Computer-aided design*;

Additional Key Words and Phrases: remote areas development, agritourism, GIS

#### ACM Reference format:

Anastasia Vythoulka, Fotis Kaliakmanis, Ekaterini Delegou, Antonis Giannikouris, Nikolaos Kampanis, Georgios Alexandrakis, Antonia Moropoulou, Stavros Chlorokostas, Efthymios Magkoufis, Christos Kontopoulos, and Vasiliki Charalampopoulou. 2025. Agritourism as a Strategy of Remote Island's Development: The Case Study of Kasos. *ACM J. Comput. Cult. Herit.* 18, 4, Article 56 (December 2025), 17 pages.

<https://doi.org/10.1145/3691347>

## 1 Background and Literature Review

### 1.1 Cultural Heritage Preservation Approaches

Planning protection and revealing of cultural and architectural reserves consists of a multispectral process, taking into consideration various values and goals [1]. According to Poullos, the main approaches to heritage conservation that have been developed are the material-based, the values-based, and the living heritage approach [2].

Material-based approach, focuses on the preservation of the authentic material and the monument as such, underlining the archeological, historic, and aesthetic monumental values. Better described in Venice Charter [3, 4], this definition of heritage preservation was vital for the rescue of many significant monuments during the 20th century, creating a protection framework according to which experts were responsible for the preservation. Values-based approach, as described in Burra Charter [5], is focused on the social values of cultural heritage, evolving the perception of local communities for the monument examined. In this more participatory process of conservation, experts should take into consideration the view of the majority of the locals while ensuring the preservation of the monument itself [6, 7]. Finally, the living heritage approach is interlinked with the concept of continuity. In this case, focus is given to the part of the local community that preserves the original function of heritage and uses it as a part of its everyday life. In this concept, among the monumental values mentioned above, the traditional relationship with the monument, as appears today, becomes another important aspect of the preservation process [8–10].

All three models deal with the same monumental values while prioritizing them in different ways. The pursuit of sustainable heritage preservation could meet with the concept of living heritage since it evolves the environmental, economic, and social aspects of cultural heritage. Especially in remote, rural areas not directed to mass tourism,

where traditional practices, tangible and intangible elements, are more likely to be preserved, the concept of living heritage conservation could be even more beneficial.

## 1.2 Sustainable Development in Remote Areas

Although there is no comprehensive, generally accepted definition of the term “remote or isolated area,” a common characteristic of areas considered isolated is the lack of connectivity due to geographic distance, topography or the travel time needed to reach them. According to the Organisation for Economic Co-operation and Development [11], remote areas need to attract external economies in order to develop. Isolation can be absolute or relative and is not exclusively a feature of rural areas. Cities can be considered relatively isolated if they are disconnected from economic networks and unable to take advantage of economic opportunities. Residents of isolated areas face difficulties in order to access basic services such as education and health care while work and business opportunities are limited. Isolated areas also face challenges related to governance, environmental vulnerability, and social isolation. Depopulation and the general aging of the local permanent residents constitute immediate effects of the problems mentioned above so the continuity of local communities is threatened. Inevitably, the lack of financial resources has a negative impact not only on the everyday life of local communities—due to the lack of basic infrastructure—but also on the state of preservation for the cultural and environmental reserve [12–15].

Around the world, rural tourism or agritourism is seen as one of the most effective options in order to promote the development of remote, rural areas [16, 17]. Revealing of traditional agricultural activities, habits and constructions in these terms strengthens their preservation but also attracts new visitors who get to know them and also bring financial benefits to the locals. Agritourism, as a development model, could serve the goal of non-exclusively seasonal tourism while creating additional economic opportunities for the locals who are mainly engaged in agriculture. Furthermore, the abandoned housing stock of these areas preserving interesting elements of the local architecture could be reused to accommodate the new facilities needed in order to revitalize the traditional. In this way, the local development could be sustainable, balanced, and in favor of the proper cultural heritage management [18, 19].

The participation of local communities in this process is vital. Educational seminars about the local cultural and environmental reserve but also the traditional agricultural practices and habits are crucial [20, 21]. Additionally, information about the available financial tools and new business opportunities could give motivation to young residents to stay and prosper in their homeland. Finally, necessary investments for the optimization of public infrastructure and accessibility could be abetted not only by the local governance but also by the increase of visitors during the whole year [22–24].

## 1.3 GIS Contribution to Islands' Sustainable Development through the Revealing of Their Cultural and Environmental Reserve

**Geographic Information Systems (GIS)** were created to obtain, organize, and present georeferenced data of a specific area [25]. Those tools permitted the interoperability of different kinds of data in a way that permits GIS to form new research questions [26, 27]. GIS's fields of application, due to the continuous improvement, development of its technology, and its low cost, are numerous, from the use of GIS in urban planning and geography to its use for transportation planning, healthcare or public administration, offering local and central authorities useful tools in order to program and monitor various interventions [28, 29]. Furthermore, the ability of GIS to be based on web platforms can make it accessible to simple, non-specialized users [30, 31]. This feature, combined with the ability of processing different types of data, makes GIS a compatible tool for collaborative designing plans [32, 33].

