# PLANNING FOR DESTINATION DEVELOPMENT THROUGH GEOTOURISM AT ANGADIPPURAM, MALAPPURAM DISTRICT

THESIS REPORT

Submitted by

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**MUP (2020 - 2022) BATCH**

*to*

*the APJ Abdul Kalam Technological University in partial fulfillment*

*of the requirements for the award of the*

*Post Graduate Degree of M. Planning in*

*Urban Planning*

**URBAN PLANNING**

**DEPARTMENT OF ARCHITECTURE**

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# CERTIFICATE

Certified that the Project entitled **"PLANNING FOR DESTINATION DEVELOPMENT THROUGH GEOTOURISM AT ANGADIPPURAM, MALAPPURAM DISTRICT"** submitted by **Anjana Lakshmanan (TKM20MUP003)** of MUP (2020-22) BATCH, in partial fulfillment of the requirements for the award of Post-Graduate Degree in Urban Planning, under the APJ Abdul Kalam Technological University is a Bonafide work carried out by them under our guidance and supervision.

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# DECLARATION

I hereby declare that the project entitled **"PLANNING FOR DESTINATION DEVELOPMENT THROUGH GEOTOURISM AT ANGADIPPURAM, MALAPPURAM DISTRICT"** is a bonafide record of the study done as part of Thesis project under the supervision of Dr. Annie John, Prof. Rini Thomas during the **Fourth Semester M. Plan (2022)** Post Graduate Degree Course in the Department of Architecture, Thangal Kunju Musaliar College of Engineering, Kollam. I declare that, to the best of my knowledge, the work reported herein does not form part of any other project report or thesis on the basis of which a degree or award was conferred on an earlier occasion to any other candidate.

Place: Kollam

Date: 14/09/2022

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Date: 14/09/2022

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# ABSTRACT

*This thesis project mainly aims to provide the idea behind geotourism and its development from grassroots level to global attention. Case-studies, best practices, and literature reviews are researched and analyzed to understand the roots of geotourism principles. Through site visits and surveys, a clear picture of Angadippuram Grama panchayath is well understood. The richness of abiotic, biotic and cultural elements of this particular area has been thoroughly studied to understand the potentials and possibilities of geotourism. From the basic understanding of panchayath, a matrix that grows from the literatures is built on a broader level and it is integrated with the scientific method to get the idea behind the educational values, culture, conservation and aesthetics of an untapped destination. Possibilities and potential are raised through site analysis.*

*The scientific analysis has given a broader vision of the development of this destination and the development strategies are also mentioned in the framework of the thesis.*

***Key Words**: -Geotourism, GIS, Matrix, conservation.*

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# CHAPTER 1 : INTRODUCTION

## 1.1 BACKGROUND OF STUDY

### 1.1.1 Land-use planning

Selection and implementation of the optimal land-use options based on a methodical analysis of available land and water, land-use alternatives, and economic and social factors. Its goal is to identify and implement land-use strategies that provide for current and future population demands while protecting existing biodiversity and ecosystems.

(Metternicht, 2017)

"Iteratively based on conversation among all stakeholders, land use planning in the framework of development cooperation aims to determine sustainable land uses in rural regions. It also entails taking steps to put into effect the agreed-upon land uses and keeping tabs on their development."

(GTZ 1995: 5).

Sustainable use of land resources that is responsive to people's needs and desires is the goal of land use planning, which is a methodical and iterative process. A land use plan "empowers individuals to make decisions about how to distribute land resources by evaluating the physical, socioeconomic, institutional, and legal potentials and restrictions for making the most efficient and effective use of those resources."

(FAO/UNEP 1999: 14).

*Figure 1-1 Illustration of Land use Planning*

*Table 1-1 Definitions for Land use planning*

| NAME | DEFINITION / PURPOSE | EXAMPLES OF APPLICATION |
|---|---|---|
| Land use planning | Identifying and adopting the most suitable land-use options through a methodical analysis of available land and water, alternative land-use possibilities, and economic and social factors. Its goal is to choose and implement land uses that will best serve the public interest by minimizing waste and protecting vital resources for the long term. (Perth, 2013) | Wide usage in both developing and developed nations for rural, regional, and local land use planning. |
| Spatial land use planning | The economic, social, cultural, and environmental policies of a society find expression in their geographic context via regional/spatial LUP. Developed as a multidisciplinary and comprehensive approach, it seeks to achieve sustainable regional development via the strategic physical arrangement of space. | Torremolinos charter by the European Ministers in Charge of Regional Development (CEMAT) |
| Integrated land-use planning | Agricultural, pastoral, crop, and forest sectors, along with industrial and other interested parties, are all included into the evaluation and allocation of resources. | Bungoma, Kenya's nearby agricultural growth; rural making plans in Laos Allocation of Land and Water in Iran's Watersheds Jinan, China land use and transportation making plans; risk-touchy land use making plans; case |

| | | |
|---|---|---|
| | | research in Nepal, Spain, and Vietnam. |
| Regional land use planning | Elaboration of general concepts of spatial and land use priorities, establishment of environmental and monumental protection conditions, formation of systems of residential areas, production areas and infrastructure areas, regulation of population employment, and private and corporate activities. territorial reservations necessary to expand the main component is strategic land use planning. An integrated plan can be used to establish guidelines for spatial development in a particular area and priorities for its use, protection and management. | |
| Participatory land use planning (PLUP) | Used for the planning of common or community property; vital in many places where communal lands have been the most severely deteriorated and where disputes have arisen over who has the right to utilize the area. Stakeholders may negotiate legally enforceable regulations for SLM at the community level, based on planning units. Both social (the village) and geographical (the watershed) units may be used. Bottom-up, people-focused strategy that takes into account regional variations in | |

| | | |
|---|---|---|
| | sociocultural, economic, technical, and environmental factors. | |
| Ecological land use planning (Ornamentor territorial ecological) | A tool of environmental policy used to control how land is used and what may be produced within, with the goals of preventing pollution and encouraging the responsible use of natural resources. It's the best tool for policymakers to use to balance human activities with environmental sustainability in the short, medium, and long term. | Methodological frameworks have been created in Mexico, Argentina, Costa Rica, and Chile that include ecological services into spatial LUP. In Argentina's Southeast Pampas Region, a method for rural LUP has been implemented which combines strategic environmental assessment with valuing of ecosystem services. |


*Figure 1-2 Principles of land use planning*

**Land Use Planning: A Tool to Achieve Sustainability**

Planning for land use include a comprehensive analysis of available resources (land and water), possible land uses, alternative land uses, and economic and social context to determine which land use choices are most suitable for the community. Its goal is to identify and implement land uses that provide for current and future human requirements while protecting existing infrastructure and natural resources. Planning is motivated by the need for change, whether it be better management or a drastically different pattern of land use necessitated by new or altered conditions. Agriculture, forestry, wildlife preservation, urban and industrial growth, tourism and amenity development are all part of this process. When there are competing options, planning may help sort them out by highlighting the best places to put various types of development. It is possible to think of land use planning as an ongoing cycle whose ultimate goal is to maximise the benefits to society that may be reaped from the use of available land.

- assessing existing and future demands and evaluating the land's availability to satisfy them;
- identifying and resolving conflicts among competing uses and requirements
- creating potential alternates and choose the one that works best with predetermined goals;
- gaining wisdom from past mistakes.

As more accurate data becomes available at any given point, the method may need to be adjusted. Planning relies heavily on the establishment of objectives. They clarify what is intended by the optimal use of the land and they have to be stated at the commencement of any planning project. Typically, there is a distinction made between the object of one's goals and the focus of one's efforts.

Objectives are the general purposes within the planning process. Through them, appropriate proposals and ideas for the use of the land may be determined, and the merits of alternative solutions to a specific issue in the planning area can be evaluated. The goals are the most specific aspirations for land use planning. They result in the formulation of concrete actions that must be taken and carried out in a certain region to address the underlying problems.

Targets and goals help determine the most productive use of the property. If two competing land uses provide the same net benefit (economically and socially), then the goals will dictate which land use is executed, while the targets will suggest which processes are carried out.

The aims, as a whole, maybe categorized under three key headings: efficiency, equity and acceptability, and sustainability.

"The time period "geotourism" refers to holidays that rent the herbal functions of a destination, especially its geology and geography, as a way of selling long-time period financial increase through the tourism industry. Learning approximately the Abiotic (non-living) surroundings is step one in increasing one's understanding of the Biotic (living) surroundings of flora and animals and the Cultural (historical) surroundings of humans. It is thought that geotourism presents a brand-new sort of sustainable tourism that's extra complete than preceding specialized sorts of tourism. It encourages tourism to geo- sites

and the safety of geodiversity and an understanding of earth sciences through entertainment and learning. This is finished with the aid of using visits to geological functions, utilization of geo-trails and view-points, guided tours, geo-sports and patronage of geosite vacationer centers." (Dowling R., 2013)

## 1.2 DEFINITIONS OF GEOTOURISM: -

*Table 1-2 Definitions of geotourism from different journals*

| |
|---|
| Travel with the intention of protecting or improving a destination's natural features, native communities, cultural landscapes, historic architecture, and quality of life for locals is known as "**geotourism.**".<br><br>(National Geographic (undated)) |
| Tourists may learn more than just how beautiful a site is by taking use of interpretative and service facilities, which provide light on the site's geology and geomorphology as well as its role in the evolution of Earth sciences.<br><br>(Hose 1995) |
| Conservation of geology and geomorphologic resources for educational and recreational purposes, as well as public enjoyment, requires the provision of interpretative facilities and services.<br><br>(Hose 2000) |
| Visits to geological objects (geosite) and the awareness of geological processes merged with aesthetic sensations acquired via interaction with a geosite constitute geotourism, a branch of cognitive tourism and/or adventure tourism.<br><br>(Slomka & Kicinska-Swiderska 2004) |

Geological tourism is a subset of environmental tourism that focuses on the study and appreciation of the Earth's geological and geomorphological aspects, including its landscapes, landforms, fossil beds, rocks, and minerals.

(Dowling and Newsome 2006)

The practice of visiting natural areas with the express purpose of learning about the area's topography and geology. It encourages people to visit geosites so that they may learn about and help preserve Earth's geological and biological diversity. This is accomplished via the use of geo-trails and overlooks, guided tours, geo-activities, and visits to geo-site visitor centers, in addition to self-directed exploration of geological features.

(Newsome and Dowling2010)

**Geotourism** is

- Environmentally responsible - concerned with preserving natural areas and reducing waste
- Culturally responsible - dedication to local culture and history
- Synergistic - creating a location that is more than the sum of its parts by integrating all of the characteristics that give a place its unique character and attracting travelers with a wide range of interests

(National Geographic, 2003)

As the Abiotic (non-living) aspects of geology and climate influence the Biotic (life) elements of animals and plants, geotourism claims that we must know about them in order to properly comprehend and enjoy the environment. Therefore, the Cultural landscape of past and present inhabitants of the place is determined by the interplay of these factors. These are the "ABCs" of geotourism, the emerging all-encompassing framework for comprehending the world's natural wonders.

(Dowling D. R., 2018)

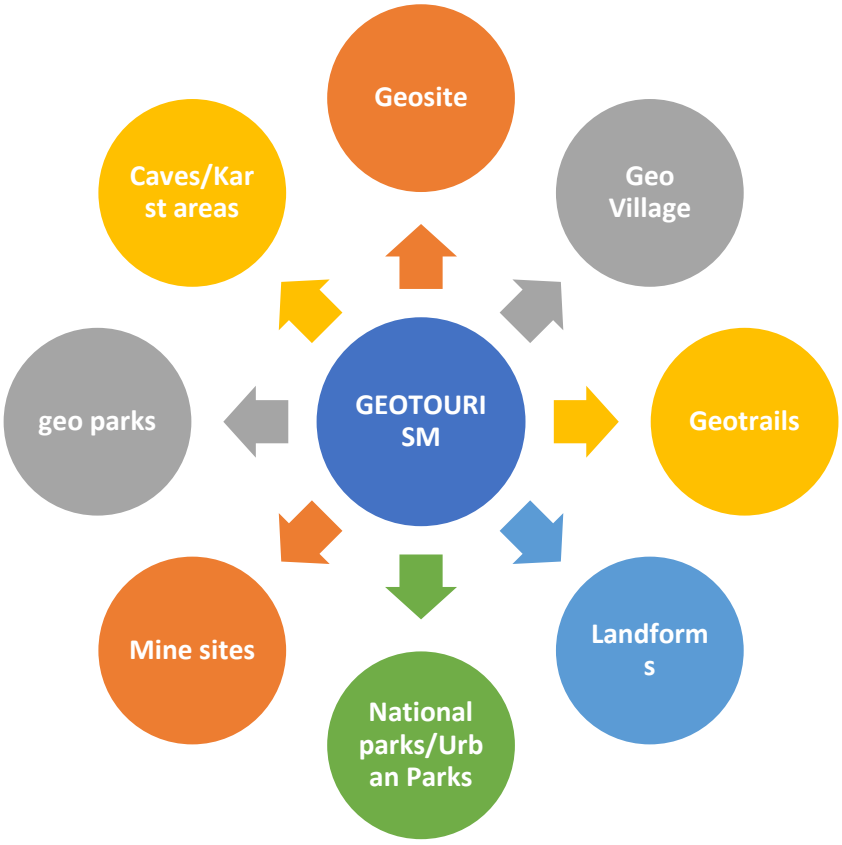



*Figure 1-3 Geotourism cycle*

The term "**geotourism**" refers to vacations that employ the natural features of a destination, specifically its geology and geography, as a means of promoting long-term economic growth via the tourism industry. Learning about the Abiotic (non-living) environment is the first step in expanding one's knowledge of the Biotic (living) environment of plants and animals and the Cultural (historical) environment of humans. It has been stated that geotourism represents a new, more all-encompassing, and environmentally friendly kind of sustainable tourism. Tourism to geo-sites, geodiversity protection, and education about earth sciences are all bolstered by this concept. This is accomplished by people going to geosites and engaging in geotours, geoactivities, and geotours.

Geotourism is a kind of tourism defined by its concentration on geology and landscape, as defined by Newsome and Dowling (2010). They stated that geotourism, in contrast to ecotourism, is not limited to natural places and may take place in both untouched and changed landscapes.

How geotourism connects to traditional vacationing. Connections between nodes are shown by solid and dotted lines, respectively. Strong evidence suggests a correlation between ecotourism and geotourism.

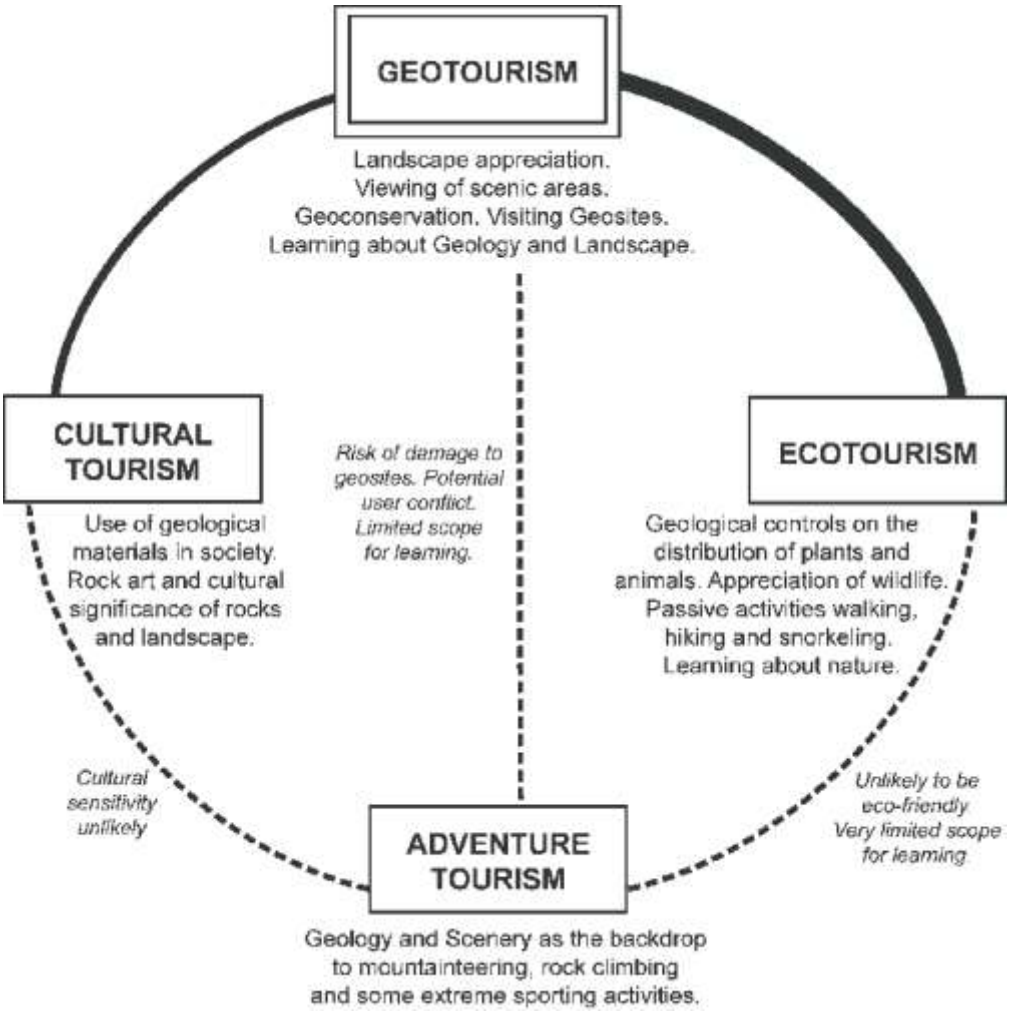



*Figure 1-4 Differentiating Geotourism with other tourism sectors*

(Dowling R. , 2013)

### 1.2.1 Difference between Geotourism and eco-tourism?

Geotourism is described as "Tourism that sustains or complements the geographical person of a place - its surroundings, culture, aesthetics, heritage, and the **well-being** of its residents," even as ecotourism is described as "Responsible journey to herbal regions that conserves the surroundings and improves the welfare of neighborhood people" through the International Ecotourism Society.'

' (Jeju, 2010)

*Figure 1-5 Different Geosites*

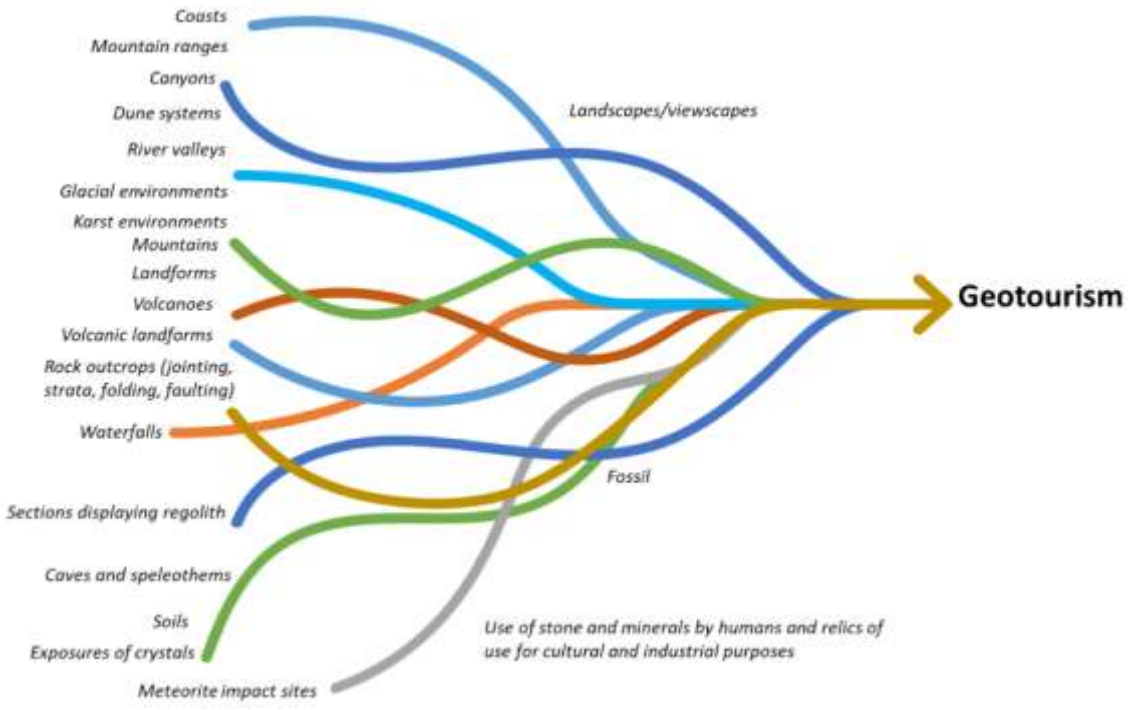



*Figure 1-6 Geotourism Land types*

*Table 1-3 Comparison between ecotourism and Geotourism*

| COMPARISON BETWEEN ECOTOURISM AND GEOTOURISM | | |
|---|---|---|
| **CONTEXT** | **ECOTOURISM** | **GEOTOURISM** |
| **DEFINITION** | "Ecotourism is a kind of vacationing that helps preserve natural regions while also benefiting the local population."<br>(Society, 1956) | "Sustainable tourism involves vacationing in a way that doesn't negatively impact the natural environment, local culture and traditions, or the quality of life for the area's permanent population."<br>(Dowling R. , 2013)<br>Travel with the intention of protecting or improving a destination's natural features, native communities, cultural landscapes, historic architecture, and quality of life for locals is known as "**geotourism**".<br>(National Geographic (undated)) |
| **AREA OF CONCERN** | The primary focus of ecotourism is ecology and protecting natural areas.<br>(Society, 1956) | The environment is only one facet of geotourism; the field also takes into account the local food, art, and culture.<br>(Jeju, 2010) |

| | | |
|---|---|---|
| **POLITICAL PRINCIPLES** | "Give back to the community financially and give locals a voice, and teach you more about the political, environmental, and social atmosphere of the nations you visit."<br>(Jeju, 2010) | Given its cultural focus, it places an emphasis on having a solid sense of community. Every location is expected to make extensive use of local volunteers and contributions.<br>(Jeju, 2010) |
| **NOTABILITY** | Great potential especially for ecologically fragile areas.<br>(V. Jovanović, A. Njeguš , September 2008 ) | Provides value to local communities, conserves geoheritage.<br>(National Geographic, 2003) |

**Ecotourism and Geotourism Concepts**

- The term "ecotourism" refers to vacations that don't negatively impact the environment. ecotourism is a kind of tourism that does not harm the environment and instead promotes environmental and cultural awareness, appreciation, and conservation via direct contact with naturalistic environments.
- But ecotourism as a whole is being more seen as a niche sector, especially from a Chinese point of view, and hence is being criticized for being too narrowly defined.
- However, "Geotourism is tourism that focuses on an area's geology and landscape as the foundation for delivering tourist interaction, learning, and pleasure," as defined by the World Tourism Organization. Encouragement of participation, information gathering, and fun for visitors.

### 1.3 Geo tourism planning indicators

⇒ Geo-conservation.

⇒ Landscape Appreciation.

⇒ Tourism contribution to local economy.

**Geotourism relies on the synergy of different modes of action:**

⇒ Involvement with neighborhood organizations and businesses;

⇒ Observance of a respect for local customs and values;

⇒ Support for environmental preservation initiatives

⇒ Efficient use of available resources (quality over quantity);

⇒ Making sure the locals benefit monetarily;

⇒ Inspiring visitors to talk about their geotourism adventures online, especially on social media.

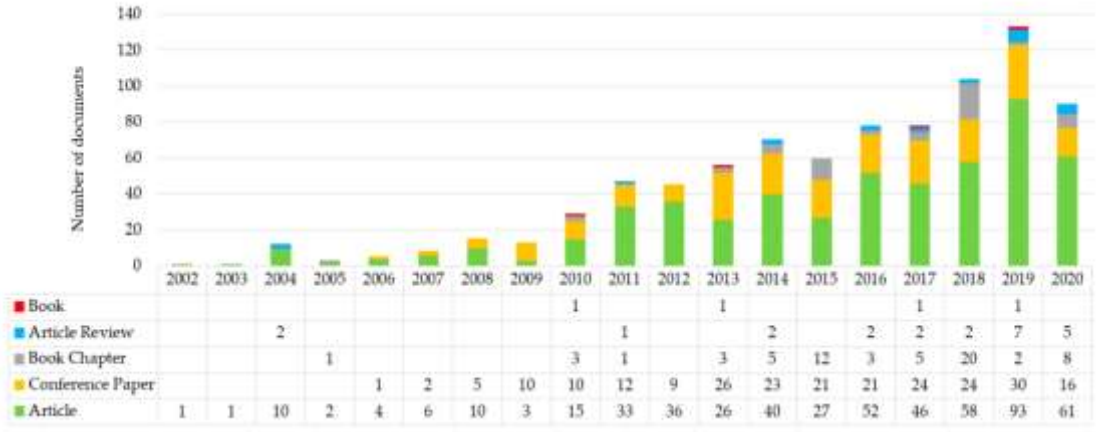



*Figure 1-7 Articles, conferences papers, book chapters, article reviews, and books associated with geoparks published*

### Contributions by Countries and Regions

It is because to the contributions of many nations that academics from all around the world may share their findings and collaborate across institutions. With the use of bibliographic coupling, we were able to count the number of times certain nations were mentioned in a collection of documents. There was a requirement of at least one document per nation in the bibliographical coupling of countries; 68 countries met this requirement

when viewed with the VOS viewer. This table ranks the top 15 nations from 2002-2020 in terms of the total number of papers mentioning Geoparks.

### 1.3.1 Destination development

1. The development goal should be framed within the larger regional or local goals in terms of economy, society, culture, and the environment.
2. Planning and design should take into account the unique traits of the destination and the communities it serves, while also preserving the particular character of any established attractions.
3. It has to be flexible enough to respect the guiding land management concepts of indigenous communities.
4. Actions to avert the negative consequences of tourism development.
5. The urban tourist attractions, facilities, services, and amenities as well as the fundamental infrastructure needs like roads, electricity, water, transit facilities, waste management system, etc., should all be accounted for in the tourism plan.
6. The areas such as promotion of existing and proposed attractions in the regions, facilities to buy local crafts, souvenirs, and to acknowledge indigenous people shall be taken care of.
7. There should be little to no negative effect on the environment and cultural and historical sites should be preserved.
8. Unique selling points (USPs) in tourism should be built on distinctive local characteristics and attractions.
9. Any planned tourist activity must be well regulated to prevent the deterioration of the same resources that draw visitors there in the first place. (Must observe the rules and protect the privacy of others.
10. Shall focus on building up a stronger identity and image for the region by growth of local tourism and associated business.
11. Media like as guides, interpretive panels, displays, kiosks, and audio/visual aids are planned, designed, and produced to help with the interpretation of our special historical, cultural, and natural features. The resources should primarily have an interpretive function for a tourist audience.

### 1.3.2 Why tourism planning is important?

Proper preparation may make or ruin a vacation spot. If done well, it has the potential to boost the local economy, protect the environment, and preserve the area's attractiveness as a tourist destination. Neither the supply nor the demand sides of the tourism industry make enough use of GIS technology to improve productivity.

- Geographic information systems make it simpler to identify areas that might accommodate tourist activities due to their suitability in terms of accessibility, capacity, and quality.
- It allows for the delineation of areas for conservation, ecological study, residential and recreational development, and more by using a variety of models.
- There is a wealth of data related to tourism pursuits that may be stored in a wide range of analog and digital forms.
- GIS has been used withinside the tourism enterprise for such things as mapping, developing traveler statistics control systems, and assisting in decision-making with reference to such things as a stock of leisure capacity, control of using area for tourism, traveler effect evaluation, an evaluation of the warfare among pastime and the environment, and more.
- In order to adjust tourism and traveler improvement that competes with or isn't always complementary to the usage of land, present infrastructure, and herbal resources, it's miles essential to create lists of traveler resources.

## 1.4 NEED OF THE STUDY

1. Promote tourism for geosites.
2. Conservation of geoparks and geosites
3. Motivated by a desire to inform the public about the fascinating aspects of nature that might attract a great number of visitors
4. Asses and predict disaster impacts.
5. To trigger the development of the local economy
6. New way of economic generation from geosites

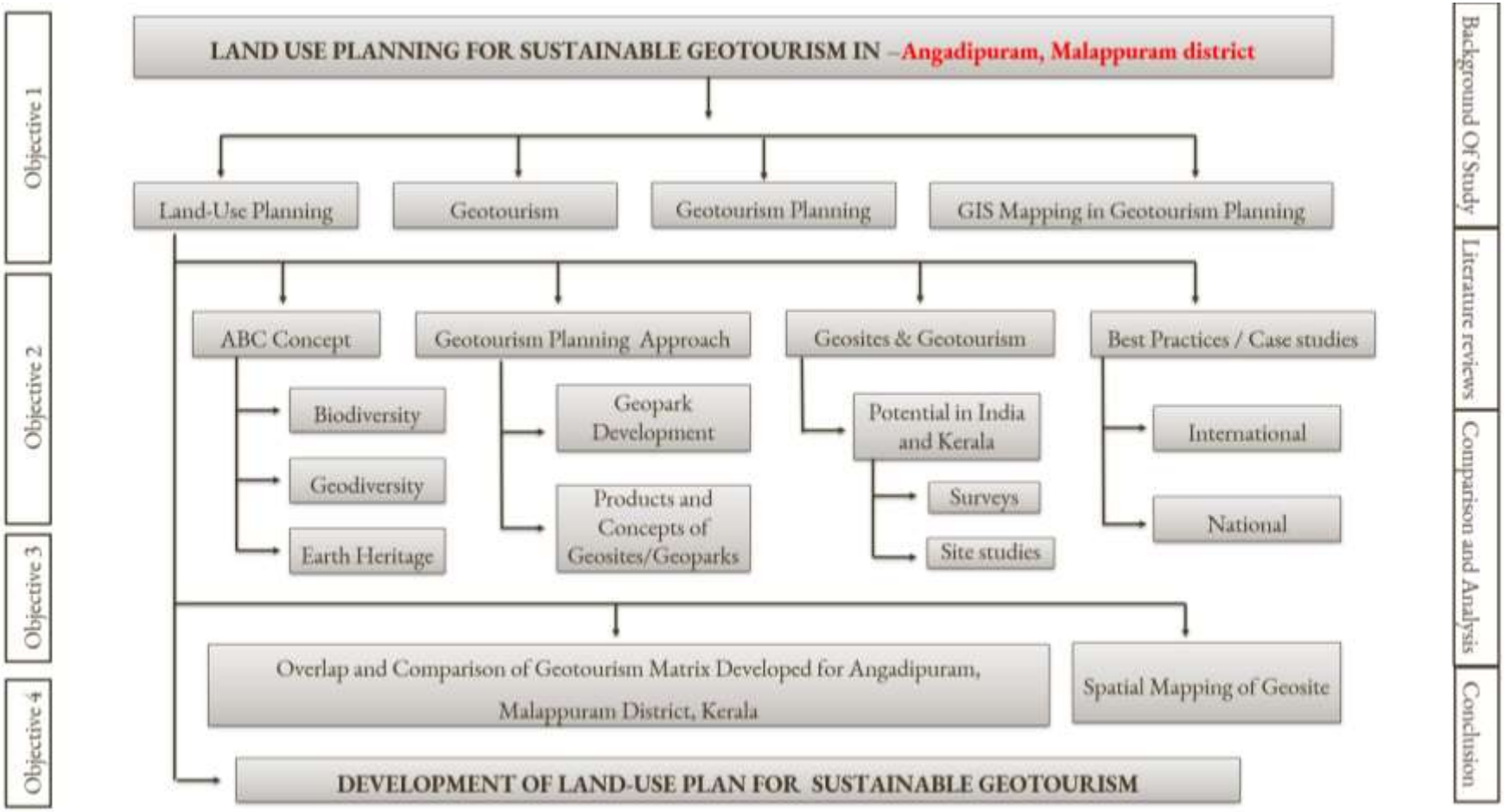
## 1.5 AIM

To develop land use and natural resource planning for geosites

## 1.6 OBJECTIVE

1. To understand the concept of spatial planning and land-use planning
2. To analyse the elements of geotourism in geosites with best practices
3. To analyse and overlap geotourism matrix and indicators developed in geosite
4. To develop land-use plan for geotourism destinations

## 1.7 METHODOLOGY



## 1.8 Scope

- Optimum planning for sightseeing.
- Query of geographical data.
- Determination of historical and tourist places.
- Identification and promotion of untapped travel destinations.

### The scope and content of geotourism

Geotourism has a number of qualities. They encompass that it's far geologically grounded, helps geoconservation, develops geo-schooling through geo-interpretation, and contributes to a place or region's sustainable improvement via financial and social advantages. Finding and naming geosites is vital to developing a geotourism inventory. Urban and peri-city regions, quarries and mining sites, agricultural land, remoted herbal regions, and guarded regions like countrywide parks, nature reserves, and countrywide monuments are just a few of the locations in which geotourism can be practiced. Geotourism is a sort of tourism that actively works to keep geographical landmarks and different historic sites.

This is often accomplished via the dissemination of geological and geomorphological information. The last aspect again helps to emphasize the crucial need of teaching and explanation in geotourism. Geotourism’s contribution to elevating attention is critical if geoconservation projects are to get the investment they want to get commenced and preserve going. Site access (roads, trails), traveler management, web website online development (web website online hardening, commentary places, signage, interpretative panels), and tracking for signs of degradation are all critical to the conservation of geosites, mainly the ones which are uncovered to excessive ranges of tourism.

Sustainability is frequently described in financial phrases and the sustainability of traveler companies is primarily based totally on well-covered and maintained sites that offer excessive ranges of traveler satisfaction.

## 1.9 Limitations

- Lack of Registered Geosites and Data. And lack of Planning Research
- Difficulty in Identification and promotion of untapped travel destinations for Geotourism

# CHAPTER 2 : LITERATURE REVIEW

## 2.1 Geoconservation: principles and practice

"Geoconservation: principles and practice" expands on and revises "Geological conservation: a guide to good practice," a review of geoconservation published by English Nature in 2006.It draws upon seventy years of practical experience accumulated by Natural England and its predecessor bodies, partners and stakeholders over that period.

It provides context to geoconservation but focuses on the principles and practice of geoconservation, illustrating the challenges, opportunities, threats and solutions associated with practice through real case studies, demonstrating approaches that have worked well, and other approaches that have not worked so well.

'Geoconservation: principles and practice' differs from 'Geological conservation: a guide to good practice' in several aspects. The diagrams have been entirely redrafted to (where appropriate) demonstrate positive management activities on geodiversity features. The case studies provide updates on cases illustrated in the 2006 publication, but many are new, and some demonstrate the use of techniques (moldings and casting, fixed point photography, visual management plans) that were in development during or after 2006.

The other major difference from previous reviews is that it has been produced using design and publishing software, giving greater flexibility for future updates, as well as facilitating the development of customized products such as standalone case studies, or adapting the diagrams to illustrate specific requirements to a contractor or developer.

Although focused on England and primarily intended as a source of advice for Natural England staff, this review is likely to be of interest and relevance to organisations, groups, partners and stakeholders involved in conserving, recovering or enhancing geodiversity anywhere in the World.

Geoconservation: principles and practice will be available soon to download from the Natural England publications catalogue, either as the whole document, or as separate parts.

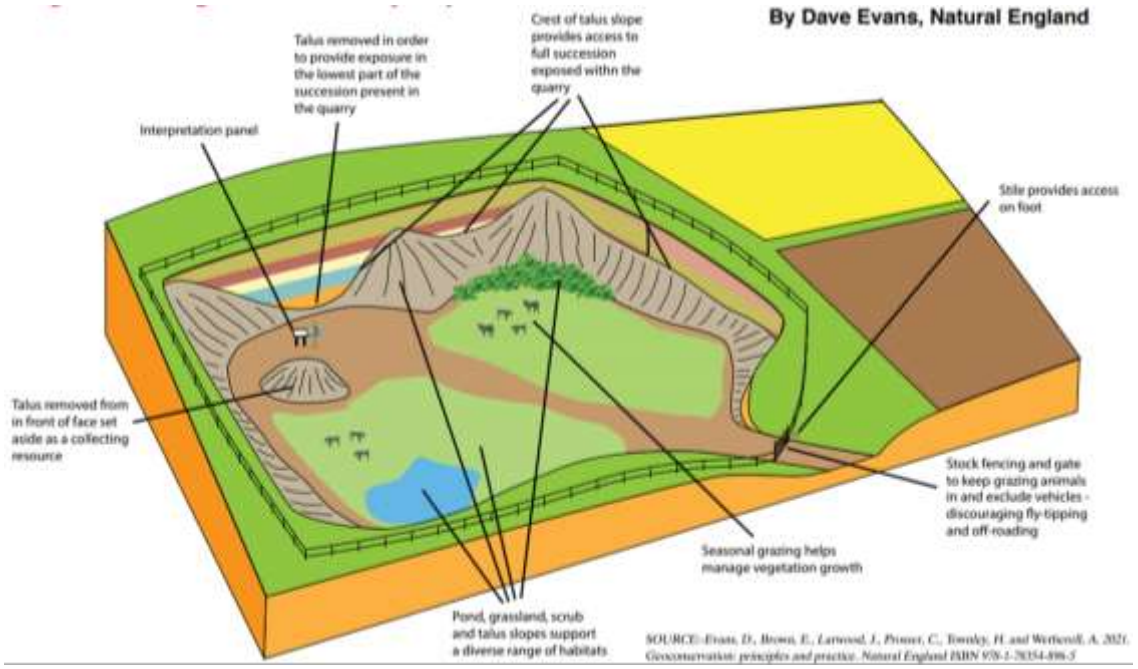



*Figure 2-1 Diagram showing how a disused quarry can be conserved*


*Figure 2-2 Conserved Quarry at England*

## 2.2 Re-maintaining Authentic Place Identity through Continuity: Sipiso-Piso, North Sumatera

Toba Caldera, the super-volcano in North Sumatera, Indonesia, is a potentially developed geo-tourism destination thanks to its geological assets, historical worth, biodiversity, cultural variety, and ecological harmony. Though it has been designated as a National Strategic Tourism Area priority (KSPN), with Lombok Island and the Borobudur temple,

Toba Caldera still needs further development to keep up with the rest of the world. In reality, multisectoral formation throughout Indonesian Ministry has been driving geo-tourism growth in the region for the last several decades. Since 2011, the Indonesian government has been preparing Lake Toba for membership in the UNESCO Global Geopark Networks (GGN) by recommending it to UNESCO GGN via the Ministry of Tourism and Creativity Economy. These proposals were submitted in November 2013 and November 2014, respectively (Simatupang, 2016). In addition, North Sumatera's governor was tasked with assembling "acceleration teams" to lobby for the designation of Geopark Caldera Toba as a UNESCO Global Geopark (UGG). Due to the proposal's lack of maturity, it was rejected as a Global Geopark during the 4th APGN Symposium, which took place in San'in Kaigan Geopark, Japan (Simatupang, 2016). The governor made another proposal in 2017, and the outcome will be made public in late July of this year. The Ministry of Public Works and Housing is now aiding Toba Caldera development by enhancing its quality, accessibility, and tourist infrastructure services (constructing road and bridge; affording clean water supply; providing affordable sanitation). The goal is to improve the local economy by strengthening its ties to tourism, luring private investment, and reducing the burden of regulatory burdens.

*Figure 2-3 Existing Building in Sipiso-Piso Waterfall*

To support Toba Caldera as a National Strategic Tourism Area Priority, the present study observed the continuity principle in preserving the site identity of Sipiso-Piso, a tourist destination in North Sumatera. Instead of improving quality of life, the pursuit of developing geo-tourism in Toba Caldera would pose threats to the local ecosystem and community. The perspectives of respondents that suggest positive experiences were identified using both a quantitative and qualitative method. Since the natural resources are Sipiso-only Piso's draw, the results demonstrated the need of integrated planning for

physical and intangible empowerment in light of the growing influx of visitors and the varying expectations they bring.

**Inference**

According to the findings, cultural and historical activities from the past is essential to maintaining a sense of place's unique character. Visiting a significant location is emotionally charged because it evokes memories and feelings of connection from previous visits. It is vital to enhance Sipiso-Piso as an appealing geo-region because of its natural riches, yet the location provides nothing else of interest. As a result, if Toba Caldera is to become a member of the UGG, it is more important to focus on environmental protection than on conserving cultural value. However, a significant influence is played by the community's interest and participation as well. Reviving the original indigenous culture would leave a lasting impression due to its inherent worth, familiarity, and sentimentality. In this situation, local autonomy is actively promoted for the sake of efficient resource use. Toba Caldera Geopark must be socialized to the local population in order to firmly establish their position as the park's most important stakeholder. Therefore, the author suggested further study on ways to enhance continuity in this area.

