

URBAN SPRAWL MAPPING FOR CULTURAL
TOURISM SUITABILITY USING GIS-AHP
MODEL IN KUANTAN DISTRICT

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DIPLOMA IN CIVIL ENGINEERING

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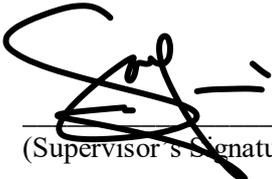
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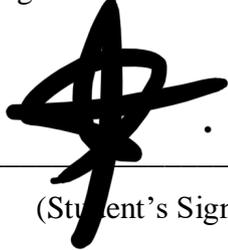
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USING GIS-AHP MODEL IN KUANTAN DISTRICT

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Thesis submitted in fulfillment of the requirements
for the award of the degree of
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ABSTRAK

Adalah penting untuk memilih tapak yang sesuai untuk aktiviti berkaitan budaya yang berlaku di dalam persekitaran bandar. Ini kerana kedua-dua pertumbuhan kawasan bandar dan permintaan untuk pelancongan budaya telah meningkat sejak beberapa tahun kebelakangan ini. Untuk berjaya mencapai objektif ini, anda memerlukan alat yang cekap dari segi perancangan dan membuat keputusan. Apabila menganalisis dan memetakan potensi aktiviti pelancongan budaya di zon bandar, penyelidikan ini mengesyorkan penggunaan Sistem Maklumat Geografi (GIS) dalam kombinasi dengan Proses Hierarki Analitik (AHP). Untuk mencipta model ini, data yang diperoleh daripada Sistem Maklumat Geografi (GIS) telah digabungkan dengan pendekatan AHP. Ini dilakukan untuk menyediakan model keupayaan untuk membuat ramalan yang tepat tentang lokasi mana yang paling berpotensi untuk pertumbuhan pelancongan budaya. Model ini mengambil kira pelbagai faktor, beberapa daripadanya termasuk, untuk menyebut beberapa contoh, kualiti alam sekitar, kebolehcapaian, corak penggunaan tanah dan infrastruktur pengangkutan. AHP memberikan penilaian kepentingan relatif untuk setiap komponen, dan GIS menjadikannya layak untuk menjalankan penyelidikan geografi dan menerbitkan penemuan kajian tersebut. Bersama-sama, kedua-dua alat ini membentuk rangka kerja analisis yang dikenali sebagai proses hierarki analitik. Strategi ini menjadikan peruntukan sumber lebih mudah dan menyumbang kepada peningkatan pelancongan berdasarkan acara kebudayaan dengan menyediakan maklumat penting yang boleh digunakan oleh perancang bandar dan pemaju. Idea yang telah dibentangkan berpotensi untuk membantu dengan beberapa perkara yang berbeza, seperti menjadikan bandar sebagai tempat tinggal yang lebih menarik, menyumbang kepada ekonomi, menggemirakan orang ramai dan melindungi alam sekitar daripada bahaya.

ABSTRACT

It is vital to choose suitable sites for culturally linked activities that take place inside urban settings. This is because both the growth of urban areas and the demand for cultural tourism have risen in recent years. To be successful in reaching this objective, you will need tools that are both efficient in terms of planning and decision-making. When analyzing and mapping the potential for cultural tourism activities in urban zones, this research recommends utilizing a Geographic Information System (GIS) in combination with the Analytic Hierarchy Process (AHP). In order to create this model, the data obtained from Geographic Information Systems (GIS) were coupled with the AHP approach. This is done in order to provide the model the ability to make accurate predictions about which locations have the most potential for the growth of cultural tourism. The model takes into consideration a broad range of factors, some of which include, to mention a few examples, the quality of the environment, accessibility, patterns of land use, and transportation infrastructure. The AHP gives relative importance ratings for each component, and the GIS makes it feasible to undertake geographical research and publish the findings of that study. Together, these two tools make up the analytical framework known as the analytic hierarchy process. This strategy makes resource allocation simpler and contributes to the enhancement of tourism based on cultural events by providing crucial information that can be used by city planners and developers. The idea that has been presented has the potential to assist with a number of different things, such as making cities a more attractive place to live, contributing to the economy, making people happy, and protecting the environment from harm..