According to the Community Research and Development Information Service [34], the digitization of cultural heritage is important for the protection, preservation, restoration, research, dissemination, and promotion of tangible and intangible cultural assets originating from all types of cultural institutions (museums, galleries, libraries and archives, monuments and sites). The capabilities of GIS for conducting data analysis, correlating,

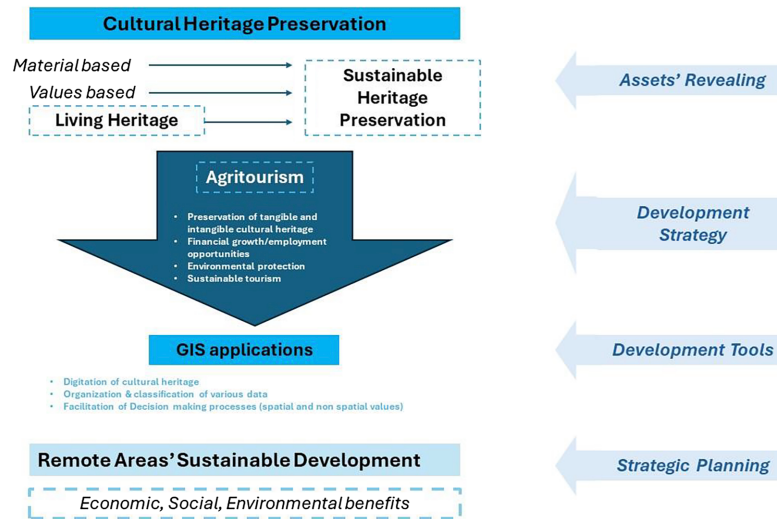


Fig. 1. Literature review.

analyzing and visualizing data combined with the factor of time and spatial modeling, allow the user to search for information at multiple levels of data and create new information based on existing data in order to achieve monumental protection [35]. Additionally, GIS is mainly used for the recording of cultural reserves, study, decision-making, and planning for the protection of cultural heritage, for impact assessment studies, as a tool in archaeological research, and the development of cultural routes for the dissemination and promotion of history and heritage of a place, etc. More and more central and local authorities responsible for cultural heritage have started to create complex and integrated information systems, with GIS as one of the key elements of their infrastructure [36] (Figure 1).

## 2 Methodology

Kasos served as a case study of an AEI program, Sustainable Development of Less Developed Regions and Isolated Areas by Creating New Touristic Resources and Products through Analysis, Documentation and Modelling of Cultural Assets Using Innovative ICT Applications (project code: T2EDK-01278).

- Axis I: Analysis, documentation, modeling, and management of the Cultural and Environmental assets.
- Axis II: Utilization of innovative Information and communication technology applications
- Axes III: Design and creation of new products for touristic local development
- Axis IV: Circular economy and social cohesion.

The methodology of the analysis was based on the bibliographic review of the data in relation to the natural environment, the history, the architectural and cultural heritage, and the social organization of Kasos. Necessary for the analysis was the active communication with local agents, such as the Municipality of H.I. Kasos, residents, and local stakeholders, in local meetings throughout the design process. The information collected was combined with the data of the bibliographic review to describe, as accurately as possible, the true current picture of Kasos. GIS was used to harmonize, organize and display the acquired diverse data of the island, incorporating the needed geospatial information, towards forming sustainable development schemes. Data collected, through literature review and close collaboration with local community stakeholders (e.g., Kaso's hiking club) have been classified and organized. The implementation of a GIS for Kasos Island aims to provide a complete view of the different aspects of the island, empowering the local authorities and stakeholders with useful information for policy-making

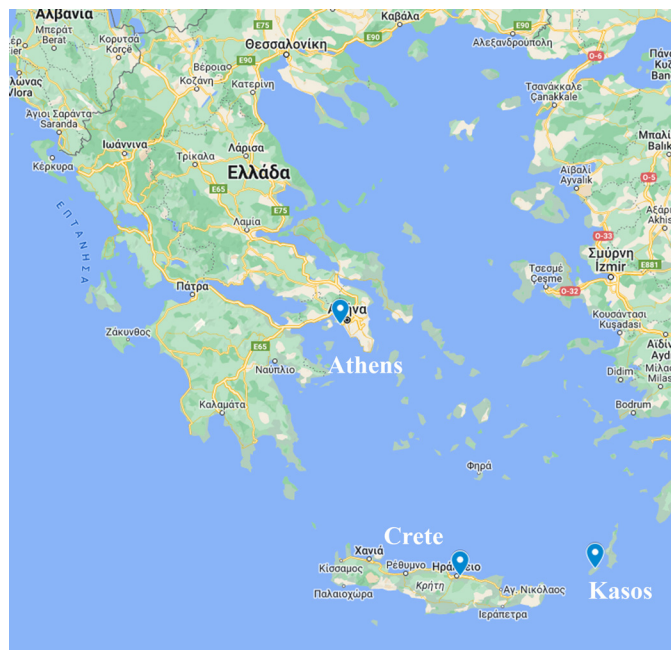


Fig. 2. Kasos on the map of Greece.

and the development of strategic cultural and agrotourism plans. To this end, geospatial data about islands' listed monuments, protected areas, road network, hiking trails, districts under special protection framework, intangible cultural assets, and public infrastructure have been acquired and first presented in the Google-MyMaps web interface. In continuation using the export functionality provided, the data was extracted to Keyhole Markup Language files in order to be incorporated into GIS maps.

The use of the open-source Quantum GIS desktop application was fundamental both for the harmonization of the geospatial data and its symbology. Taking into consideration the profile of the end users and the purposes of the current research, the data was validated with the use of earth observation imagery products, while unnecessary fields (e.g., native id, source encodings) were excluded from its attributes, minimizing the total size and providing clear and digestible information to the user. With regards to the symbology, the geospatial data was classified based on its specific values and appropriate color palettes, symbol shapes, and sizes were selected to ensure clear communication, accurate interpretation, and accessibility for the diverse users. The results of this process combined with the pursuits of the locals for their island's sustainable development and the revealing of Kasos cultural and environmental reserve, led to proposals based on agrotourism [37].