**Geosites for geoheritage, geotourism, and geoconservation in songkhla province, southern Thailand**

Several prospective geoheritage, geotourism, and geoconservation hotspots in Songkhla Province (southern Thailand) have been the focus of a comprehensive research. This has included inventorying, characterizing, classifying, assessing, and evaluating these locations. Songkhla Lagoon/Lake, Samila Beach, Tone Nga Chang (Elephant's Tusk) Waterfall, Khao Rup Chang (Dragon and Elephant) Cave, and Khao Daeng Hot Spring are among the geosites included in this investigation. The majority of these locations, with the exception of a hot spring’s location, have been found to include unusual and fascinating landforms (geomorphological sites) (hydrogeological site). Features ranging in size from micro to macro may be found at the geosites. Geoheritage values (scientific & educational, artistic, recreational, cultural, etc.) at the state/provincial to national levels have been evaluated qualitatively and quantitatively. All of these locations need geoconservation work for many reasons, including geotourism in the province and the area, educational opportunities, and scientific exploration.

*Table 2-1 Geosite locations*

| No. | Geosite | Location | Main geological feature | Other features |
|---|---|---|---|---|
| 1 | Songkhla Lagoon/ Lake | Amphoe or districts: Ranot, Krasae Sin, Sathing Pra, Singhanakhon, Khuan Niang, Mueang Songkhla, Hatyai (7°08' N–7°48' N; 100°08' E–100°35' E) | Great lagoon (lake) with Quaternary deposits and some rock outcrops | Several islands within the lagoon, and a great spit |
| 2 | Samila Beach | Amphoe Mueang Songkhla (7°13'40.00" N; 100°34'57.83" E) | Fine white sandy beach with a few rock outcrops in the area | Some nearby hilly areas and two islands off the shore of the beach (Ko Meaow and Ko Noo islands) |
| 3 | Tone Nga Chang Waterfall | Amphoe Hatyai (6°57'23.34" N; 100°14'07.81" E) | Seven-tier waterfall | Rock outcrops (granite, hornfels) |
| 4 | Khao Rup Chang Cave | Amphoe Sadao (6°42'55.80" N; 100°16'35.47" E) | Cave landforms | Buddhist temple |
| 5 | Khao Daeng Hot Spring | Amphoe Saba Yoi (6°28'56.05" N; 100°51'47.62" E) | Hot spring in a low-lying area | - |

## 2.3 Geotourism development in the Azores archipelago (Portugal) as an environmental awareness tool

Natural beauty and a stunning sea backdrop are what set the Azores archipelago apart. There are many craters, lakes, fumaroles, hot springs, volcanic caves, marine fossil deposits, and thermal water springs across the region, all of which may be attributed to the area's volcanic origin and contribute to the region's rich and extraordinary geodiversity. The Azores Geopark's recent inclusion in the European and Global Geopark Networks is a nod to the significance of the island group's geological history. For these reasons, as well as the necessity to establish alternative types of tourism that contribute to the socioeconomic development in rural regions, geotourism has emerged as a vital instrument for promoting and preserving the Azores' geological heritage in recent years. It's no secret that geotourism has become a powerful tool for raising environmental consciousness among both domestic and international visitors.

*Figure 2-4 Azores archipelago*
*Source: -http://cdn.cnn.com/cnnnext/dam/assets/220504113707-01-vila-franca-do-campo-azores-portugal.jpg*

**Geotouristic potential**

The great geodiversity of the archipelago's natural settings is linked to its rich biodiversity and undeniable beauty, both of which draw in locals and tourists alike and serve as the impetus for the growth of geotourism there.


*Figure 2-5 Geosites of azores island*

- Lima (2007) states that crucial actions were done to start the growth of geotourism in the archipelago: Furna do Enxofre on Graciosa Island in 1939, the Algar do Carvo on Terceira Island in 1968, and greater recently,Furna da gua and Gruta do Natal, additionally on Terceira Island, Gruta do Carvo on So Miguel Island, and Gruta das Torres on Pico Island, displaying a number of the volcano speleological history of the archipelago;
- Classification of the primary geosites as herbal reserves within the 1970s (Pico Mountain and Faial Caldera), and of others as Natural Monuments within the 1990s (including, for example, Pedreira do Campo on Santa Maria Island, Gruta do Carvo and Pico das Camarinhas e Ponta da Ferraria on So Miguel Island, and Gruta das Torres on Pico Island);
- The Speleological Museum of the Volcano, was opened to the public in the 1980s and is located on the island of Terceira and is the property of the Speleological Association Os Montanheiros;

- For a long time, tourists have utilized the old pathways as walking trails and trekking routes, with the volcanism, the presence of water (lagoons, streams, waterfalls), the flora and fauna, and the cultural legacy being the primary points of attraction along the way.
- Spa (termas in Portuguese) with treatments, either by consumption or baths, were built in various locations around the archipelago where thermal, mineral, and carbonated waters with acknowledged medicinal characteristics are found. Important spas include the 17th-century Termas das Furnas and the mid-20th-century Termas da Ferraria, both on So Miguel; the 19th-century Termas do Carapacho on Graciosa; and the mid-20th-century Termas do Varadouro on Faial.
- The natural situations create some of bathing regions in unique locations of geological interest, consisting of volcanic craters (for example, Vila Franca islet, close to So Miguel Island), hydrothermal zones (for example, Ribeira Quente and Ferraria in So Miguel Island, or Carapacho in Graciosa Island), herbal swimming swimming pools at the volcanic rocks, and black sand beaches.

*Figure 2-6 Azorean geolandscapes: (a) - Capelinhos volcano (Faial island), (b) - Caldeira (Graciosa island), (c) - Rocha dos Bordões (Flores island), (d) - Caldeirão (Corvo Island)*

**Challenges of the Azorean geotourism: -**

The volcanic terrain is the primary symbol of the archipelago and the driving force behind the growth of geotourism, and it presents a wealth of opportunities for sustainable usage, with a broad variety of activities that may be done and related with a wide variety of

touristic goods. Managing tourist activities while also enforcing geoconservation rules is the biggest obstacle facing this kind of tourism (Lima, et al., 2009).

To safeguard and promote the geological legacy of the Azores is especially crucial in view of the stress that tourism's ever-increasing popularity has been putting on specific geosites, as well as the necessity to establish new kinds of tourism that contribute to rural regions' socioeconomic growth (Viveiros, et al., 2012).

The dissemination of knowledge about geosites, geolandscapes, and geological manifestations via a variety of informational and explanatory resources (Figure) is another significant undertaking, as it provides a means by which to learn about and appreciate the unique features of the Azorean geosites, as well as to take note of the geological phenomena that gave rise to them.

## 2.4 CASE STUDY: - POTENTIAL GEOTOURISTS: AN AUSTRALIAN CASE STUDY: - PURNULULU NATIONAL PARK

Western Australia is domestic to the huge 239,723-hectare Purnululu National Park. The Bungle Bungle Range, that's observed there, is made of Devonian-technology quartz sandstone and become eroded into a sequence of beehive-formed towers or cones over a length of 20 million years. The towers and cones have steeply sloping surfaces which might be marked with the aid of using everyday horizontal bands of dark-gray cyanobacterial crust (single-celled photosynthetic organisms). Cone karsts like those are uncommon and excellent consequences of numerous unique however interrelated geological, biological, erosive, and climatic processes.

*Figure 2-7 Purnululu National Park*

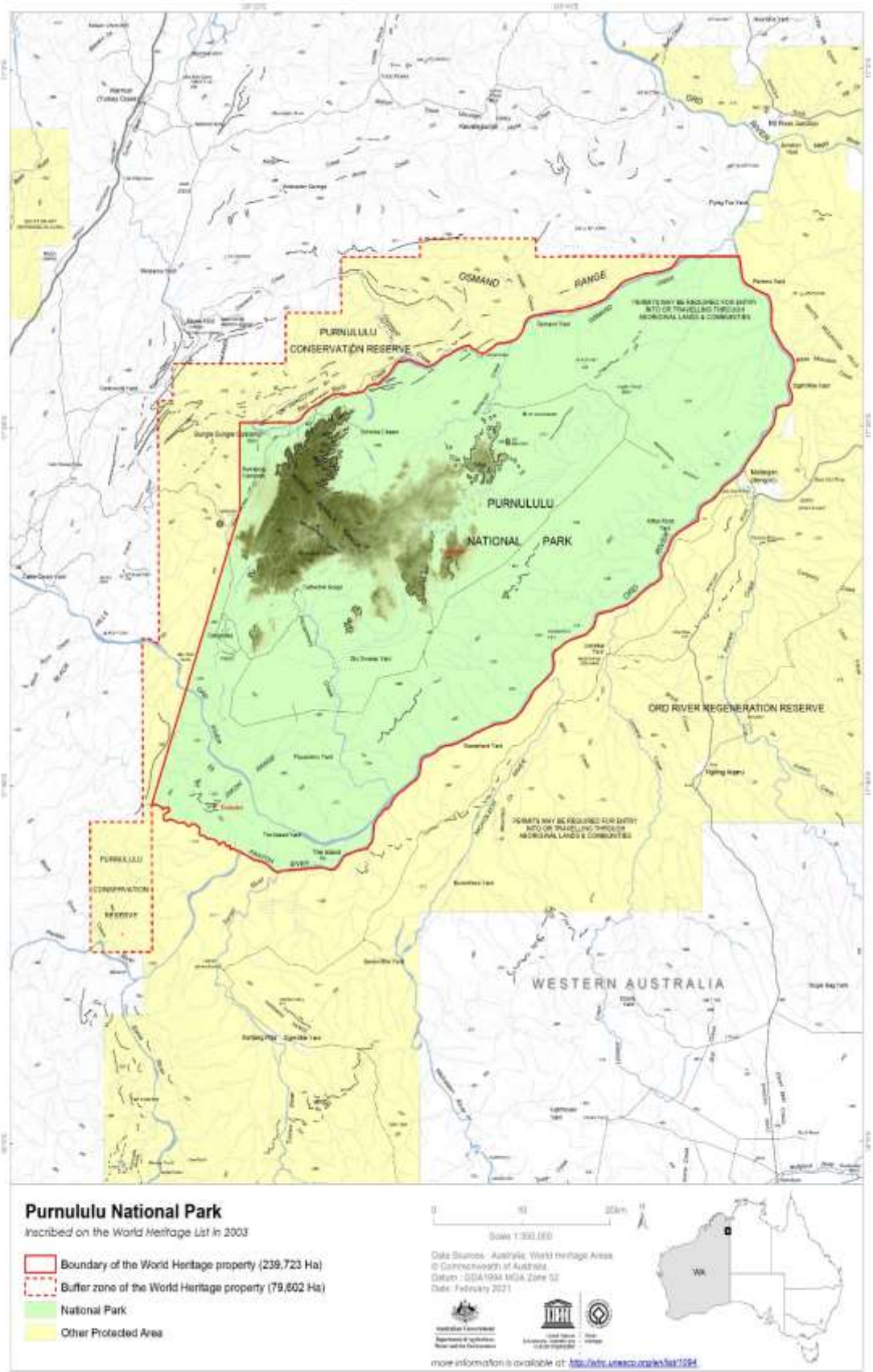



*Figure 2-8 Purnululu National Park*

Experiencing the Earth's geological traits in a way that promotes environmental and cultural appreciation, conservation, and know-how is on the coronary heart of geotourism, a type of sustainable travel (Dowling & Newsome, 2006). Locals and site visitors alike have to be capable of freely discover and admire the neighborhood geological landscapes as a part of geotourism. In doing so, it creates a shared revel in among the neighborhood landscape, the neighborhood population, and its tourists, all of whom have various and wonderful pastimes withinside the earth's geological features

(Dowling & Newsome, 2008).

The emergence of geoparks is parallel to the boom of the geotourism industry. A geopark is a place that has a good-sized geological history, is well-managed, and has a long-time period plan for financial boom and prosperity

(UNESCO, 2006).

Geoparks have been formed to promote better job prospects for the people who live there and encourage economic advantages for them, mainly via the growth of sustainable tourism. Protection, education, and sustainable development are all intertwined with the idea of preserving these earth heritage places. Though more is being learned about geotourism and geoparks on the supply side, (Dowling, 2008), there is still a significant knowledge gap when it comes to the demand side (Robinson & Roots, 2008). The study's primary objective was to ascertain the level of interest Australian geoscientists had in going on geotours, both domestic and abroad.

### 2.4.1 The Study

This study's data was collected by a postal survey sent to members of the Geological Society of Australia (GSA) in late 2008. Edith Cowan University and Leisure Solutions created the questionnaire for the self-reported survey. There were three parts to the survey: the first asked for basic demographic information, the second probed respondents' broader motivations for travelling, and the third gauged respondents' geotourism enthusiasm. In order to provide a more complete picture, the questionnaire used both closed- and open-ended questions.

### 2.4.2 Findings

There were 154 people who filled out the survey, which is equivalent to around 7% of the total GSA membership. Among the respondents, 84% were men and 16% were women; the highest age group was 55-64. Individuals in the group ranged from those with a bachelor's degree to those with master's or doctoral degrees. Only half of those who answered the survey were actively seeking employment, with the other half either semi- or fully-retired. Nearly a third (30%) of respondents are employed by consulting firms; 25% are government workers; 24% are involved by the 3-D printing sector; and the remaining 7% are educators. Most of the people in the sample had weekly incomes of more than AUD$2000, indicating that they are well-off financially (45 percent). In terms of life stage, most replies are either "empty nest - still working" or "empty nest - retired" (57 percent).

*Table 2-1 Important travel purposes*

| | N | Minimum | Maximum | Mean | Std. Deviation |
|---|---|---|---|---|---|
| Increasing knowledge of geological sites and landforms | 158 | 1.00 | 5.00 | 4.1582 | .88528 |
| To satisfy my curiosity | 157 | 1.00 | 5.00 | 4.1401 | .85828 |
| To have a memorable experience | 156 | 1.00 | 5.00 | 4.1026 | .91707 |
| To obtain intellectual stimulation | 157 | 1.00 | 5.00 | 4.0955 | .89000 |
| Visiting destinations off ering a unique bundle of features and attractions (i.e., ecology, geology | 158 | 1.00 | 5.00 | 4.0316 | .98019 |

An important result for the growth of geotourism locations in Australia is that respondents valued learning more about geological features and landforms above anything else. Respondents tend to be older, well-educated, and somewhat well-established, suggesting that they are more interested in finding possibilities to be inspired and fulfill their curiosity via geotourism than in just meeting new people. Through the use of the free-

form questions, respondents were able to provide a variety of additional recommendations. They discussed many aspects of their travels, including where they slept, how easy it was to get to the attractions, what they learned, what they saw, and what amenities were available.

All suggestions are welcome as we work to expand geotourism in Australia. Because various demographic groups recognized different kinds of accommodation needs, it is important to take into account the detailed information supplied on the design and development of accommodations. Younger individuals, for example, have said they do not mind staying in more basic lodgings like tents or huts, while those who are older or who have families have said they are pickier about where they stay and the quality of their accommodations.

An important subset of survey takers also revealed that they would rather go alone than join a tour group to geotourism destinations. Respondents older than 55 years old were most concerned about the accessibility of tourist destinations (59%). Wheelchair access for the handicapped and easy access to medical care are only two examples of what kind of amenities may need to be given at the locations. Tour guides and information on the area's geological landmarks should be available onsite, as should safe road access (to reduce the likelihood of damage to visitors' cars).

One major discovery was that respondents would rather travel alone in Australia or abroad than take part in a tour group. As shown by the findings, over half of Australians (46%) and people from other countries (45%) are not inclined to go on a trip to a geotourism location. In contrast, respondents indicated a preference for independent travel to geotourism locations either in Australia (77%,) or abroad (53%,).

Results show that GSA members are well-traveled and competent enough to go to geotourism locations individually, but that geotourism destinations are not yet fully established for organized tour groups.

### 2.4.3 Conclusions

This study is a controlled trial exploring the demand for geotourism goods amongst prospective Australian Geotourists; current research on geotourism and Geotourists is in its infancy. The results show that many individuals are keen to participate in geotourism

activities such as travelling to new locations, learning about the area's history and geology, engaging in cultural exchange, taking part in adventurous pursuits, and splurging on basic lodgings. Respondents would rather go to Australian and international geosites individually than join organized tours, either because they do not exist at the current time or, if they do, do not meet the requirements and wishes of the respondent. On the basis of the results, some suggestions are offered for the improvement of geological tourism in Australia.

They include:

- The "retired/empty broody hen" demographic was an important target for the geotourism industry's future growth. Those persons are in a position to devote greater resources to geological expeditions. Because of their heightened enthusiasm for geotourism, they would be more open to exploring new destinations.
- The vast majority of those who took the survey would prefer to travel alone rather than as part of a tour group. The reason for this is because individuals often seek out experiences outside from groups.
- While the study focused on those working in or interested in geology, it is recommended that future studies include those working in fields other than geology, such as education, medicine, engineering, etc.
- The five A's (Access, Accommodations, Activities, Attractions, Amenities) were considered when planning a destination, with special attention paid to the needs of visitors with disabilities.
- The need of emphasizing safe procedures and taking into account quick access to medical facilities, particularly for the elderly, is heightened when geotourism locations are located in somewhat distant areas.
- Travelers place a premium on safety; thus, Geotours' modes of transportation must adhere to strict standards in this area.
- Tourists should be supplied with extensive information on the place in advance of their visit through websites, pamphlets, or information at visitor centers.
- Accurate, high-quality information is valued at many different levels, including on road signs, display boards, maps, and by tour guides.

- While encouraging growth in the geotourism industry is desirable, it must not come at the price of protecting natural resources. Therefore, it is important to urge builders and land managers to strike a balance between protecting and expanding geotourism destinations.


*Figure 2-9 Park Website - Purnululu World Heritage Region*

*Figure 2-10 A Key Australian Geosite - the Bungle Bungles, Purnululu World Heritage Region, north Western Australia and Information Panel - Purnululu World Heritage Region*

*Figure 2-11 Tented Accommodation - Purnululu World Heritage Region, Geotour Guide - Purnululu World Heritage Region*


*Figure 2-12Reporting Trend*

## 2.5 Case study: - Geotourism Potential and Challenges of the Coastal Region Around Santa Marta (Colombia): a Novel Strategy for Socioeconomic Development.

By promoting geoeducation and geotourism sports that make contributions to its geoconservation, green control that outlines tips that sell the improvement of appropriate visitor infrastructure, facilities of clinical interpretation, and disseminating applicable information, the panorama price of the coastal areas of the Colombian Caribbean may be advanced and protected, thereby boosting the location's monetary and cultural standing. This is mainly actual of the coastal location round Santa Marta.

### 2.5.1 Geological setting

The research area (Figure 3.16) is situated in the Caribbean region of Colombia and comprises a strip of land of 25 kilometers in length and 2 kilometers in width that stretches down the coast from Taganga Bay in the north to the Simón Bolvar International Airport in the south. It exposes characteristics of the imposing coastal landscape that are geologically significant (with several evidences of the action of erosion and deposition processes that have contributed to the development of a typical coastal geomorphology along the shoreline), and constitutes an excellent scenario for the understanding of the subduction processes along the northwestern edge of South America, that shows a very complex tectonic configuration due to the interaction between the Caribbean oceanic and South American continental plates

(Cortés, Angelier, and Colletta 2005).

Sierra Nevada, Seville, and Santa Marta are the three ne-sw trending belts that make up this ancient massif, with the oldest and youngest rocks defining a pattern from east to west. These three belts have distinct geological histories (Tschanz et al. 1969) and are tectonically separated by the Guachaca fault system (Toussaint 1996) and by the Se (Tschanz et al. 1974). The Sierra Nevada belt, located in the southeast, is the earliest geotectonic province and is made up of granulite to upper amphibolite facies metamorphic rocks that were formed during the Grenvillian orogenesis (Ramos 2010; Cordanietal. 2016). In the southeast, Carboniferous and Late Mesozoic sedimentary strata sit unconformably on the crystalline basement and are cut by intrusive rocks and covered by extrusive rocks of Jurassic age (Tschanz et al. 1974). Paleozoic schists, amphibolites, gneisses, migmatites, and permian mylonitized granitoids make up the intermediate Seville belt (Tschanz et al. 1974; Meja et al. Subbelts of Cretaceous imbricated metamorphosed volcanoclastic rocks that reached the greenschists to amphibolite's facies and Mesozoic amphibolites, greenschists, and phyllites are separated by the Lower to Middle Cenozoic Santa Marta Batholith in the northwest of the youngest geotectonic province (Meja et al., 2008). Previous investigations (Tschanz et al. 1969, 1974, Meja et al. 2008, Idárraga-Garca and Romero 2010, Montes et al. 2010, and Cordani et al. 2016), among others, have shown that the coastal area of interest in this study, which is a component of the Santa Marta belt, has a complicated geological history. The Santa Marta

Fault System (sfsm) is the most major tectonic accident in the research region with plainly apparent geomorphologic evidences.

Geodiversity Geoheritage site identification in the coastal region around Santa Marta and its geodiversity are very important for the selection of Colombian heritage sites. Geosites are part of the geological heritage of a region, since they constantly reveal characteristics of international importance to elucidate their geological history (Koh et al. 2014).

The proposed geosites have added value thanks to their attractive landscape and due to their uniqueness and beauty those can be used as geotourism resources. Photographs of geosites are presented in a didactic and instructive style, drawing attention to the most significant geological agents at work in the contemporary landscape's shaping.

They make it easier to appreciate the intriguing geomorphology of the shore by exposing the crystalline basement rocks that contain crucial clues about the geological history. On the other hand, they contain a very important scientific, didactic and cultural value. They would be very useful to constrain the early evolution of the Earth crust, magmatic processes, tectonics and surface forces that contribute to such cortical evolution, the relationship between metamorphism, magmatism, and deformation, as well as the tectonothermal history that has occurred in this orogenic belt, the partial fusion in the tectonic development of orogenic belts, including magmatic arches, exhumation processes, and tectonic denudation that have favored the extensive retrograde metamorphism that has affected the metamorphic rocks in its more recent history, the hydrothermal history of paleo fluids that have circulated through the Earth crust, the mineral deposits associated to magmatism and metamorphism, the history of fluvial processes that have played an important role in modeling of the coastal landscape.

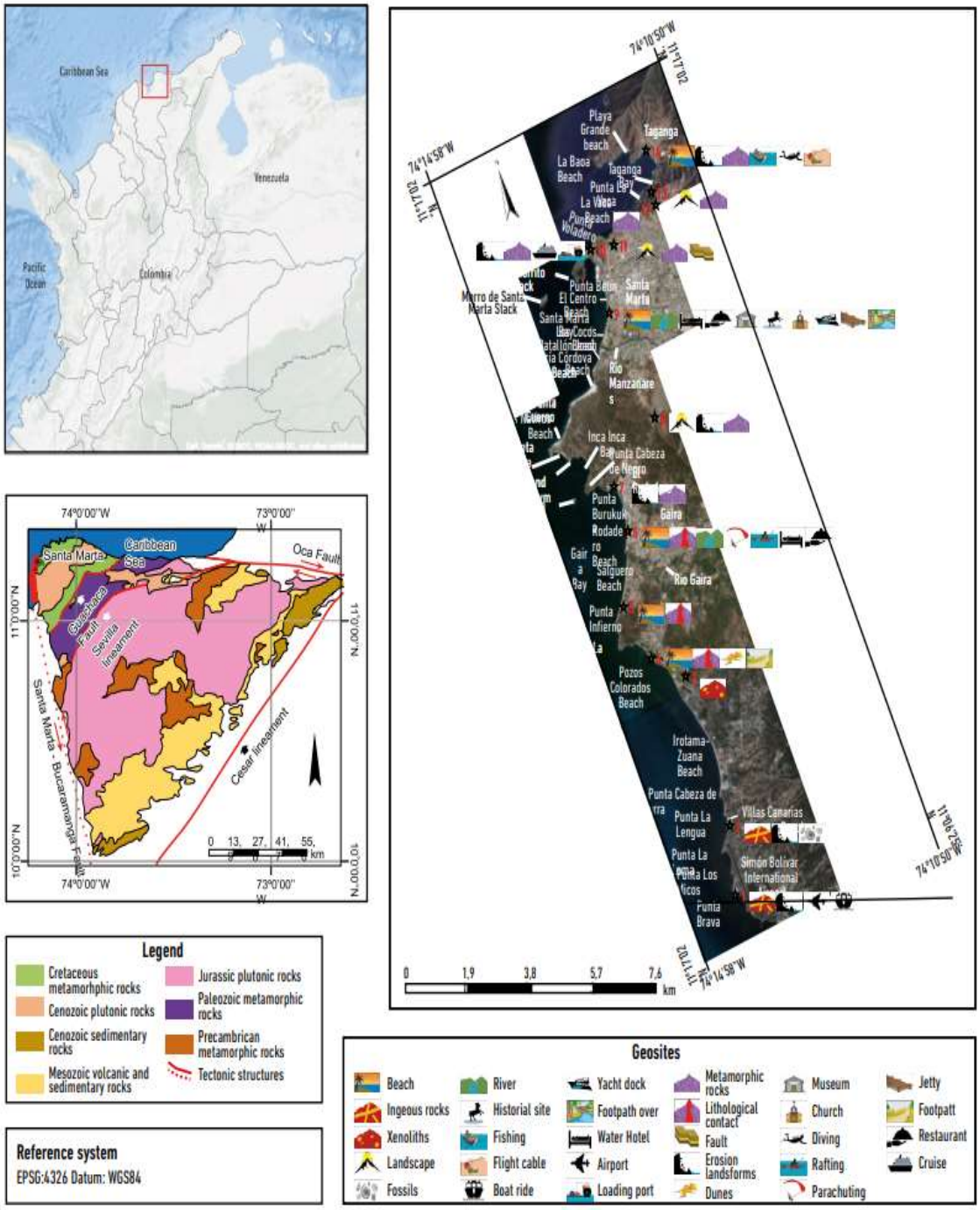



*Figure 2-13 Left, geographical location of the study area (red color) in the snsm. Right, mosaic of satellite images showing the northwestern foothills of the snsm, 2018as well as the distribution and characteristic of geo-heritage sites. Source: Prepared by Ríos-Reyes, Castellanos-Alarcón and Manco-Jaraba 2018. Adapted and modified after Tschanz et al. 1974, adapted and modified after Google Earth 2018.*

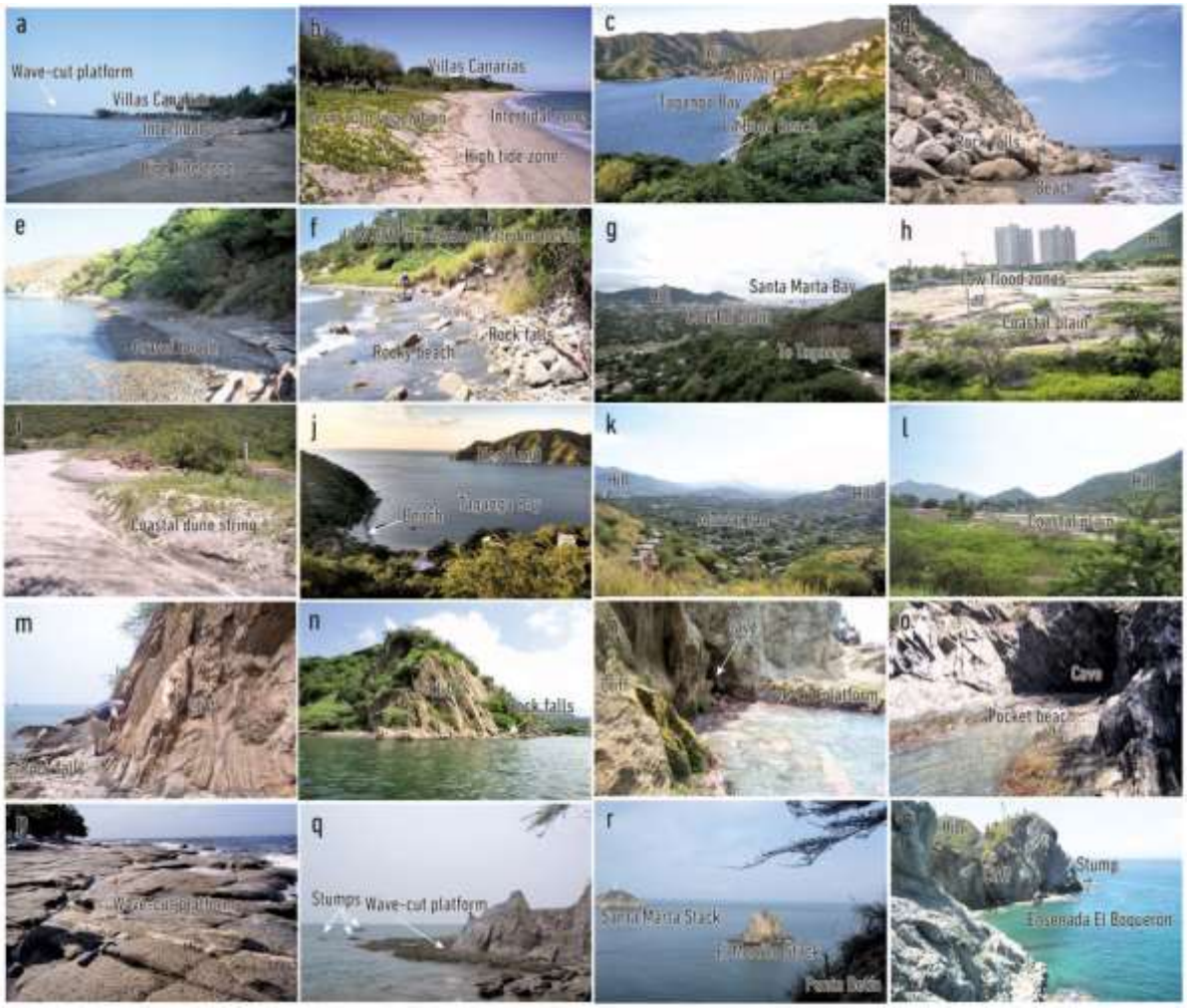



*Figure 2-14 Coastal landsforms of the coastal region around Santa Marta Massif (Colombia).* Photography by Ríos-Reyes, Castellanos-Alarcón and Manco-Jaraba, February de 2018

Geotourism constitutes an experiential strategy that allows you to enjoy and learn about the natural and cultural heritage of the region, stimulating favorable attitudes for its conservation. However, it is very important to promote the development of responsible tourism with nature and respecting international standards of sustainability. All throughout the world, people are working on new geotourism projects with the goal of using tourism as a tool for sustainable development. Several of the most popular tourist destinations along Colombia's crucial coast have a strong connection with geotourism (Figure). No one can deny that this area's geological history has scientific and scenic significance, making it a potentially lucrative tourism destination.

*Figure 2-15 Tourism attractions along the coastal region around Santa Marta Massif (Colombia). Photography by Ríos-Reyes, Castellanos-Alarcón and Manco-Jaraba, February 2018.*

*Figure 2-16 Outdoor adventure, sports and health activities of the coastal region around Santa Marta Massif (Colombia). Photography by Ríos-Reyes, Castellanos-Alarcón and Manco-Jaraba, February 2018.*


*Figure 2-17 Geotourism and different types of tourism alternatives for the coastal region around Santa Marta Massif (Colombia). Photography by Ríos-Reyes, Castellanos-Alarcón and Manco-Jaraba, February 2018.*

### 2.5.2 Conclusion

Due to its scientific, educational, and aesthetic importance, the geological legacy has the potential to become one of the region's primary tourist draws, introducing it to new audiences and encouraging conservation efforts in the process. However, those who can contribute to the preservation of this heritage wealth are the local communities from their sustainable use to obtain economic benefits. In this way, the geoconservation of this region is closely related to the several benefits that can find local communities. In addition, the geological legacy of this region must be widely shared, taught, and valued as an integral part of the natural and cultural heritage of the area in order to be managed by a community that is conscientious and considerate of its natural resources and works to preserve and conserve them. Therefore, it is necessary to establish strategic alliances between local communities and public and private institutions of preschool, basic, middle, and high education, tourism businesses, restaurants and housing, governmental and non-governmental organizations, etc., along with the construction of plans focused on the preservation and management of its patrimonial wealth. The natural and cultural heritage proper of this territory must be maintained as sites of interest that can be transferred to

future generations. In this way, the development of geoeducation activities is necessary in response to the need for the use of natural and cultural resources to be identified and classified by geoscience professionals, that is important for socioeconomic development, where geoeducation plays a fundamental role. Geoeducation can be promoted, allowing the development of activities for the transfer of geoscientific knowledge to the tourists through geosites, museums, information centers, guided tours, excursions, maps, educational materials, exhibitions, workshops, etc. Geotourism has emerged as a strategy for sustainable development of a region based on the dissemination of its geological heritage from its use as a resource thanks to its scientific, educational and aesthetic interest, generating several social and economic benefits, including revenue creation, employment opportunities for local communities, social inclusion, and infrastructure development.

It promotes environmental protection, cultural enrichment, and economic stimulation in the tourist industry, therefore integrating the ideals of sustainability, responsibility, and excellence. In addition to creating a name for itself on a global scale, geotourism has the potential to boost tourism numbers, enhance local communities' quality of life, create substantial employment opportunities for underserved groups, foster innovation in the fields of economics, business, culture, and tourism, and promote geoconservation and environmentally responsible management. However, in order to create a development strategy that encourages geoconservation of geosites, it is required to form strategic partnerships with educational institutions, tour operators, hotels and restaurants, non-governmental organisations, producers of unique items, and so on.

### 2.6 CASE STUDY: - A Progress Evaluation of National Geographic's Geotourism Program (Susannah Brouwe)

The Geotourism Program is a sustainable tourism project created by National Geographic to mitigate the negative effects of mass tourism by providing a platform for local stakeholders to build their own brands and promote regional and cultural pride. Although past research on National Geographic's Geotourism Program has explored the program's potential and accomplishments from a select few angles, the Geotourism charter requires that programme assessment take into account the interests of all stakeholders. Several studies (Boley 2009, Leonard 2011).

Mount Sierra Yosemite National Park is a focal point of the Sierra Nevada (SN) Geotourism Project, which straddles the border between California and Nevada from just north of Medoc National Forest to just south of Bakersfield, California. In 2009, Sierra Business Council president Steve Frisch reached out to National Geographic Society after learning about successful Map Guide initiatives elsewhere, such as at Crown of the Continent. He took on the undertaking and hired Nicole DeJonghe to lead it because he saw the Sierra Nevada as a unique tourist destination for its cultural significance and natural beauty. Here, DeJonghe administers the COTC project in addition to four other unrelated initiatives, while a full-time Geotourism project manager oversees the COTC project (DeJonghe 2011). This project was carried out in four stages due to the enormous scope of the Sierra Nevada area. Beginning with the Yosemite Gateways, the Tahoe Emigrant, Southern Sierra, and Sierra Cascade regions have all formed their own Geotourism Alliances (Kamansky et al 2011).

The whole process, beginning with nominations in August 2009 and ending with the launch of the website in the middle of 2011, took place over the course of three years. As each region completed its own set of initiatives, the corresponding council was disbanded, and its members who were interested and able joined the Sierra Nevada-wide Geocouncil.

(DeJonghe 2011).

The US Forest Service, the Federal Highways Administration's Scenic Byways Grant, the Morgan Family Foundation, and other private donors all chip in to make the Sierra Nevada project a reality (Sierra Nevada Geotourism Website 2012). Currently the Sierra Nevada on-line MapGuide has roughly 1,237 active sites and is continually increasing. During very active periods of outreach, we have had as many as twenty weekly nominations

(DeJonghe 2011).

By encouraging tourists to remain in and see the neighboring areas, SN hopes to reduce the strain on popular tourist destinations like Yosemite National Park and Lake Tahoe. Additionally, the Geocouncil intends to implement cutting-edge technology, such as a Geotourism Smartphone App (Kamansky et al 2011)


*Figure 2-18 Sierra Nevada the Sierra Nevada*

Methods Those in locations shown on the COTC and SN Web Maps were encouraged to take part in the 2011 Participant Assessment Survey so that they could contribute to the body of knowledge on the program's effects. To further explore the findings of the survey and its effect, in-depth interviews were performed with six locations, three in each destination. Previous assessment methodologies and data acquired for both tourist and Geocouncil views of effect were included in the literature study to offer context for the Geotourism project. It helped shape the 2011 Participant Assessment survey instrument by identifying critical variables for measuring social, environmental, and economic outcomes.

**Survey Results**

Mount Sierra With 213 answers collected by the cutoff date of December 20th, 2011, we have the findings of the 2011 Participant Assessment Survey. Results were only computed for those who answered 5 or more of the 16 survey questions (n = 213). The survey invitation was extended to 1151 locations, and little over 20.5% replied (n = 236). For specific responses to each 2011 survey question, please refer to Appendix E. Site

legality and industry classification were gleaned from responses to questions meant to collect demographic and contextual data. Accommodations are offered by the majority of responders (83%). Also, 45 percent of all businesses are nonprofits.

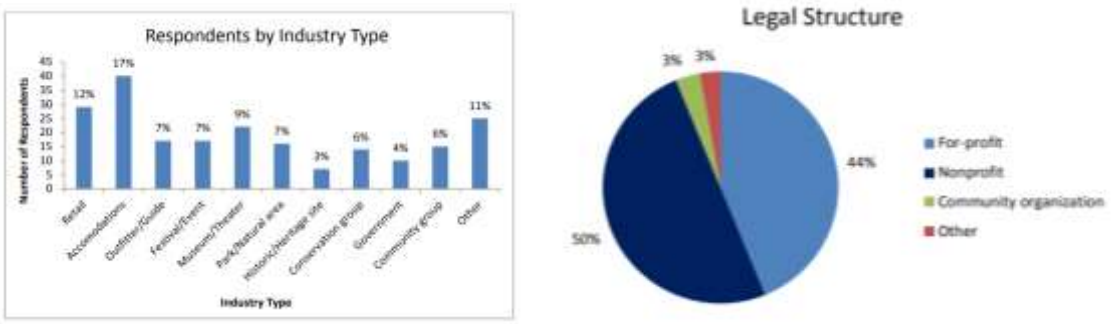



*Figure 2-19 Sierra Nevada sites by legal structure*

### 2.6.1 Site Study

The first interview was with the proprietor of a vacation rental complex in the Sierra Nevada area of four small historic residences. According to the respondent, the only other similar businesses in the area have 20 rooms or more, making theirs the only one of its sorts in the region. The second person we spoke to is the head of a local history museum that utilizes artifacts to teach people about the area's past. The next person we spoke to was the proprietor of a holiday home that had been furnished and decorated by a local artist. At the outset of the project, all three respondents had great hopes that the National Geographic name would bring in more visitors and boost their visibility. Given her limited advertising budget, one respondent to our survey of 49 was very enthusiastic about the service's possibilities. Museum and historical vacation rental owners said they decided to participate in Geotourism despite having lower expectations than originally anticipated for the project's marketing potential. None of the places have ever had a tourist ask about Geotourism, and all of them blame slow Internet from their rural locations for hindering the effectiveness of the Web Map.

### 2.6.2 Social Impact

The interviewees in the Sierra Nevada area cared most about the positive social effects of Geotourism. One property manager for a vacation rental company said that her willingness to network with other local groups had improved as a result of Geotourism.

The motivation to suggest a picturesque drive for the Map Guide and cooperate on its nomination came from the owner's desire to share the experience of driving with other users. The proprietor has also broadened her cultural awareness by paying more attention to the problems faced by other local businesses. The second vacation rental owner agreed that Geotourism has been beneficial to her personally, even if she has not seen any monetary advantages.