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CHAPTER 1

INTRODUCTION

1.1 Background of Study

As the world's population, urbanisation, and economy continue to grow at unprecedented rates, urban sprawl is a common phenomenon. The spread of cities into rural regions is known as "urban sprawl," and it often leads to the loss of natural ecosystems and historical sites. Tourism based on cultural traditions is on the rise, and this is where the term "cultural tourism" comes in. Therefore, it is important to map urban sprawl in order to evaluate its effect on cultural resources and its viability as a destination for cultural tourism. This paper introduces the GIS-AHP paradigm for mapping cultural tourism in urban sprawl and gives examples of its use.

The term "urban sprawl" describes the pattern in which cities expand outward, encroaching on surrounding regions and causing the loss of farmland and natural habitats. As a consequence of this growth, agricultural land, forests, and water supplies are being depleted, as well as natural ecosystems and cultural resources. Historic structures and monuments, cultural landscapes, and traditional communities are all at risk from urban sprawl's destructive effects. Urban expansion may harm cultural resources if the vulnerable locations are not identified and mapped.

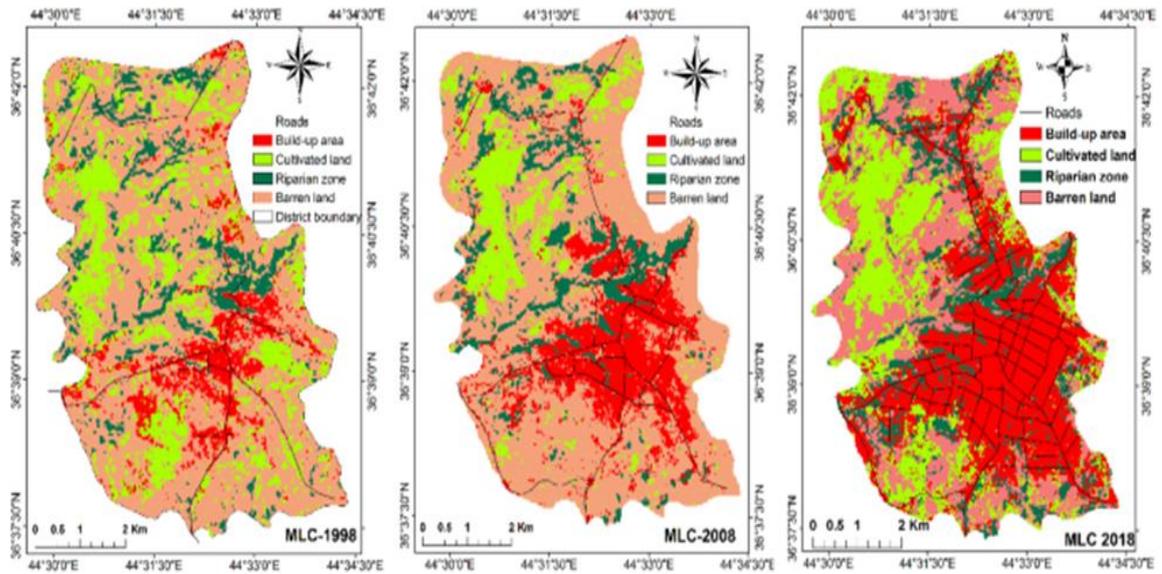


Figure 1.1 Urban sprawl in Soran District

As the tourism industry in Pahang slowly recovers, the state government is targeting the arrival of 13 million tourists to visit holiday destinations here this year. Pahang's tourist arrivals totaled 10.18 million as of Dec 31 last year compared with 2 million in 2021 when the country's borders were closed due to Covid-19 restrictions. State Unity, Tourism and Culture Committee chairman Leong Yu Man said as post-pandemic tourism initiatives move into top gear, the Pahang government was looking at marketing strategies and programmes to lure domestic and international visitors.