### 3 The Case Study of Kasos

#### 3.1 Study Area Analysis

Kasos is a Greek island of the southern Aegean and the southernmost of the Dodecanese. It is located between Crete and Karpathos. The Municipality of Kasos together with the Municipality of Karpathos Unit, is one of the 13 regional units of the Region of the South Aegean and includes the island of Kasos, as well as the surrounding islets. Kasos is connected by air with Rhodes, Karpathos, and Sitia in Crete (Figure 2). By ferry, it is connected to Karpathos, Rhodes, Chalki, Crete, and the islands of the Cyclades and Piraeus. The trip to Kasos can be done by conventional ship (20–22 hours) or by high-speed ships.



Fig. 3. Paths in Kasos.



Fig. 4. Anavathmides in Kasos.

The island is mountainous with rocky terrain and little arable lands. Kasos can be considered as a typical example of environmental degradation. Since 1980 there has been an uncontrolled increase in the number of goats and sheep, resulting in the degradation of the ecosystem. In 2001, pasturage control helped the protection of the island's environment but also improved breeders' income. Due to Kasos geomorphology, the northern side hosts all the settlements of the island as well as the main economic activity. The rural landscape of Kasos is characterized by terraces, dry stones, paths and small stone agricultural structures (*mitata*), elements of the high aesthetic value of its historical and cultural heritage (Figures 3 and 4).

The ancient capital, the island's namesake according to Strabo, was in the region of Poli, around the Mycenaean acropolis. The scattered pottery found there [38], dates from the Late Neolithic/Early Bronze Age until the Early Christian period and witnesses the continuous habitation of the position, which along with the strip that connects it to the port in Emporio, was the main residential core on the island throughout time. Our knowledge of the history of Kasos from the 5th to 2nd century, e.g., is limited. Probably during the first half of the 2nd c., e.g., Kasos was submitted in the Rhodian State.

During the Roman and early Christian periods, the main establishment on the island seems to have moved to the beach around its bay of Emporios. The concentration of traces from large public buildings of fine construction of this period testifies to the economic heyday of the island during the early Christian times. From 1207 to 1537, when the island was conquered by the Ottomans [39], Kasos was under the auspice of Venice. During the 16th century, Kasos was abandoned and resettled in the 17th century, mainly in the settlements of the inland due to the fear of pirate raids. The recent history of Kasos is characterized by periods of prosperity and major disasters. The inhabitants of Kasos due to the barren land of the island, turned early to the sea and managed to set their island as a strong naval and commercial power. Additionally, Kasos, since it was a focal point for trade or warships over the centuries, is considered an important field of systematic survey of marine archaeology. The marine findings found in the Kasos marine area are particularly important (Figure 5). A total of five wrecks were identified, as



Fig. 5. Findings of marine archeology in Kasos.



Fig. 6. Kasos’ settlements.

well as one possible ancient port settlement. A particularly noteworthy find is one shipwreck of the Late Classic period, which yielded five stone pyramidal anchors [40].

Kasos had an important role during the Greek Revolution that led to the holocaust of 1824 by the Egyptian army. In 1912, Italy occupies Kasos, which until then was under Turkish rule. In 1947, the Dodecanese were liberated from the Italians and incorporated in Greece. In Kasos, there are three (3) statutory archaeological sites, according to the archaeological cadastre. There are also single-proclaimed monuments, mainly churches and newer monuments reflecting the island’s history [41].

Today, the main road network connects the five settlements of Kasos that are developed in the middle of the island north-facing (Figures 6 and 7). Fry and Emporios is the capital of Kasos consisting of two cores, one around the old port and the other around the new port and the fishing shelter in Buka. Today the term Fry has prevailed for the entire settlement. Mansions called “Kapetanospita” or captain’s houses characterize the settlement. Kapetanospita do not have a single type since each owner-captain carried them images that impressed

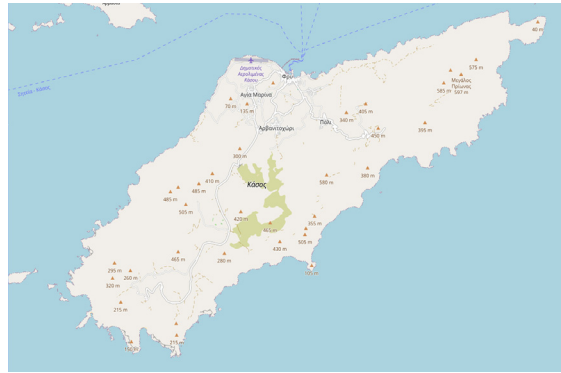


Fig. 7. Kasos' road network.



Fig. 8. Mitato in Agia Marina.

him on his travels. The majority of them are two-story buildings with neoclassical influences, raised above street level, with impressive front doors with pilasters.

Agia Marina is the largest settlement of the island and the former capital. It is located southeast of the settlement of Fry and built on different levels due to the land morphology. The inhabitants of the settlement are mainly stockmen. It is the area with the most “matata,” seasonal residences of the breeders and stables at the same time. The production of livestock products, including sheep and goats is the sector that has a growth in the region (Figure 8). Agriculture is the second economic activity of the residents combined with seasonal tourism activities. In general, the economic activities in the settlement are limited. Other settlements of the island are Poli, Panagia and Arvanitochori. Arvanitochori is an agricultural settlement, and Panagia is almost included in Fry. Poli is the oldest and smallest settlement of Kasos.