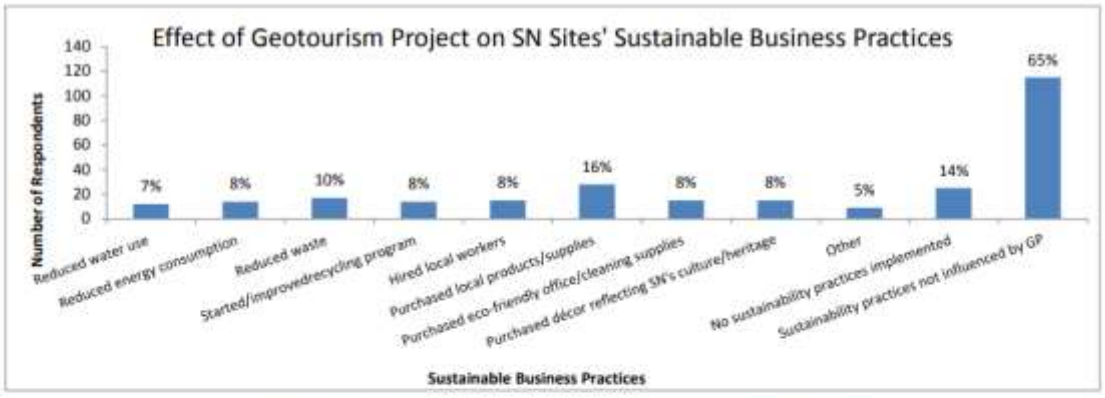



Figure 5: Effect of Geotourism Project on sustainable business practices at Sierra Nevada sites


Figure 6: Effect of Geotourism Project on Sierra Nevada sites' participation in stewardship activities

*Figure 2-20 Effect of Geotourism project at Sierra Nevada sites*

### 2.6.3 Environmental Impact

Another set of inquiries centered on the Geotourism Project's potential influence on the environment by way of the sites' participation in three types of sustainability activities: encouraging environmentally conscious travel, enriching visitors' comprehension of the Sierra Nevada, and facilitating more opportunities for visitors to engage in stewardship and volunteerism in the region. Sixty-five percent of those surveyed said they already had efforts in place to increase their company's sustainability, and they didn't start doing so

because of the Geotourism Project. Those who said they had changed their behavior as a result of the Geotourism Project were most likely to report buying local items and supplies (16%) and minimizing their trash (10%). Only 14% of those polled said they employ any kind of sustainable business methods. Respondents were also questioned about their engagement in environmental stewardship efforts in the Sierra Nevada area, such as monetary contributions and board memberships. Most respondents (56%) said they are already involved in stewardship initiatives, similar to the adoption of sustainable business practices, and these efforts are not due to the Geotourism Project. For the 26% of survey takers who did take some type of environmental stewardship action as a result of the Geotourism Project, the two most popular actions were volunteer work and collaboration with environmental groups. Two-fourths of those polled said they never or seldom engage in any kind of stewardship activity.

### 2.6.4 Economic Impact

The last set of questions inquired into how the Geotourism Project benefited the local economy in Sierra Nevada by asking about tourist habits, budgetary monitoring, and strategic planning. At first, survey takers used a Likert scale from "very much" to "not at all" to determine whether or not the Geotourism Project has improved a number of visitor dynamics. Responses were ranked on a scale from "1" for very much to "3" for not at all. I didn't know was an option, too. While 45% of respondents saw an improvement in visitor dynamics as a consequence of the Geotourism Project, 55% of those who were aware of Geotourism's impact on these elements did not. The vast majority of those that did so saw an increase in traffic, especially from word-of-mouth and returning customers. The majority of respondents (56% overall) were unsure as to whether or not the Geotourism Project had an effect on tourist behavior. Next, we inquired how the Geotourism Project affected the respondents' bottom lines. In fact, just 2% of those who took the study have really linked any financial gains to the Geotourism Project.

### 2.6.5 Conclusion

The goal of geotourism is to encourage worldwide preservation and responsibility. It's an expanding initiative that has the ability to aid several communities in their fight to preserve and improve local culture in the face of ill-considered development and

excessive tourists. This paper elucidates the need of prioritizing management goals for Geotourism destinations in order to overcome obstacles associated with low project awareness among participating sites and to make the most of the project's strengths and potential. The community will reap social, environmental, and economic advantages from well-informed management, and the project's legitimacy will be strengthened, making it easier to get finance. If these suggestions are put into action, maybe the Sierra Nevada and Crown of the Continent areas will see a rise in beneficial benefits.

## 2.7 Case Study: - GEODIVERSITY: A NEW QUANTITATIVE INDEX FOR NATURAL PROTECTED AREAS ENHANCEMENT (Laura MELELLI)

### Introduction

Italy relies heavily on its natural landscapes, which are very varied, as its primary renewable resource. The dynamic development of natural systems is triggered by the environment's complex geological and geomorphological context, as well as the fluctuation of topographic and climatic aspects. They are crucial to maintaining the ecology and adding to Italy's special character. Both biotic and abiotic factors contribute to the richness of a natural environment. Biotic variety, sometimes known as simply "biodiversity," is often used as a synonym for natural variation; nonetheless, the rapid pace of its formation and evolution serves as a sobering reminder of how fragile this feature really is. Since the United Nations Conference on Environment and Development (UNCED), often known as "the Rio Summit of 1992," the scientific community has paid a lot of attention to preserving and improving biodiversity (Pimm et al., 1995; Myers et al., 2000; Petterson et al., 2013).

The geodiversity values were divided into four categories (Gray, 2004). The first is the concept of "intrinsic value," which is defined as "the ethical belief that some things (in this case geodiversity) are of values simply for what they are" as opposed to "the ethical belief that some things are of values simply for what they can be used for by humans (utilitarian value) (Gray, 2004).The second changed into the financial price, as geodiversity may be an financial resource, on occasion of high significance for the regions wherein it's miles recognized, and the 1/3 changed into the cultural and aesthetic price assigned via way of means of a network for which a selected web website online performs an vital function in cultural and historic heritage. The very last one changed into the

importance of geodiversity as a topic for clinical study, education, and dissemination. An alternative definition of geodiversity value is as follows (Panizza & Piacente, 2008):

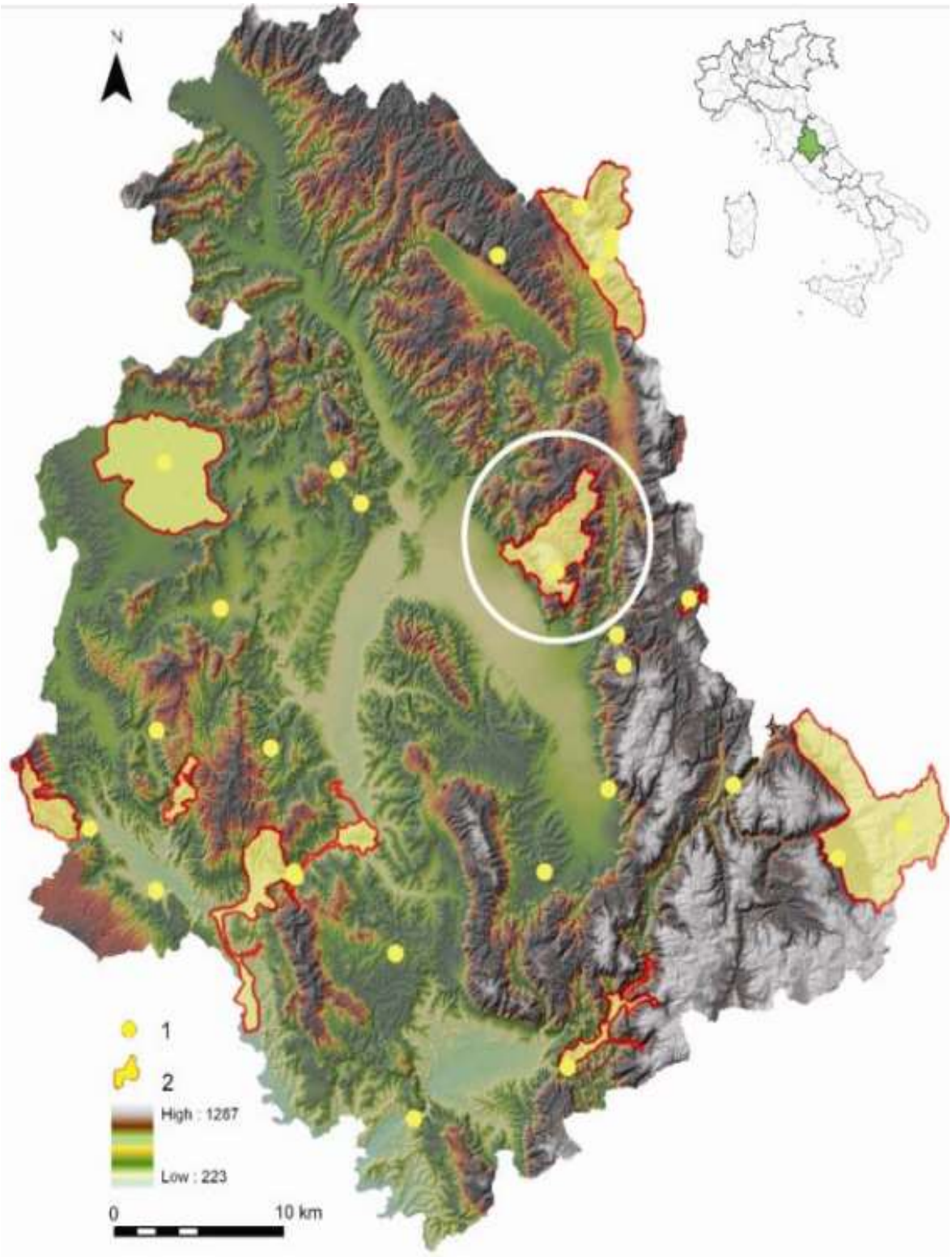



*Figure 2-21Location map of the Umbria Region (central Italy). The white circle marks the Subasio Mt. Regional Park. (1) Geosites, (2) Regional Parks*

### 2.7.1 THE TEST AREA: SUBASIO REGIONAL PARK (CENTRAL ITALY)

Umbria (central Italy) is home to twenty-seven geosites that have been identified and examined, including the Subasio Mountain regional park. There are eight parks in the area, seven of them regional and one national (Figure 1). The southern boundary of the 7.200-hectare Subasio Mt. Park is formed by the mountain of the same name (1.290m a.s.l.). The boundary is marked by a moderate slope dotted with terrigenous outcrops, and it runs parallel to the Tescio River in the west. There are three primary litotype complexes in this region, with a variety of Holocene deposits (alluvium, colluvium, debris, and landslide bodies) resting on top (Figure 2, Melelli et al., 2012).

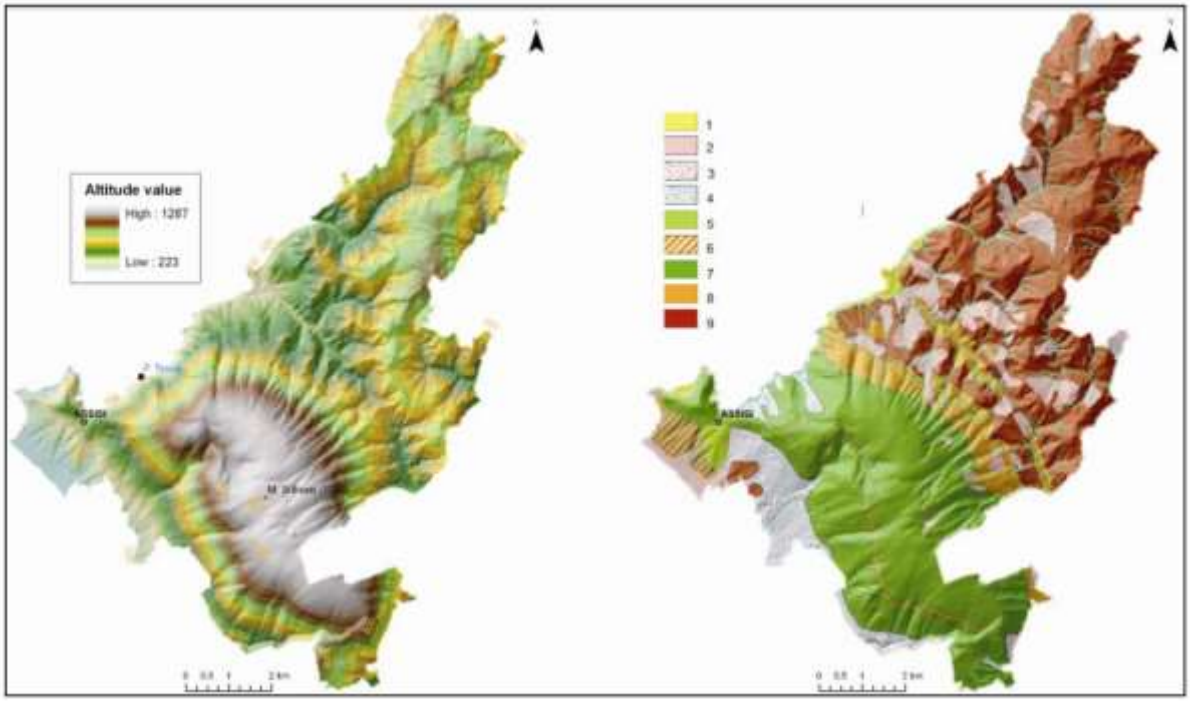



*Figure 2-22Left: DEM of Subasio Mountain Regional Park (altitude values in meters a.s.l.) Right: geological map: (1) Alluvial deposits, (2) Colluvial deposits; (3) Debris deposits (active); (4) Debris deposits (ancient); (5) Fluvial Lacustrine complex; (6) Travertine; (7) Calcareous complex; (8) Terrigenous complex with prevalent clay; (9) Terrigenous complex with prevalent sandstone*

In the southern part, on the slopes of Subasio Mount's circular antiformal ridge, the calcareous Complex (upper Trias - Oligocene) crops out. The remaining portion of the research region is comprised of the terrigenous complex (Miocene), which is split in half according to clay percentage. Fluvial-lacustrine deposits are the oldest surface deposits (Pliocene - Holocene), whereas debris, colluvial, and alluvial deposits are the most recent. Despite the small size of the test area, a wide range of lithotypes emerge, each with its own distinct morphological organization. While the calcareous complex boasts the

greatest height and amplitude of relief values, the terrigenous formations are characterized by gentle slopes that are infrequently intersected by deep and narrow valleys. Large dolines, known as "mortari" in the local tongue, are characteristic of the karst landscape that characterizes the peak of Subasio Mountain (Figure). Structural and fluvial features are typical of what remains of the antiformal ridge. Due to the great erodibility of the terrigenous rocks, the major portion of the park area is characterized by an active morphogenesis with fluvial characteristics, both erosional and depositional. Subasio Mountain is also home to a high number of mass landslides.

The study region is a great natural laboratory for examining the effect of geodiversity on the appearance and development of landscapes because of the wide range of lithotypes, covering layers, and geomorphological processes present. In addition, the town of Assisi, with its magnificent basilica recognized as a UNESCO world heritage site, and countless historical and religious landmarks distinguish the Subasio Mt. Park and guarantee a constant influx of visitors and pilgrims from all over the globe to this region.

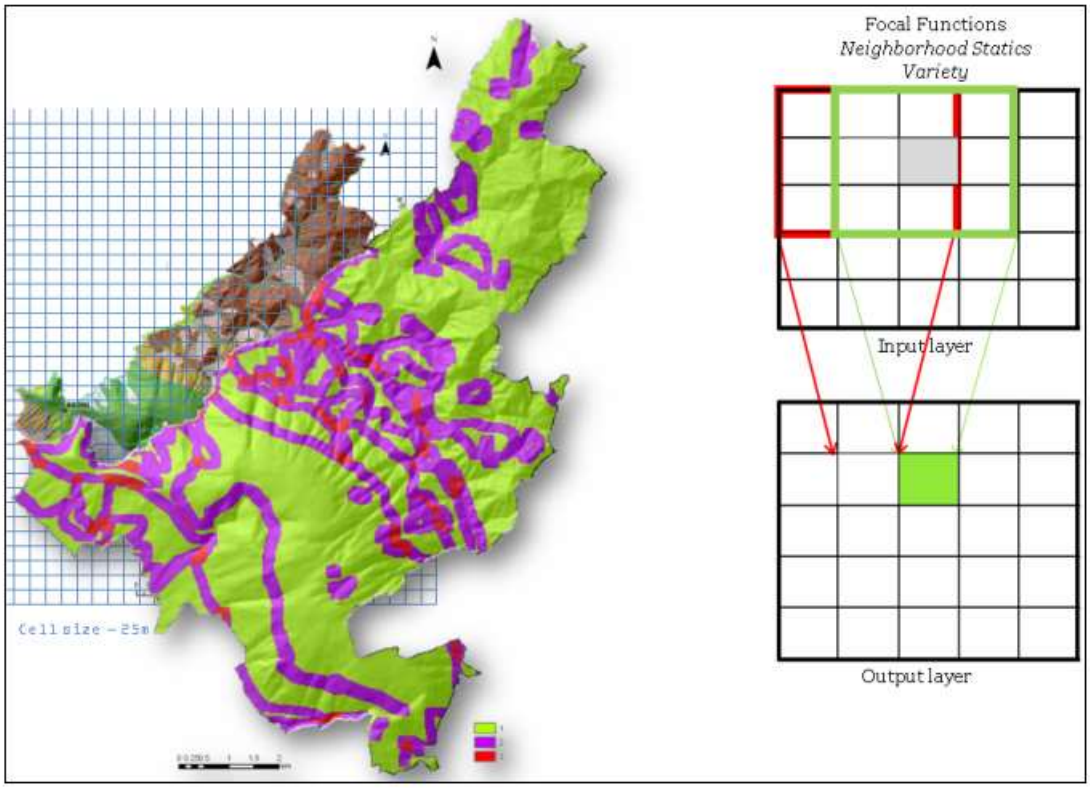



*Figure 2-23 DEM of Subasio Mountain Regional Park*

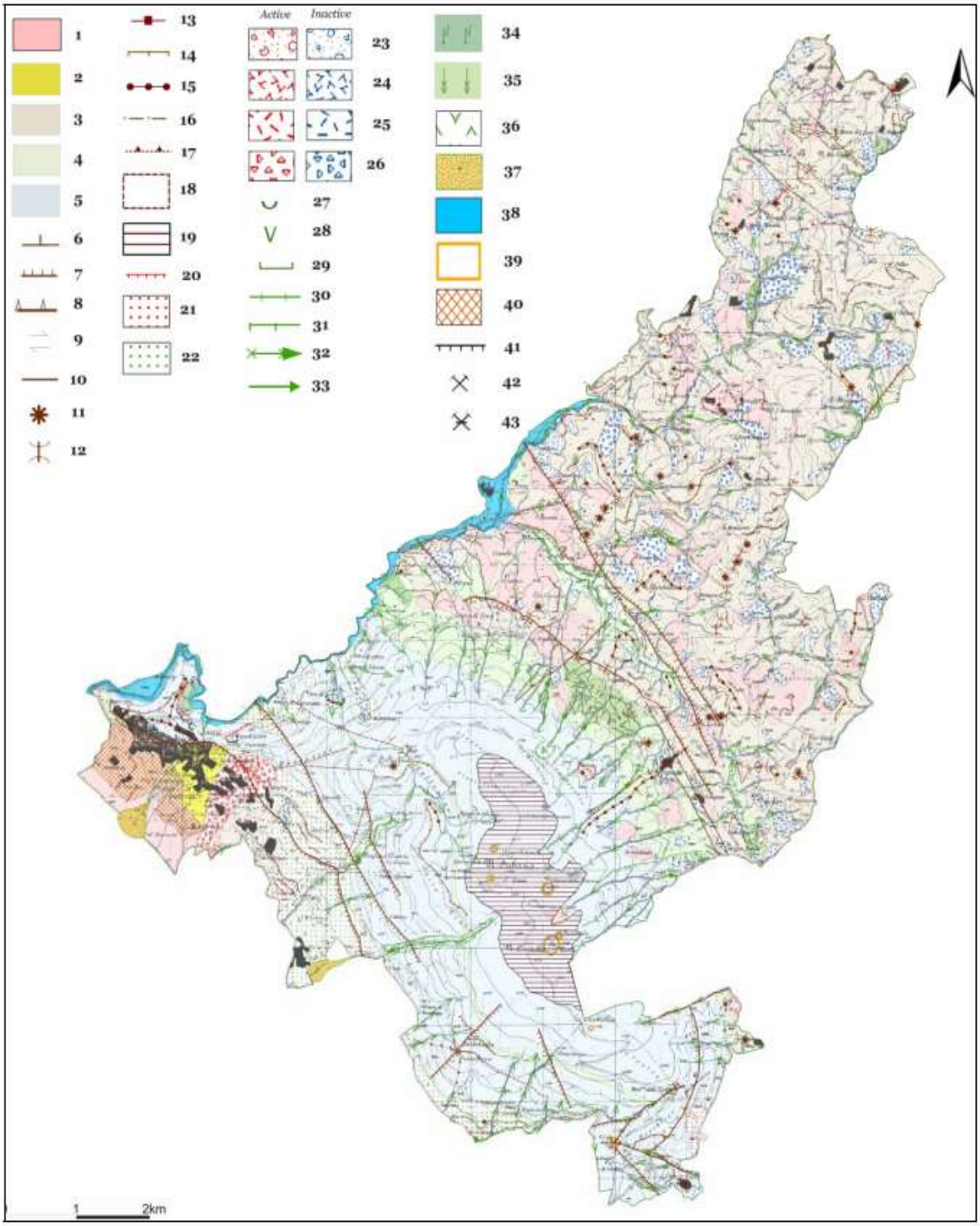



*Figure 2-24 Geomorphological Map of Regional Park*

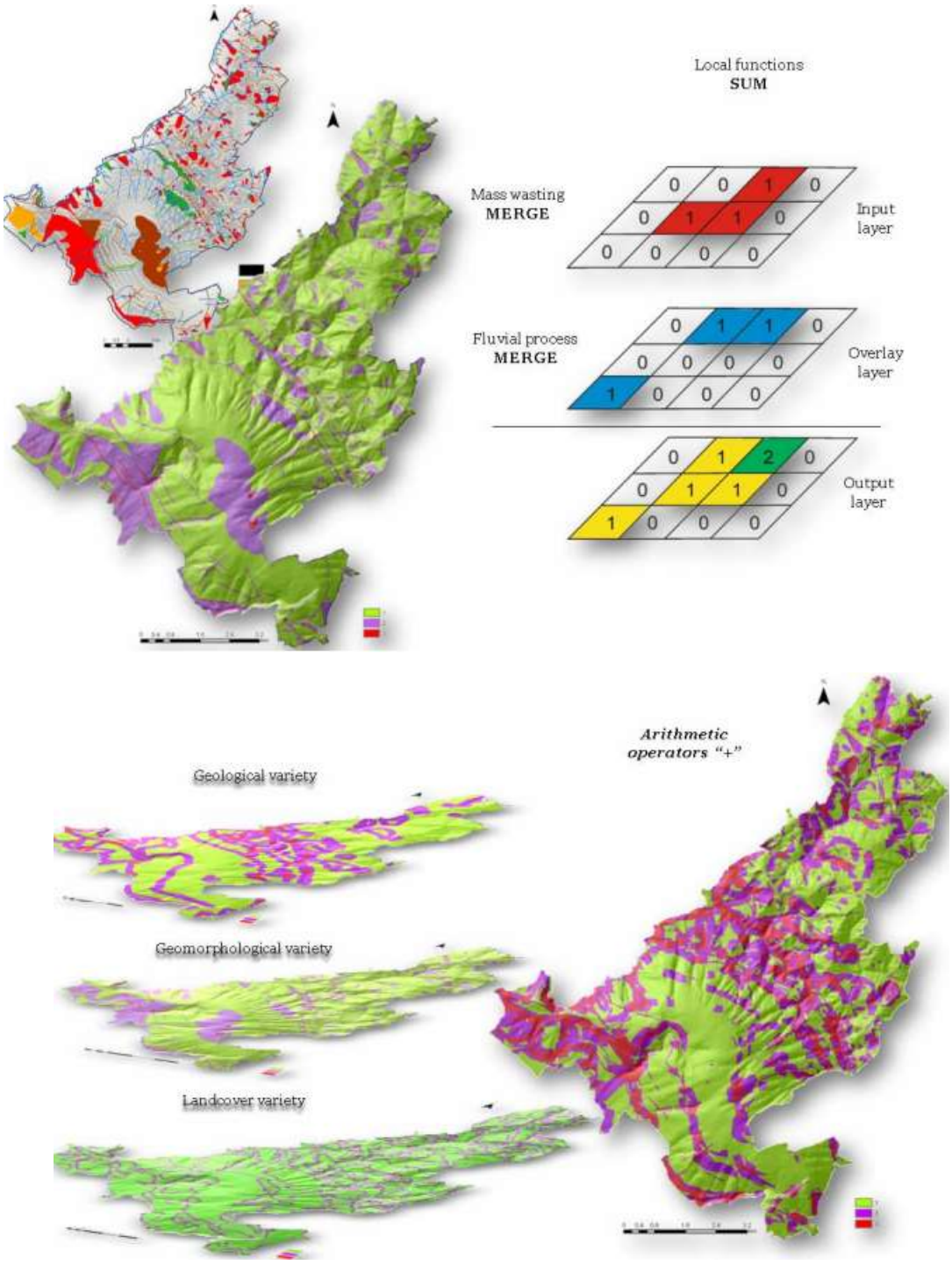



*Figure 2-25Overlapping input themes. On the right, the resulting grid of geodiversity index*

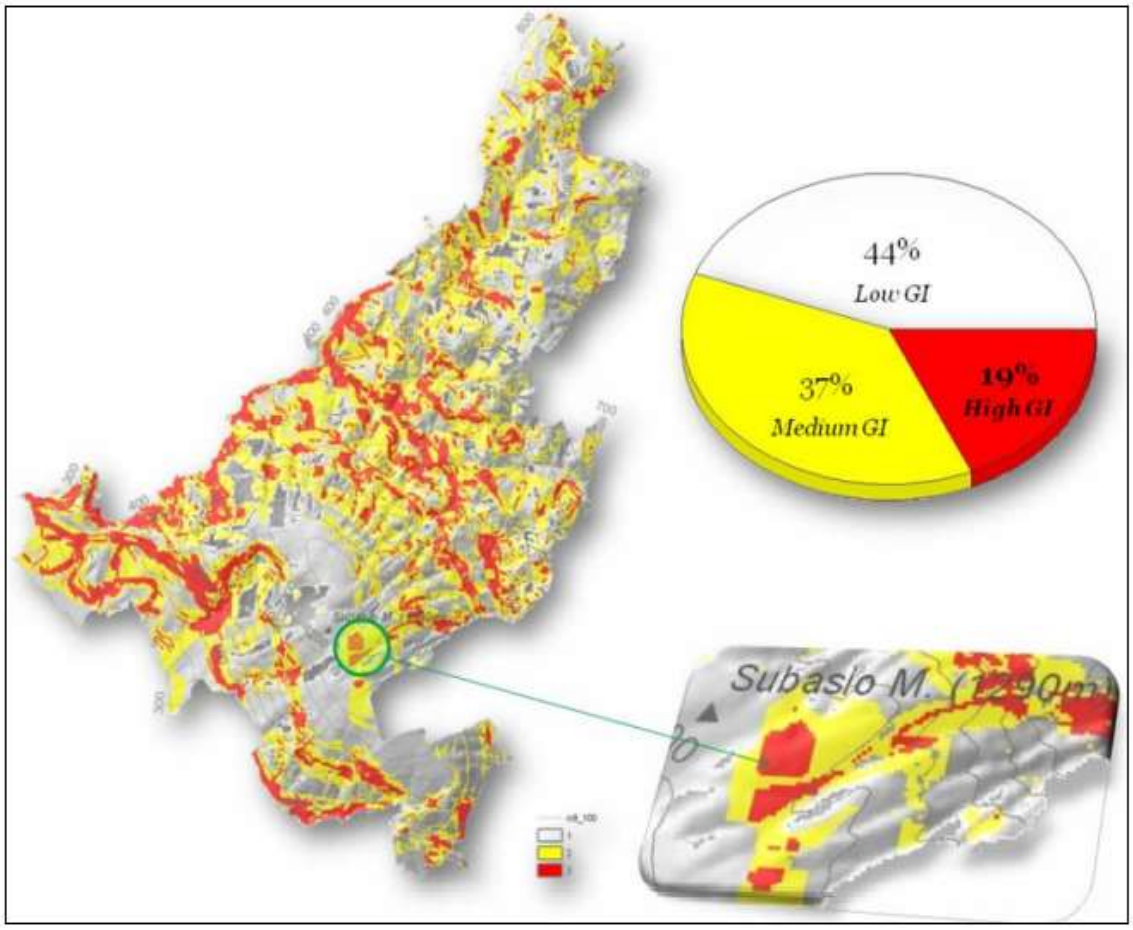



*Figure 2-26 grid of geodiversity index*

**2.8 Best practice guidelines for the use of the geoheritage in the city of Segovia A sustainable model for environmental awareness and urban geotourism.**

This research is local in scope, evaluating 95 geosites first identified for the city of Segovia in a 2011 paper by Dez-Herrero and Vegas, as well as 10 additional geosites discovered between 2011 and the present. According to the global chronostratigraphic scale, the geology of Segovia is broken down into 13 different local geological frameworks.

These frameworks are comprised of rocks, minerals, fossils, soils, tectonic structures, morphologies, and hydrogeology, all of which contribute to our understanding of the city's geological evolution. The initial step in locating these geosites is to categories the urban area within these geological frameworks.

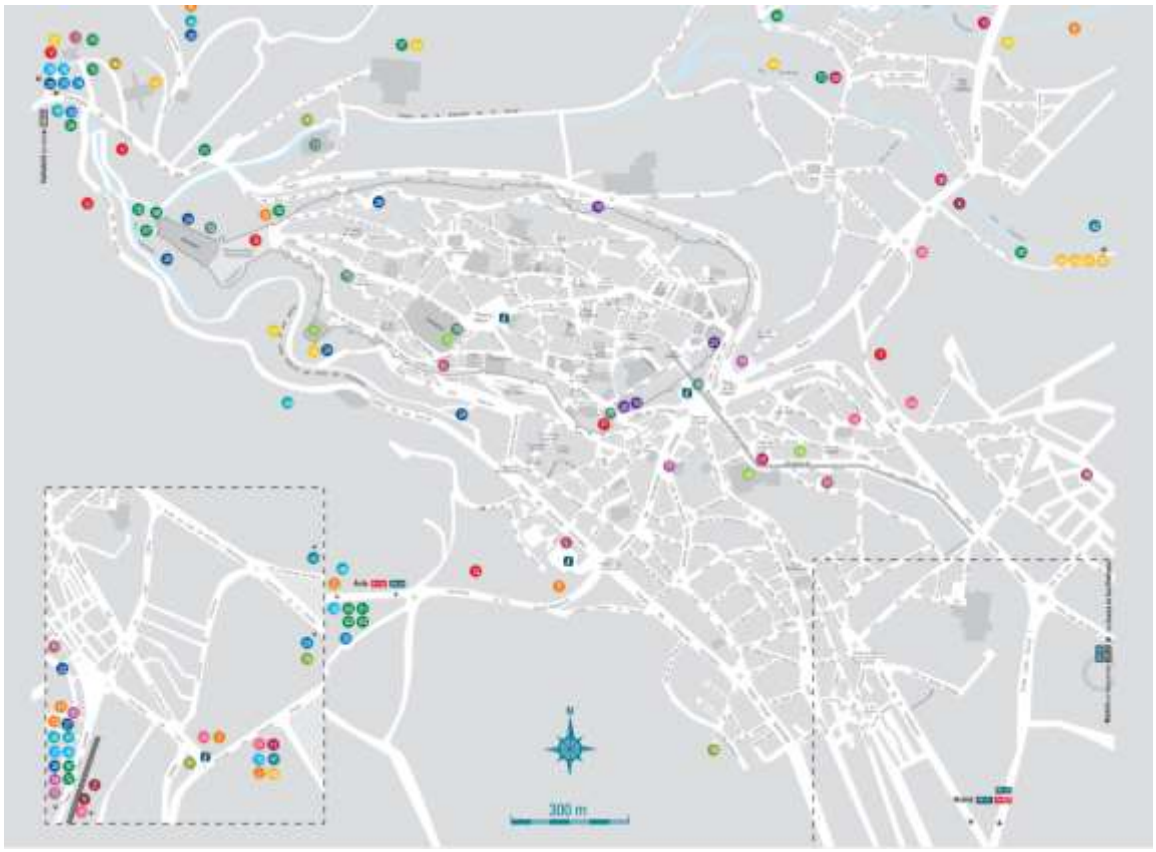


*Figure 2:29 Map of geosites located in Segovia city. For more information go to the book "De roca a roca. Descubre el patrimonio geológico de la ciudad de Segovia. In: Díez-Herrero and Vegas, 2011)*

*Table 2-2 Main geological frameworks in the city of Segovia that have been identified previous to define the geosites that are representative of its urban geology.*

| No. | Geological frameworks for the city of Segovia |
|---|---|
| 1 | Metamorphic rocks from the Iberian massif |
| 2 | Carboniferous igneous rocks from the Iberian massif |
| 3 | Sandstones and clays from transitional sedimentary environments from the Late Cretaceous |
| 4 | Rocks from intertidal sedimentary environments in the Late Cretaceous |
| 5 | Carbonate marine rocks from the Late Cretaceous |
| 6 | Continental rocks and sediments from the Cenozoic |
| 7 | Tectonic structures from the Variscan and Alpine orogenies |
| 8 | Mineral deposits |
| 9 | Palaeontological sites |
| 10 | Geomorphological features |
| 11 | Movable geological heritage: museums and collections |
| 12 | Soil profiles |
| 13 | Hydrogeology |

An initial semi-quantitative assessment turned into carried out of all of those functions withinside the one hundred ten geosites identified, specifically deliberate for public

utilization for environmental schooling and in a secondary style for geotourism. We used Suzuki and Takagi's (2018) "Evaluation of geosite for sustainable making plans and control in geotourism" as our beginning point; this method is primarily based totally on six primary standards which can be essential to the control of the geoheritage for its use in tourism. The "Assessment of the geoheritage for environmental schooling and geotourism withinside the city areas" turned into created the use of this authors' cautioned method of six standards, every of which incorporates 4 sub-standards that explicitly examine functions of environmental schooling and geotourism. Environmental schooling withinside the town has taken into consideration the extensive variety of those who might also additionally gain from it, such as elementary, middle, and excessive college students, in addition to adults and kids playing amusement time together, tourists, and men and women with quite a few impairments. This geoheritage assessment is groundbreaking due to the fact it's miles the primary of its type to be implemented to a town. The methodological framework of this assignment makes it a replicable version for utility in every other town in Castile-León or every other self-sufficient place in Spain, or some other place withinside the world.

*Table 2-3 Main assessment criteria and their identifiers (ID) applied to the geosites in the city of Segovia for environmental education and urban geotourism*

| ID | Assessment criteria |
|---|---|
| Ved | Value for environmental education |
| Vsc | Scientific value |
| Vtr | Tourism value |
| Vsa | Value for safety and accessibility |
| Vcs | Conservation and site sustainability |
| Vti | Value of the geosite´s environmental information for geotourism |

All of Segovia's geosites have been evaluated using these standards, each of which breaks down into four additional factors designed to reduce the amount of subjectivity involved in the selection process. This approach, which is extensively used and generally recognized throughout all geoheritage research, is distinguished by its semi-quantitative evaluation of the sub-criteria, with scores ranging from 1 (the lowest possible value for each criterion) to 4 (the greatest possible value for each criterion). Situations with a score of 2 or 3 are in the gray area.

### 2.8.1 Main stakeholders involved in managing the geoheritage in the city of Segovia

Pursuant to the recommendations of the 2nd Castile-León Environmental Education Strategy for 2016-2020, this guideline is aimed at the municipal authorities in Segovia, Spain, in their roles as advocates of the sustainable use of the urban geoheritage for environmental education and geotourism. Several goals have been presented to make sure that Segovia's urban geoheritage is managed in a way that promotes both environmental consciousness and geotourism.:

- Transmission of geoheritage best practices to city workers in an efficient manner.
- To emphasize the natural importance of this geoheritage.
- Learning to care for the environment through understanding geoheritage and the role it plays in the world and in human history.
- Use the connections between geodiversity and biodiversity to promote wildlife preservation in urban areas and raise public awareness.
- To initiate a strategy of sustainable development in the city of Segovia by means of environmental education initiatives that make use of the potential of the geoheritage in the city's urban setting.
- To ensure that all sections of the local community have access to environmental training and education.
- Taking into account humans as an active factor that affects both the natural and built environments and as a result being able to preserve and appreciate this history.
- Get the nod of approval from the people in charge of protecting and sharing this treasure so that it can be preserved for future generations.
- In order to plan, create, and implement an urban geoheritage-based environmental education strategy.
- Incorporating the perspectives of all Segovia residents interested in the city's urban ecosystem into environmental education efforts.
- Objective: To put in place measures for tracking and evaluating environmental instruction in metropolitan areas by way of their geographical history.

We have mapped out the key players in the Segovia City Council, the available resources, and the capacities and interdependencies among them in order to realize these suggested

goals. Although we are aware that departments may and do change with each legislative session, we have identified these players at the departmental level. Government agencies' roles in caring for and making use of geoheritage have been identified and assigned to corresponding categories. The goal is to create best practice recommendations that will encourage the preservation and conservation of the city's geoheritage among all municipal stakeholders. The primary audience for this guidebook is Segovia's municipal technologists, businesses that promote environmental consciousness, educators at all levels (preschool through college), and visitors to and residents of Segovia.

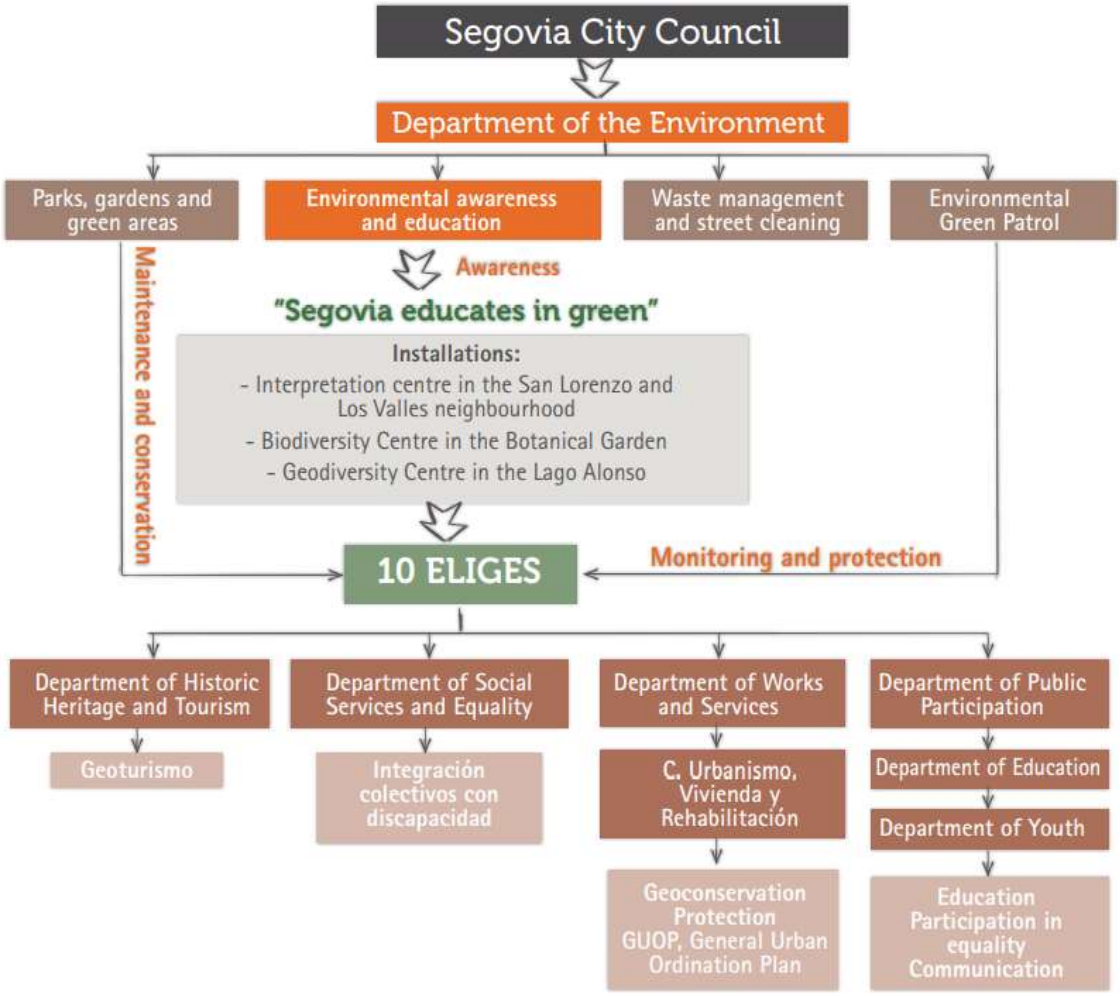



*Figure 2-27 Council departments involved in the management of geoheritage in the city of Segovia. GUPR: General Urban Planning Regulations. TOGSS: Territorial Planning Guidelines for Segovia and its Surroundings.*

### 2.8.2 Best practices in the city of Segovia

In order to preserve the use of those herbal sources for the financial and social improvement of the city environment's population in a sustainable way and make certain that the destiny conservation of the character or its feasible makes use of aren't damaged, we want to have exceptional practices pointers for the sustainable use of the geoheritage. To help those procedures of chronic development withinside the control of the herbal sources withinside the jurisdiction of the neighborhood government desires equipment that enlighten and create attention a few of the promoters and the neighborhood community. This manual is a beneficial device for retaining and defensive city ecosystems. It is needed to create a control device primarily based totally at the clinical statistics derived from the findings of the method designed for the town of Segovia.