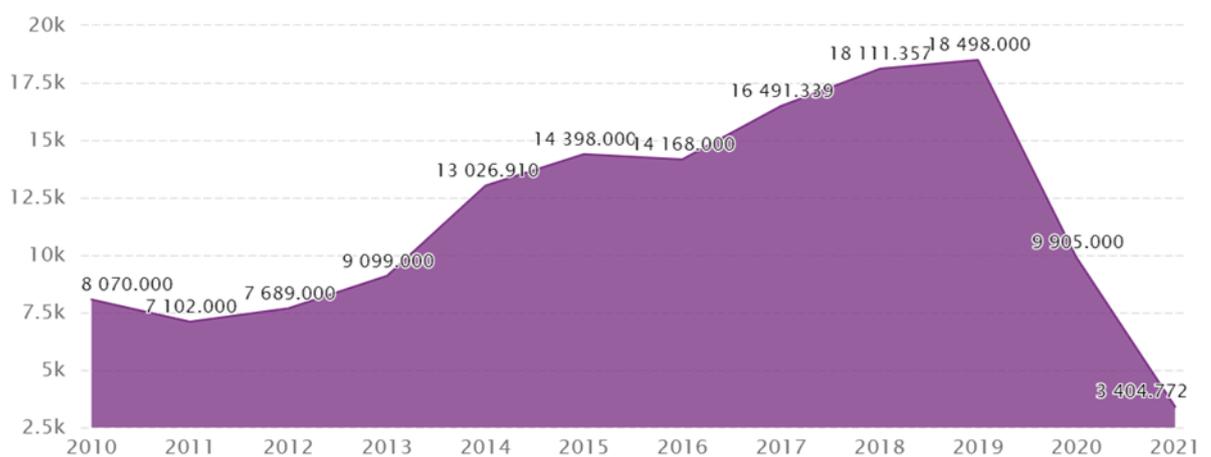


Figure 1.2 number of visitors in Kuantan

Mapping urban sprawl and determining whether or not it is appropriate for cultural tourism may be accomplished with the use of strong technologies like GIS (Geographic Information System) and AHP (Analytical Hierarchy Process). The ability to collect, store, manipulate, and analyse spatial information is made possible by geographic information systems (GIS). Cities, agricultural land, and historical sites are just a few of the many topics that might benefit from GIS mapping. The Analytical Hierarchy Process (AHP) is a technique for making decisions by considering numerous criteria simultaneously. AHP is a useful tool for prioritizing decisions based on a set of criteria by providing a systematic method of analysing and comparing available possibilities.