Over time, the population of Kasos follows a decreasing course, parallel to that of most Greek islands. According to the census of 2011 by Hellenic Statistical Authority the permanent population of the Municipality of Kasos is 1084 people. The economically inactive population remains at high levels (69%). As far as the primary sector of production is concerned, the production of vegetable products production is relatively limited. Animal husbandry and especially sheep and goat breeding is the most important branch activity. The utilization of the products of the

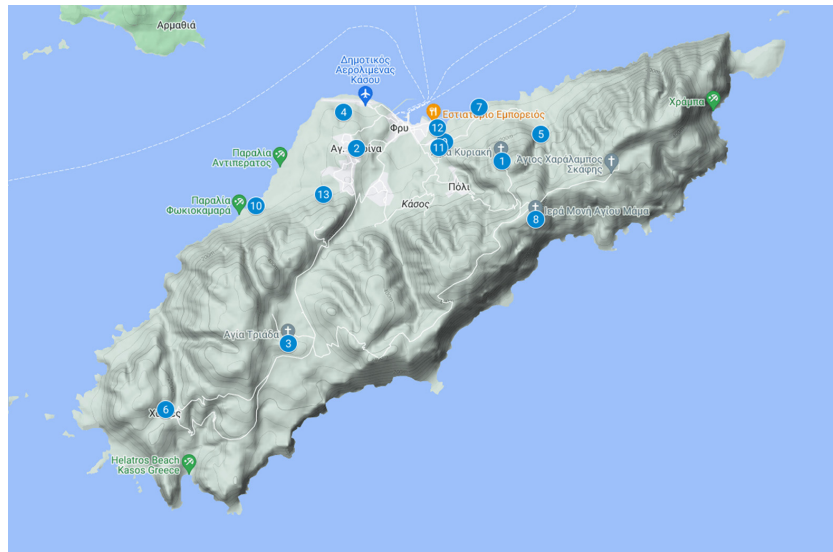


Fig. 9. Kasos cultural reserve.

primary sector, both through their processing (secondary sector), as well as through the promotion of synergies between the primary and tertiary sectors, through the utilization of agricultural and livestock products of the island to diversify the tourist product, is an important local development issue. The secondary sector is limited and concerns a small percentage of businesses on the island and a relatively small percentage of employment. There are no organized processing units in Kasos for the products of the primary sector. Most accommodation facilities on the island only operate in the summer tourism season, which is characterized by its short duration and peaks in the two months of July–August, following the “profile” of seasonality that as a rule is also observed at the national level.

### 3.2 Assessment of Results

During the study area analysis, thirteen points of cultural reserve (Agia Kiriaki, Agia Marina, Agia Triada, Agios Georgios Vrisis, Agios Georgios Maritsas, Agios Georgios Hadias, Agios Ioannis, Agios Mamos, Panagia, Monument of Antiperatos, Six churches, Panagia Emporiou, Ellinokamara Cave) (Figures 9 and 10) and eight points of environmental reserve (Ammoua, Antiperatos, Avlaki, Emporios, Fokiokamara, Helatros, Hohlakias, Armathia) were mapped (Figure 11). Additionally, the trail network was mapped as well, consisting of seven routes (the route of the settlements, Arvanitohori-Agia Marina, Arvanitohori-Panagia Potamitissa-Poli, Ammoues-Skafi, Ammoues-Grammata, Hadies-Agia Marina and Agia Marina-Antiperatos (Figures 12 and 13). Each of the island's settlements was examined as well in order to study its urban planning and buildings' state of preservation. Finally, the public infrastructure of Kasos was studied to conduct directions for the needs of the local community.

One of the major aims of the AEI project was the representation of different data into a comprehensive and useful tool. To that end, the incorporation of GIS was considered crucial. Thematic and interactive maps offer a comprehensive overview of the suggested routes, points of interest, and specific area characteristics and are easy to understand for people outside the scientific field. The functionality and flexibility of the GIS software have been expanded on by commercial actors and open communities, as a result, the maturity and flexibility of modern GIS software provide a sophisticated way to organize, store and visualize diverse datasets. This is achieved by the combination of geospatial database technologies such as PostgreSQL/PostGIS, standardized data formats for vector data (e.g., ESRI.shp, GeoJSON), raster data (e.g., geoTIFF, ECW, JPEG2000) and standardized data dissemination



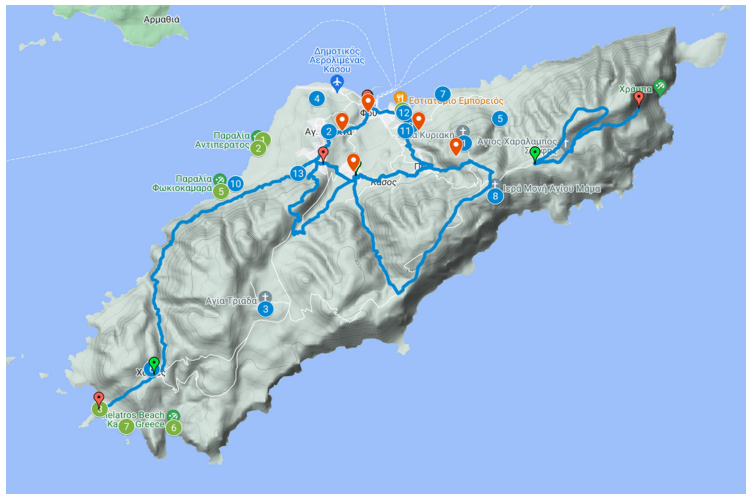


Fig. 12. Kasos trail network.



Fig. 13. Kasos hiking trails in GIS.