Compared to geoheritage in more remote locations and protected natural regions like national parks and nature reserves, this urban heritage is more susceptible to damage and destruction. Promoting best practice standards is necessary to ensure the preservation and heritage of public places in the face of pollution, urbanization pressure, and other threats to their integrity.

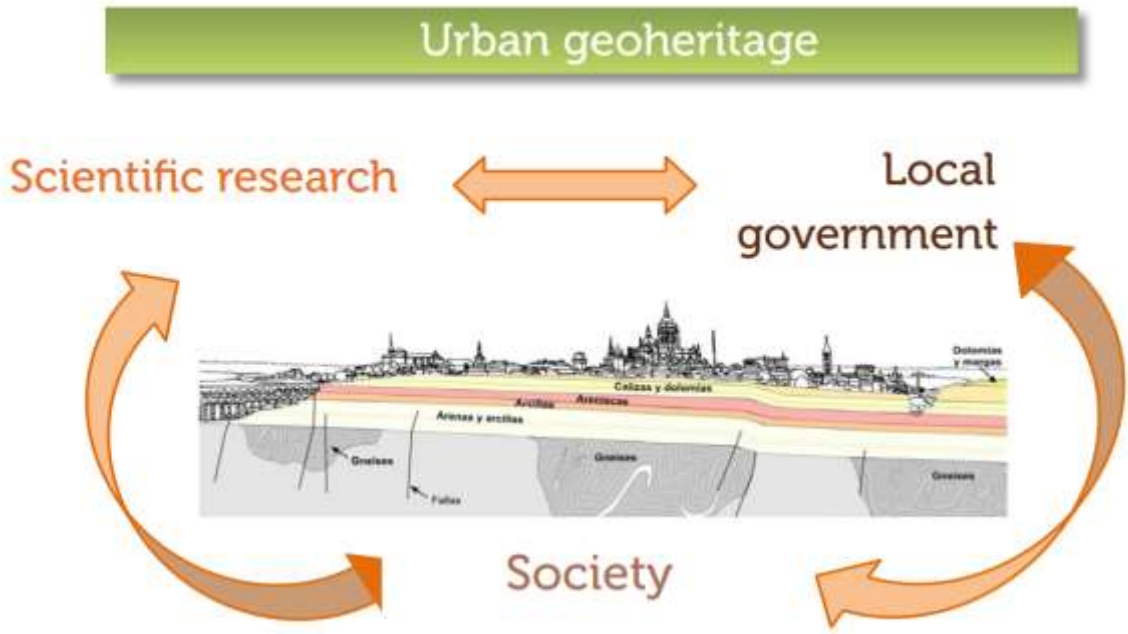



*Figure 2-28 A basic model of local governance to ensure the sustainability of the geoheritage as a resource for*

To accomplish the set goals, the best practice recommendations presented for Segovia

## 2.9 How to become a member of the Global Geoparks Network

After receiving recognition as a UNESCO Global Geopark, your Geopark will need to take care of certain paperwork. The following is a check list of administrative necessities that, if met, will guarantee that you are ready to begin. If your area has been designated as a UNESCO Global Geopark, it must meet the following requirements by December 31 of the same year.:

*Table 2-4 steps to be followed to register in UNESCO*

| |
|---|
| 1. Apply for GGN Membership (Institutional member) |
| 2. Inform the GGN of the contact details of your Geopark's contact person(s) |
| 3 Inform the GGN of your Geopark Representative for the General Assembly of the GGN |
| 4. Contact your GGN Regional Geoparks Network |
| 5. Pay your Annual GGN Membership Fee |
| 6. Get informed about the basic documents regarding the operation of the Global Geoparks Network |
| 7. Use the Global Geoparks Network logo for your communication activities |

One of the great benefits of Geoparks is being able to network, to exchange ideas and connect to each other through various common events. The Global Geoparks Network, GGN Regional Networks, GGN National Fora/Committees, and UNESCO Global Geoparks all host conferences and meetings and organize a wide range of shared activities and events.


What is a UNESCO Global Geopark?
UNESCO Global Geoparks
Global Geoparks Network
UNESCO Global Geoparks
2018/2019
Global Geoparks Network
UNESCO Global Geoparks
Top 16 Focus Areas
Global Geoparks Network
Geological Heritage Conservation
Culture Heritage Enhancement
Biodiversity Protection
Capacity Building Activities
Education for Sustainability
Natural Resources Wise Use
Geological Hazards Risk Reduction
Sustainable Development
Climate Change Understanding
Sustainable Tourism
Employment
Women Empower
Science & Research
Networking
Local and Indigenous Knowledge
Monitoring and Evaluation

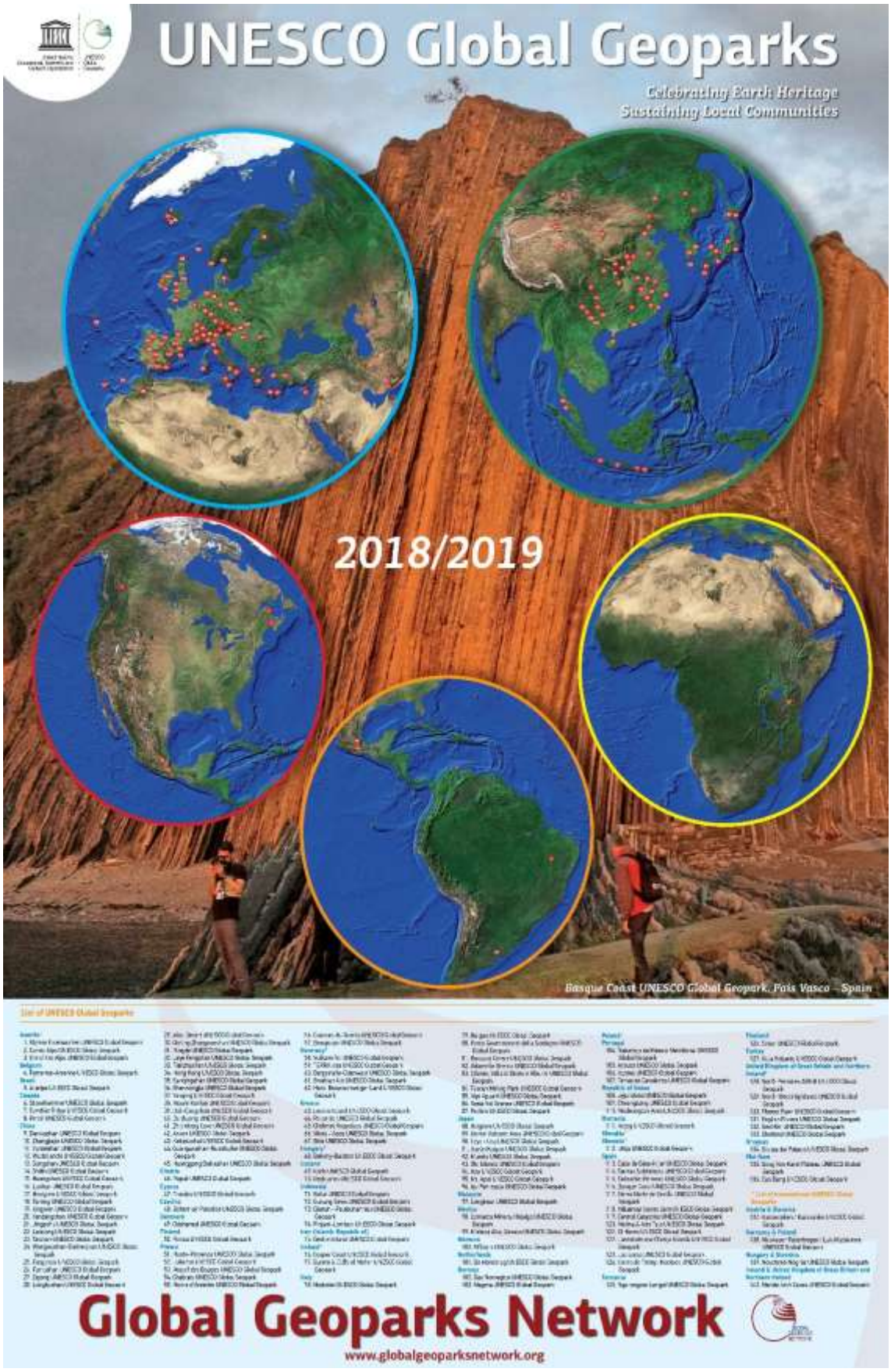



*Figure 2-29 Global Geopark Network 2018-2019*


*Figure 2-30 Global Geopark Network 2019-2020*


*Figure 2-31 Global Geopark Network 2020-2021*

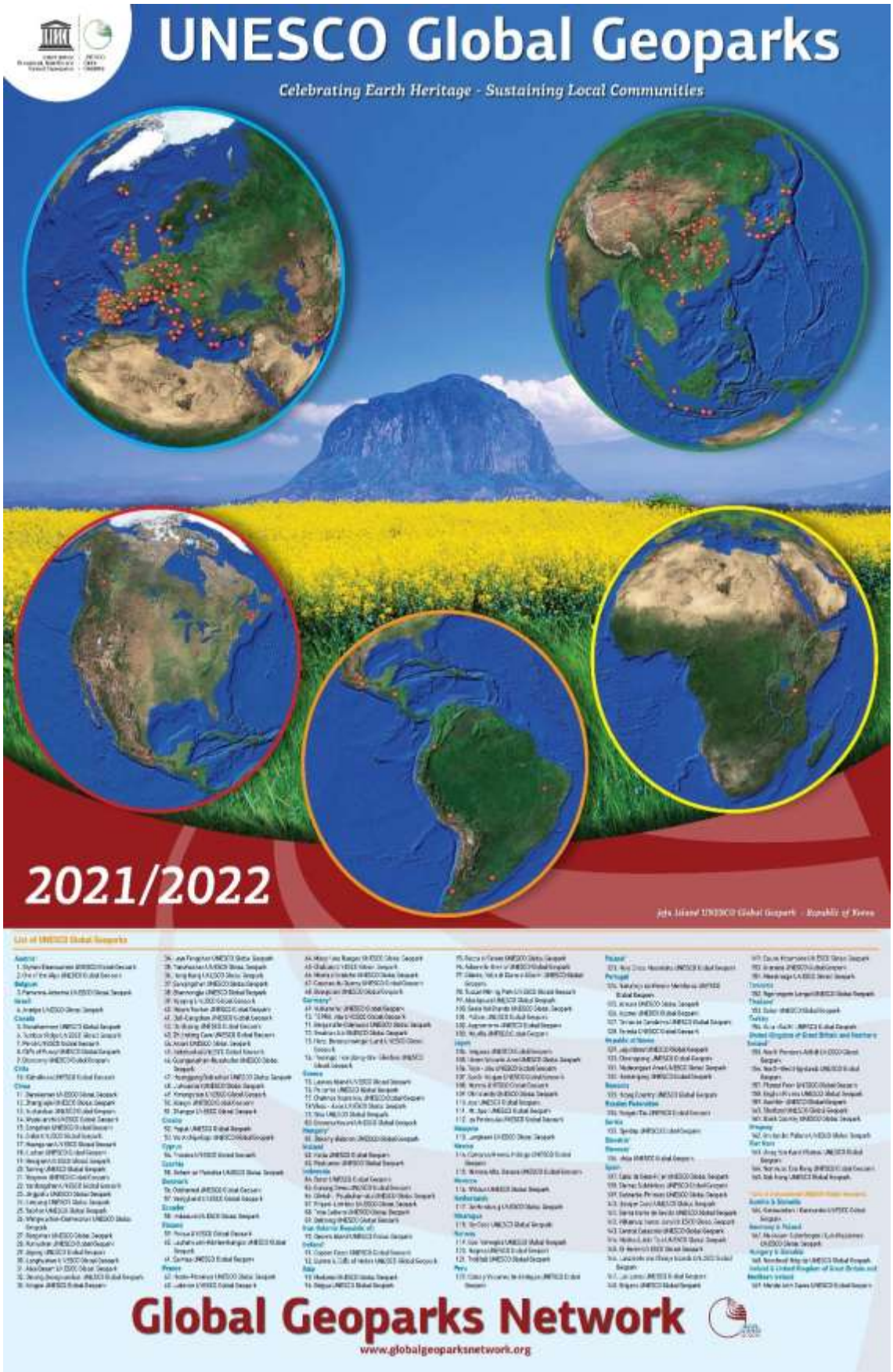



*Figure 2-32* Global Geopark Network 2021-2022

## 2.10 Start a Geotourism Program

In cooperation with National Geographic, the Geotourism content marketing initiative allows travel destinations to catalogue and advertise the attractions that residents value and recommend the most. Developed in conjunction with National Geographic, the Geotourism content marketing initiative allows travel destinations to catalogue and advertise the attractions that residents hold in highest esteem.

To create a comprehensive digital and/or printed Map Guide for tourists as well as a forum for sustainability discussions and actions, it brings local people and organizations together to define what makes their destination special and to generate user-generated content about distinctive attractions, businesses, and events.

Visitors to a destination may support local businesses and attractions by using the Geotourism Map Guide platform, which encourages residents of that area to develop and share previously unheard tales and material.

Ecological, cultural, and economic sustainability are at the heart of every successful geotourism experience.

### 2.10.1 Start a Geotourism Program at Your Destination

To improve the inventory and wise stewardship of cultural, historic, and natural resources; boost local economies; and aid destinations in telling their story internally and to their target travel markets, National Geographic's geotourism program combines the knowledge of the world's leading sustainable tourism thinkers with the publishing power of National Geographic and the participation of local residents at a tourism destination.

The geotourism campaign uses the National Geographic name and message to spark interest among locals and draw in the right kind of visitors.

The initiative uses a stakeholder--driven approach to develop destination communication tools, cultivate a local constituency of destination ambassadors and storytellers, and collaborate with these people to support the destination's stewardship and marketing.

Unlike many other forms of tourist promotion, geotourism may really work.

The first step in the geotourism process is to forge solid alliances among locals who are well-versed in the destination's distinct natural, cultural, historical, and aesthetic features. Through the creation of multimedia communication products and campaigns directed by locals to promote stewardship, improvement, and marketing of the destination, this strategy serves to stimulate action and cooperation among local stakeholders over a year's time horizon.

Program direction is provided by a local Geotourism Stewardship Council, which may take on a variety of monikers and form out of, or reorganize around, an already existing organization. This organization seeks to increase program participation at the community and institutional levels via publicity in local media. Additionally, National Geographic collaborates with the council to develop the infrastructure and expertise necessary to sustain and promote the program beyond its first launch.

### 2.11 Geotourism Principles

National Geographic works to protect the world's distinctive places through wisely managed tourism and enlightened destination stewardship. Its 13 guidelines for governments and tour operators in the geotourism industry are listed below.

**1. Integrity of a Place**

Develop and improve the area in ways that are uniquely associated with the region to enhance its geographical identity. Promote economic difference and national pride by catering to ancient customs.

**2. International Codes**

Honor the values expressed in the International Council on Monuments and Sites' Cultural Tourism Charter and the World Tourism Organization's Global Code of Ethics for Tourism (ICOMOS).

**3. Community Involvement**

To the degree possible, tourism should rely on the resources of the local community, with the latter being urged to form alliances with the former in order to better advertise their areas, attract more visitors, and give a unique and authentic experience for those who do come. Assist local companies in creating tourist strategies that highlight the area's unique

natural features, historic sites, and cultural offerings (such as food, drink, handicrafts, and performances).

**4. Community Benefit**

Encourage micro- to medium-length companies and traveler commercial enterprise fashions that strain monetary and social benefits to engaged communities, which include poverty reduction, with clean conversation of the vacation spot stewardship rules vital to keep the ones benefits.

**5. Tourist Satisfaction**

Get your happy, thrilled Geotourists to share their new vacation tales with family and friends back home so that the word keeps spreading and the place keeps being visited.

**6. Conservation of Resources**

To reduce water pollution, solid waste, energy use, water use, landscaping chemicals, and excessive nighttime illumination, enterprises should be urged to take the following measures. Put out the word in a manner that will appeal to the vast eco-friendly tourist market that will be attracted by these actions.

**7. Protection and Enhancement of Destination Appeal**

Insist that the location take care of its natural ecosystems, historic places, aesthetic attractiveness, and native traditions. Reduce the potential for deterioration by limiting the number of visitors. Look for models that can make money within such constraints. When necessary, resort to coercion, rewards, and legal action.

**8. Planning**

Consider short-term economic needs without compromising the destination's unique identity or future as a geotourism hotspot. Create new communities that are an asset to the destination in areas where tourism draws in new residents. Make an effort to broaden the economy's base of support and keep population growth to a minimum. Take proactive measures in the public sphere to reduce geotourism-incompatible and reputation-harming activities.

**9. Land Use**

Plan ahead for the impacts of development demands and implement measures to stop excessive growth and environmental deterioration. In order to preserve a variety of natural and picturesque landscapes and to guarantee continuing access to waterfronts for locals, it is important to rein in the development of sprawling resorts and vacation homes, particularly along beaches and islands. Prompt the placement of big, self-contained tourist attractions in areas that are in greater need of economic development but lack distinguishing natural or cultural features. Examples are theme parks and convention facilities.

**10. Market Diversity**

Maximize short- and long-term economic resilience by encouraging a wide variety of suitable food and accommodation establishments to attract visitors from all segments of the geotourism sector.

**11. Interactive Interpretation**

Get the locals as well as the tourists interested in the history of the area. Motivate locals to exhibit the historical and cultural landmarks that make their neighborhoods unique in order to enhance visitors' experiences and instill a sense of pride in locals.

**12. Market Selectivity**

Drive more business from the visitor demographic most likely to enjoy the area's unique offerings and spread the word to others.

**13. Evaluation**

Create a system for periodical review by a group that fairly represents all interested parties, and make the results public.

## 2.12 IDENTIFICATION OF GEOSITES IN INDIA

To ensure their preservation, the Geological Survey of India (GSI) designates some areas as geo-heritage sites and national geological monuments. All of the information broken down by state is included in the attached Annexure. To ensure the safety of these locations, GSI or the relevant state governments take the appropriate precautions.

**2.12.1 State-wise details of the geological heritage sites/ national geological monuments**

| Sl. No | Geological heritage site / National geological monument | Sl. No | Geological heritage site / National geological monument |
|---|---|---|---|
| 1 | **ANDHRA PRADESH**<br>1) Barytes deposited in lava flows in the Mangampeta area of the Cuddapah District.<br>2) Chittor Dist. Eparchaean Unconformity.<br>3) Tirumala Hills Natural Arch, Chittor District, India.<br>**4)** Between Vishakhapatnam and Bhimunipatnam may be found the dissected and stabilized mounds of red coastal silt known as Erra Matti Dibbalu. | **2** | **TAMILNADU**<br>1) fossilized timber in the South Arcot District, close to Tiruvakkarai.<br>2) Park for Fossil Wood, National, Sattanur, Tiruchirapalli District<br>3) Madras, India; Charnockite; St. Thomas Mount.<br>**4)** Cretaceous fossils may be seen in the Karai Formation's badlands in the Karai and Kulakkalnattam sections in Perambalur District. |
| **3** | **KERALA**<br>**1)** Angadipuram, Malapuram District, Laterite Near the PWD Rest House.<br>**2)** District of Thiruvanatapuram, Varkala Cliff Section | **4** | **GUJARAT**<br>1) Markings Left Behind by Currents in a Dam at Kadan, Panch Mahals District, India, Sedimentary Structures. |
| **5** | **HIMACHAL PRADESH** | **6** | **ODISHA** |

| | | | |
|---|---|---|---|
| | **1)** Siwalik Fossil Park, Saketi, Sirmur dt., | | **1)** Pillow Lava in lron ore belt at Nomira, Keonjhar dist. |
| **7** | **MAHARASHTRA**<br>**1)** Lonar Lake, Buldana Dist. | **8** | **CHATTISGARH**<br>**1)** Manendragarh, Surguja Dist., is home to a marine bed that dates back to the Lower Permian period. |
| **9** | **KARNATAKA**<br>1) St. Mary Island's Columnar Lava, Udupi County.<br>2) Pillow lavas near Mardihalli, Chitradurga Dist.<br>3) Peninsular Gneiss, Lalbagh, Banglore<br>**4)** Pillow lavas and pyroclastic flows in the Kolar Gold District. | **10** | **RAJASTHAN**<br>1) Sendra Granite, Pali Dist.<br>2) Barr Conglomerate, Pali Dist.<br>3) Stromatolite Fossil Park, Jharmarkotra Rock Phosphate deposit, Udaipur Dist.<br>4) Gossan in Rajpura-Dariba Mineralised belt, Udaipur Dist.<br>5) Bhojunda Stromatolite Park, Chittaurgarh District.<br>6) Jaisalmer Province, Akal Fossil Wood Park.<br>7) Kishangarh Nepheline Syenite, Ajmer Dist.<br>Welded Tuff, Jodhpur Dist.<br>8) Malani Igneous Suite, Jodhpur District, Jodhpur Group.<br>**9)** Satur, Bundi District, Great Boundary Fault. |
| **11** | **JHARKHAND**<br>**1)** Around Mandro in the Sahibganj district, one may find plant fossils in the intertrappean beds of the Rajmahal Formation, which is part of the upper Gondwana sequence. | | |
| **12** | **NAGALAND**<br>**1)** Nagahill Ophiolite Site near Pungro, | | |
| **13** | **SIKKIM**<br>**1)** Stromatolite bearing Dolomite / Limestone of Buxa Formation at Mamley, near Namchi, South district. | | |

*SOURCE: -This information was given by Minister of Mines and Steel Shri Narendra Singh Tomar in reply to a question in Rajya Sabha today.*

### 2.12.2 Geo-heritage sites in Northeast:

1. Majuli (Assam):

A river "island", among the world's largest, in Brahmaputra River.

Several'satras,' or Vaishnav monasteries, founded by 15th-16th century saint-reformer Srimanta Sankaradeva and his followers, make the island a centre of Assamese spirituality.

2. Sangetsar Tso (Arunachal Pradesh):

A river was dammed following a big earthquake in 1950, creating what is today known as Madhuri Lake, which is located close to the border with Tibet.

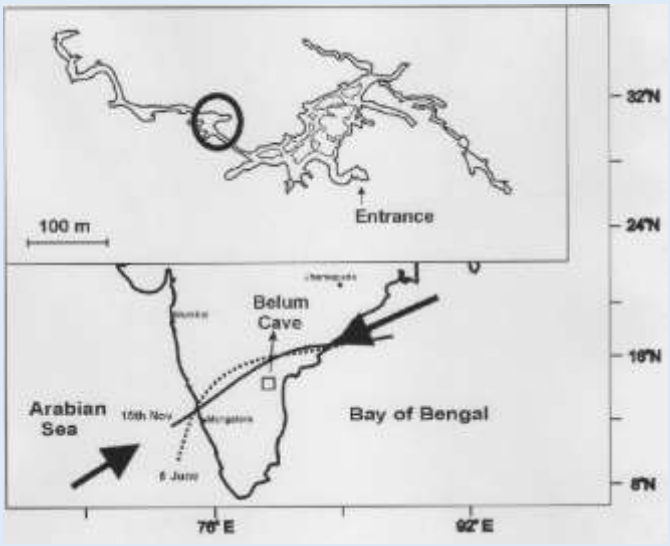
3. Loktak Lake (Manipur):

It's the largest lake in the Northeast that's filled with fresh water. The 'phumdis' or floating biomass and the 'phumsangs' or cottages of fisherman on them are the main attractions to this lake. Located on the lake's southwestern shore, Keibul Lamjao National Park is home to the critically endangered sangai or brow-antlered dancing deer.

4. UNESCO Global Geoparks:

These are contiguous regions where sites and landscapes of global geological significance are managed under a single overarching framework of conservation, education, and sustainable growth. However, whereas there are already 169 UNESCO Global geoparks located in 44 different countries, India has yet to be awarded this designation.

**Belum Caves, Kurnool District, Andhra Pradesh**




The Belum caverns, located in Andhra Pradesh's Kurnool district, are the longest and biggest cave system in the Indian Subcontinent that visitors may explore. The speleothems in these caverns are what draw the most visitors. Stalactites and stalagmites are examples of speleothems, which are secondary mineral deposits that occur in caves. Because of a steady supply of groundwater, this natural cave system was created over many thousands of years. The galleries, caverns, syphons, and extremely lengthy tubes in these caves are all great places to explore. The caves are known as Belum Guhalu in Telugu and stretch for a total of 3,300 metres. Pataalaganga lies 46 metres below the cave entrance and is the deepest point in the cave system. Since 1884, when they were first noticed by scientists, the caverns have been extensively explored, even until the 1980s. To preserve its geological significance, the Andhra Pradesh state government designated the area as a conservation zone in 1988. Andhra Pradesh Tourism Development Corporation (APTDC) finished preparing these locations for visitors in 2002. Only half of the cave's total length of 3.5 km is currently accessible to visitors.

Figure 2-33 Images of Belum Caves, Kurnool District, Andhra Pradesh

**Yana Rocks, Yana Village, Karnataka**

The settlement of Yana may be found in the North Canara district of Karnataka, deep inside the Kumta woods. Its karst landscape is its most distinctive feature. The dissolving of soluble rocks like dolomite, gypsum, and limestone leads to the formation of karst topography. Bhairaveshwara Shikhara and Mohini Shikhara are two enormous rock formations that make up the yana rocks. The term "shikhara" really means "hill" in the Hindi language. Both of these stones are made out of crystalline karst limestone. Both the Bhairaveshwara Shikhara and the Mohini Shikhara are stupas, although their heights differ by 30 and 20 meters, respectively. The crystalline karst rocks are a major draw, but a cave temple with a self-manifested Shiva linga at the base of the Bhairaveshwara Shikhara also contributes to the area's notoriety as a pilgrimage site. Dripping water from the cave's ceiling continually sprinkles over the Shiva linga, making the site an appropriate pilgrimage destination. The Western Ghats in South India are home to the Sahyadri range of hills, which includes the two rock monoliths. A bronze figure of Durga may be seen within the Bhairaveshwara Shikhara cave. Moreover, the Vibhuti Falls, a natural cascade about 8 kilometers from the Yana Rocks, are another major draw for visitors.

Geologists believe that Stalagmites and Stalactites in a limestone deposit were responsible for the spontaneous construction of the Shiva linga. Stalactites are rock formations made of lava, mud, minerals, sand, peat, pitch, etc. that emerge from the cave floor. Stalactites, on the other hand, may be made of lava, mud, minerals, sand, pitch, peat, etc., but they are found dangling from the roofs of caves and hot springs.

*Figure 2-34 Yana Rocks, Yana Village, Karnataka*

**Varkala Cliff, Thiruvananthapuram, Kerala**

Varkala, in Kerala, "God's Own Country," is a stunning destination. In all of southern Kerala, this is the only location where one could encounter cliffs. The Arabian Sea is at a short distance from these cliffs. All along the cliff's edge are sedimentary rocks that have been deposited by the water. The term "Varkala Formations" is widely used to refer to these Cenozoic sedimentary cliffs. In addition to the beach, Varkala is also home to a temple that has been there for over two thousand years. Janardana Swami Temple is a must-see for every visitor to this area. Beds of sand and shale make form the varkala cliff. Natural springs and dispersed flora are typical in this region because of the thin seam of lignite that makes it an excellent site for natural vegetation. The Varkala Cliff is a popular tourist destination in this area of Kerala since it is close to the water and has a beach. Paragliding and other air and water activities are popular here. Extreme visitor numbers pose the most immediate danger to this location.

While beneficial to the state and city's economies, this action makes it challenging for officials to administer the region. That's why it's so common for people to be careless about trash disposal and waste management, among other issues. The site's recent designation as a National Geological Monument may also be hindering efforts to raise public awareness of its geological significance.

*Figure 2-35 Images of active tourism in a geosite*

**Zawar Mines, Udaipur, Rajasthan**

The Udaipur area of Rajasthan is home to the renowned Zawar mines, a geological and historical landmark that is famed for being a zinc and lead mining location. History, science, economics, archaeology, and geology are all enriched by the site's prospective designation as a National Geological Monument. Zawar is a small town around 40 kilometres (km) from Udaipur. Back in the day, the Hindustan Zinc Limited firm built this whole town. This area was formerly home to a network of mines that were mostly forgotten until recently, and the remnants of a once-thriving smelting industry, making it a prime candidate to become the first location in India to house a Geopark. Smelting is the technique used to remove zinc from its ore, which may be a lengthy and laborious procedure. Because of its low boiling point of 907 °C, this metal can only be successfully extracted via a complex smelting process. It was at the Zawar Mines in the Udaipur district that India made history by becoming the first nation to perfect the art of zinc smelting. There was no immediate fear of someone else attempting to replicate the mine's process of extracting zinc since the technology was so difficult to acquire, even in India at the time. Zawar metallic zinc was the world's first manufacture through distillation, as shown by archaeological research conducted by the British Museum in London, M.S. University of Baroda, and Hindustan Zinc Ltd.

*Figure 2-36 Imges of zawar mines*

**2.13 Potential geoheritage sites in India (briefly)**

Natural phenomena in India's geology and geomorphology are really one-of-a-kind. However, the country's geological riches have suffered as a result of the development tendency. The purpose of this study is to explain to the reader in short about the notion of Potential Geoheritage sites in our nation existing in virtually every state. This coincides with the still-invisible tourism of such locations.

The 'marketing' of those sites includes elevating expertise approximately them amongst the overall public and the authorities with a purpose to growth their respectable recognition. These sites, that have the capability to be transformed to 'Geoparks,' can simply be transformed to such parks and mark themselves at the UNESCO Geoheritage Sites Map. Today, India compares itself with the sector at the improvement front, however it additionally desires to examine itself at the promoting of Geoheritage sites and the suitable showcasing of those sites, which many nations round the sector are becoming right.

The Indian Subcontinent is endowed with cultural history, a wealthy ancient context and giant bodily qualities, which this undertaking tries to cover. In 1851, the Indian authorities set up a department of the Ministry of Mines devoted to collecting information on Earth technological know-how and different survey-associated topics; this corporation could later grow to be referred to as the Geological Survey of India (GSI). In India, GSI has regularly occurring the obligation of conservation and promoting of the bodily capabilities of India and has identified 26 such locations in numerous regions of India as "National Geological Monuments (NGMs)". For this reason, we set out to research the various NGMs available. GSI, or the Geological Survey of India, become set up in 1851 as a central authority corporation below the Ministry of Mines of India to acquire information associated with Earth technological know-how and different surveying disciplines. In India, GSI has regularly occurring the obligation of conservation and promoting of the bodily capabilities of India and has identified 26 such locations in numerous regions of India as "National Geological Monuments (NGMs)".

With this in mind, we set out to investigate the various NGMs and prospective sites in India, their commonalities, and the ways in which they differ from and are similar to the internationally recognized UNESCO Global Geoparks. This study was motivated by a

desire to learn more about why UNESCO still hasn't stepped in India and why people aren't truly aware of these NGMs that India so proudly owns.

(Ranawat, 26 May 2020)

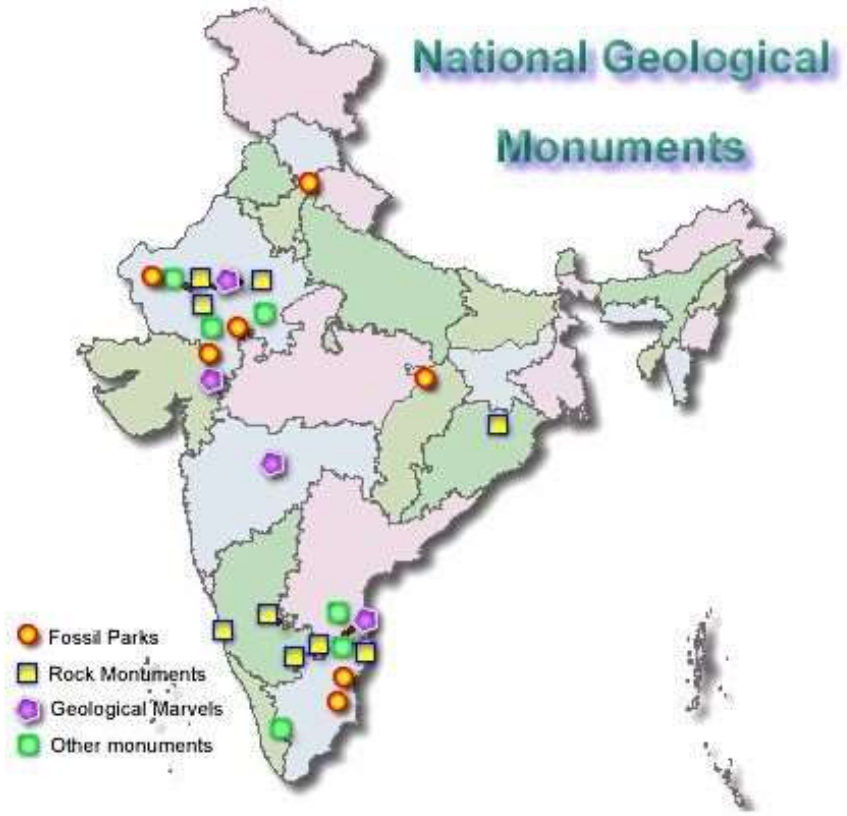



*Figure 2-37NGM in India*

*Source: -https://i.pinimg.com/originals/36/e6/e0/36e6e04f7d6bfbfa5ed2d7811353417a.jpg*

India is a fascinating nation because to its varied topography, extensive cultural history, and dramatic prehistoric past. Travel and tourism are vital to promoting awareness of our remarkable nation abroad. Recently, there has been a lot of activity aimed at boosting tourism all throughout the nation, even in the most out-of-the-way places. The Indian subcontinent is a treasure trove of fascinating geological features, bearing the marks of a wide range of geological processes across time. A few of these locations are already on the Geological Survey of India's list of National Geological Monuments. It is crucial that these geological monuments and others like them be included on the Tourist Map of India so that people from all over the world can learn about the real past — the formation of the subcontinent, the orogeny, the paleoenvironment, and the exotic collection of paleo - flora and fauna — during their travels. To ensure their preservation and public awareness,

the Atlas Geological Survey of India has designated 26 places around the nation as National Geological Monuments. To mark the 150th anniversary of the Geological Society of America and to encourage the public to take an interest in and contribute to the preservation of these natural marvels as irreplaceable national heritage, a special book on "National Geological Monuments" was produced in 2001.

**2.14 Geo Tourism in Kerala**

On the occasion of the "International Conference on Laterization" held in 1979, the Geological Survey of India (GSI) constructed a monument in Angadipuram (shown) where the laterite formations were first recognized. This monument is one of 26 that were proclaimed National Geological Monuments.

*Figure 2-38 Geosite at Angadippuram*

## 2.15 Angadipuram Laterite

is a notified National Geo-heritage Monument in Angadipuram town in Malappuram district in the southern Indian state of Kerala, India. Angadipuram has a significant place in the history of laterites since it was here that a medical doctor named Dr. Francis Buchanan-Hamilton described them for the first time as "indurated clay," making them a prime building material. This study was published in 1807. Sedimentary residual products are a distinct geological entity that cannot be placed in the broader categories of igneous, metamorphic, or sedimentary rocks. It has often a pitted and porous look. Named from the Latin word for bricks, "letritis," the term "laterite" was originally used by Buchanan in India. This unusual formation is located atop parent rock types of varied composition namely, charnockite, leptynite, anorthosite and gabbro in Kerala. Goa, Maharashtra, and certain parts of Karnataka all have it over basalt. Gujarat, in western India, is home to some magnificent laterite formations on top of granite, shale, and sandstone.It has been shown that laterites are closely juxtaposed with aluminum ore (bauxite), iron ore, and nickel ore mineral resources in various regions of Kerala, giving the material great economic importance beyond its usage as bricks in building construction.

On the occasion of the "International Conference on Laterization" held in 1979, the Geological Survey of India (GSI) constructed a monument in Angadipuram (see image) to commemorate the discovery of the laterite formations.

Angadipuram's prominent temples, including the Thirumandhamkunnu and Tali temples, make it a popular destination for religious tourists.

### 2.15.1 **Formation**

Laterites originate from the leaching of more insoluble ions, mostly iron and aluminium, from parent sedimentary, metamorphic, igneous, and mineralized proto-ore rocks, such as sandstones, clays, limestones, granitoids, basalts, gabbros, peridotites, and schists. Acid dissolves the host mineral lattice, then hydrolysis and precipitation of insoluble oxides and sulphates of iron, aluminium, and silica occur at the high temperatures typical of a humid sub-tropical monsoon environment, completing the leaching process.


*Figure 2-39 National Geographic Monument at Angadippuram*

*Source: - https://www.wikiwand.com/en/Angadipuram_Laterite*

### 2.15.2 Geography

Malappuram district, in which Angadipuram is located, is flanked by the Wayanad and Kozhikode districts to the north, Tamil Nadu to the northeast, Palakkad District to the southeast and south, Thrissur District to the southwest, the Arabian Sea to the west, and Kozhikode District to the northwest. It is not only in the Malappuram district that you can find laterite; you can also find it throughout the state's central and northern areas. Its incidence spreads to Aleppey, Quilon, Thiruvananthapuram, Kottayam, Trichur and Cannanore districts. Overall, in the landform of Kerala which includes seven landscape ecological zones, laterites account for a large part of 50%. This terrain feature encompasses lateritic mesa, mounds, slopes and ridges. This mostly laterite environment, which spans the state from north to south, is bounded by an elevation range of 50 to 150 meters (160 to 490 feet), but it may be found at elevations as high as 2,000 meters (6,600 feet). In addition, as you go inland from the coast to the east, you'll pass through a series of valleys known as elas, where you may find rice paddies, coconut groves, and arecanut trees. Incidence of laterite in other regions of India is documented in the states of Karnataka Maharashtra and Gujarat. Extensive deposits of lateritic bauxites with high output have been recorded in Australia, Brazil, Guinea, Guyana, Suriname, and Venezuela, among other places across the world.


*Figure 2-40* Kerala agro-ecological zones map

### 2.15.3 Climate

The chemical procedures over the bottom rocks in Kerala were accentuated with the aid of using the heavy southwest Monsoon rainfall (3,107 mm annually) and excessive temperatures (25–27.5 °C withinside the coastal lowlands to 20–22.5 °C withinside the Japanese highlands) and plush vegetation (belongs to the Malabar Coast wet forests of a tropical wet broadleaf wooded area ecoregion of southwestern India). In mild of those circumstances, the laterization process, which ends up in advent of laterites, is nicknamed the "Tropical illness of rocks".

### 2.15.4 Structure

Laterite is a leftover product formed with the aid of using the herbal technique of rocks weathering withinside the warm humid climatic situations and call with water, oxygen and carbon dioxide. In primary words, it's miles a soil formation associated with the discern rock cloth that has fashioned due of various forces of nature withinside the equal manner as different styles of soils consisting of alluvial soil, normal soil and crimson soil. In addition, paleoclimate from tens of thousands and thousands of years in the past is believed to have had a function withinside the genesis of laterite. The residue normally includes more suitable iron, aluminium and titanium oxides in numerous quantities. The residue is pitted and porous in appearance. Buchanan, who determined this shape in Kerala, in his document of 1807 noted:

*Figure 2-41An abandoned Laterite quarry*

*Source:-*
*https://upload.wikimedia.org/wikipedia/commons/thumb/8/8f/Abandoned_laterite_quarry._C_014.jpg/1280px-Abandoned_laterite_quarry._C_014.jpg*

It is spread out in huge chunks, with no discernible stratification, and piled on the granite bedrock of Malayala. It has many crevices and holes, as well as a high concentration of iron (in the form of red and yellow ochres). It is dug out in square masses with a pick-axe, and then immediately cut into the form needed using a trowel or a big knife since it is so soft when in the mass and deprived of oxygen. Very quickly after that, it reaches brick-hardness and outperforms any Indian bricks I've ever seen in their resistance to air and water.