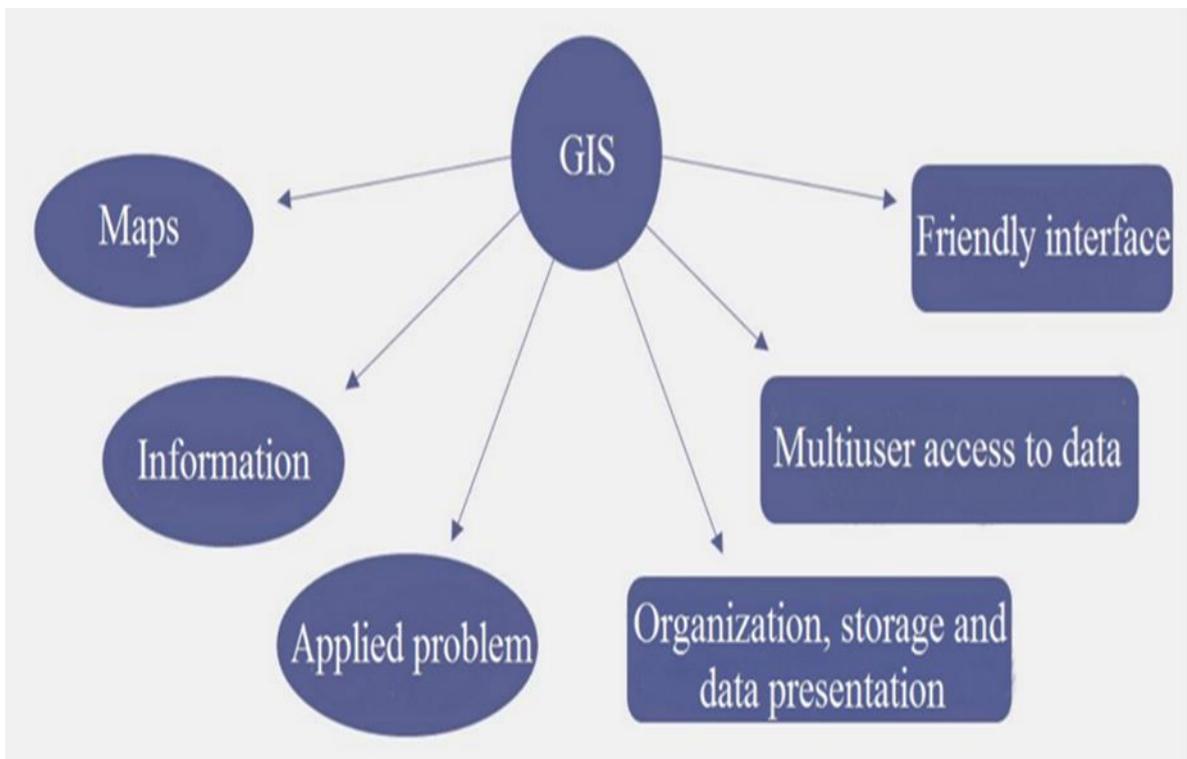


Figure 1.3 Advantages of GIS

By combining geographical information and evaluation criteria, the GIS-AHP model may be utilised to create a map of urban sprawl that is conducive to cultural tourism. Urban sprawl hotspots, their effects on cultural resources, and their viability as destinations for cultural tourism may all be determined with the use of the GIS-AHP model. The GIS-AHP approach may also be used to determine which locations are most important to preserve and develop from a cultural tourism standpoint.

The use of a GIS-AHP model to map urban sprawl for cultural tourism appropriateness provides a number of benefits beyond those already discussed. The influence of urban expansion on cultural resources may be evaluated in a more thorough and impartial manner, which is one of the key benefits. The GIS-AHP model takes into account a wide range of variables—including land use, accessibility, cultural heritage value, and environmental conditions—to give a comprehensive evaluation of urban sprawl's appropriateness for cultural tourism.

Integrating stakeholder viewpoints and preferences is another strength of the GIS-AHP methodology. Incorporating stakeholder feedback and priorities in the decision-making process, the GIS-AHP model can help to increase stakeholder involvement, which is essential in cultural tourism planning and development. This method has the potential to better match cultural tourism development with the requirements of locals and other interested parties.

In addition, the GIS-AHP model is a flexible and evolving framework that may be revised and updated as new information is collected or as the decision-making criteria shift. This adaptability is crucial for sustainable planning and management, as it enables constant monitoring and evaluation of urban sprawl and cultural tourism development.

There are also some problem using GIS-AHP. Transparency issues may arise from decision-makers' reliance on complicated GIS-AHP models for cultural tourism appropriateness evaluation, which may be beyond the comprehension of those who are not professionals in the field. This might reduce public confidence in both the evaluation process and the final decisions. Data used to map urban sprawl may be obsolete, erroneous, or lacking in key details that would be important for determining the area's cultural tourist potential. Lack of critical thinking and dependence on algorithms may result from overusing technology like GIS and AHP models, which might negatively affect cultural tourism by obscuring subtleties in local customs and other variables. In conclusion, using urban sprawl mapping for cultural tourism suitability using GIS-AHP model may have some disadvantages.

1.2 PROBLEM STATEMENT

The statement of the issue is that culture is solely concentrated in one place, such as Kuantan, the capital of Malaysia. Therefore, it will cause the city's population to become more concentrated. Kuantan is such a huge city that until this study is conducted, the tourist sector won't be aware of the city's other attractions. The use of GIS to streamline the process and save expenses.

Geographic information systems (GIS) may be used to reduce the complexity and expense of this problem. Geographic information systems (GIS) are a set of tools for collecting, analysing, and displaying geographical information. Kuantan's cultural landmarks may be better marketed to visitors from beyond the city limits thanks to GIS. This has the potential to reduce pressure on the nation's capital by spreading its residents out over a larger geographic region. Cultural development outside of the nation's capital may be fostered by using GIS to locate potential sites for new cultural institutions. This has the potential to encourage sustainable development and more equitable distribution of culture across the area.