- Cultural Heritage zones (archaeological cadastre entries)
- Administrative divisions' boundaries
- Hydrological network data (river geometries, lake boundaries, catchment areas)
- Power production facilities (e.g., wind farms, hydroelectric dams, solar power plants)
- Meteorological station locations
- National Cadastre data
- Road network data
- Registered trekking trails
- Registered beaches
- Existing infrastructure (e.g., ports, airports)
- Settlement locations
- Map backgrounds (Land cover, ESRI Satellite, Openstreetmaps)

In continuation of the development of a QGIS project following the aforementioned methodology, a web map application was developed to provide a unified web interface of the AEI's geospatial database, accessible via

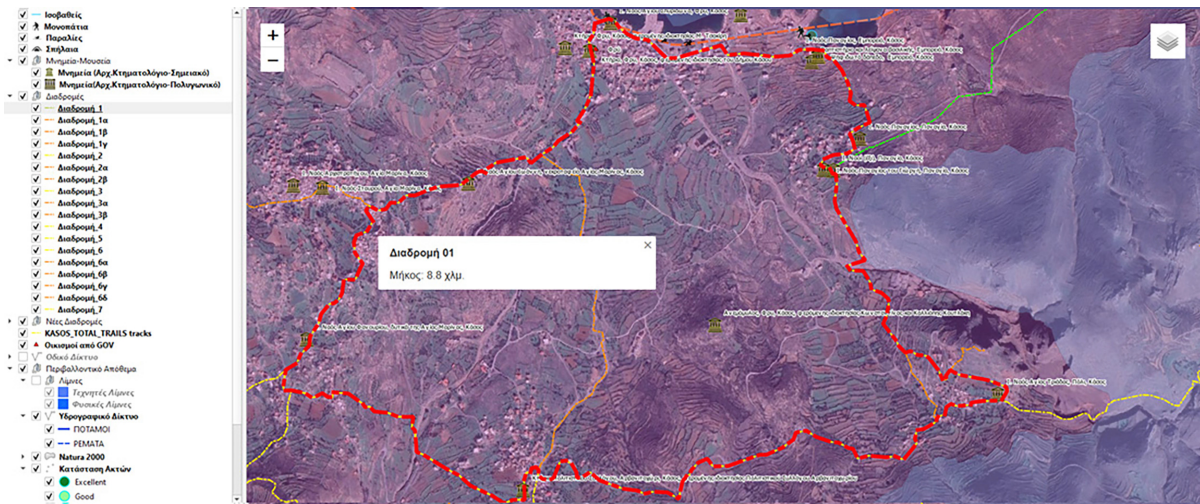


Fig. 14. Kasos hiking trail 1 in relation with the island's cultural monuments in GIS.

every browser. For the implementation of the application, an open-source architectural approach was followed to provide a modern web application without subscription restrictions. The overall application is written in HTML5, JavaScript ES6, and CSS3 leveraging the enhanced capabilities of jQuery for Document Object Model manipulation and dynamic content update. Furthermore, for the development of the map component, the Leaflet.js library was utilized, providing all the necessary tools for geospatial data visualization and functionalities for the interaction of the user with the map features. Aiming to develop a robust lightweight application for geospatial data visualization the implementation of a Geoserver instance constituted the most efficient alternative. All the geodata acquired under the AEI project were uploaded on the Geoserver to be easily accessible via Geoserver's Open Geospatial Consortium services. Specifically, in the case of vector data (e.g., road network, CH zones) the WFS is used for its request, while in the case of raster data (e.g., Digital elevation model) the WMS constituted the best solution, providing a light version of the file as.png georeferenced tiles, decreasing significantly the loading time of the data. The communication of the frontend module with the Geoserver is established via the backend, developed using the Flask framework, written in Python3. The intercession of the backend for the communication between the frontend and Geoserver eliminates potential security issues that may exist, providing a more secure application to the end-user while also improving the safety of the Geoserver.

The following figures (Figures 10, 13, and 14) provide a comprehensive view of the web application and the geospatial visualization techniques that were used to develop a well-performed web mapping tool.

The forms of alternative tourism that potentially and under very specific terms and conditions could be exploited in the context of a sustainable tourism model development by the Municipality are (Figure 15):

1. Marine tourism is a special form of tourism in particular important for Greece with an important scope for development and concerns activities carried out in the maritime space of an area (e.g., diving tourism).
2. Cultural and Religious Tourism—It concerns educational tours, plays, festivals, visits to archaeological sites, religious sites, study of the natural environment, etc.
3. Agritourism—It concerns the revealing of the island's traditional agricultural practices and constructions.
4. Walking & Sports Tourism—It's about mixing in walking and sports activities (e.g., sailing).

*Marine tourism* could attract visitors from the islands that lie within the narrow or wider region of Rhodes in order to create new touristic activity and add value to tourism and the local economy by increasing the residence