Laterites are a common kind of soil found in the central part of Kerala. They are a residual deposit left behind after crystalline or sedimentary rocks have been weathered, and they may be anywhere from 5 to 8 meters deep (16–26 ft). Plateaus are another feature they create. The gradual rising of the soil in terraced formations throughout time is responsible for the creation of these laterite plateaus. Laterites, however, are thickest in the Malappuram, Kozhikode, and Kannur districts of the plateau area. It's been observed that the laterite layer just above the crystalline rocks is particularly densely packed. As GSI notes, the situation in Kerala is no better.

From the highest to the lowest points of the laterite profile, quartz veins, joints, and fractures may be seen. Relict foliation that matches that of the underlying rocks characterizes the laterite profile over pyroxene granulites, metaultramafites, and gneisses, proving that the laterite formed naturally. Laterites, after meta-ultramafites, may be identified by their porous and spongy feel. Tertiary laterite has an indurated cap that typically extends 2–5 m in height (6.6–16.4 ft). The profile gradually changes to softer laterite with gritstone fragments at the base and then peaks in a zone of varying clays farther down.

### 2.15.5 Chemical composition

Chemical study has shown that Angadipuram laterites are related to charnockite. An admixture of pyroxene granulite, charnockite, and migmatite may be found in the laterite that is found at an average height of around 60 meters (200 feet) in the Angadipuram region. The following composition was determined by chemical analysis of samples of these laterites:

$SiO_2$ - 32%, $Al_2O_3$ – 29.38%, $Fe_2O_3$ –17.38%, $TiO_2$ – 2.05%, $Na_2O$ – 0.95%, KO – 0.27%, CaO – 0.3% and MgO – 0.2%

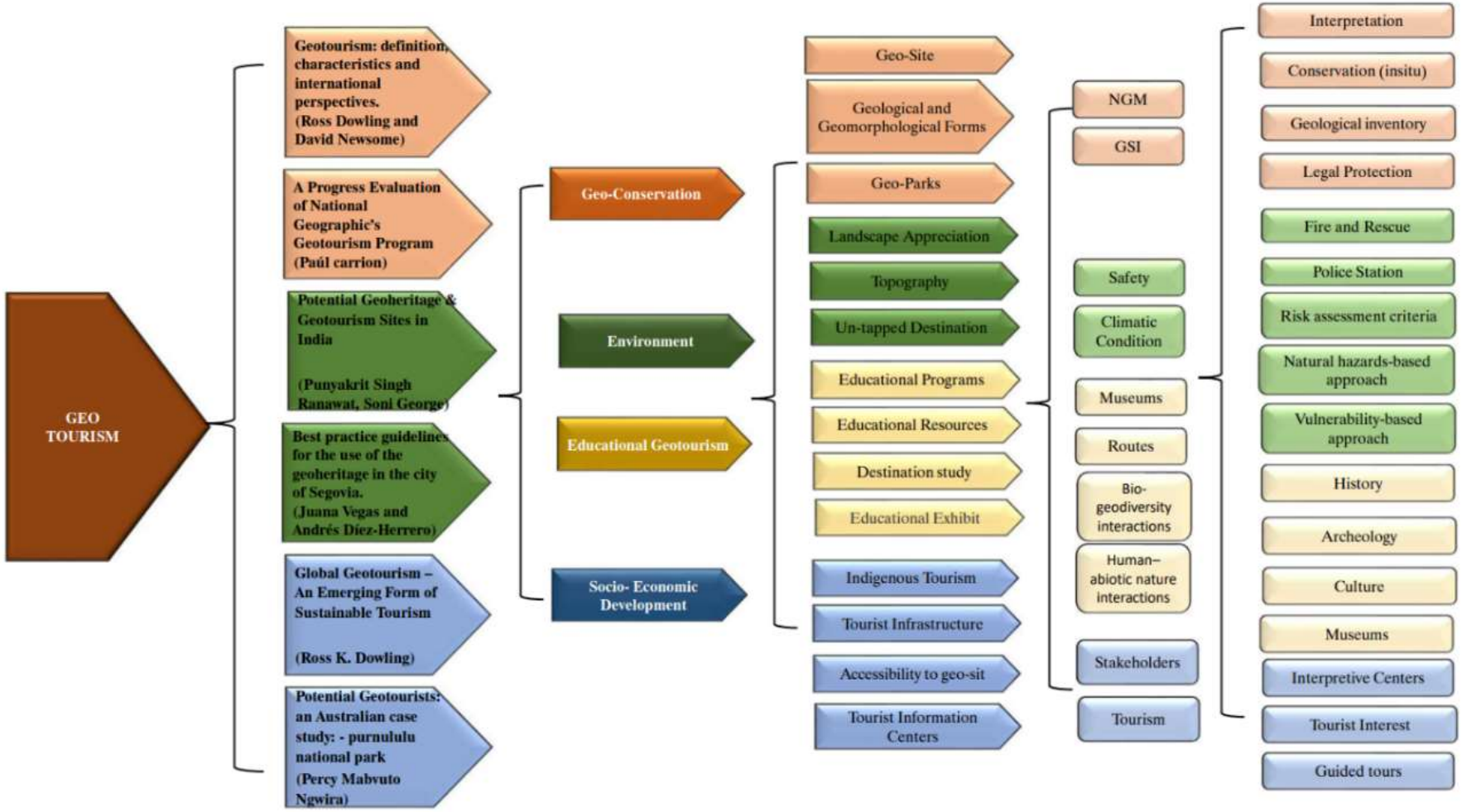
Spatial variations have been recorded in the chemical composition of laterites in Kerala.

### 2.15.6 Economic uses

Nickel and aluminium, two metals mined from laterites, are crucial to the economy. Commercial interest is high for the laterite bauxite because of the aluminium it contains. There are bauxite outcrops covered by laterites ranging in thickness from 1 to 50 metres (3.3 to 164.0 ft). [16] According to the global inventory of resources, laterites are the most important source of nickel, accounting for a whopping 70% of the world's supply. However, this only accounts for around 40% of global nickel output. One of the state's most lucrative spices, pepper, thrives in the red laterites that dot the landscape of Kerala. These soils drain well and can store plenty of water. It has a high concentration of humus and other beneficial plant substances.

# CHAPTER 3 : INDICATORS DEVELOPED

## 3.1 INDICATORS




GEO TOURISM
Geo-Conservation
GSI
Geo-Parks
Geological and Geomorphological Forms
Geo-Site
NGM
Economic Development
Tourist Infrastructure
Indigenous Tourism
Accessibility to geo-sit
Tourism
Environment
Un-tapped Destination
Topography
Landscape Appreciation
Climatic Condition
Safety

## 3.2 GIS TOOLS AND GEOLOGICAL MAPPING: -

**Measuring Tools**

Length/area measurement tools allow map-based calculations

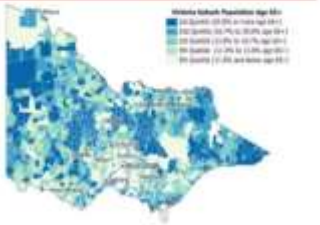
**Desire Lines**

Desire lines (also known as spider diagrams) allow the visualization of flows

**Surface Analysis**

Surface analysis tools include spot height data querying, surface profiling, viewsheds, contouring, 3D terrain visualization, DEM/TIN creation, and the calculation of terrain shortest paths

**Data Classification**



Data classification methods include: quantiles, equal weight, equal interval, standard deviation, nested means, arithmetic or geometric progression

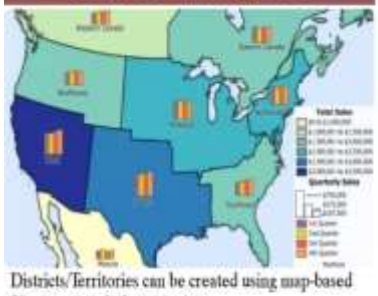
**Areas of Influence**

Areas-of-Influence (also known as Thiessen Polygons or Voronoi Diagrams) are a powerful GIS tool that divide the study area using a triangulated irregular network (TIN)

**GPS Support**

GPS support includes the ability to read/animate/import GPS data, overlay tracks with aerial photos and topographic or vector maps, track real time GPS locations, create vector line/point layers from GPS playback files, and import/export formats such as GPX (the GPS Exchange Format)

**Territory Building Tools**



Districts/Territories can be created using map-based filters or via tabular groupings.

**Facility Location**

A facility location tool identifies the best location for one or more facilities from a set of candidate sites

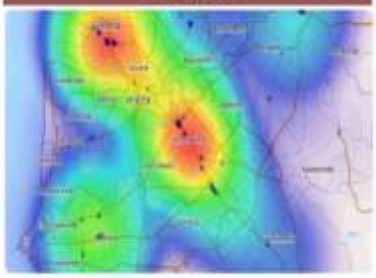
**Buffers**

Circular buffers/bands for analyzing proximity

**Geographic Overlay**

Geographic overlay/aggregation is supported and allows attribute assignment between layers based on percentage overlap for estimating demographics of territories, buffers, areas of influence, and more

**Hot Spots**



Kernel-based density grids can be created using the quartic, triangular, uniform, or count methods, and allow "hot-spot" mapping

**Weighted Center**

Weighted center calculations allow the identification of centers of "gravity" among points

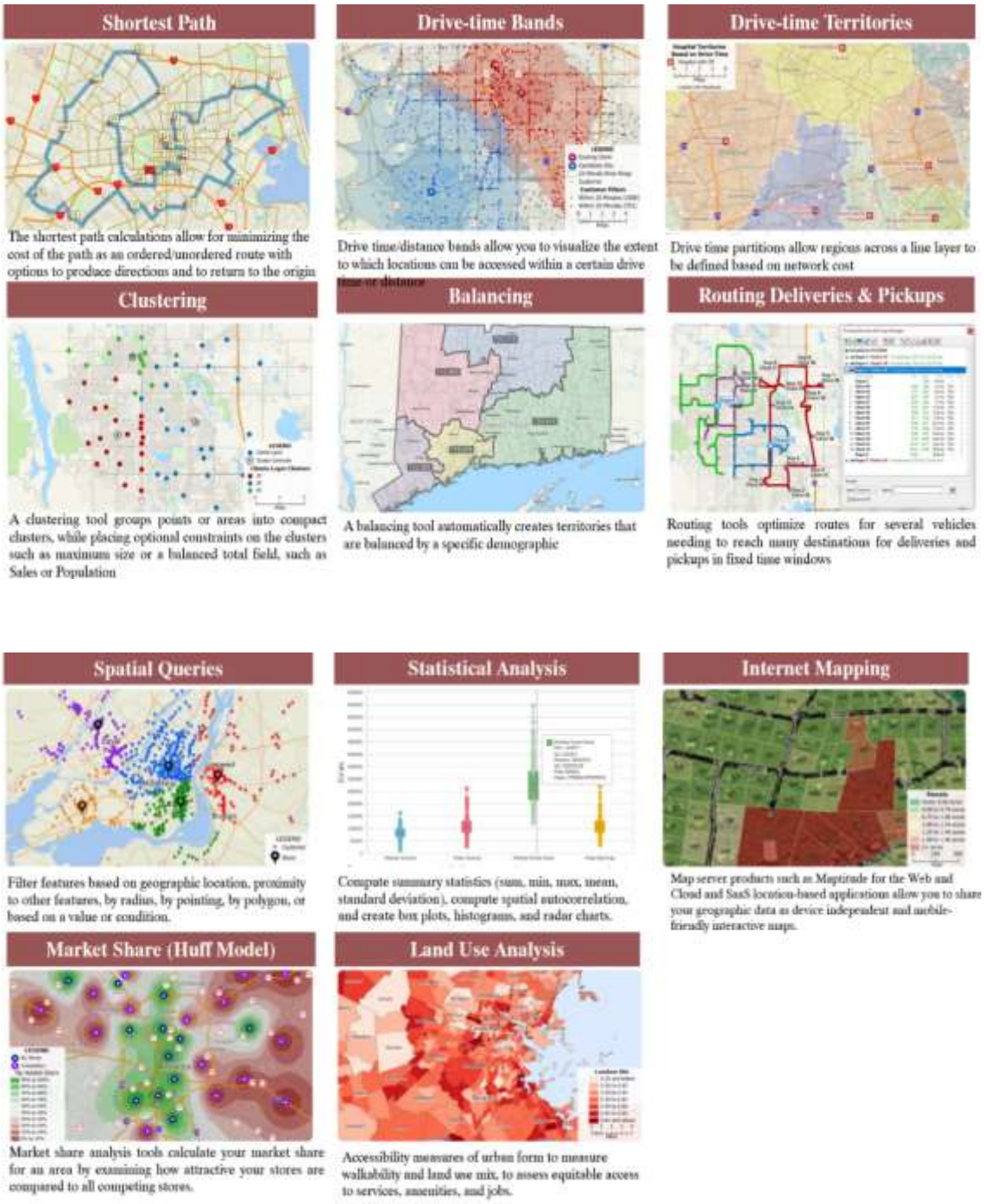



*Figure 3-1 Gis tools*

### 3.3 COMPREHENSIVE MATRIX

*Table 3-1 Geotourism Matrix*

| Indicators | Sub- Indicators | GIS Layers | Resource Data |
|---|---|---|---|
| Geo-Conservation | Geo-Site | Land Use Analysis | Land Use /Land cover Map |
| | | Geographic Overlay | Areas of statistics |
| | | Measuring Tools | Geospatial database |
| | | Desire Lines | Waste Land Map |
| | Geological and Geomorphological | Statistical Analysis | Costal zone Management map |
| | Geo-Parks | Land Use Analysis | Environment Impact assesment map |
| Environment | Landscape Appreciation | Areas of Influence | Contour Maping |
| | Topography | Surface Analysis | Forest cover Map |
| | | Land Use Analysis | Flood zone Map |
| | | GPS Support | Hydromorphological Map |
| | Un-tapped Destination | Buffers | Zonal Regulations |
| | | Spatial Queries | Route allignment and spatial communication map |
| Socio-Economic Development | Indigenous Tourism | Spatial Queries | Spatial analysis Maping |
| | | Data Classification | Road Safety Surveys |
| | Tourist Infrastructure | Areas of Influence | Surveys |
| | | Hot Spots | Watershed Land Map |
| | | Market Share (Huff Model) | Wetland Map |
| | Accessibility to geo-sit | Shortest Path | Road/Rail, Regional connectivity |
| | | Drive-time Bands | OD Survey |
| | | Routing Deliveries & Pickups | Transport Planning Surveys |
| | Tourist Information Centers | Internet Mapping | Satelite based development community Network |
| | | GPS support | |

Updated Indicators and Sub indicators integrated to evaluate the scientific, educational economical, conservational values of any geosite is arrived. And a 3 level values are sorted to find the end results.

| SCIENTIFIC AND INTRINSIC VALUES | | SITES |
|---|---|---|
| **Integrity** | 0- Totally destroyed sites, | |
| | 0.5- Disturbed site, but with visible abiotic features. | |
| | 1- Site without any destruction | |
| **Rarity** (number of similar sites) | 0- more than 5 sites | |
| | 0.5- 2to 5 similar sites | |
| | 1-The only site within the area of interest | |
| **Diversity** (number of different partial features and process within the geosite or geomorphosite) | 0- Only one visible feature/processes | |
| | 0.5- 2 to 5 Visible features / processes | |
| | 1- more than 5 visible features/processes | |
| **Scientific Knowledge** | 0-unknown site, | |
| | 0.5-Scientific papers on national level | |
| | 1-High knowledge of the site, monographic studies about the site. | |
| **EDUCATIONAL VALUES** | | **SITES** |
| **Representativeness** and visibility/clarity of the features/processes | 0- Low representativeness/clarity of the form and process, | |
| | 0.5- medium representativeness, especially for scientists | |
| | 1-high representativeness of the form and process also for the laic public. | |
| **Exemplarity, Pedagogical use** | 0- very low exemplarity and pedagogical use of the form and process, | |
| | 0.5- existing exemplarity, but with limited pedagogical use | |
| | 1-High exemplarity and high potential for pedagogical use, geodidactics and geotourism | |
| **Existing Educational Products** | 0-no products | |
| | 0.5- leaflets, maps, webpages | |
| | 1-info panel, information at the site | |
| **Actual use of a site for educational purposes** (excursions, guided tours) | 0- no educative use of the site, | |
| | 0.5-site as a part of specialized excursions (students) | |
| | 1-guided tour for public | |
| | | |

| ECONOMIC VALUES | | SITES |
|---|---|---|
| **Accessibility** | 0- more than 1000m from the parking place | |
| | 0.5-Less than 1000m from the stop of parking place | |
| | 1- more than 100m from the stop of the public transportation | |
| **Presence of tourist infrastructure** | 0- more than 10km from the site existing tourist facilities | |
| | 0.5- 5 to 10 km tourist facilities | |
| | 1-less than 5 km tourist facilities | |
| **Local Products** | 0- no local products related to site | |
| | 0.5- Some products | |
| | 1- emblematic site for some local products | |
| **CONSERVATION VALUES** | | **SITES** |
| **Actual Threats and risks** | 0- high both natural and atrophic risks | |
| | 0.5- existing risk that can disturb the site | |
| | 1-Low risk and no threat | |
| **Potential threats and risks** | 0- high both natural and atrophic risks | |
| | 0.5- existing risks that can disturb the site | |
| | 1-low risks and almost no threats | |
| **Current status of a site** | 0-Continuing destruction of the site | |
| | 0.5- the site destroyed now with management measures for avoid the destruction. | |
| | 1-no destruction | |
| **Legislative protection** | 0- no legislative protection | |
| | 0.5-Existing proposal for legislative protection, | |
| | 1-Existing legislative protection (natural monument. Natural reservation) | |
| **ADDED VALUES** | | **SITES** |
| **Cultural values:** presence of historical/archeological/religious | 0- no cultural features, | |
| | 0.5-existing cultural features but without strong relation to abiotic features | |
| | 1- existing cultural features with the strong relations to abiotic features. | |
| **Ecological values** | 0- not important | |
| | 0.5- existing influence but not so important | |

| | | |
|---|---|---|
| | 1-important influence of the geomorphologic feature on the ecologic feature. | |

**3.3.1 Methodology used for site analysis with reference to indicators; -**

Indicators and sub indicators are analyzed for any geosite development, along with that a proper site analysis and quantitative assessment in the main sectors have to be done.

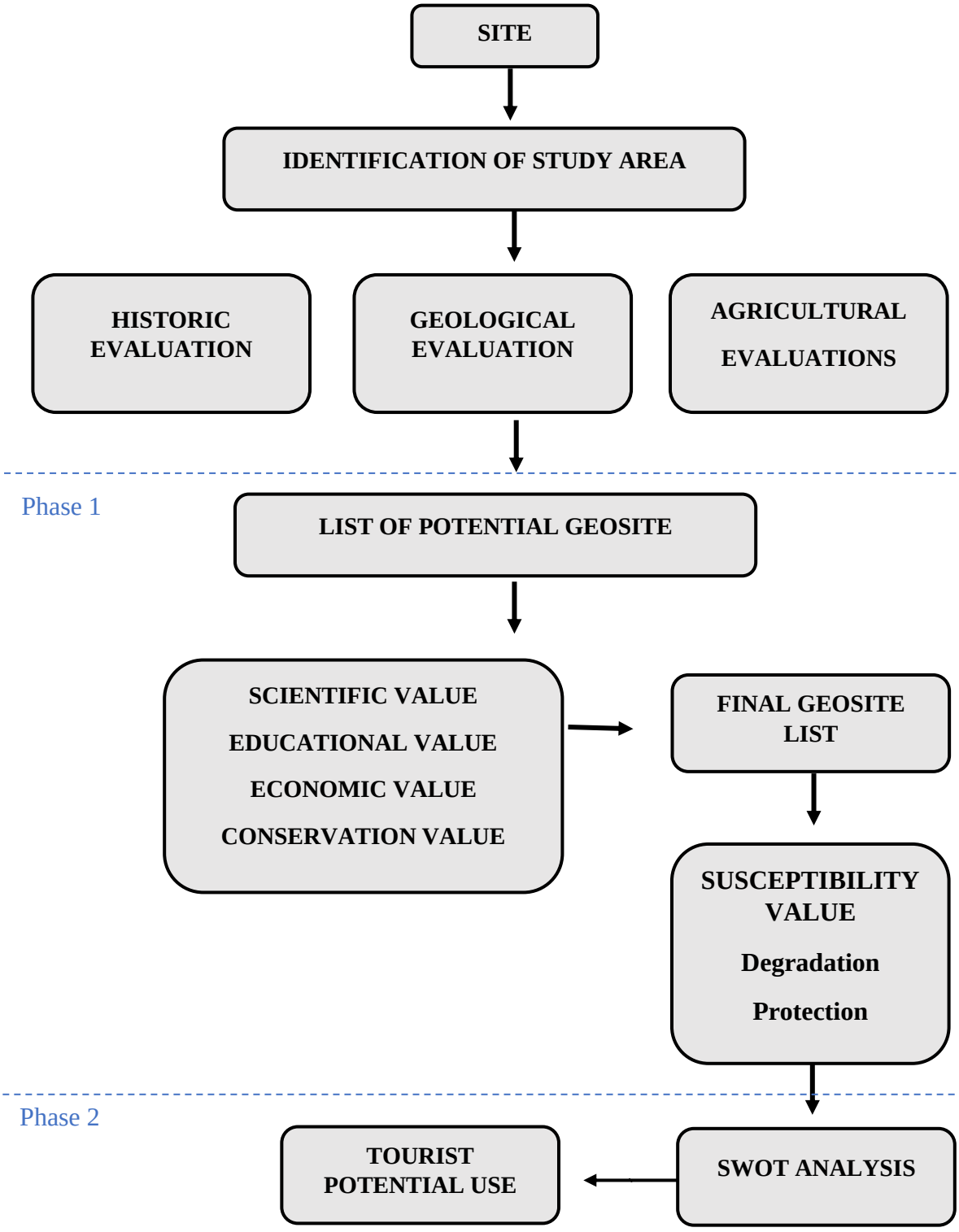



*Figure 3-2 Methodology*

Geological history is a symbol and a link between geological features of enormous regional and global significance. Sustainability and reduced consumption are also encouraged.

Each indicators refined here enhances the level of understanding and developing a geosite for geotourism.

Through this evaluation of indicators anyone can understand and analyse the basic needs and enhance the growth of future tourism in any geosite. this also includes nearby sites which has major importance in cloud infrastructure creation.

Such infrastructures make major connectivity among different tourism sectors and enhances the economy.

# CHAPTER 4 : DELINIATION OF THE REGION, HISTORY, EVOLUTION

## 4.1 INTRODUCTION TO THE STUDY AREA, ANGADIPPPURAM

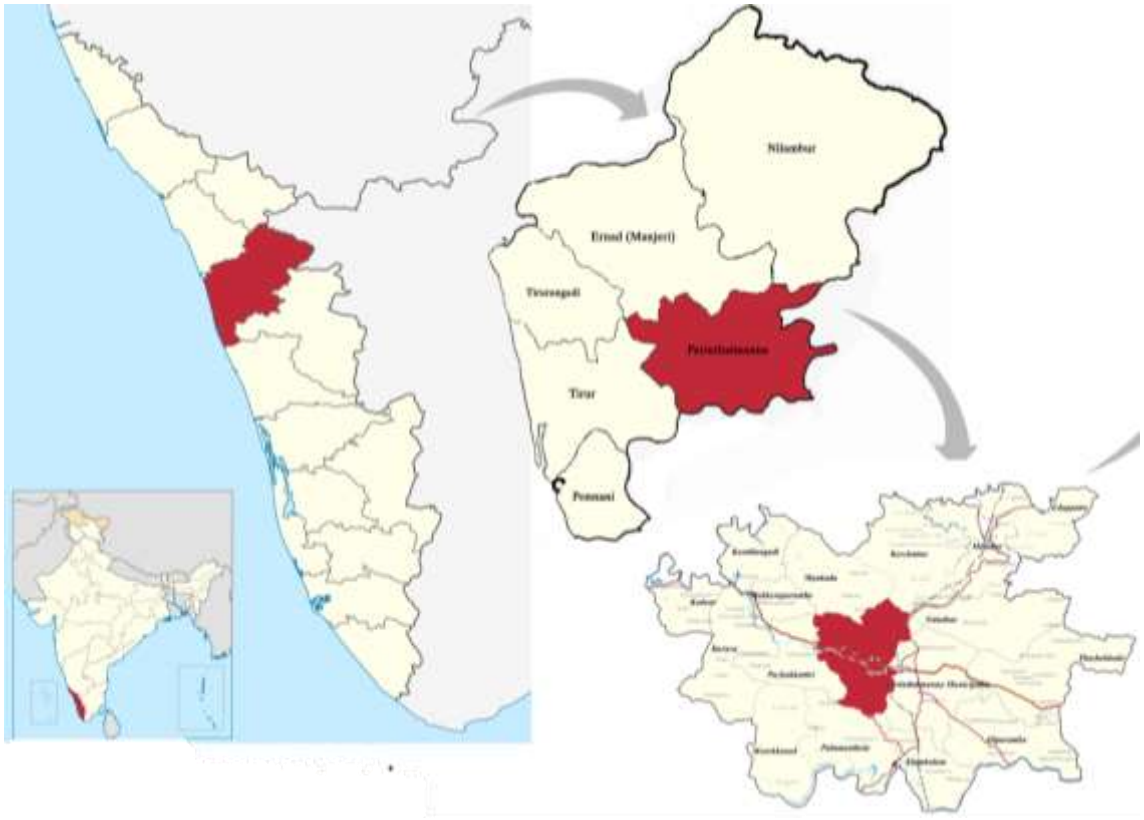



*Figure 4-1 Delineation of the study area*

### 4.1.1 About the study area: -

The town of Angadipuram is located in the Malappuram District of Kerala in southern India, and it is a prominent suburb of the nearby town of Perinthalmanna. During mediaeval times, the mighty kingdom of Valluvanad called this city its capital. A classified Go-heritage monument, Angadipuram Laterite is another point of interest in the town. The Thirumandhamkunnu Temple and the Tali Mahadeva Temple are two of the most well-known landmarks in Angadipuram. The town lies on National Highway 966 between Kozhikode and Palakkad, and Angadipuram Railway Station is a key stop along the Nilambur-Shornur Line in the Palakkad Division of Southern Railways. This line links the area to the cities of Kochi and Thiruvananthapuram.

**Geography**

The streamlet Cherupuzha forms the northern limit of the settlement. There are hills towards the south. Perintalmanna Village forms the eastern border. Valambur Village forms the western border.

**Geo Tourism in India**

Geo tourism in India has a lot of potential both domestically and internationally because of the country's diversified landscape. Of late, the country has put lot of efforts to promote its rural and even remotest hinterland. Some of India's lands of gone through years of geographical and climatic processes. These areas are storehouses of interesting geographical features. Because of their unique aesthetic features, these places not only attract geo-enthusiasts, but also general tourists. The Geographical Survey (GSI) of Department has already identified 26 such geo tourism locales and named them as National Geological Monuments. GSI has undertaken the responsibility to protect and promote those locations.

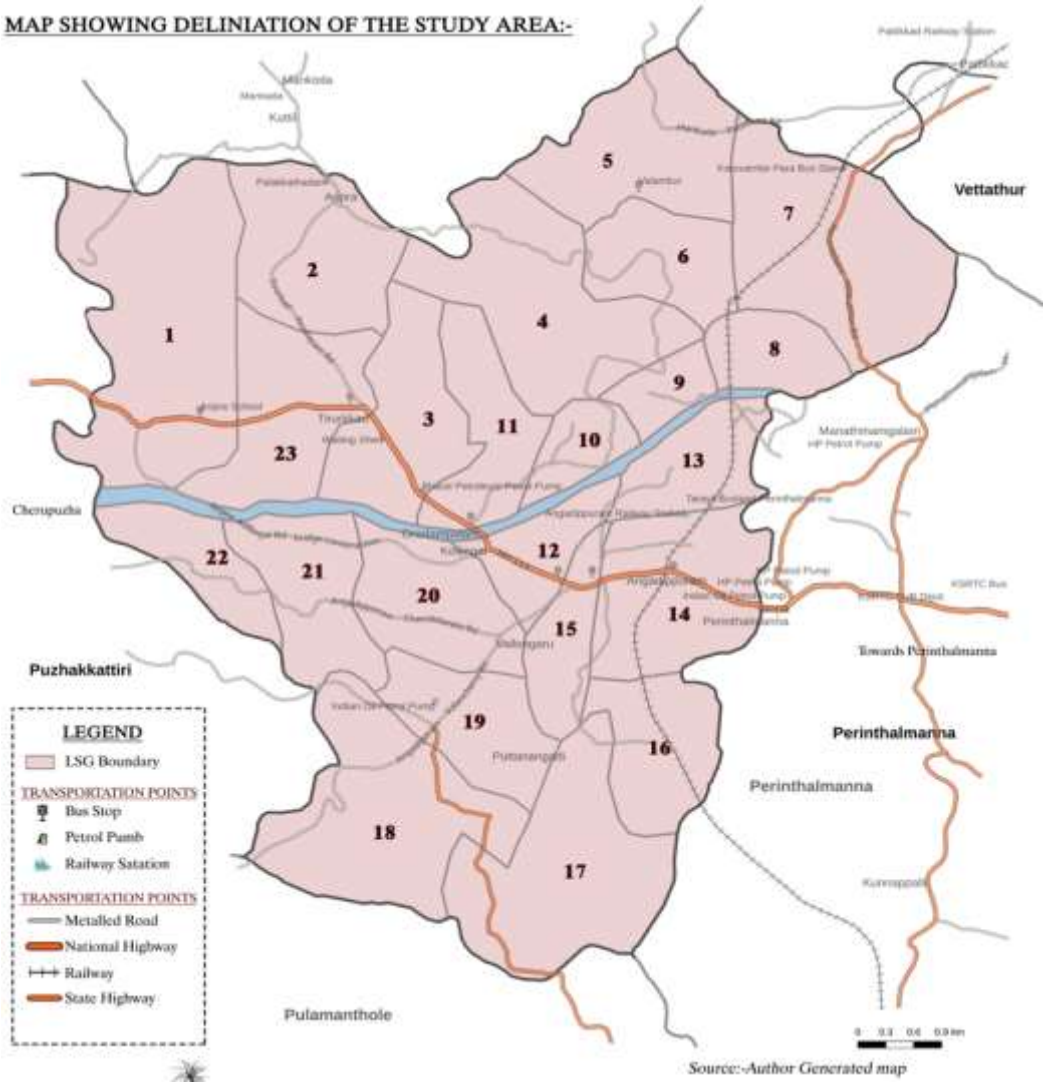



*Figure 4-2 Map of the study area*

*Table 4-1 Angadipuram Panchayat basic data*

| ANGADIPURAM GRAMA PANCHAYATH DETAILS | |
|---|---|
| Area in Sq. Km | 38.50 |
| Population | 56,451 |
| Density of Population | 1466.26 |
| Wards | 23 |
| No of house holds | 11,712 |
| Male Population | 26,582 |
| Female Population | 29869 |
| Literacy Rate | 97% |

*Figure 4-3 Laterite Quarries*

## 4.2 Regional connectivity, transport

The town ranks high among Malappuram district villages in terms of population. Traditions abound, and the tourist industry is growing.

In addition to the Thirumandhamkunnu Bhagavathy Temple, the Tali temple, located close to the highway, is also an important pilgrim site in the area. The holy shrine of Puthanangadi, located only 2 kilometres outside of town on the Valanchery road, is another site of consolation for the crowds. Malabar's temple town is now often referred to as Angadippuram.

Sree Thirumandhamkunnu temple and Thali temple are only two of the numerous Hindu places of worship in the area.

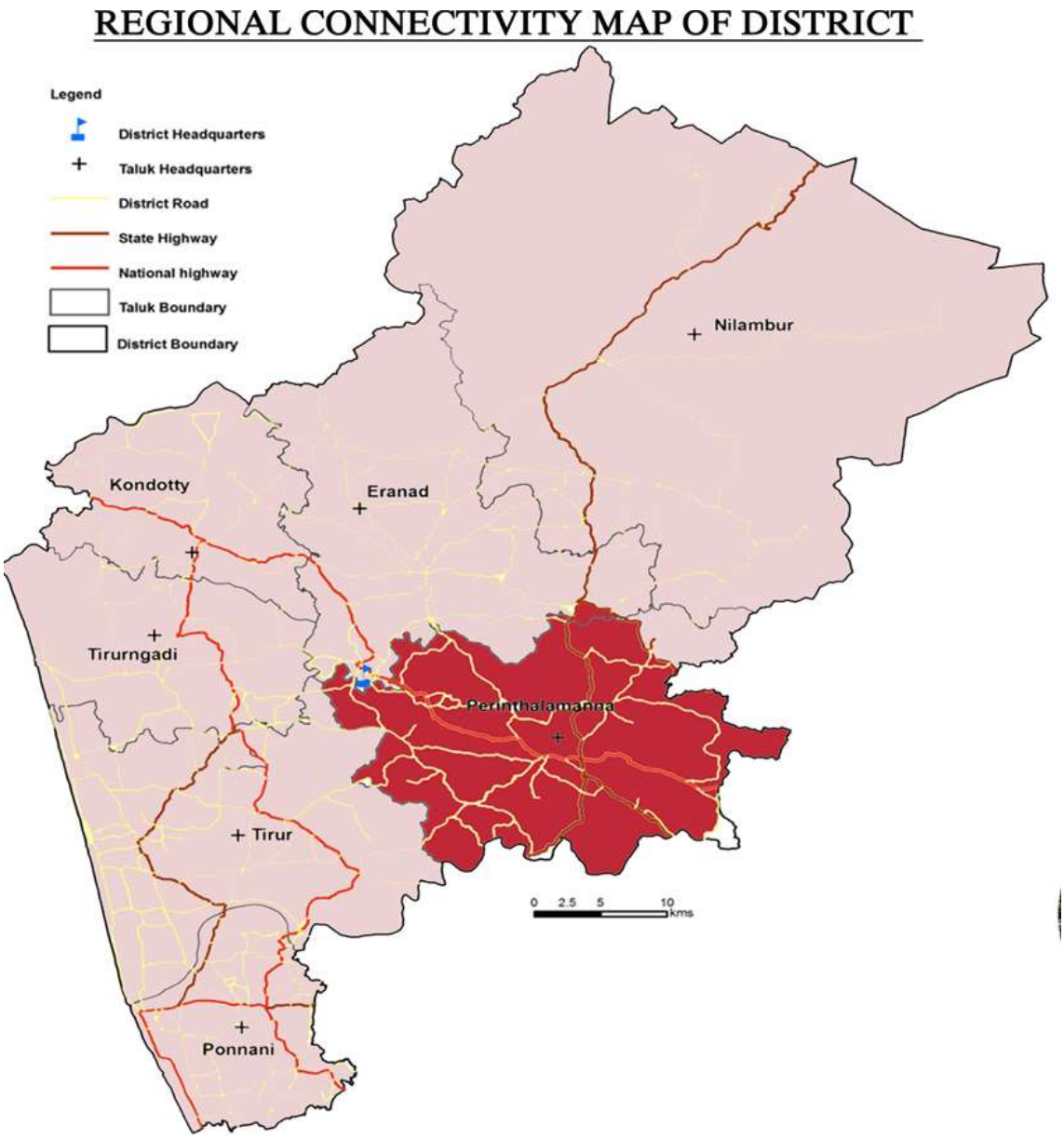



*Figure 4-4 Regional connectivity map of district*

**Railway**

The Nilambur-Shoranur line stops heavily at Angadipuram, one of the most important stops along the route.

From here, you may get a train to Nilambur, Shoranur, Palakkad, Kottayam, or Kochuveli.

**Road**

The National Highway 966 connects Kozhikode and Palakkad, and Angadippuram is right there.

In Angadippuram, you may connect to the NH 966 from State Highway 73, which runs between Valanchery and Nilambur. State Highway 60, which begins at Angadippuram and continues all the way to Cherukara, is just as significant as the Kottakkalal-Perinthalmanna route, which connects to SH 73 at Vylongara.

**Air**

The nearest airport is Calicut (Kozikode), 50 kilometres (31 mi) away.

Angadippuram railways

Angadippuram Over Bridge

Thirumanthankunnu Bagavathi Temple

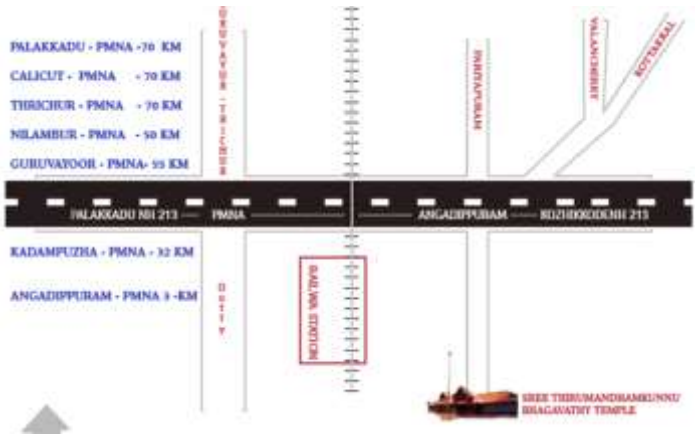



*Figure 4-5 Route map to temple*

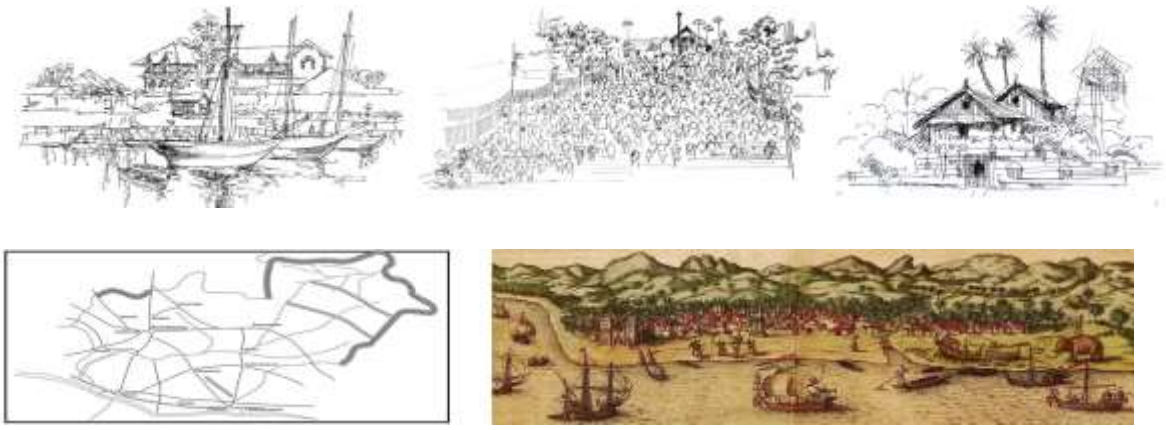


*Figure 4-6 historical buildings sketches*

Angadipuram was the capital of Valluvanad. The historical Valluvanad, a princely kingdom in what is now Kerala, included the area between the Bharathappuzha River in the south and the Panthaloor Mala in the north. The Arabian Sea near Ponnani formed its western boundary, while the Attapadi Hills to the east served as its eastern limit.

Angadippuram is known as a "temple town" due to its abundance of religious buildings.

The town is home to around a dozen different temples. Once upon a time, the lords of Valluvanad constructed the magnificent temple known as Thirumandhamkunnu Bhagawathy. The Valluvokonathiris consider the temple's statue of Bhagavathi to be their kuladaivam, or family deity. This shrine has recently risen to popularity.

The ancient state of Valluvanad functioned as a princely state. In 1320, the title deed Veeranghava was presented in the presence of the monarch of Valluvanad. In the years after Cheraman Perumal's (1320–1342) death, the kingdom of Kerala was partitioned among the kings of the realms of Thiruvanthamcoore, Kochi, Kolothunaadu, Kurumbanadu, and Valluvanad. The title of king in Valluvanad was Valluvakkonathir. The Valluvakkonathiri was the oldest member of the Ayirazhi, Kadannamanna-aripra 'Kovilam.' Kuruvaand, then Angadipuram, have both served as capitals of Valluvanad at various times. For obvious reasons, the region controlled by the Valluvakkonathiri eventually became known as Valluvanad. A region of the Chera Perumal empire in central Kerala. One of the Chera Perumal chiefdoms, Valluvanad was a part of their larger realm (until the 12th century). In Valluvanad, the chieftain, known as the nadu-udayavar, asserted his position by blood ties. The chiefdom's military organization, known as the

"aru-nurruvar," was known as "The Hundred" (the Six Hundred). Historically, the Vellattiri chieftain (the udayavar) had suzerainty over a broad area in central Kerala.