The research by Huang and Tsai (2012) in Taiwan demonstrates how GIS may be used to promote cultural tourism. Researchers mapped cultural assets in a rural region using GIS in order to pinpoint promising spots for future cultural investment. It was determined that GIS was useful in fostering sustainable tourism since it allowed for a more thorough knowledge of the cultural landscape and encouraged the expansion of tourism beyond the primary tourist sites.

A detailed examination of urban sprawl and its effects on the tourism industry is required in the instance of Kuantan due to the lack of an inventory map for sprawl tourism. Planning for sustainable tourism. For the purpose of creating sustainable tourist strategies, it is crucial to comprehend the scope and distribution of urban sprawl in Kuantan. City planners can pinpoint areas that need better management, conservation, or infrastructure development by examining the spatial patterns of tourist-related infrastructure, such as hotels, resorts, and attractions. This information enables the development of initiatives that reduce detrimental environmental effects and advance ethical tourist practices.

Management for land use and zoning. Land-use planning and zoning restrictions can be informed by mapping the amount of urban sprawl. Authorities can put laws into place that encourage sustainable development, conserve important property, and ensure a balance between tourism growth and other land uses by identifying locations where sprawl has occurred or is expected to occur. This proactive strategy protects the preservation of natural and cultural heritage assets and helps prevent uncontrolled development.

Lastly, Infrastructure Management. Urban sprawl growth puts a considerable pressure on the infrastructure and services already in place. Finding regions where tourist-related activities are concentrated and where infrastructure development is necessary is made easier by researching sprawl tourism in Kuantan. City planners may make educated judgements to satisfy the expanding needs of both inhabitants and visitors by studying the transportation networks, water supply systems, waste disposal facilities, and public amenities involved with tourism.

1.3 Objectives

This research is concentrated on urban sprawl mapping for cultural tourism suitability using GIS-AHP MODEL

- a) To categorize and map the urban sprawl on aspects of culture by utilizing the GIS
- b) To assess Tourism suitability in Kuantan district using GIS-AHP Model

1.4 Scope Of Study

The area chosen for this research is Kuantan, Pahang. Kuantan is the capital city of Pahang and is located on the east coast of Peninsular Malaysia, facing the South China Sea. Kuantan is a city located in the state of Pahang, Malaysia. The area of Kuantan is approximately 2,960 square kilometers (1,142 square miles).



Figure 1.4 Location of study area

One of the study areas is a museum. The museum, known as the Istana Abu Bakar, is located in the palace that housed the sultan of Pahang from 1932 until the 1970s. Artifacts, such as the royal regalia, traditional weaponry, and clothing, from the Pahang royal family's past, are on display for visitors to peruse.

Famous for its beautiful architecture that blends traditional Islamic with contemporary architectural features, Masjid Sultan Ahmad Shah is a must-see Kuantan monument. Travelers interested in the mosque's background and significance can take a guided tour.

Several cultural attractions, including a traditional Malay house, a cultural center, and a handicraft market, can be found in Gelora Park, a popular recreation area for both locals and tourists. In addition to learning about Malay culture via performances and demonstrations, tourists may also purchase unique handicrafts.



Figure 1.5 step to make Batik Pahang



Figure 1.6 Natural Batik Village

The study is conducted in the Kuantan district. One of the reasons that this project only Kuantan district is we did not have any transportation. If we use the rental car, the cost will be higher. So we did the fieldwork with our supervisor. So, we did not have to increase the cost of our project to do the fieldwork. The second reason that this project was only around the Kuantan district is that there is no data on urban sprawl in the aspect of culture in Kuantan until now. So, this project will be useful to the government in the future.

Lastly, the method used for this project is QGIS with AHP tools and questionnaire. There is also other tools like ArcGIS but we focus only in one app which is QGIS. It is because not many people use QGIS to make the project. So we can explore new things and also can teach other people to use this application. For the

questionnaire, asking local people about to the tourist and their opinion about the urban sprawl.