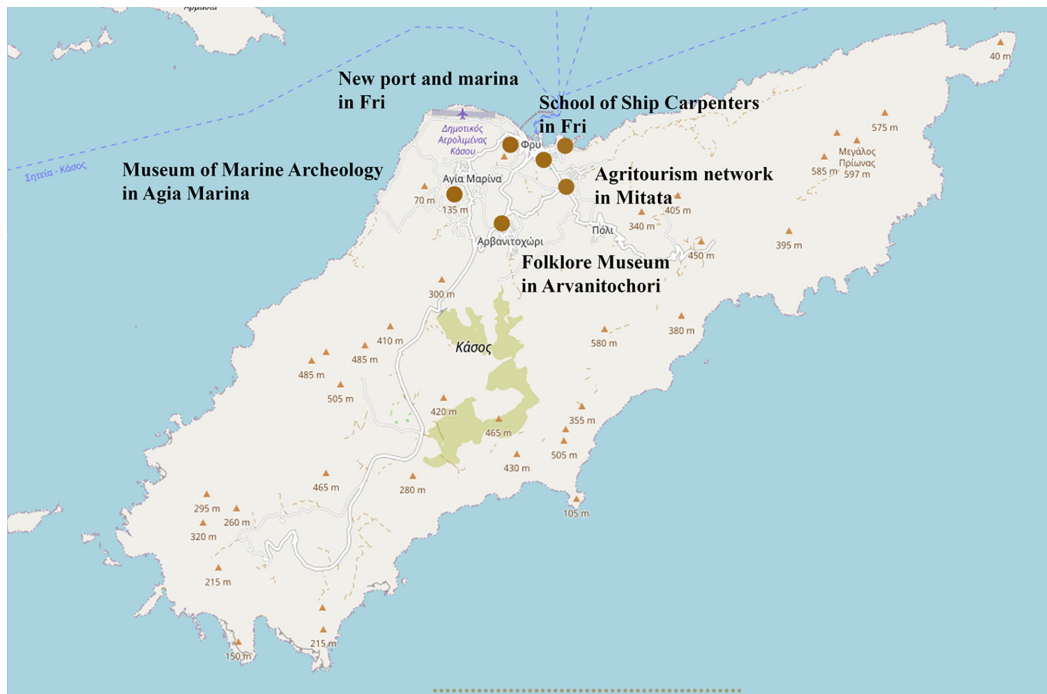


Fig. 15. Proposal schemes for Kasos sustainable development.

beyond the daily or short-time tourism, as it stands for now. To this end, the extension and renovation of Kasos port are vital in order to provide cruise ships with the opportunity to anchor there. Special deals with travel agents and ferry companies are necessary as well to reinsure the island's accessibility. On a smaller scale, the reuse of the old port as a tourist anchorage with organized tours to the island's beaches and the other islet of the complex could improve the visitor's experience by creating new tourism products. With actions like the creation of a bird observatory in Armathia, the biodiversity of Kasos could be explored and known.

*Cultural and Religious Tourism* could be beneficial by revealing Kasos' tangible and intangible cultural heritage. From the important findings of marine archeology to the demonstration of Kasos' contribution to the Greek revolution, museums like the Marine archeology museum in Agia Marina to the Folklore museum of Arvanitochori could constitute new landmarks for the local communities. The goal and vision for Kasos is the creation of an underwater archaeological site—park, with a network of exhibits and their multi-level presentation. The importance of marine antiquities is also great for Kasos. In fact, during the research in 2020, the municipality of Kasos organized a conference on the specific topic ("Marine Archeological Survey H.N. Kasos—Results and Prospects" conference) with the aim of informing the agencies and the island's residents about the course of the investigations. The creation of an Information Center for the Marine Antiquities of Kasos at the Old School of Agia Marina (Figure 16) could contribute to strengthening alternative tourism on the island. Local festivals, music, and dances should be promoted in order to present the authentic identity of Kasos.

*Agritourism* could combine the traditional breeder activities with the revealing of anavathmides, mills, and mitata (Figure 17). Today in Kasos, among the 150 mitata that existed, only fifteen of them are in use. Municipality and local communities should map and examine their ownership in order to create an agritourism network while preserving their special architectural form and giving them new, compatible uses. The fine cheese products of Kasos were and are still being produced in mitata. The shepherds' houses are stone buildings in the countryside



of Kasos, and the shepherds' activity is concentrated in them. In the paddocks of "mitata" the pastoral animals are gathered where they are milked for the cheese-making process to follow. Essentially, this is the agritourism model of visiting farms, where there is the possibility of hosting or catering on a limited scale. These actions could provide new job opportunities to the locals but also give them motivation to continue the traditional practices and learn them in deep. Seminars or standardization of traditional products could create a new tourism product and also improve the primary sector of production.

Finally, *walking and sports Tourism* could be promoted by the trail network and diving. Infokiosks and proper signaling of the trails could provide a different tourism experience while revealing the interesting cultural and environmental reserves of Kasos. The development of the path network includes the interconnection of the settlements, the highlighting of important monuments, landmarks and landscapes of natural beauty of the island as well as the promotion of local products. Walking tourism combined with the organization of activities such as underwater diving to explore underwater antiquities and climbing and exploring the caves of the island's archaeological sites.

#### 4 Conclusions

The island of Kasos is a very interesting case study due to its peculiarities. One of the main goals of the proposals was to draw up a plan that on the one hand will protect and reveal the least prominent elements of the island's heritage and, on the other hand, would create new economic opportunities for the inhabitants and overall more favorable living conditions in one, as much as possible, self-sufficient island. Promoting agritourism as a development tool in a remote island that preserve an active agricultural and livestock tradition could contribute to the island's financial growth but also to the preservation of tangible and intangible cultural heritage [42, 43]. Additional initiatives, such as the promotion of walking tourism combined with agritourism, could set Kasos as a distinctive all-year destination with unique and authentic tourism products [44, 45].

One of the first conclusions drawn is the fact that the sustainable development of an island is directly linked with the well-being of its residents. The participation of local communities and local governance in the discussion about Kasos' sustainable development was crucial in order to describe useful and realistic proposals. The main guide of all the proposals that were formulated is the awareness and the active involvement of the inhabitants of the island in the promotion of their monumental wealth. The empowerment of the local community and the encouragement of new initiatives based on culture must be the basis of any promotion effort.