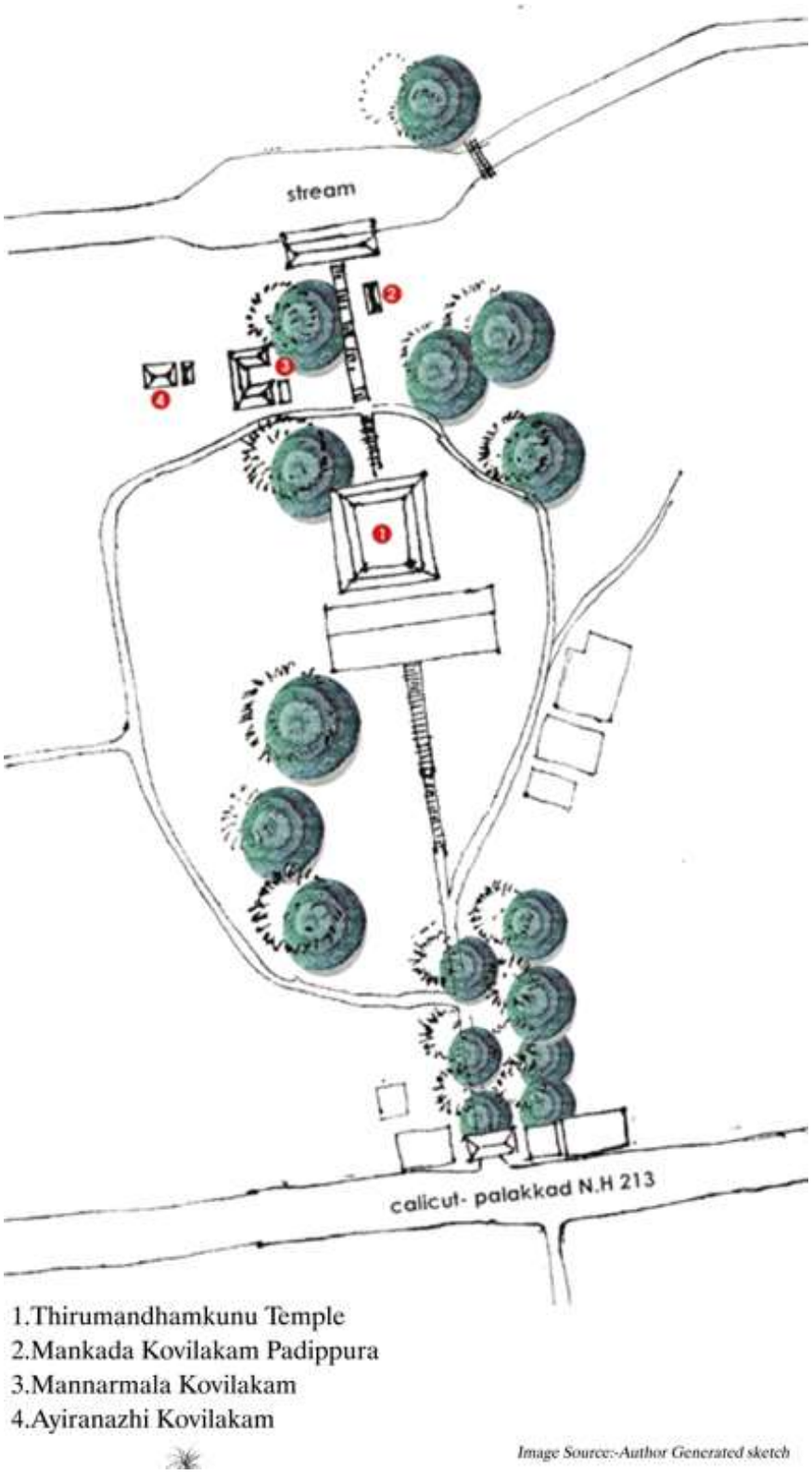



*Figure 4-7 Aerial view of the temple*

## 4.3 IDENTITY OF PLACE, IMAGEABILITY

### 4.3.1 Thirumandhamkunnu Bagavathi temple

*Figure 4-8 Thirumandhamkunnu Bagavathi temple*

Former Valluvanad lords erected the Thirumandhankunnu Bhagawathy Temple. The Valluvokonathiris consider the temple's statue of Bhagavathi to be their kuladaivam, or family deity. This shrine has recently risen to popularity.

**Thirumandhamkunnu temple history**

The old and well-known Mahakshethra of Thirumandhamkunnu Bhagavthy may be found in Kerala. There is no more important Bhadrakali temple than this one. Angadippuram, which is in the Malappuram district, is home to this sacred structure. The temple has a commanding presence due to its prominent location on a hilltop. A devotee's memory of this site will always be infused with the tranquility, peace, and beauty that it provided during their visit.

Surya dynasty king Mandhatha governed the land for a very long time. He abdicated to his heirs and spent his time in meditation, eventually reaching the feet of Lord Siva. The god Siva, delighted with the king's sacrifice, came to him and promised him whatever wish he might wish for. The monarch beseeched the gods for an image he could adore till

his death. After he became overly attached to the Siva linga in Kailas, Siva handed it to him. Before his disappearance, Parvathy and the other devotees of Siva would worship this linga. By descending from Kailas with the Siva linga on his head, mandhatha eventually arrived at the summit of the hill presently known as Thirumandhamkunnu. Water from a pure spring seeped down the hill's northern slope. The forest was alive with the sounds of its many colorful birds. Even usually hostile species like lions, tigers, and elephants got along well and explored the wilderness together. Various tree and plant species flourished there, filling the air with their pleasant aromas. The monarch was charmed by the scenery. He dropped the heavy linga off his head and watched as it promptly became embedded in the dirt.

During the time when the king's queen, Parvathy, was in the bath, Lord Siva presented him with the linga. The Siva linga was missing when Parvathy arrived to worship. When told that her husband had given it to King Mandhatha, she became irate. As a result of her emotional attachment, she demanded the return of the linga. Siva told her he didn't mind if she went after it again.

Parvathy then pleaded with bhadrakali and a swarm of bhoothas to retrieve the Siva lingam from the monarch as quickly as possible. Kali, accompanied by the Bhoothas' army, made it to the hill of Thirumandha's northern slope. The Linga that Mandnatha had set up shone so brightly that the kali and bhoothas could not see to climb the hills. Therefore, they began tossing weapons up the slope from the base. Ascetics protecting Mandhatha sought to defend him with everything they could find, despite being unarmed. Seeing that these measures were ineffective, they therefore resorted to hurling the many Attanga nuts they had harvested from their creeper vines. The nuts were quickly transformed into arrows thanks to the mandra power of Mandhatha and the blessings of Lord Siva. After fighting for 15 days, Kali and her Bhoothas were defeated

Traditions like "ATTANGA YERU" on the first day of the Malayalam month Thulam, on the new moon day of that month, in the morning before the pantheerady pooja, alludes to the mythical battle between the goddesses Kali and Mandhata.

Mahamaya, anticipating loss, put on her viswaroopa. She was wearing a pair of earrings that resembled animals: an elephant in one ear and a lion in the other. Upon beholding this shape, the ascetics collapsed in a daze. Mandhatha felt powerless as well as

mahamaya in this form reached the peak. He enthusiastically welcomed the sivalinga kali and then used force to seize it. As a result of the ensuing conflict, the linga was effectively divided in half. Jyothis (light) emanated from it, and the "THRIMOORTHIS" (Brahma, Vishnu, and Siva) and Parvathy made an appearance. This idol is extremely special to me, as Parvathy shared with Mandhatha. Nonetheless, I cannot go against my husband's desires and take it from you. I have a hard time being apart from it, too. That linga is calling me, and I intend to answer. Kali, my daughter, is just like me. True, she arrived here before I did. I would want her to be placed next to me, facing north, and all of the necessary poojas and festivals to be observed. Consequently, the same parvathy vanished inside the statue. SREEMOOLASTHANAM is the name of this location. This sivalinga is still in the broken state. While performing abhisheka prior to ushapooja and "Malarnivedia" to the god, its location below the "peedam" and the "Prabhamandalam" is revealed

Parvathy had Sapthamathrukkal, Veerabhadran, and Ganapaty, together with Bhagavathy, set up so that they faced north. The term for this is "Mathrusala." We honor her with celebrations like Pooram and Pattu.

Infant Ganapathy was there to greet Sree Parvathy when she made her appearance. The sreemoolasthanam temple now has this baby ganapathy as well.

Once again, Sree Parvathy was seen looking westward. Sivalinga statues at Sreemoolasthanam were positioned such that their eastern faces faced the sunrise. The need for two darshan entrances, one facing east and the other west, arose for this reason. Most of the time, the western door is kept closed by the family descendants of "Valluva Konathiri," except during darshan. Other believers may get a glimpse of the deity via the two apertures on each side of the entryway. However, the rules have changed recently. The door is left open for some time after each pooja so that worshippers may get darshan, or a glimpse, of the god

For a long time, Mandhatha resided in thirumandhamkunnu, where he practiced thapusu and meditation. When the moment came, he realized he had to leave this world. He was contemplating hiring someone to preserve the temple in pristine condition when two Brahmins showed there. Mandhatha confided in them the shrine and its upkeep by sharing his wishes and handing them a Grandha with rituals to follow. Then, using his yogic skills,

he withdrew to the nearby forest, which is now called KUKSHIPPARAKKAD, and ceased to be a part of mortal society. Bhakthas who make a pilgrimage through the forest do so by carefully selecting a leaf from one of the many species there and wearing it as a hair ornament. The rainforest here is still a protected habitat. An idol of mandhatha was recommended to be placed here and poojas were recommended to be done at the 1959 Devaprashna. To prepare for the Malayalam month's pooja, the temple's priests. The midday puja on Mandhatha dedicated to Chithra is a yearly tradition steeped with importance.

One of the two Brahmins responsible for the temple's care became known as "KATTILLAMUTTAM" because he removed the forest that had grown up around the idol. The second pavilion, used for prathishta, was dubbed PANTHALAKODE. Both of these lineages have produced the thanthri of thirumandhamkunnu temple. One of the nair karyasthans that accompanied them was granted the honorific of "chathathumarar" and given the responsibility of blowing the sacred conch at the temple. They broke the news to Vadakkara swaroopam raja, who at the time was a subordinate chieftain of Valluvanadu Raja and went by the name mannarmala raja. He hastened to the location, and the goddess stood to pay her respects upon seeing the hill's ruler. This modesty of Devi, the protector of three realms, caused the raja to blush, and he begged the goddess to accept him as her son. Following this, he offered an elephant to the deity and stood in its shadow as a form of devotion. The custom was continued by his offspring. Even today, mannarmala raja is not allowed to have direct darshan of thirumandhamkunnu Bhagavathy.

When the first Vallavaraja assumed power, he left the temple's care and maintenance to the local feudal lords (known as "ETTUVEETIL ACHANS") in exchange for their loyalty. Kavudaya nair was developed from Erukalikara nair. Sreemoolasthanam's lack of a roof is proof that it was formerly a kavu.

Illustrations on the walls of the mathrusala provide some illumination on this myth. These paintings were completed in 1944 and are found in laying with the wall painting at suchindram, Pundarikkapuram, vaikom, and Guruvayoor.

**FESTIVALS**

Kalampattu begins on Vrischikam Ist and continues for eleven days until the Pooram festival in Meenam, which begins on the twenty-first day of the lunar month (beginning on the star of Makaiyram). Laksharchana is performed at Sreemoolasthanam, and Mangalya pooja is performed on the Ist Friday of Thulam.


*Figure 4-9 Festivals of Angadipuram*


*Figure 4-10 Festivals*

### 4.3.2 Angadipuram Thali Temple - Sree Tali Mahadeva

Angadippuram About 200 yards from the Thirumandhamkunnu Temple is the Tali Sree Mahadeva Temple at Angadipuram. This sacred structure is one of Parasurama's 18 Tali temples, all dedicated to Shiva.The temple now situates in 19 cents of land. When the rule of Thaliyathiri got into an end the Thali temples also lost its glory. It was during Tipu's invasion that this temple also got attacked. But they didn't destroy the Siva Linga and Peedam. After the invasion Thali temple went unattended and afforested.

*Figure 4-11 Angadipuram Thali Temple - Sree Tali Mahadeva*

Angadipuram Thali temple, also known as Sree Tali Mahadeva kshetram, is located at Angadipuram, around 3 km from Perinthalmanna, in Malappuram district, Kerala. Shiva is worshipped in the form of Shivling. The Upa Devata in the temple is Ganapathy. The annual pratishta festival in the temple is held in Malayalam Meda Masam on the Vishu day.As per history, initially there was only a Shivling located amidst a number of Kanjiram Maram (trees). The temple was attacked and ransacked by Tipu Sultan.

The main festival observed in the temple is Shivratri. The temple is now governed by Thali Kshetra Samrakshana Samiti.

**Angadipuram Thali Temple Agitation**

Angadipuram Thali temple agitation is an important event in the history of Kerala. This agitation led to Aradhana Swathanthryam. Muslims and the communist government were against the renovation of the Angadipuram Thali Temple.

Angadipuram Thali temple agitation was led by K Kelappan on November 16, 1968 during the renovation of the temple. This agitation led to the formation of Malabar Kshetra Samrakshana Samithi on November 25, 1968.

In memory of this important agitation, Aradhana Swathanthryam day is observed in the temple on November 25 annually.

### 4.3.3 Chaver Thara

*Figure 4-12Chaver Thara*

Chaver Thara - Historical landmark in Pariyāpuram, India. The birth place of the warriors of chavers (suicide squards), who scripted a chapter of delirium to the pulsating history of Mamankam, a duo-decennial festival and trade fair held on the banks of Nila River in Thirunavaya in north of Kerala. Thirunavaya is a tiny hamlet in the Malappuram District of Kerala, India, on the banks of the river Bharathapuzha or Nila. Formerly the seat of the Kingdom of Cochin, it fell under the control of the Cochin (or Cochi) royal dynasty known as the "Perumpadappu Swaroopam" until being conquered by the Kozhikode monarch Saamoothiri (Malabar).

The magnificent "Mamankam" Festival, a celebration and trade fair that lasted for 28 days and took place once every 12 years at the "Navamukunda Temple" on the banks of the "Bharathapuzha" river, also made "Thirunavaya" well-known. One of the oldest and most well-known fairs and festivals in Kerala, "Mamankam" has been celebrated by locals and visitors alike since the medieval ages. Many merchants came from all around the regions that are now Kerala and Tamil Nadu to do business.

The rights to celebrate this event passed from one set of rulers to another when the kingdom of Kerala splintered into smaller and smaller kingdoms. These kings included the Chera monarch of Kodungaloor (Perumals), Perumpadappu Swaroopam, and finally the Vellattiri and Valluvanadu dynasties.

Then, from 1353 to 1361, "Saamoothiri," king of "Kozhikode" (Malabar), fought a series of small battles named "Thirunavaya War" to capture the small states nearby, including Thirunavaya; he forcibly took over the sole right of conducting Mamankam and proclaimed himself as the protector (Raksha Purusha) of these states and temple.

All the neighboring kings sent their flags to Saamoothiri when he began performing Mamankam to show their allegiance. While he watches Mamankam from a safe distance at "Nilapaadu Thara," the monarch of Valluvanadu used to dispatch a suicide squad of 18 individuals dubbed "Chaver" from various households in Valluvanadu to kill Saamoothiri. It was speculated that the Chaver warriors were from the following families: "Putumanna Panikkar," "Chandrath Panikkar," "Kokat Panikkar," "Verkot Panikkar," "Elampulakkad Achan," "Kulathoor Varier," "Uppamkalathil Pisharody," "Pathiramana Vellody," "Parakkatt Nair," "Kakkoot Nair,"

The remains of the Chaver who fought to the last end are said to have been buried in a nearby well called "Manikkinar," after having been crushed and covered with the assistance of elephants.

It is said that the final Mamankam took place in 1755, when a Chaver soldier called Putumanna Kandaru Menon from the household of Putumanna Panikkar, aged 18, gave the Saamoothiri a narrow escape. Regardless, the Mysore monarch "Hydarali" destroyed Saamoothiri in 1765, thereby putting a stop to the celebration.

At Thavanoor, on the bank of the Bharathapuzha River, there is still a banyan tree that is said to have seen all of the Mamankam Festivals.

The trading fair held over these 28 days are so economically significant for each kingdom, that it is widely thought that all of the kings of Kerala would get together to pick their emperor during Mamankam.No one, not even the Banyan tree, which was there, can give us the unambiguous truth.

### 4.3.4 Chengara Puthan Veedu Tharavadu

*Figure 4-13 Chengara Puthan Veedu Tharavadu*

The 125-year-old 'Chengara Tharavadu' in Angadippuram is one of the ancestral residences in Angadippuram. Puthanveedu family is one of the primeval families, from the district Malappuram, Kerala state located on the south coast of Arabian Sea.

t really becomes a preferred location of travelers who wish to see the living style of Kerala in cultural surroundings. Culture and heritage in modern Kerala have its roots in the

traditions of various small kingdoms and the efforts of individual families and faiths. The Puthanveedu clan has played a significant role in maintaining the cultural stability and historical dominance of the Keralites.

Sri.Kesava Tharakan, a land owner of "Valluvanad," constructed the "Tharavadu" of the Chengara Puthan veedu family.

The ancestors have dispersed to various locations, and Sri.P. Narayanan, the managing partner, is the current owner of the land (SPARC Group).

The "Tharavadu" has remained mostly unchanged for four generations, and it is situated in a beautiful, tranquil area with plenty of greenery and a relaxed atmosphere. Even on the warmest days of the year, the building's exterior remains comfortably cool.

Traditional Kerala architecture was adhered to in the construction of the "Tharavadu," a 'ettukettu' (with a double elevation plan and a nadumattam). All rooms have good ventilation and decorative brass cladding on the doors. All things give the attractiveness to the Mansion-house. The outside of the house is not covered with cornice works, and it has three stories made of laterate stones.

The elevated 'Purathalam' (sit out) on the front elevation, supported by massively carved Jack Pillars, is a distinctive design element. Most 'tharavadu' follow the traditional gender segregation of a two-room dwelling for men and women. The ladies have their own separate 'purathalam' at the back of the home, while the males have theirs in the front. There is a family 'Kulam' (pond) with two 'Kadavu' (Entry) (Entry). Men's and women's bathrooms are separate.

**The City of Angadipuram**

Angadipuram is the capital of south Valluvanad. The ancient state of Valluvanad functioned as a princely state. In 1320, the title deed Veeranghava was presented in the presence of the monarch of Valluvanad. Following Cheraman Perumal's (1320-1342 CE) death, the kingdom of Kerala was partitioned among the kings of Thiruvanthamcoore, Kochi, Kolothunaadu, Kurumbaadu, and Valluvanad. The title of king in Valluvanad was Valluvakkonathir. The Valluvakkonathiri was the oldest member of the Ayirazhi, Kadannamanna-aripra 'Kovilam.' Kuruvaand, then Angadipuram, have both served as

capitals of Valluvanad at various times. For obvious reasons, the region controlled by the Valluvakkonathiri eventually became known as Valluvanad.

The Thirumanthamkunnu Goddess Bhagavathi Temple and the Tail Lord Shiva Temple are two of Angadipuram's most well-known landmarks. One of the boards of the Puthanangadi Mosque is etched with Arabic lettering.

### 4.3.5 Mankada Kovilakam

*Figure 4-14Mankada Kovilakam*

The biggest of the three valluvanad royal family had its base here in this huge mansion established in 1852. The communal harmony of this town was well known and much talked about. The story goes that the entire Muslim population stood in front of this Hindu landlords' strong hold during the 'Mapplila revolt' during 1921.Mankada has myriad and illustrious contributions to the history of Northern Kerala as such.

Located in the Malappuram region of Kerala, the hamlet of Mankada is perched atop a hill. It is a part of the Malappuram parliament constituency and is situated 15 kilometers (9.3 miles) away from Malappuram. Located about 6.2 miles (10 km) away from you is the municipal town of Perinthalmanna. Manjeri and Malappuram, both of which are municipal towns, are just around 15 kilometers (9.3 miles) distant. Mankada The royal dynasty of the former Kingdom of Valluvanad resided at Kadannamanna Kovilakam.

During the early Middle Ages, Mankada was ruled by the Valluvanad Swaroopam dynasty (12th century CE). Their capital was the Kadannamanna Kovilakam in Mankada. The historical Valluvanad, a princely kingdom in what is now Kerala, included the area between the Bharathappuzha River in the south and the Panthaloor Mala in the north. At its height in the early Middle Ages, it was surrounded on the west by the Arabian Sea at Ponnani and on the east by the Attappadi Hills. Angadipuram, a city in present-day Tamil Nadu, was formerly the capital of the kingdom of Valluvanad. The Samanthan Nair Vellodis clan dominated Valluvanad, just as the Eradis ruled neighboring Eranad and the Nedungadis ruled Nedunganad. Valluvakonathiri/Vellattiri was the name given to the kings of Valluvanad. Legend has it that before setting out for Mecca, the last Cheraman Perumal king bestowed a wide swath of land in South Malabar to one of his governors, Valluvakonathiri. The region of Valluvanad was well-known for its annual Mamankam festivities and its never-ending conflicts with Kozhikode's Samoothiri.

### 4.3.6 Angadi Veedu

*Figure 4-15Angadi Veedu*

The houses provide shelter for traders in perithalmanna. So, the settlement is nearly in perithalmanna market (800M). The settlement is near to the railway station that help for transportation easily.

The nearest famous town in that time is Otta palam, Shornur,Nilambur & Pattambi are main traders in Perinthalmana. It is very adjacent of road.

### 4.3.7 Ayiranazhi Kovilakam Ettukett

Aiyanarazhi Kovilakam is located a few kilometers away from Mankada in Malappuram district (Mankada-Manjeri road) and a little further inland from 'Ayiranazhipadi'. This octagon has a history of over a hundred years. The Aiyaranazhi Kovilakam plays an important role in the history of Valluvanad.

*Figure 4-16Ayiranazhi Kovilakam Ettukett*

### 4.3.8 Paloor Kotta Waterfalls

*Figure 4-17Paloor Kotta Waterfalls*

A lesser-known jewel in Malappuram district, Paloor Kotta waterfalls is the dream of any traveller. This gorgeous two-decker waterfall flaunts a magnificent drop amidst a verdant landscape. It is secluded deep in the woods, and the leap of the waters offers all the drama in the forest. It is not just a natural wonderland, rather, the place has something to offer history enthusiasts as well.

### 4.4 Angadipuram Laterite

*Figure 4-18Angadipuram Laterite*

Angadipuram has a significant place in the history of laterites since it was here that a medical doctor named Dr. Francis Buchanan-Hamilton described them for the first time as "indurated clay," making them a prime building material. This study was published in 1807. Located in the Malappuram district of the southern Indian state of Kerala, Angadipuram Laterite is a designated National Geo-heritage Monument. Angadipuram

has a significant place in the history of laterites since it was here that a medical doctor named Dr. Francis Buchanan-Hamilton described them for the first time as "indurated clay," making them a prime building material. This study was published in 1807. Sedimentary residual products are a distinct geological entity that cannot be placed in the broader categories of igneous, metamorphic, or sedimentary rocks. The overall impression is one of pitted porousness. Named from the Latin word for bricks, "letritis," the term "laterite" was originally used by Buchanan in India. In Kerala, you may find this extraordinary formation perched above charnockite, leptynite, anorthosite, and gabbro, all of which are parent rocks of different compositions. Goa, Maharashtra, and certain parts of Karnataka all have it over basalt. Magnificent laterite formations are exposed on top of granite, shale, and sandstone in Gujarat in western India.

Apart from its usage as bricks in building construction, it has additional major economic worth, because it has been proven that laterites are closely juxtaposed with aluminum ore (bauxite), iron ore and nickel ore mineral resources in various regions of Kerala.

A monument offering information of the Laterites above a pedestal constructed of laterite

On the occasion of the "International Conference on Laterization" held in 1979, the Geological Survey of India (GSI) constructed a monument in Angadipuram (see image) to commemorate the discovery of the laterite formations.

Angadipuram's two most prominent temples, the Thirumandhamkunnu and Tali temples, have made it a popular destination for religious tourists.

**Geography**

Malappuram district, which includes Angadipuram, is located in northern Kerala and is bounded by the Wayanad and Kozhikode districts to the north, Tamil Nadu to the northeast, Palakkad District to the southeast and south, Thrissur District to the southwest, the Arabian Sea to the west, and the Kozhikode District to the northwest (see Kerala eco zones map). Although Angadipuram in Malappuram district is where you're most likely to encounter laterite, you'll also be able to locate this material throughout the state's central and northern areas. Aleppey, Quilon, Thiruvananthapuram, Kottayam, Trichur, and Cannanore are just few of the districts where it has been seen. Laterites make up over half of Kerala's varied topography, which has seven distinct landscape ecological zones.

This terrain consists of lateritic mesa, mounds, slopes, and ridges. This mostly laterite environment, which spans the state from north to south, is bounded by an elevation range of 50 to 150 meters (160 to 490 feet), however it may be found as high as 2,000 meters (6,600 feet). In addition, when you go inland from the coast to the east, you'll come across a variety of valleys known as home to rice paddies, coconut groves, and arecanut trees. The states of Karnataka, Maharashtra, and Gujarat are all believed to have laterite problems.

Large deposits of lateritic bauxites that have historically yielded a lot of the metal may be found in places like Australia, Brazil, Guinea, Guyana, Suriname, and Venezuela, among others.

# CHAPTER 5 : GEOGRAPHYIC FEATURES OF STUDY AREA

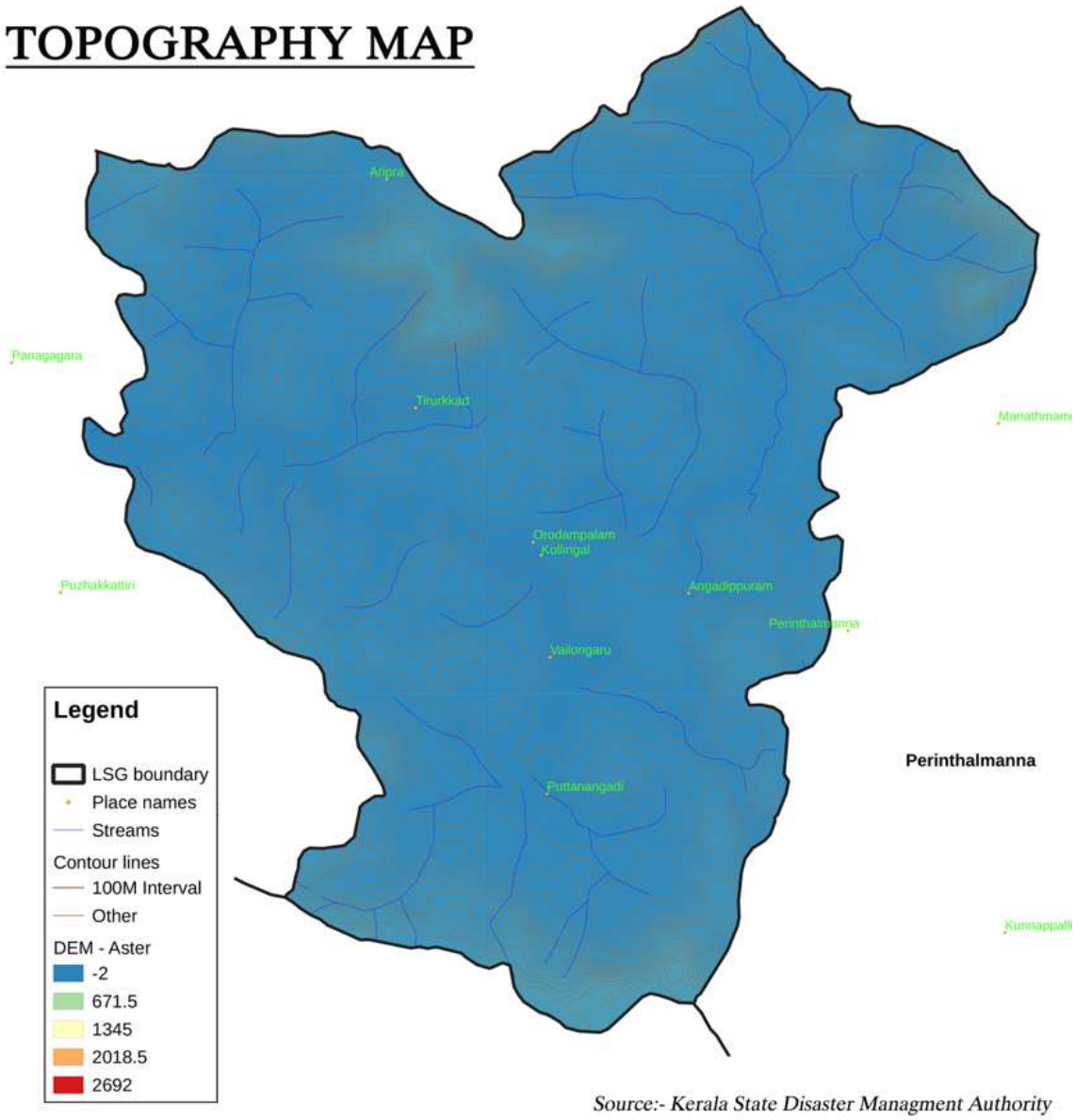



*Figure 5-1 Topography Map of Angadipuram Panchayath*

**OBSERVATIONS & INFERENCE: -**

Thirurkada region is with higher altitude when compared to the entire panchayath. The DEM map of this area is evenly distributed and is -2. Almost evenly distributed topography is scene.Angadipuram Panchayath, which used to be a commercial center in the intermediate region, is situated on a hillock, high plain, small slope, valley, plain and water (outside but market climbing area, steep source of livelihood).

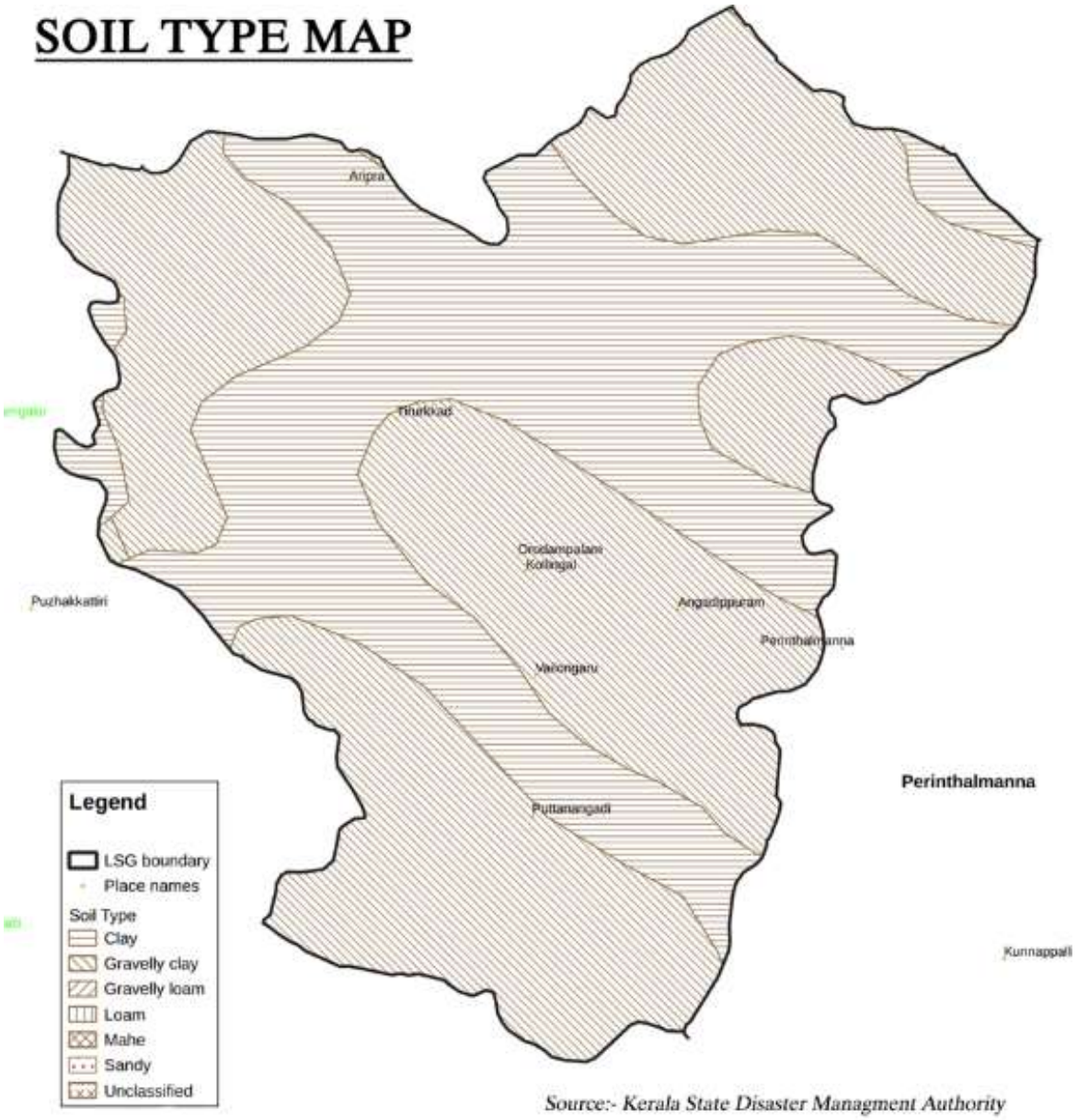



*Figure 5-2 Soil type Map of Angadipuram Panchayath*

**OBSERVATIONS & INFERENCE**

Due to the increase in population and the consequent increase in housing construction, the land is becoming fragmented and the area of arable land is declining. Paddy cultivation has become unprofitable. The lands are cultivated with vegetables, bananas and betel leaves. Extensive lands are being filled and houses are being built. Angadipuram Grama Panchayat is a village which was mainly dependent on agriculture. The land is hilly and plains with virippu, mundakan and puncha lands. The main soil types are this land and loamy loam.

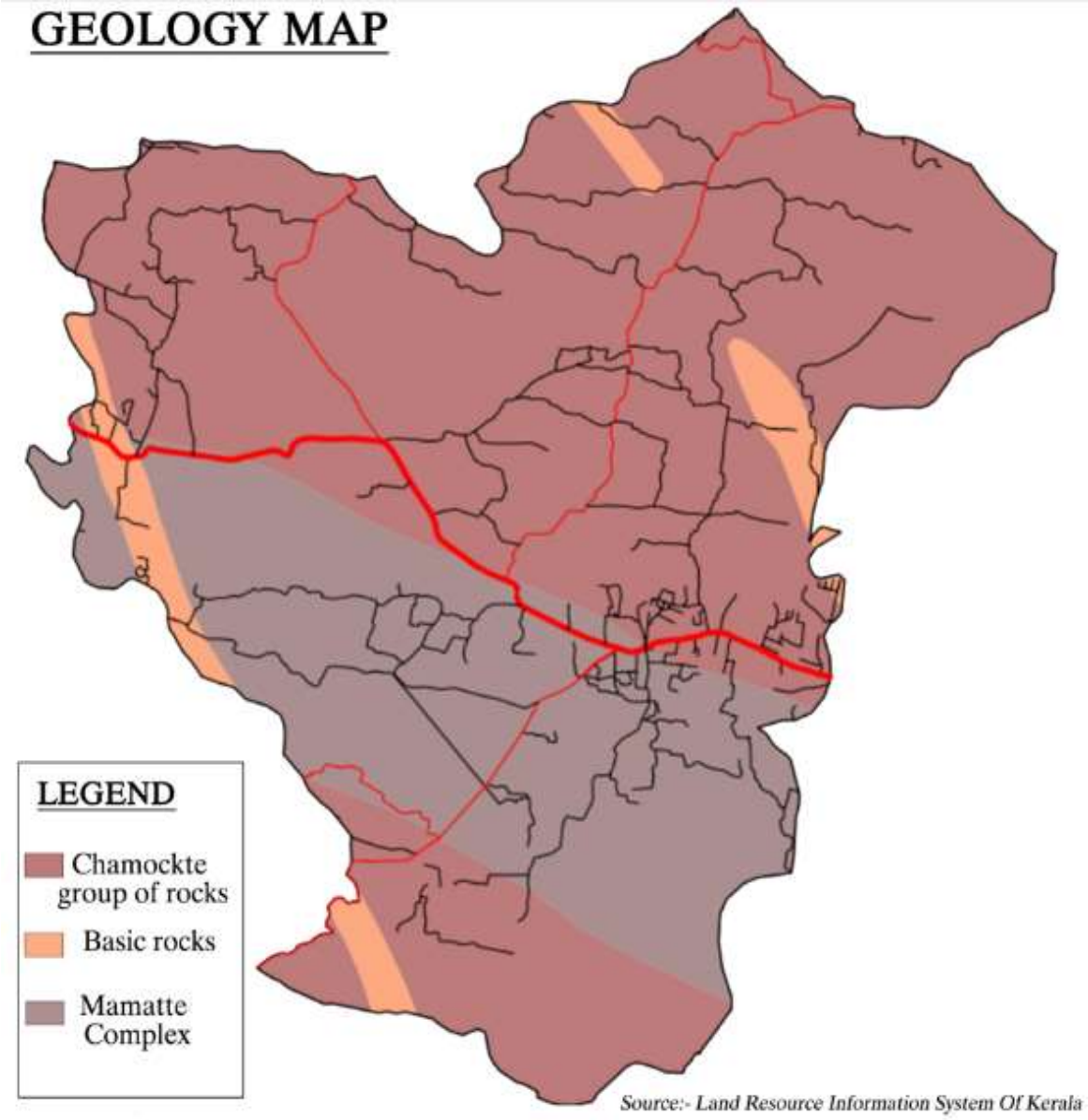



*Figure 5-3 Geology Map of Angadipuram panchayath*

**OBSERVATIONS & INFERENCE**

Agriculture is the main occupation of the people here. But as part of the gradual urbanization, the main occupation at present is in the construction allied sector. In the hinterland of the Gram Panchayat, the agricultural employment sector is still important. Basic rocks rarely scene. Most of the region is Chamockte group of rocks which is good for the cultivation and production of crops. The geology of Angadipuram has a major influence on the sector of agriculture. Mamatte complex is the next type and it is seen in the southern part of Angadipuram panchayath. Cherupuzha divides the entire panchayath into two and geologically it got divided into two.