1.5 Significant Of Study

The Sustainable Development Goals (SDGs) are the roadmap of the United Nations for a more sustainable future for everyone. Their adoption drew international attention to environmental degradation, sustainability, climate change, and water security. Since 2015, when the SDG compass was launched by the Global Reporting Initiative, the UN Global Compact, and the World Business Council for Sustainable Development, CDP has been actively involved in the SDG agenda, culminating in the report 'Business Reporting on the SDGs: An Analysis of the Goals and Targets'. Throughout the last year of my project, I will be able to correlate the SDGs with SDG 11. SDG 11 aims to make locations more inclusive, secure, durable, and sustainable. In relation to my area of study, the location is suitable for the establishment of a large city. For example, the establishment of a university can make the region safer and more resilient to natural calamities such as earthquakes, storms, and soil degradation.

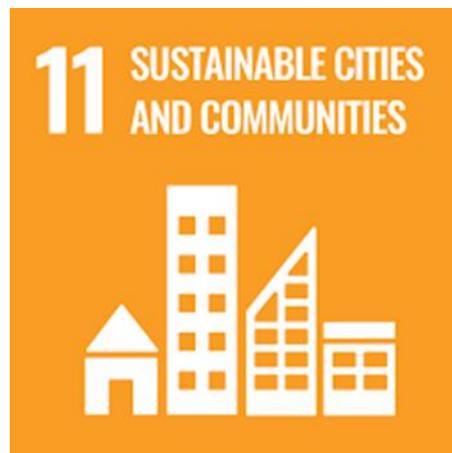


Figure 1.7 Logo Of SDG 11

Researchers and policymakers often utilize Geographic Information Systems (GIS) and Analytic Hierarchy Processes (AHP) to create maps and models for identifying areas that are most suitable for tourism. GIS is a powerful tool for capturing, managing, analyzing, and visualizing geographic data. It enables researchers to

overlay different layers of information, such as topography, land use, transportation networks, and environmental features, to gain a comprehensive understanding of an area. AHP is a multi-criteria decision-making method that helps evaluate and prioritize alternatives based on multiple criteria. It allows researchers to assign weights to different factors and compare their relative importance. Identify important factors like attractions, accessibility, safety, and sustainability. Gather relevant spatial and non-spatial data. Combine and align the data in a GIS environment. Use AHP to determine the relative importance of criteria. Use GIS tools to assess suitability based on criteria. Present maps and visuals highlighting suitable areas. By combining the power of GIS and AHP, researchers and policymakers can effectively analyze and identify areas that are most suitable for tourism, leading to informed decision-making and sustainable development in the tourism industry.

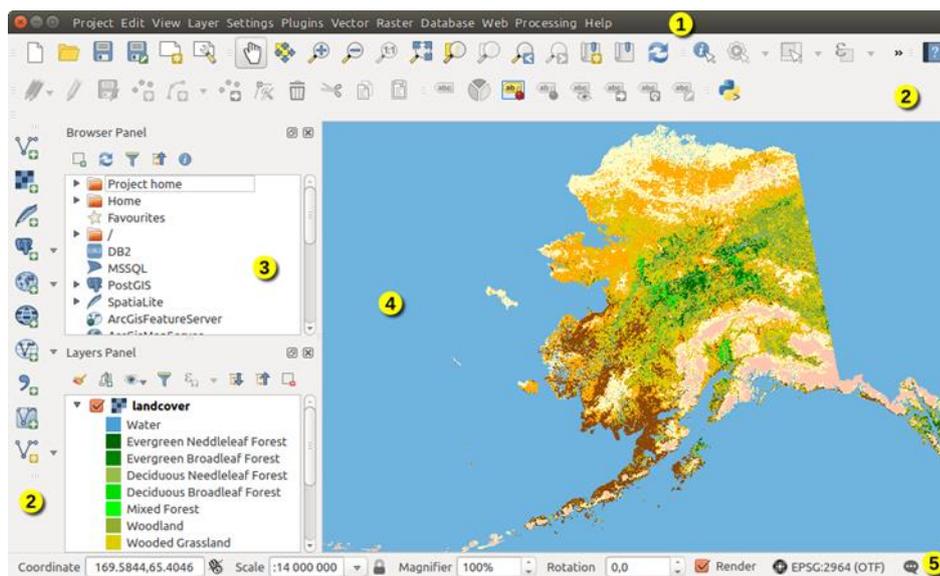


Figure 1.8 Image of QGIS

Researchers and policymakers may save time, money, and manpower resources by using GIS AHP for mapping urban sprawl. Better urban planning and decision-making are possible with the help of these instruments because of their efficiency and automation. GIS enables the integration of various data sources, such as satellite imagery, land use maps, population data, and infrastructure information. This