The fusion of the datasets into a unified and interactive map to facilitate the dissemination of the geospatial information to be used as a point of reference for future research and easily accessible and amendable by future users such as public bodies or government organizations to take more efficient decisions and orchestrate better development plans. The thematic and interactive maps created offer a comprehensive overview of the suggested routes, points of interest, and specific area characteristics and are easy to understand for people outside the scientific field.

Now, the local communities have the GIS platform and active cooperation with Government and Administration responsables in order to implement the project's proposals. Next steps are to achieve the extroversy to the business community in order to support entrepreneurial initiatives capable of dealing with PPP efforts, overcome unemployment, and confront with current energy crisis as well as the economic and social challenges. The measurement of socio-economic outcome of the proposals mentioned above would be a useful addition to the GIS platform as well as the assessment of its use by the local stakeholders.

#### References

- [1] A. Papandreou, M. Papageorgiou 2019. Planning for the enhancement of the modern built heritage in Thessaly region: The case of the "Konakia" monuments. *Heritage* 2 (2019), 2039–2052. DOI: <https://doi.org/10.3390/heritage2030123>
- [2] I. Poullos. 2014. Discussing strategy in heritage conservation: Living heritage approach as an example of strategic innovation. *Journal of Cultural Heritage Management and Sustainable Development* 4 (2014), 16–34.

- [3] ICOMOS. 1964. The Venice charter-1964. In *Proceedings of the 2nd International Congress of Architects and Technicians of Historic Monuments*.
- [4] M. Demas. 2000. Planning for conservation and management of archaeological sites. In J. M. Teutonico and G. Palumbo (Eds.), *Management Planning for Archaeological Sites: An International Workshop Organized by the Getty Conservation Institute and Loyola Marymount University*. The Getty Conservation Institute, 27–54.
- [5] ICOMOS. 1994. The Burra document of authenticity. In *Proceedings of the Burra Conference on Authenticity*.
- [6] R. Mason. 2002. Assessing values in conservation planning: Methodological issues and choices. In M. de la Torre, (Ed.), *Assessing the Values of Cultural Heritage: Research Report*. The Getty Conservation Institute, 5–30.
- [7] S. Labadi. 2005. A review of the global strategy for a balanced, representative and credible world heritage list 1994–2004. *Conservation and Management of Archaeological Sites* 7, 2 (2005), 89–102.
- [8] I. Poullos. 2011. Is every heritage site a ‘living’ one?: Linking conservation to communities’ association with sites. *The Historic Environment: Policy and Practice* 2, 2 (2011), 144–156.
- [9] G. Wijesuriya. 2007. Guest editorial. *Conservation and Management of Archaeological Sites* 8, 3 (2007), 121–122.
- [10] H. Stovel. 2003. Introduction. In H. Stovel, N. Stanley-Price, and R. Killick (Eds.), *Conservation of Living Religious Heritage: Proceedings of the ICCROM 2003 Forum on Living Religious Heritage: Conserving the Sacred*. ICCROM, Rome, 1–11.
- [11] OECD. Rural Well-being: Geography of Opportunities. Retrieved from <https://www.google.com/search?q=oeed+remote+areas&oq=oeed+remote+areas&aqs=chrome.69i57j0i546l5.5120j0j4&sourceid=chrome&ie=UTF-8>
- [12] EU Action for Smart Villages. 2017. European Commission. Retrieved July 22, 2022 from <https://enrd.ec.europa.eu/news-events/news/eu-action-smart-villages>.
- [13] A. Despotovic, M. Joksimovic, L. Kascelan, and M. Jovanovic. 2015. Causes for depopulation of rural areas in the municipality of Pljevlja. *Agriculture & Forestry* 61 (2015), 393–407.
- [14] R. Cáceres-Feria, M. Hernández-Ramírez, and E. Ruiz-Ballesteros. 2021. Depopulation, community-based tourism, and community resilience in southwest Spain. *Journal of Rural Studies* 88 (2021), 108–116.
- [15] C. Garau. 2015. Perspectives on cultural and sustainable rural tourism in a smart region: The case study of Marmilla in Sardinia (Italy). *Sustainability* 7 (2015), 6412–6434.
- [16] G. Manyara, E. Jones. 2007. Community-based tourism enterprises development in Kenya: An exploration of their potential as avenues of poverty reduction. *Journal of Sustainable Tourism* 15, 6 (2007), 628–644.
- [17] S. Zielinski, Y. Jeong Yoonjeong, Kim Seong-il, and C. B. Milanés. 2020. Why community-based tourism and rural tourism in developing and developed nations are treated differently? A review. *Sustainability* 12, 15 (2020), 1–20.
- [18] S. Flanigan, K. Blackstock, and C. Hunter. 2015. Generating public and private benefits through understanding what drives different types of agritourism. *Journal of Rural Studies* 41 (2015), 129–141.
- [19] M. Canovi. 2019. Resistance to agritourism diversification: An analysis of winery owners’ identities. *Tourism Management Perspectives* 32 (2019), 100566.
- [20] G. Foster. 2020. Circular economy strategies for adaptive reuse of cultural heritage buildings to reduce environmental impacts. *Resources, Conservation and Recycling* 152 (2020), 104507.
- [21] UCLG Executive Bureau. 2010. *Culture: Fourth Pillar of Sustainable Development*. UCLG Executive Bureau, Mexico City.
- [22] Europa Nostra, ICOMOS, and Climate Heritage Network. 2021. *Europa Nostra, ICOMOS, Climate Heritage Network: European Cultural Heritage Green Paper*. Europa Nostra and ICOMOS.
- [23] UNESCO, ICCROM, ICOMOS and IUCN. 2013. *ENCATC (The European Network on Cultural Management and Policy)*. Europa Nostra, Heritage Europe (The European Association of Historic Towns and Regions), The Heritage Alliance, The International Cultural Centre (Krakow, Poland), and The Raymond Lemaire International Centre for Conservation at the University of Leuven (Belgium), *Global Education Monitoring Report Team: Education for People and Planet: Creating Sustainable Futures for All. Global Education Monitoring Report*. UNESCO.
- [24] R. Pickard. 2009. *Funding the Architectural Heritage: A Guide to Policies and Examples*. Council of Europe Publications.
- [25] M. Aldenderfer and H. D. G. Maschner (Eds.). 1996. *Anthropology, Space, and Geographic Information Systems*. Oxford University Press, New York, NY.
- [26] D. J. Pequet and D. F. Marble (Eds.). 1990. *Introductory Readings in Geographic Information Systems*. Taylor and Francis, London, UK.
- [27] M. F. Goodchild. 2000. The current status of GIS and spatial analysis. *The Journal of Geographical Systems* 2 (2000), 5–10.
- [28] O. Huisman and R. A. de By (Eds.). 2009. *Principles of Geographic Information Systems* (4th ed.). The International Institute for Geo-Information Science and Earth Observation (ITC): Enschede, The Netherlands, 2009.
- [29] X. Brunetaud, L. De Luca, S. Janvier-Badosa, K. Beck, and M. Al-Mukhtar. 2012. Application of digital techniques in monument preservation. *European Journal of Environmental and Civil Engineering* 16 (2012), 543–556. B. Santos, J. Gonçalves, A. M. Martins, M. T. Pérez-Cano, E. Mosquera-Adell, D. Dimelli, A. Lagarias, and P. G. Almeida. 2021. GIS in architectural teaching and research: Planning and heritage. *Education Sciences* 11 (2021), 307. DOI : <https://doi.org/10.3390/educsci11060307>