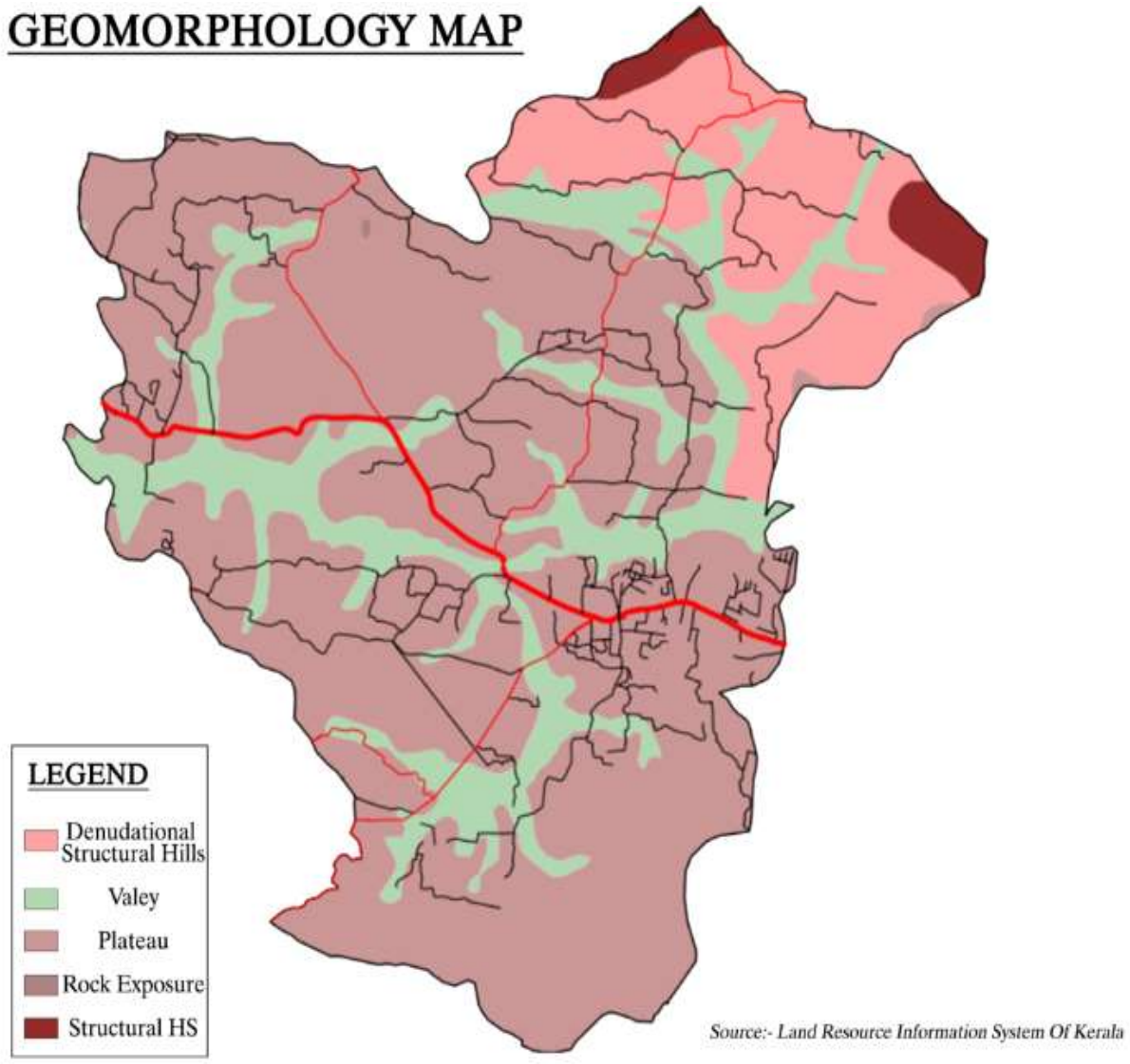



*Figure 5-4 Geomorphology map of Angadipuram panchayath*

**OBSERVATIONS & INFERENCE**

The landforms and surface and subsurface elements shown on geomorphological maps may be thought of as visual inventory of the terrain. This panchayath consists mostly of valleys and plateaus. It is possible to observe the valley by travelling via the cherupuzha area and its waterways. Denudational structural hills may be found in the northern area.

Denudation is a geological process wherein the height and relief of landforms and landscapes are reduced due to erosion by flowing water, ice, wind, and waves. In common parlance, erosion and denudation mean the same thing; the movement of soil and rock from one place to another. However, denudation really refers to the total of processes, including erosion, that result in a reduction of the Earth's surface.

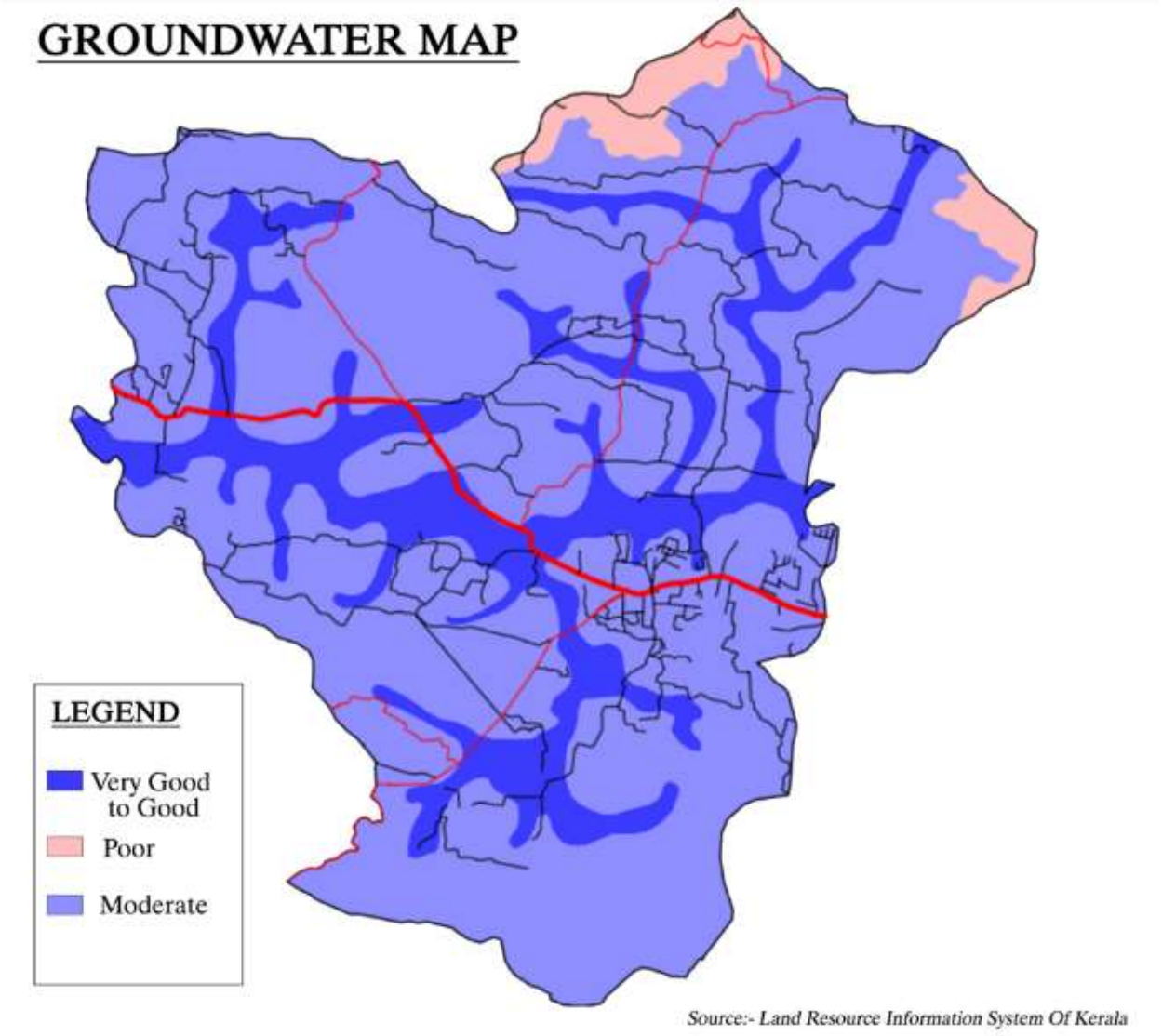



*Figure 5-5 Groundwater map of Angadipuram panchayath*

**OBSERVATIONS & INFERENCE**

The cherupuzha water body which is 4859 m, divides the panchayat into two parts. The long Cherupuzha and 97 ponds are the main water sources of the panchayat and the Poopalam Kollaram torrent also increases the water resources of the panchayat. From the Map, it is visible that the quality of the water is good near the cherupuzha which acts as the main source. Channel can be made in order to reach the hinterlands. Groundwater is of moderate quality for the panchayath. Drought issues are also faced due to a lack of reachability and availability. Measures to reach the hinterlands of the panchayath can be taken.

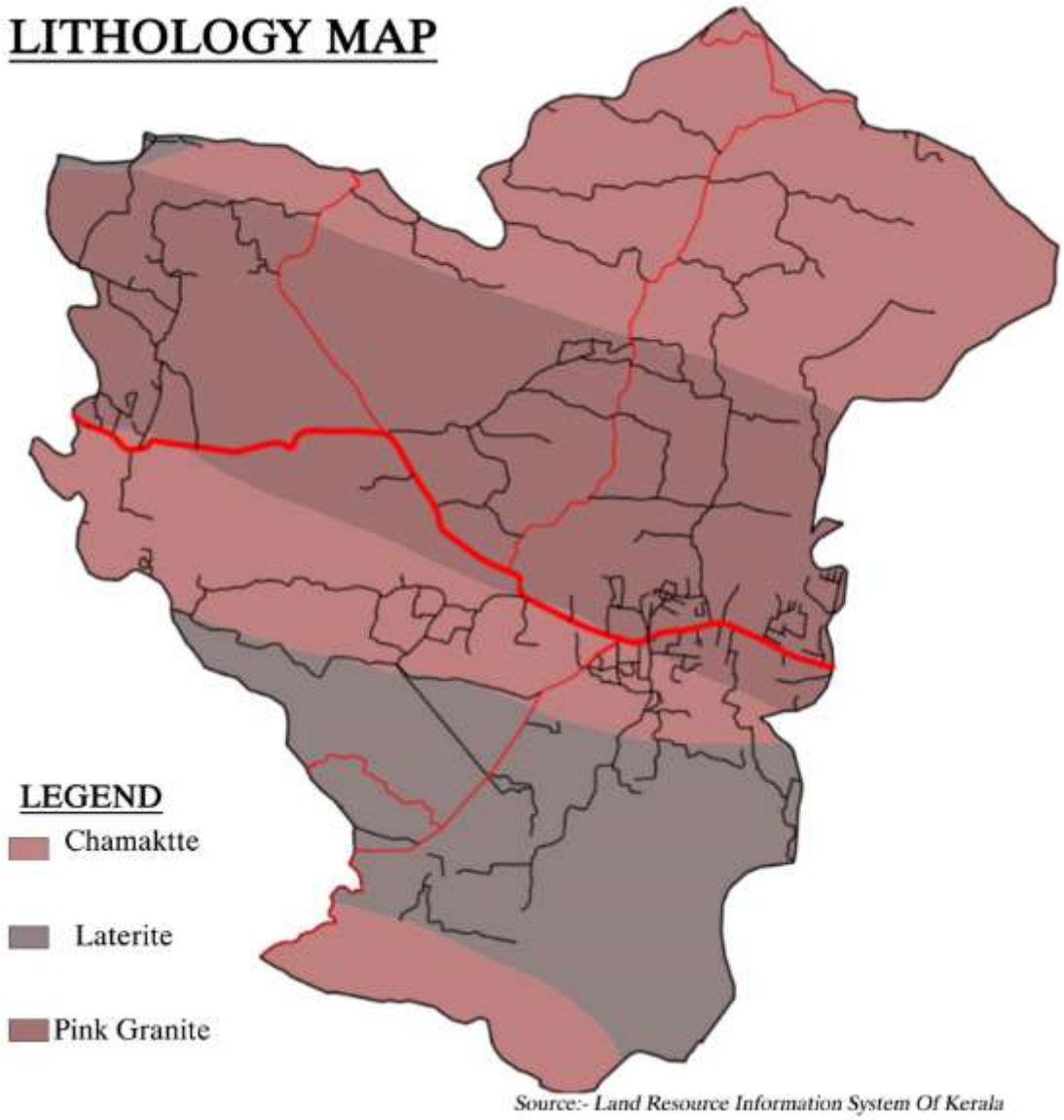



*Figure 5-6 Lithology map of Angadipuram panchayath*

**OBSERVATIONS & INFERENCE**

For geological reasons, it is necessary to create a map showing where rocks are located within a certain area. Researchers use ASTER data, spectral reflectance measurements of rock samples, and in-field observation to create a map of the lithologic units of the exposed rocks in the research region. History says that the presence of Laterite was more in this region and now at the present condition Chamakktte and Pink Granite's presence is more. Laterite presence is only visible in the southern region of the panchayath. Hence it is evident that the protection of such milestones has to be taken care of through geotourism and destination development.

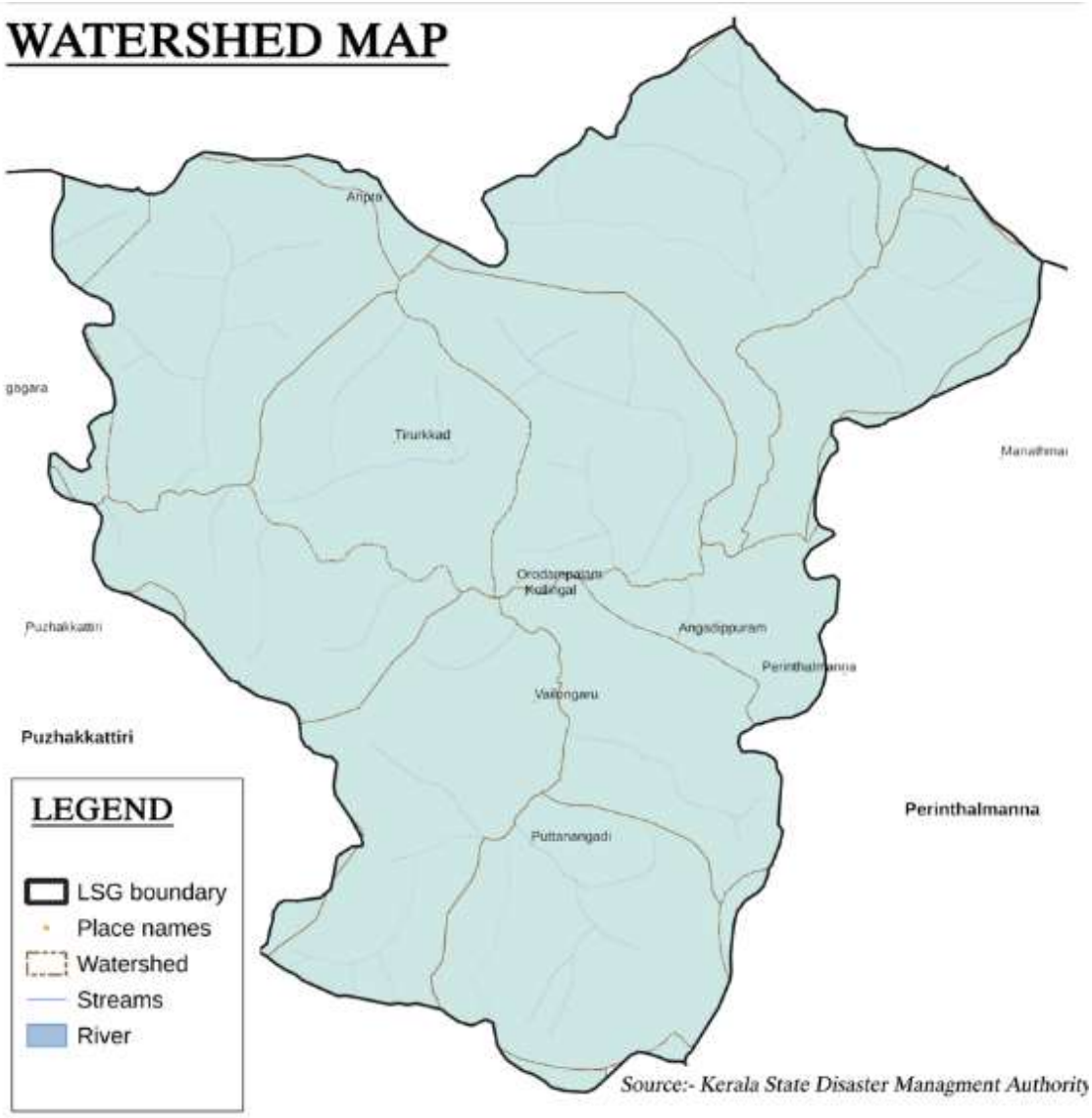



*Figure 5-7 Watershed Map of Angadipuram panchayath*

**OBSERVATIONS & INFERENCE**

The map shows that there are plenty of streams and water channels in this particular panchayath. Cheruppuzha whoch divides the panchayath in to half acts as the main stream. As the topography is higher at northern side it always runs towards south while it rails and rest passes through cherupuzha water body.


*Figure 5-8 Drought Proneness map of panchayath*

**OBSERVATIONS & INFERENCE**

In addition, the district's efforts during the last several years have borne fruit this summer. Marakkara, Muthuvalloor, Kondotty, Vengara, Tirurangadi, Wandoor, Thuvvur, Thrikkalangode, Areekode, Angadipuram, Moorkanad, Pulamanthol, Thazhekode, and Vettathoor are just a few of the grama panchayats and municipalities withinside the district which have been deemed very liable to drought. It determined seven water schemes being achieved via way of means of the Kerala Water Authority, in addition to 3,195 micro irrigation schemes and the cleansing of waterbodies being achieved via way of means of the Mahatma Gandhi National Rural Employment Guarantee Scheme, and numerous different fixes being proposed via way of means of the Kerala Water Authority.

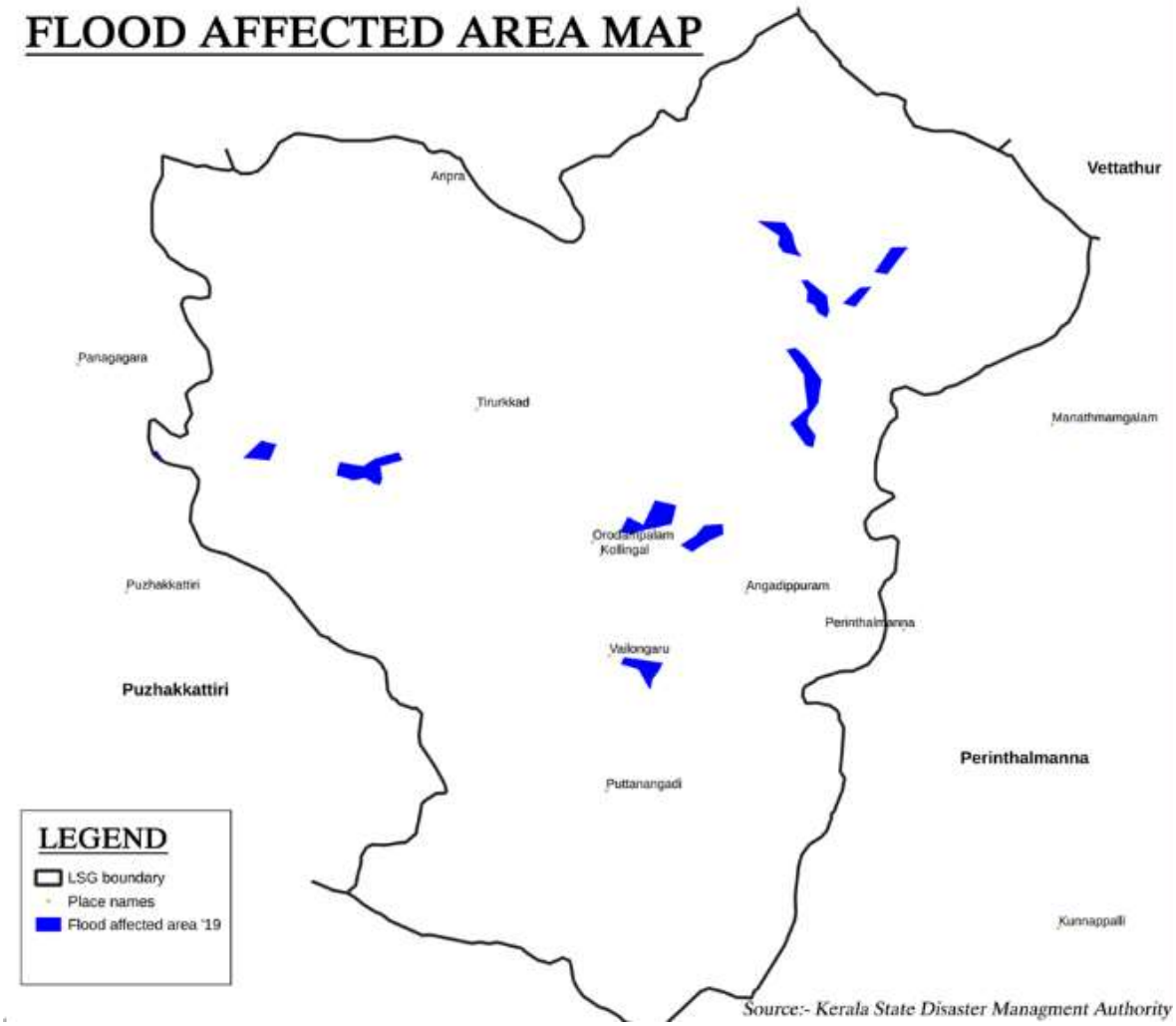



*Figure 5-9Flood affected area map of panchayath*

**OBSERVATIONS & INFERENCE**

The eastern section of the district was flooded due to flash floods caused by continuous rainfall and landslides in the steep forest regions. This is especially true in the cherupuzha area. Because to the rising water level, the Chaliyar river, which flows west along the Kozhikode-Malappuram boundary and empties into the Arabian Sea in Beypore, suffered the most damage.

# CHAPTER 6 : TRASPORTATION, PHYSICAL INFRASTRUCTURE AND TOURISM

## 6.1 Transportation Network of Panchayath

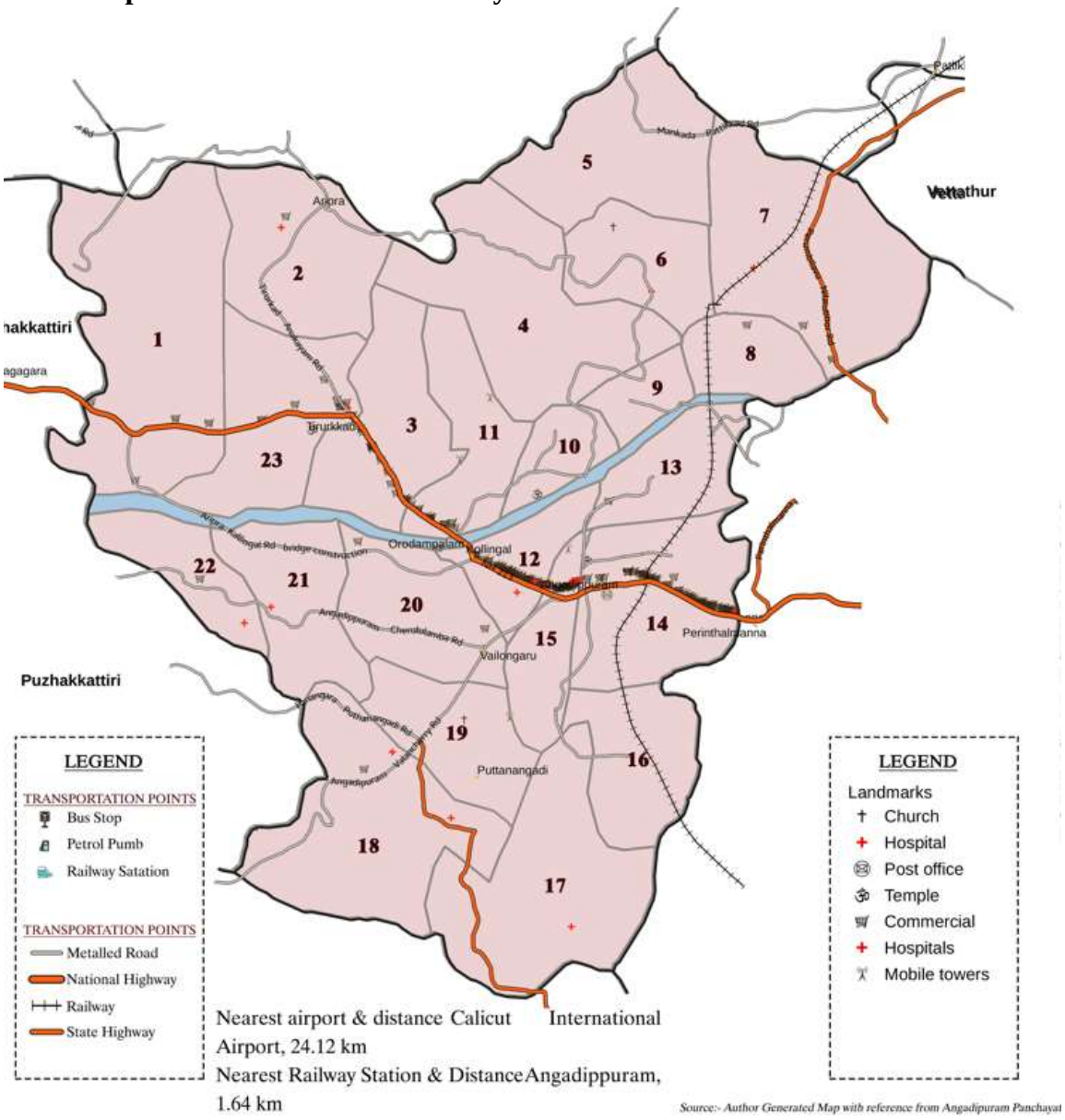



*Figure 6-1 Map showing Transportation network*

### Railway

The Nilambur-Shoranur line stops heavily at Angadipuram, one of the most important stops along the route.

From here, you may get a train to Nilambur, Shoranur, Palakkad, Kottayam, or Kochuveli.

### Road

The National Highway 966 connects Kozhikode and Palakkad, and Angadippuram is right there.

In Angadippuram, you may connect to the NH 966 from State Highway 73, which runs between Valanchery and Nilambur. State Highway 60 begins in Angadippuram and terminates in Cherukara; it connects to the Kottakkalal-Perinthalmanna route and State Highway 73 at Vylongara.

**AIR**

The nearest airport is Calicut (Kozikode), 50 kilometres (31 mi) away.

**OBSERVATIONS & INFERENCE**

Angadipuram is situated in the heart of the Perinthalmanna Taluk. Due to the geographical placement in the center. The accessibility is easy for this particular panchayath. The presence of the famous Thirumanthakunnu Temple and Thali Siva temple gives more prominence to this panchayath and its surroundings. The railway station is just 1km away from the temple. And it is the most convenient mode of transportation.

KSRTC and Private Buses are available for these particular spots. Hence accessibility doesn’t make an issue. The train timing is also convenient for the passengers who looks for one day trip

**Mass transit**

Lensfed has suggested a metro rail system for Malappuram (Licensed Engineers & Supervisors Federation). The concept took into account the expected growth of Malappuram's urban agglomeration, which would need a more extensive and efficient transportation network in the future. Lensfed presented eight main stations and nine intermediate stations to the government in April 2012, including three elevated stations at Malappuram Central, Kondotty, and Angadipuram. Calicut-Malappuram-Angadipuram is a planned rail route with a path that is quite similar to this one. In addition, the Calicut-Malappuram 'Urban Corridor' idea would be facilitated by a plan to expand the Kozhikode Light Metro Rail network to Malappuram during its third phase of growth. Original Kadalundi is the name of a small town in the Kozhikode district in the Indian state of Kerala. It's a little town on the Arabian Sea's shore. The bird refuge at Kadalundi has gained international renown. Locations in Kozhikode and Malappuram are in different districts. KadalundiNagaram, its original name, is a small town in Malappuram. Malappuram's Vallikunnu is included in KadalundiNagram.


*Figure 6-2 Proposed route for Metro*

Location: Mankada Block, Malappuram District, Kerala State, India. The region is part of the North Kerala Division. You may get there by travelling 20 kilometres due east from Malappuram, the district capital.9 KM from Mankada. 336 KM from State capital ThiruvananthapuramAngadipuram Pin code is 679321 and postal head office is Angadipuram. Perinthalmanna (2 KM), Kakkoth (4 KM), Ponniakurussi (4 KM), Mankada (7 KM), Keezhattur (8 KM) are the nearby Villages to Angadipuram. Angadipuram is surrounded by Mankada Block towards west, Pattambi Block towards South, Kuttippuram Block towards west, Malappuram Block towards west.

**Observations & inference**

Angadipuram is already known as the temple town of the Malappuram district. There are 12 famous temples in this panchayath. Historical relevance and cultural relevance give more value to enhancing destination tourism. The laterite stone which was meant for construction was first found in this area.

Geologically and culturally this site is best for geotourism development. As it follows those ABC-Concept. Tharavadus, Temples, Mosques, and geological beauty paves the

way for the development of tourism. Historical Flea Market Mamangam has begun from this panchayath which was the capital of valuvanad in the 18 th century.

**DRINKING WATER AND SANITATION**

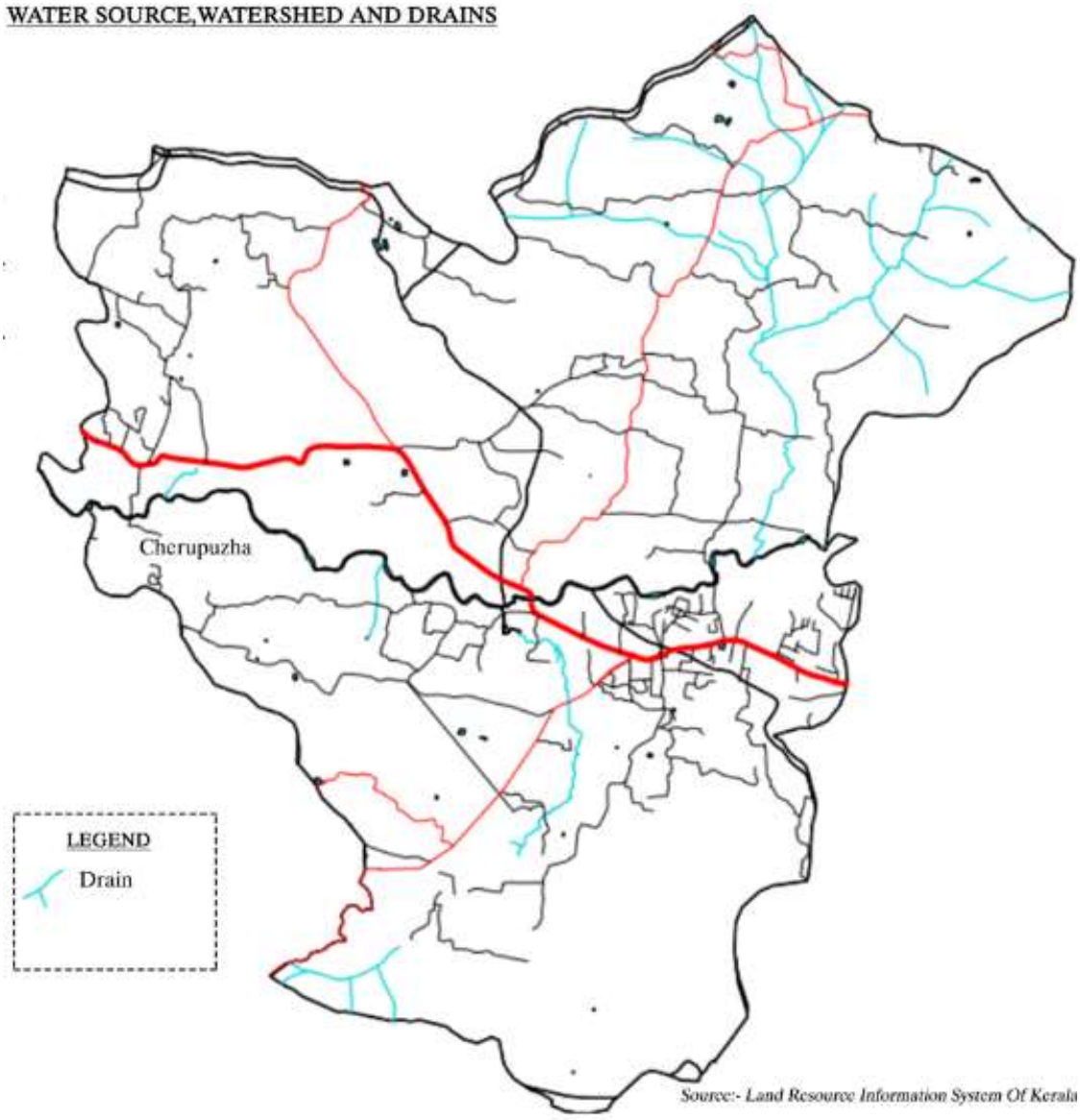



*Figure 6-3 Water Resource map*

**1. The present condition of the region**

Wells are the main source of drinking water in Angadipuram panchayath. 11712 houses Most households have their own wells. The rest are the ones who bring the cuttings from the neighbors and use them. From January to May, all the wards experience severe water shortage. Most wells are very deep and dry up in summer. Public wells. Wells, especially

in schools, are not cleaned from time to time. The water supply scheme has not been implemented anywhere in the panchayath. However, the Kerala Water Authority's plies have to be diverted from nearby Perinthalmanna to the Gram Panchayat's food storing areas. Rhea streams like the Charupuzha are a great help for irrigation and other purposes. But today such streams are full of waste. In summer, these streams dry up. Sewage from Perinthalmanna Munsipa area is also polluting the streams in the panchayat.

Plastic products are proliferating. Dimming in hygiene. Barren farmland is overgrown with weeds, which can lead to infectious diseases. Private individuals and plantations are overgrown, causing mosquitoes to breed. Awareness of the importance of personal hygiene

**2. Projects implemented in the previous financial year**

1.Construction of complete toilet. ODF 2. Well construction 3. Pre-cleaning
4. Biogas plants 5. Waste treatment.

Clap-Clean This is a huge waste treatment project called Clean Angadipuram implemented by the Panchayat during the financial year 2016-17 to transport solid waste including plastics collected from the vivi wards to the recycling unit. There is a lot of support from the public. The panchayat has decided to go ahead with the project within a year.

**3. Projects implemented by the departments**

1. Construction of toilets with the help of Sanitation Mission 2. Mosquito control schemes
3. Cleaning of public places 4. Immunization against infectious diseases

# CHAPTER 7 : SOCIO-CULTURAL ASPECTS

### 7.1 Social history of panchayath

Angadipuram which is heart of old valluvanad has lot of history. Angadipuram was commercial,spiritual and cultural center for Valluvanad. The historic Thirumandamkunnu Temple, Chaverthara, Thali Temple, Kottaparambu, Alpakulam, Chaverkadu are located in this Panchayath. Ancient Valluvanad lords erected the Thirumandhankunnu Bhagawathy Temple. The Valluvokonathiris consider the temple's statue of Bhagavathi to be their kuladaivam, or family deity. This shrine has recently risen to popularity. The town is among the largest in the Malappuram area. It has a rich history and a thriving tourist industry. The Tali temple, located similarly close to the highway as the Thirumandhamkunnu Bhagavathy Temple, is another significant pilgrim center in the area. The holy shrine of Puthanangadi, located only 2 kilometers outside of town on the Valanchery road, is another site of consolation for the crowds. Angadippuram has become Malabar's foremost pilgrimage center. Sree Thirumanthamkunnu Temple and Thali Temple are only two of the numerous Hindu places of worship that can be found in this area.


*Figure 7-1 Festivals of Angadipuram*

### OBSERVATIONS & INFERENCE

Most of the people in the panchayat are below the poverty line. Agriculture is the main occupation of the people here. But as part of the gradual urbanization, the main occupation at present is in the construction allied sector. In the hinterland of the Gram Panchayat, the agricultural employment sector is still important. But a large number are employed in the Gulf region. The population of the panchayat is increasing exponentially

as many people from other states and elsewhere are still settling here in search of employment in the construction sector as part of urbanization.

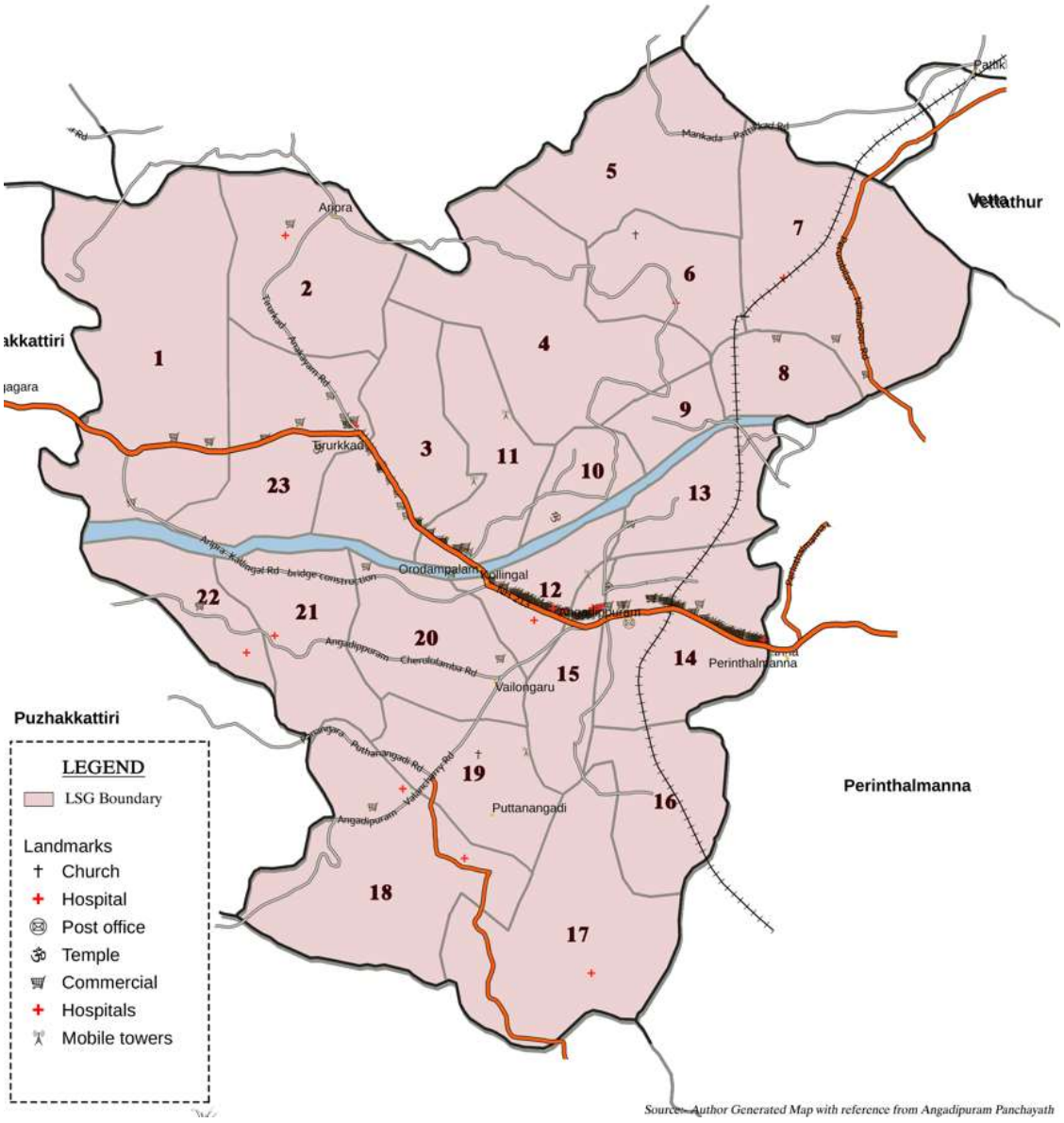



*Figure 7-2 Map showing social infrastructures of panchayath*

## TEMPLES OF ANGADIPURAM

Malabar's temple town is now often referred to as Angadippuram. Sree Thirumandhamkunnu temple and Thali temple are only two of the numerous Hindu places of worship in the area.


*Figure 7-3 Images of Important temples*

**Social history**

In the old days, Angadipuram was the commercial hub of Valluvanad and the spiritual and cultural center, which stretched from Panthalloor hill in the east to Anakayampulamantol hill in the north and south borders and Malappuram Pang hills in the west. During the Sangam period (up to the 5th century AD) the inhabitants of Kerala were Pulayars, Kuruvars, Villavars, Parayars, Panars and Vellalars. The name Valluvanad is derived from the dominance of the Valluvanas. This place is the heart of the old Valluvanad and has a lot of history. Angadipuram, a small town, was the capital of the Valluvanad dynasty. The ancients still call this place 'Vellatangadi'. Historical Thirumandhamkunnu Temple, Chaverthara, Thali,

Kottaparambu, Alpakulam, Chaverkadu is also located in this panchayat. "Valluvakonathiri" was dominated by the famous Mamankam, which was held once in twelve years on Thirunavaya Sands. The Zamorin's soldiers beheaded Valluvakonathiri, who was adorning the presidency with Udaval on the "stand floor" of Mamankam. The White Army knew that it was impossible to fight and win against the Zamorin's army. Suicide bombers in Valluvanad volunteered to shed blood and sacrifice their lives for the pride of their country. Valluvakonathiri was ruled by the Ettuveettilachans.