- [30] F. Rinaudo, E. Agosto, and P. Ardissonne. 2007. GIS and Web-GIS, commercial and open source platforms: General rules for cultural heritage documentation. *The International Archives of the Photogrammetry, Remote Sensing and Spatial Information Sciences* 36–5/C53 (2007), 625–630.
- [31] H. Rantanen and M. Kahil. 2009. The SoftGIS approach to local knowledge. *Journal of Environmental Management* 90 (2009), 1981–1990.
- [32] M. Kytä, A. Broberg, T. Tzoulas, and K. Snabb. 2013. Towards contextually sensitive urban densification: Location-based softGIS knowledge revealing perceived residential environmental quality. *Landscape and Urban Planning* 113 (2013), 30–46.
- [33] M. Pavlovskaya. 2006. Theorizing with GIS: A tool for critical geographies? *Environment and Planning A* 38 (2006), 2003–2020.
- [34] Community Research and Development Information Service (CORDIS) and European Commission. Retrieved August 1, 2023 from <https://cordis.europa.eu>
- [35] Krzysztof Rzasca, Marek Ogryzek, and Mateusz Ciski. 2018. Application of GIS technology in the protection of monuments on the example of historic monuments. In *Proceedings of the E3S Web of Conferences*.
- [36] F. Petrescu. 2012. The use of GIS technology in cultural heritage. In *Proceedings of the XXI International CIPA Symposium*.
- [37] A. Moropoulou and E. Delengou. 2003. *Innovative Technologies and Strategic Planning Methodology for Assessing and Decision Making Concerning Preservation and Management of Historic Cities*.
- [38] J. B. Bury and R. Meiggs. 1998. *A History of Greece*. Macmillan Education, UK, 420–423, 436, 441.
- [39] D. Giannopoulos. 2015. Italian presence in the Dodecanese 1912–1943: Teaching a history topic in weebly environment. *Procedia Computer Science* 65 (2015), 176–181.
- [40] Kasoproject. Retrieved May 22, 2024 from <https://kasoproject.com/GR/>
- [41] Arxaiologikoktimatologio.gov. Retrieved May 22, 2024 from <https://www.arxaiologikoktimatologio.gov.gr/>
- [42] A. Vythoulka, E. T. Delegou, C. Caradimas, and A. Moropoulou. 2021. Protection and revealing of traditional settlements and cultural assets, as a tool for sustainable development: The case of Kythera Island in Greece. *Land* 10 (2021), 1324. DOI: <https://doi.org/10.3390/land10121324>
- [43] J.M. López-Sanz, A. Penelas-Leguía, P. Gutiérrez-Rodríguez, P. Cuesta-Valiño. 2021. Sustainable development and rural tourism in depopulated areas. *Land* 10 (2021), 985.
- [44] Ioanna Mikrou, Petros Dimas, Georgia Skoulaki, Anastasia Vythoulka, Aspasia Fafouti, Ekaterini Delegou, Aggelos Tsakanikas, and Antonia Moropoulou. Multiplying effects in the local economy through the sustainable development of the cultural and environmental stock. The case of Symi. *WSEAS Transactions on Business and Economics* 20 (2023), 2376–2387.
- [45] A. E. Fafouti, A. Vythoulka, E. T. Delegou, N. Farmakidis, M. Ioannou, K. Perellis, A. Giannikouris, N. A. Kampanis, G. Alexandrakis, and A. Moropoulou. 2023. Designing cultural routes as a tool of responsible tourism and sustainable local development in isolated and less developed Islands: The case of Symi Island in Greece. *Land* 12, (2023), 1590. DOI: <https://doi.org/10.3390/land12081590>

Received 21 March 2024; revised 22 May 2024; accepted 16 July 2024