Agriculture and allied occupations were the livelihood of the common villagers. Agricultural production was on a lease basis. In the 19th century, folk technology for iron mining and production existed in the area. In 1826, Henry Hamilton Buchanan, an Englishman, discovered in this panchayat that iron ore could be used for building, and with the introduction of modern technology, the production of iron became obsolete. MP Narayana Menon, MP Kunjikannan Menon, MP Govindamenon and many young people led by the Paredath brothers actively participated in the national freedom struggle from here. Angadipuram was the center of control of the freedom struggle. The Land Reform Acts of 1957 and 1967 revolutionized land relations. Migrant farmers from South Kerala

reached the hilly areas of the panchayat in the fifties. The Angadipuram-Pariyapuram road was completed with the help of over a thousand people under the leadership of K. Seshu Iyer, a prominent citizen of Angadipuram and a Christian priest named Gilbert Gonsalves. Kottaparamba School is the first educational institution in the panchayath. The school is over 100 years

*Figure: -7-4 sketches representing history of Angadipuram*

## 7.2 HERITAGE BUILDINGS AT ANGADIPURAM


### HERITAGE VALUES

Angadipuram which is heart of old valluvanad has lot of history. Angadipuram was commercial,spiritual and cultural center for Valluvanad. The historic Thirumandhamkunnu Temple, Chaverthara, Thali Temple, Kottaparambu, Alpakulam, Chaverkadu are located in this Panchayath.Former Valluvanad lords erected the Thirumandhankunnu Bhagawathy Temple. The Valluvokonathiris consider the temple's statue of Bhagavathi to be their kuladaivam, or family deity. This shrine has recently risen to popularity. The town ranks high among Malappuram district villages in terms of population. There are many of long-standing customs, and the tourist industry is booming. Apart from Thirumandhamkunnu Bhagavathy Temple, there is still another prominent pilgrim place in the area is the Tali temple which is situated close the highway. The holy shrine of Puthanangadi, located only 2 kilometres outside of town on the Valanchery road, is another site of consolation for the crowds. Malabar's temple town is now often referred to as Angadippuram. There are so many Hindu temples present here like Sree Thirumanthamkunnu temple and Thali temple.

### 7.3 Cultural history

Angadipuram Pooram, an 11-day long festival at the legendary Thirumandhamkunnu temple, is considered to be the national festival of Valluvanad. The Krishna Temple on the left, dedicated to the great poet Poonthanam, is a place of pilgrimage for many devotees. The Puthanangadi Mosque is also notable for its features. The village of Angadipuram was the birthplace of Poonthanam's literary works written by Jnanappana. The village is a land of historical folklore and temple art, and at the same time exhibits all the evils of a landlord-tenant culture. Velladangadi Angadipuram was also the cultural center of Valluvanad. Malayalees will never forget Nanthana, the local author of many novels, including Unnikuttan's World. Balakrishna Menon was born and raised in

Kochattil, the eyes of Kerala's art lovers. Angadipuram Desasevini Library, established in the 1950s; The Tirurkadu Vijayan Memorial Library also plays a leading role in the cultural activities of the panchayat. The main festivals of the panchayath are Pooramahotsavam at Angadipuram Thirumandhamkunnu temple, Puthanangadi Nercha, Palliperunnal at Valampur and Pariyapuram churches. Traditional arts like Kolkali, Cherumakkali and Poothamkali still exist here to this day. The first library in Angadipuram panchayath was established at a time when the library movement was flourishing with organization and organization. Angadipuram Desasevini Library was established during the period 1953-54. It was inaugurated by SK Pottakad, who was notable in the field of Malayalam literature at that time. When the first library in the panchayat became a reality, not only did the intense dream of the youth of that time come true, It was also the birthplace of a strong institution to play a leading role in the later cultural activities of Angadipuram Panchayath. The second library in the panchayat is the Tirurkadu Vijayan Memorial Library which came into existence during 1959-60. This is the result of the efforts of the Tirurkadu Mahila Samajam activists who were active at that time.


**Kolkalli**

Kolkali is a kind of traditional music and dance from the north Malabar area of Kerala that is characterised by a strong sense of rhythm. Dancing and singing around a nilavilakku with short pairs of sticks, tapping each other's sticks as they go. Even as the dancers split out into new formations, they keep the pace. Muslim males in Malabar are the most likely to play Kolkali.

**Chimmanakali**

The Pulaya people of North Kerala are responsible for the art form known as Chimmanakali (India). Chimmanam should be understood to indicate chit-chat.

Garbhabali, also called Kannal Kalampattu, is linked to Chimmanakali. The play's theme song is called "chothiyum pidiym pattu," and it's performed after intermission. Speeches laced with comedy are often delivered. The events are presented and acted out for the audience. Chimmanakali is mainly a sort of satire used to highlight the problems with society.

**Poothan and thira**

individuals in the South Malabar area of Kerala, India, dress up as Poothan, the lieutenant of Kali, and Thira, the goddess Kali, and dance to the beat of drums. Thirud, a smaller drum, is used for poothan, whereas para, a heavier drum, is used to accompany thira.

During the Pooram festival season (December–May), it is often conducted once a year in villages in connection with the Kali temple festivities, particularly in the coastal districts and along the river Nila.

**Kathakali**

Is one of the essential forms of classical Indian dance.

• It is another "tale play" style of artwork, however one prominent through the elaborately colourful make-up, costumes and facemasks that the historically male actor dancer's wear.
• Kathakali frequently advanced as a Hindu overall performance artwork withinside the Malayalam-speak me southwestern place of India (Kerala).

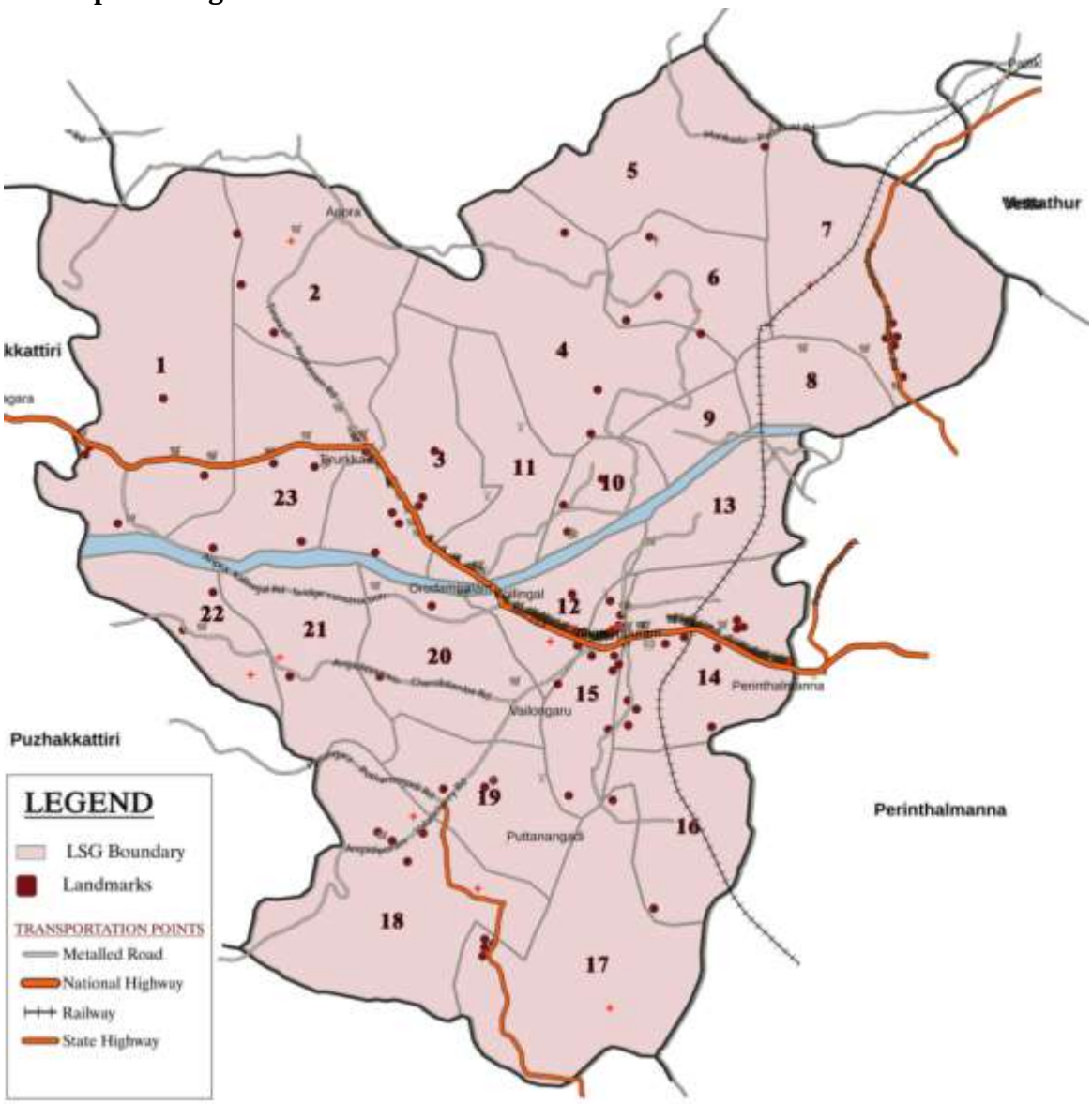
**OBSERVATIONS & INFERENCE**

Tradition, Culture, and Historical monuments has to be preserved and promoted in this modern developing era. Kerala is a state rich in culture and tradition. It has its own art forms and heritage buildings.

Due to private ownership, this Theravad are getting vanished. A heritage walk can be proposed and this identity can be put forward for destination tourism promotions. Geologically and culturally this panchayath gives 100 ways of development possibilities.

# CHAPTER 8 : HEALTH, EDUCATION, CIVIC AMENITIES AND AGRICULTURE

**8.1 Map showing the locations of health centers and educational institutions.**




There are 38 ration shops and a Maveli store in the public distribution area of the panchayat. Angadipuram, Tirurkadu and Puthanangadi are the important trading centers of the panchayath.

Angadipuram was the commercial hub of Valluvanad and the spiritual and cultural center of Angadipuram. Angadipuram is currently the only temple town in Malabar. This panchayat is located in the heart of the old Valluvanad district and has a rich history. Angadipuram, a small town, was the capital of the old Valluvanad royal family. The reference to Valluvanad in all the documents of Valluvanad is abbreviated as Vellavanadukara, which means the marketplace of Valluvanad.

## 8.2 The current Health state of the region

It is a primary health ayurvedic hospital and a homeopathic hospital. For the health care of the people. Maternal and child care activities are carried out through sub-centers and Junior Health Inspector Offices under the Primary Health Center. In addition to the private systemic activities, the PHC gadan rate of 200 patients per day who have the consciousness to achieve the PHC gadan rate can be understood from the fact that the health care interest of the people in terms of mental health is high.

The health problems in this panchayath are shortage of drinking water, poor sanitation and inadequate treatment facilities. Hemorrhoids are the cause of many diseases that have been eradicated from society. This is due to the decline in health. Carelessness in personal hygiene and environmental hygiene invites disease. Toxic foods are also pushing the economy to the brink of destruction. The city pushes. This is due to the man-made employment opportunities as part of the urbanization and many workers from other states are staying in the panchayat. The next infectious diseases that need to be formed are human beings with indigenous peoples.

**History of Agriculture**

Agriculture and allied occupations were the livelihood of the common villagers. Agricultural production was on a lease basis. The cropping pattern in the area is determined mainly on the basis of the agro-climatic conditions. In the past, paddy was the major crop in the panchayath. There were long-term crops only in the foothills. The main varieties were Kari, Arivakari, Chenkayma, Mundakan, Thekkanchira, Cherukayma, Atakayma, Thavalakannan and Vrishchikapandi. At that time, farming was a part of life and was associated with entertainment and farming. Cattle and buffalo were the main agricultural recreational competitions. The festive seasons were also agricultural marketing fairs. Festive paraphernalia, agricultural products, And agricultural implements and outlets. In the land areas, coconut, squash, rubber and cashew were cultivated and intercrops were grown commercially.

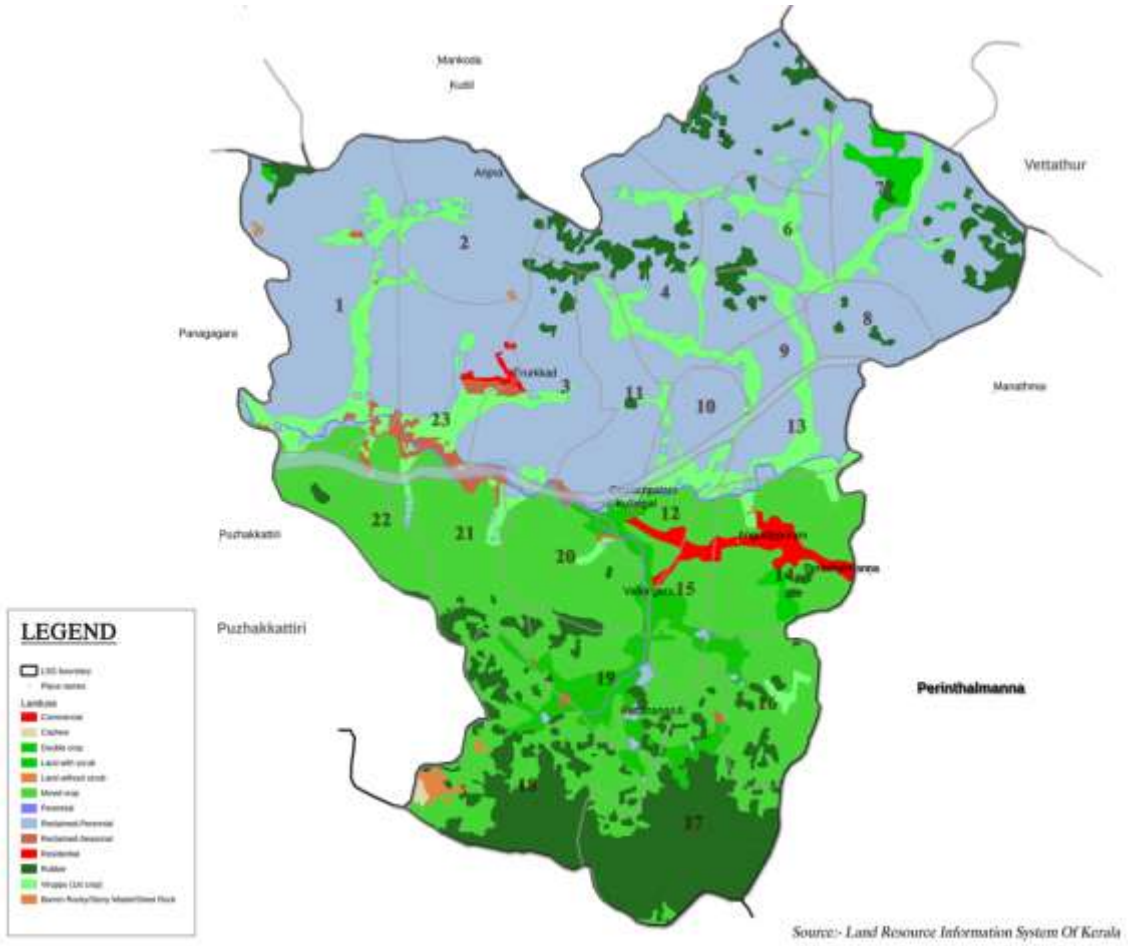



*Figure 8-1 Map showing agricultural intensity*

It is a rural area which was mainly dependent on agriculture. Angadipuram Grama Panchayat. Due to the increasing population and the increase in Tawar housing construction, the land is becoming fragmented and the area of agricultural land is declining. The problem is exacerbated by declining land area and low crop production. Paddy cultivation has become unprofitable. Vegetables, bananas, etc. are grown in the fields. Extensive lands are being filled and houses are being leveled.

Since the beginning of the century, tapioca cultivation, which has been an important staple food of human beings, has declined due to changes in land use which have been nominally reduced and due to rat infestation. Vegetable cultivation is widespread but not widespread. Part of our wealth goes to the neighboring state because we depend on the neighboring states for the most commonly used vegetables today.

# CHAPTER 9 : STRATERGIES AND GOALS FOR THE DESTINATION DEVELOPMENT THROUGH GEOTOURISM

## 9.1 IDENTIFICATION OF GEOSITE AND OTHER POTENTIAL SITES

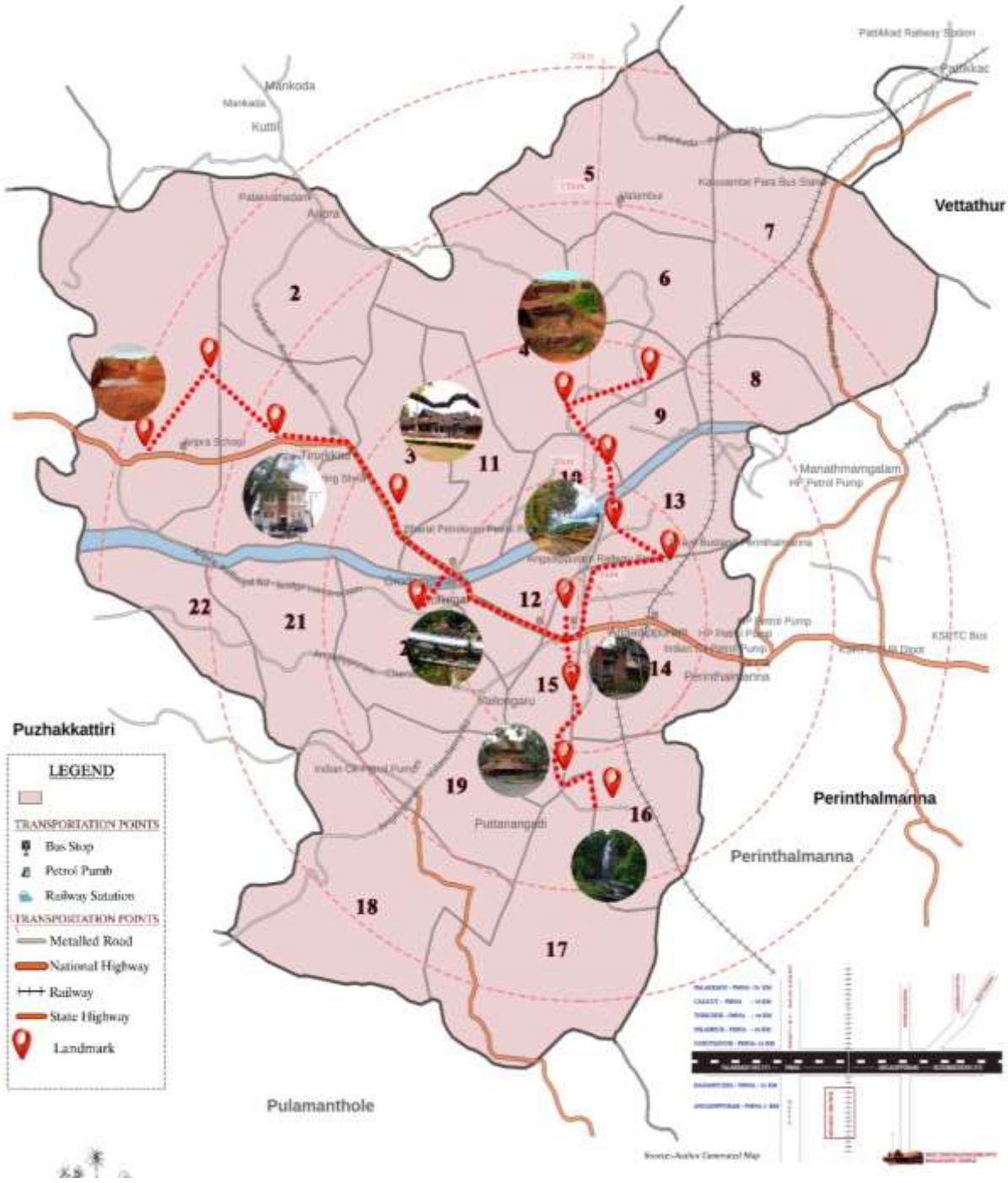



*Figure 9-1 Potential geosite Mapping*

Potential geosites are listed below and the indicators are values as a part of evaluation of the geosites. A rating between 0-1 is given as per each criteria. Each criteria are assessed well and is observed through understanding from in site and surveys. Below shown is the list and assessment values evaluated.

## LIST OF POTENTIAL GEOSITE


*Figure 9-2 List of Potential sites*

## 9.2 Evaluation of indicators for the identified geosites and potential sites

*Table 9-1 Scientific Analysis*

| SCIENTIFIC AND INTRINSIC VALUES | | 01 | 02 | 03 | 04 | 05 | 06 | 07 | Avg |
|---|---|---|---|---|---|---|---|---|---|
| **Integrity** | 0- Totally destroyed sites,<br>0.5- Disturbed site, but with visible abiotic features.<br>1- Site without any destruction | 1 | 0 | 1 | 0.5 | 1 | 1 | 0.5 | 0.7 |
| **Rarity** (number of similar sites) | 0- more than 5 sites<br>0.5- 2to 5 similar sites<br>1-The only site within the area of interest | 0 | 1 | 0 | 1 | 1 | 1 | 0.5 | 0.64 |
| **Diversity** (number of different partial features and process within the geosite or geomorphosite) | 0- Only one visible feature/processes<br>0.5- 2 to 5 Visible features / processes<br>1- more than 5 visible features/processes | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 |
| **Scientific Knowledge** | 0-unknown site,<br>0.5-Scientific papers on national level<br>1-High knowledge of the site, monographic studies about the site. | 1 | 1 | 1 | 1 | 1 | 1 | 0.5 | 0.92 |
| **EDUCATIONAL VALUES** | | 01 | 02 | 03 | 04 | 05 | 06 | 07 | Avg |
| **Representativeness** and visibility/clarity of the features/processes | 0- Low representativeness/clarity of the form and process,<br>0.5- medium representativeness, especially for scientists<br>1-high representativeness of the form and process also for the laic public. | 1 | 1 | 1 | 0.5 | 1 | 1 | 1 | 0.71 |
| **Exemplarity, Pedagogical use** | 0- very low exemplarity and pedagogical use of the form and process,<br>0.5- existing exemplarity, but with limited pedagogical use<br>1-High exemplarity and high potential for pedagogical use, geodidactics and geotourism | 1 | 0 | 1 | 0.5 | 1 | 1 | 0.5 | 0.92 |
| **Existing Educational Products** | 0-no products<br>0.5- leaflets, maps, webpages<br>1-info panel, information at the site | 1 | 0 | 1 | 0.5 | 1 | 1 | 0.5 | 0.7 |
| **Actual use of a site for educational purposes** (excursions, guided tours) | 0- no educative use of the site,<br>0.5-site as a part of specialized excursions (students)<br>1-guided tour for public | 1 | 0 | 1 | 0.5 | 1 | 1 | 0.5 | 0.7 |

### 9.2.1 INFERENCE

The scientific and intrinsic values of identified potential geosites are found through evaluation and rating of certain criteria and average is taken from all the mentioned sites. and it is o.7 for integrity. which means there is more sites without destruction. Likewise, rarity is considered it averages .64 and which employs few sites have rare features while comparing. As there is low number of geosite the rarity is concerned. While assessing the case of diversity it stands full which is 1 the sites are having more diverse features and attracting content within them which is a plus point for tourist attraction and economic generation. Educational values are assessed based on the representativeness, exemplarity,

pedagogical use, existing educational products and actual use of a site for educational purposes. The 2nd criteria shave more value in educational assessment.

*Table 9-2 Scientific Analysis*

| ECONOMIC VALUES | | 01 | 02 | 03 | 04 | 05 | 06 | 07 | 08 |
|---|---|---|---|---|---|---|---|---|---|
| **Accessibility** | 0- more than 1000m from the parking place<br>0.5-Less than 1000m from the stop of parking place<br>1- more than 100m from the stop of the public transportation | 1 | 1 | 1 | 1 | 1 | 1 | 0 | 0.85 |
| **Presence of tourist infrastructure** | 0- more than 10km from the site existing tourist facilities<br>0.5- 5 to 10 km tourist facilities<br>1-less than 5 km tourist facilities | 1 | 0 | 1 | 0.5 | 1 | 1 | 0.5 | 0.71 |
| **Local Products** | 0- no local products related to site<br>0.5- Some products<br>1- emblematic site for some local products | 1 | 0 | 1 | 0.5 | 1 | 1 | 0.5 | 0.7 |
| **CONSERVATION VALUES** | | 01 | 02 | 03 | 04 | 05 | 06 | 07 | Avg |
| **Actual Threats and risks** | 0- high both natural and atrophic risks<br>0.5- existing risk that can disturb the site<br>1-Low risk and no threat | 1 | 0 | 1 | 0.5 | 1 | 1 | 0.5 | 0.71 |
| **Potential threats and risks** | 0- high both natural and atrophic risks<br>0.5- existing risks that can disturb the site<br>1-low risks and almost no threats | 1 | 0 | 1 | 0.5 | 1 | 1 | 0.5 | 0.7 |
| **Current status of a site** | 0-Continuing destruction of the site<br>0.5- the site destroyed now with management measures for avoid the destruction.<br>1-no destruction | 1 | 0 | 1 | 0 | 1 | 1 | 0.5 | 0.64 |
| **Legislative protection** | 0- no legislative protection<br>0.5-Existing proposal for legislative protection.<br>1-Existing legislative protection (natural monument. Natural reservation) | 1 | 0 | 1 | 0.5 | 1 | 0.5 | 1 | 0.71 |
| **ADDED VALUES** | | 01 | 02 | 03 | 04 | 05 | 06 | 07 | Avg |
| **Cultural values**: presence of historical/archeological/religious | 0- no cultural features,<br>0.5-existing cultural features but without strong relation to abiotic features<br>1- existing cultural features with the strong relations to abiotic features. | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 |
| **Ecological values** | 0- not important<br>0.5- existing influence but not so important<br>1-important influence of the geomorphologic feature on the ecologic feature. | 1 | 0 | 1 | 0.5 | 1 | 1 | 0.5 | 0.7 |

**INFERENCE**

Economic value here is asses through the accessibility to site, presence of tourist infrastructure and local products related to the site and its periphery

It is evident that the accessibility towards the site is more easer and it is within a 10 km radius. Parking slots are within 100 to 500 m.

The evaluation reveals that it stands in between 70 to 80% for economic values.

While assessing the conservation values 4 major factors are well considered and they are

actual threats and risks, potential threats and risks, current status of site and legislative protection. From the evaluation it is evident that only geosite are registered under legislative protection. and quarries are under destruction condition. if this trend goes on there will be no trashes of laterites and geosites. Risk is comparatively low for our sites. Flood in 2018 and 2019 have less impact as the topography is bit higher latitude. Added values includes cultural and ecological values. which is rich in the site and lot of influences are visible.


*Figure 9-3 Swot Analysis*

### 9.3 VISION STATEMENT

To develop a sustainable Geo-tourism by integrating all aspects and promote destination development through proper planning and management's guiding force which will provide a clear vision and direction for optimizing the tourism potential of the State in a sustainable manner.


*Figure 9-4 Missions*

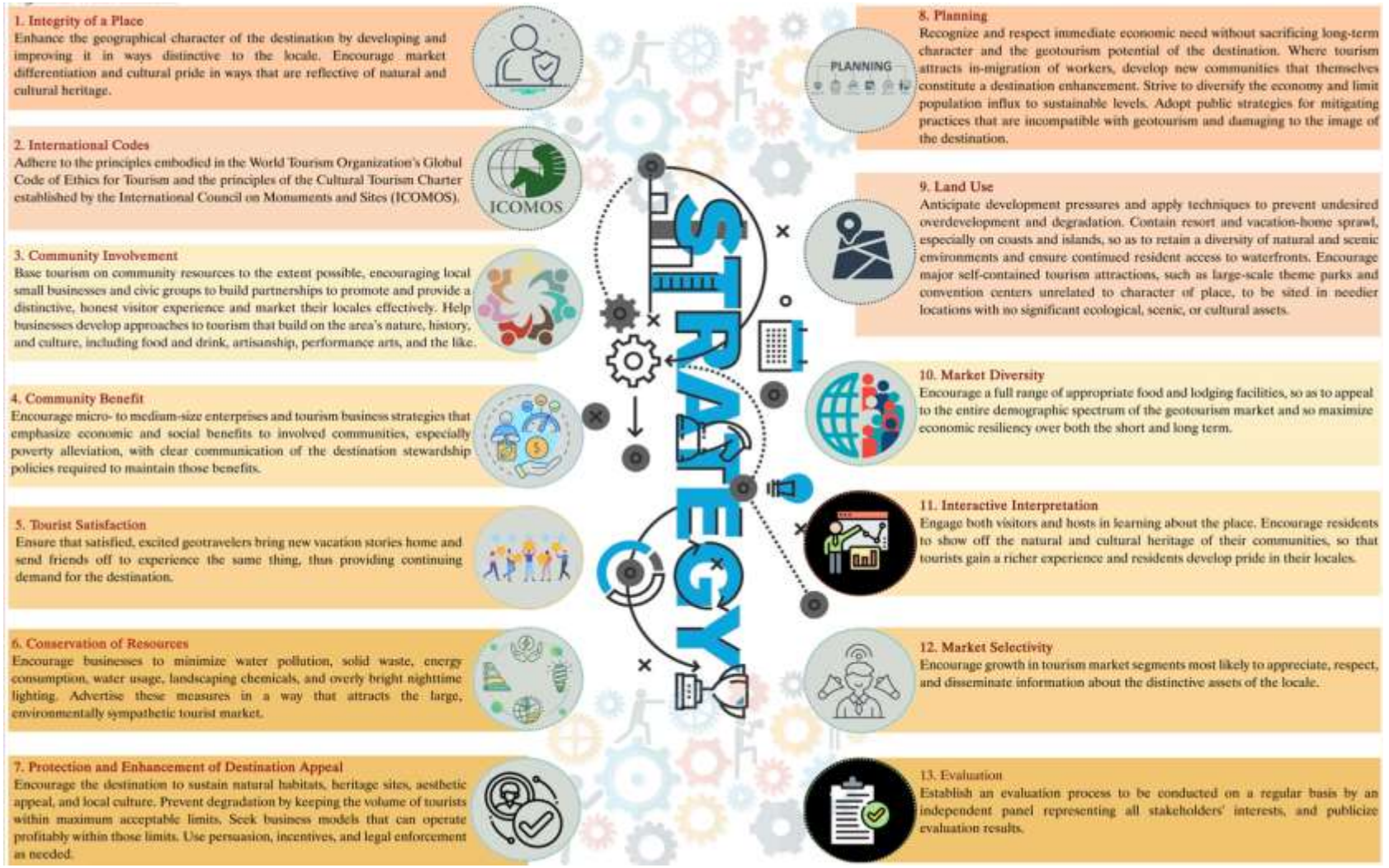



*Figure 9-5 Strategies*

## 9.4 DEVELOPMENT GOALS FOR POTENTIAL GEOSITES

### GOAL 1: -Geological Heritage Conservation

Places that practice geotourism conservation are ones that adhere to the principles of sustainability, respect the Earth's cultural history, and are aware of the importance of preserving it. Indigenous, local, regional, and/or national legal and management authorities ensure that the defining geological locations in UNESCO Global Geoparks/Geological survey of India/National Geographic monuments are preserved and get the attention and care they need.

The government creates, tests, and improves procedures to keep our geological history safe. By sharing information and expertise, the Geosite Network works to better safeguard and manage the world's geological treasures.

### GOAL: -2 Climate Change Understanding

As well as implementing best practices-3 in the use of renewable energy and "green tourism," the disaster management at the Panchayath level keeps records of previous climate change and educates on present climate change. Local communities in Kerala are equipped with the information to reduce and adapt to the possible consequences of climate change thanks to the work of the Kerala Disaster Management Authority, which acts as outdoor museums showcasing the effects of historical and present climate change.

### GOAL: -3 Culture Heritage Enhancement

Symbolic geosites have religious significance in many cultures. All throughout the globe, billions of people have been drawn to holy places by their air of mystery since ancient times. Both ancient myths and modern accounts speak of visitors' out-of-this-world encounters at these sites. Healing the body, enlightening the intellect, and inspiring the heart are all possible at various holy locations. Temples and monasteries were erected by the people in these areas. Some of the most significant religious sites on the planet are located inside UNESCO Global Geoparks, and these sites highlight the ways in which particular landscapes and landforms are intertwined with mythology, archaeology, and history. When it comes down to it, UNESCO Global Geoparks are all about us

discovering and praising the ways in which we are connected to one another and to the planet we call home. Our cultural activities, from farming to house construction to mythology and folklore, are all deeply rooted in Earth's natural features.

**GOAL: -4 Capacity Building Activities**

Offering education guides and capability constructing sports for nearby stakeholders and younger un hired individuals who can then, in turn, assist Geopark sports and operation. The Indian geosite Network in collaboration with organizes International Training Courses on Geoparks assisting the improvement of Geoparks in many nations particularly in regions with much less UNESCO Global Geoparks

**GOAL: -5 Employment and Women Empowerment**

Geotourism offers a stage for fostering and publicising the growth of regional handicraft and cottage industry. By starting businesses and providing opportunities for young people in their communities, they are helping to ensure the long-term success of regions that are home to important geological heritage sites.

And place a premium on fostering women's independence in all its forms, from gender-specific educational initiatives to the formation of women-led cooperatives. Some UNESCO Global Geoparks have women-led cooperatives that allow local women to earn an income on their own terms and in their own communities.

**GOAL: -6 Science & Research**

Developing regions for geotourism are those with particularly significant geological heritage (or geodiversity) on the global stage. Because of this, Geoparks offer a promising venue for the application of scientific findings in the areas of geo-conservation, tourism, and sustainable local development. To further our understanding of the Earth and its processes, even UNESCO Global Geoparks are urged to collaborate with university and research institutes to conduct active scientific research in the Earth Sciences, and other disciplines as appropriate. From the most advanced academic researchers to the casual observer, everyone may participate in scientific inquiry in a UNESCO Global Geopark.

**GOAL: -7 Networking**

Geoparks and Geosites are founded on the idea of networking between its members.

The growth of the Geosite movement may be directly attributed to the many ways in which its members are able to connect with one another and work together on shared goals, such as quality management, the creation of collaborative projects, and the strengthening of existing capabilities. UNESCO Global Geoparks may work together and share ideas with one another via the Global Geopark Network and its subset, the Regional Geopark Network.

**GOAL: -8 Local and Indigenous Knowledge**

One of the fundamental tenets of Geoparks and Geosites is the need of networking. The growth of the Geosite movement can be directly attributed to the efforts of its members, who have found that networking greatly aids in the dissemination of knowledge, the improvement of quality management, the development of collaborative projects, and the strengthening of existing capabilities. UNESCO Global Geoparks are able to work together and share best practices via the Global Geopark Network and its associated Regional Geopark Networks.

**GOAL: -9 Monitoring and Evaluation**

In order to ensure the continuing high quality of Geosites and Geoparks, including the quality of the management of each Geotourism potential sites, the status of each site is subject to a thorough revalidation every 4 years. By supplying specialists for assessment missions and keeping a register of evaluators up-to-date, the Tourism Development Authority is aiding the Geopark review and revalidation process

## 9.5 CONCLUSION: -

The entire report gives insight into geotourism activities and how effectively a location may be developed for continued economic growth. After creating a matrix framework and overlaying the current conditions at a destination, the areas that need to be developed are identified, and objectives are created. Through the study, it is clear that if monitored, periodically evaluated, and the legal process is carried out correctly, a destination can also be reached up to UNESCO affiliation. If a location has the potential to be developed for geotourism, it might be considered a destination.

# CHAPTER 10 : MISCELLANEOUS

## 10.1 GEOTOURISM QUESTIONNAIRE

This survey is mainly to analyse the relevance and identify the potential of geosite in Angadipuram, Malappuram district.

Section A. Purpose of trip

1. Please suggest your age group?

- 15 – 24
- 25 – 34
- 35 – 44
- 45 – 54
- 55 – 64
- 65 +

2. Please imply your marital status?

- A Single
- B Married
- C Widowed
- D others

3. Which category best describes you?

- In full-time employment (30+ hours per week)
- In part-time employment
- Student
- Unemployed
- Retired/Pensioner
- Housewife/husband

4. What is the main purpose of your visit to this area?

- Holidays, leisure and recreation
- Visiting friends and relatives
- Education and training
- Health and medical care
- Religion/pilgrimages
- Shopping
- In Transit

- Business and professional
- Other

5. How many times have you come to Angadipuram as a tourist?

- This the first time.
- Second time
- Third time
- Fourth time
- More than Five times

6. Which of the following businesses might you place your self in?

- Local residents of this area
- Day visit from home outside this area
- Day visit whilst staying outside this area
- Independent visit of more than 1 day
- Inclusive package holiday
- Temple visit
- Other (specify):

7. What was the main method of transport used to travel to this area?

− Air transport

− Rail transport

− Bus or coach

− Organised coach tour

− Water transport

− Car (own, friends, firms)

− Car (hired)

− Motorcycle

− Bicycle

− Lorry/truck/van

− Walk/hiked

– Other

8. If staying overnight, what is the main type of accommodation used?

− Hotel/motel/inn

− Guesthouse

− Rented self-catering

− Static owned

− Static not owned

− Camping

− Hostel

− Homes of friends or relatives

− Second-home

− Other

− If applicable, what is the name of the place they are staying

9. How would you rate the quality of your accommodation?

− Excellent

− Good

− Average

− Poor

− Very poor

10. How many nights are you staying?

− In this area?

− Away from home in total?

11. Have you been on a day visit to this area before?

Yes or No response (If respondent answers no go to question12)

12. If yes, when did you last visit?

− Within last month

− Within last year

− Previous year

− More than two years ago Question

13. How did you find out about this area?

− A previous visit

− Friends/relatives

− Tourist Information Centre

− Newspaper/magazine article

− Newspaper/magazine advertisement

− Website (Please state which one)

− Tourist brochure/leaflet (Please state which one)

14. What had been the primary traits of the vicinity that made you need to go to here? (Choose one or more)

− Beach facilities

− Accessibility

− Historic interest

− Peace and quiet

− Sporting facilities

− Entertainment and recreation facilities

− Quality of accommodation

− Scenery and countryside

− Particular activities

− A Particular event (please specify)

− Friendliness and hospitality of locals

− Other (specify)

15. Please rate the following destination features on a scale of

1 (Very Poor) to 5 (Excellent)

by circling the appropriate number

− Places for families to visit 5 ☐4 ☐ 3☐ 2☐ 1☐

− Places for adults to visit 5 ☐4 ☐ 3☐ 2☐ 1☐

− Shopping 5 ☐4 ☐ 3☐ 2☐ 1☐

− Evening entertainment 5 ☐4 ☐3☐ 2☐ 1☐

− Tourist accommodation 5 ☐4 ☐ 3☐ 2☐ 1 ☐

− Signposting 5 ☐4 ☐3☐ 2☐ 1☐

− Ease of being able to walk around 5 ☐4 ☐3☐ 2☐ 1☐

− Surrounding countryside 5 ☐4 ☐3☐ 2☐ 1☐

− Restaurant/eating facilities 5 ☐4 ☐ 3☐ 2☐ 1☐

− Public transport 5 ☐4 ☐ 3☐ 2☐ 1☐

− Parking facilities 5☐4 ☐ 3☐ 2 ☐ 1☐

− Overall appearance 5 ☐4 ☐3☐ 2☐ 1☐

− General cleanliness 5☐ 4☐ 3☐ 2☐1 ☐

− Value for money 5 ☐4 ☐3☐ 2☐ 1☐

16. Is car parking a problem?

Yes or No response (If respondent answers no go to question15)

17. If yes, why?

− Too far from town

− Too expensive

− Insufficient spaces

− Badly signposted

− Insufficient disabled provision

− Other (specify):

18. Have you heard about geotourism?

Yes

No

19. If Yes Do u know Angadipuram is Having a geosite / A monument

Yes

No

20. Do you believe natural resource protection and tourism can be compatible?

strongly agree

agree

don't know

disagree

strongly disagree

21. Do you accept as true with safety of nearby history and tourism may be compatible?

strongly agree

agree

don't know

disagree

strongly disagree

22. Do you believe the community would benefit from developing a sustainable tourism framework?

strongly agree

agree

don't know

disagree

strongly disagree

23. Do you believe there is a demand for sustainable tourism in and around your MPA?

Yes

No

24. What are the advantages for operating a tourism business in this area? (list up to three)

- Adventure (e.g., ziplining)
- Festivals / events
- Agri-tourism
- Fishing
- Shopping
- Arts & culture
- Heritage

25. Proximity to lake Close to highway Rural / agricultural communities Seasonal traffic Community support Other (please specify):

26. What do you feel are the products / activities that attract visitors to the area?

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