integration streamlines the process of compiling and organizing data, reducing the time and effort required to gather information from multiple sources. GIS can quickly generate results and identify patterns of urban sprawl, reducing the time needed for manual analysis. GIS can leverage freely available or cost-effective spatial data, such as open-source satellite imagery or publicly accessible datasets. GIS provides powerful visualization capabilities, allowing for clear and intuitive representation of urban sprawl patterns. This enables stakeholders and policymakers to understand the results more easily. HP within GIS facilitates the creation of models for assessing urban sprawl. By assigning weights to different criteria, such as population density, land use changes, or proximity to infrastructure, the modeling process becomes more automated. This reduces the need for extensive manual calculations and decision-making.

CHAPTER 2

LITERATURE REVIEW

2.1 Introduction

A literature review is an examination of previously published research on topics relevant to this effort. This chapter provides an introduction of urban sprawl mapping and presents an example of using the GIS-AHP model to the specific problem of determining whether or not a certain area is suitable for cultural tourism. Reading the works might help you figure out the characteristics you find most appealing. Some insight into the intended attributes may be gleaned from the results of different approaches used to ascertain the needs and perspectives of the space's actual users.

2.2 Population Changes in Kuantan

Kuantan serves as the administrative centre of Pahang in Malaysia. The city's growth in recent years has been phenomenal and includes the expansion of its cultural tourist offerings. This is one way in which Kuantan's recent changes in population have affected the city's once-thriving cultural tourist industry. Foreign visitors have contributed significantly to Kuantan's population growth. The number of international visitors to Pahang, which includes Kuantan, increased from 1.8 million in 2017 to 2.2 million in 2018, a growth rate of 21.6%, according to a study by the Ministry of Tourism, Arts, and Culture. The demand for cultural tourism activities, such as trips to local museums and historical sites, has increased in tandem with the rise in the number of international visitors.

The increase in Kuantan's indigenous Malay population is another factor that has altered the city's cultural tourist landscape. The bulk of Kuantan's population is Malay, the country's most populous ethnic group. This has led to the creation of tourist goods that honor the customs and beliefs of the Malay people. At cultural events like the

Malay Cultural Village in Kuantan, for instance, guests can sample traditional Malay fare and enjoy traditional Malay music, dance, and clothing. The oil and gas sector, in particular, in particular, has attracted a growing number of foreign workers, who have settled in Kuantan. Expats typically bring their own cultural traditions and customs with them, enriching the cultural landscape for visitors. New cultural events, like Oktoberfest and international food festivals, have emerged because of the presence of expatriates. Cultural tourism in Kuantan has suffered as a result of the city's demographic shift. Kuantan's cultural tourism sector has flourished thanks to an influx of international visitors, a rising native Malay population, and the presence of foreigners.

Kuantan - Historical Population Data		
Year	Population	Growth Rate
2023	537,000	2.09%
2022	526,000	2.33%
2021	514,000	2.19%
2020	503,000	2.44%
2019	491,000	2.29%
2018	480,000	3.00%
2017	466,000	2.87%

Table 1 (Historical population data)

Kuantan's expanding Chinese community is helping the city attract more visitors interested in its rich cultural history. Traditions, celebrations, and food associated with Kuantan's Chinese population are well-known across Malaysia. Both residents and visitors go to Kuantan every year for the city's traditional Chinese New Year festivities. The rise in the number of domestic visitors to Kuantan has also had an effect on the city's cultural tourism industry. The Pahang State Government reports that in 2018, there were 10.8 million domestic visitors in Pahang, up from 9.4 million in 2017. New cultural tourism experiences, such as eco-tourism activities and cultural homestays, have emerged to cater to the growing number of domestic visitors. Because of its potential positive impact on the economy, the Pahang State Government has launched a number of programs to encourage cultural tourism in Kuantan and across the state. Infrastructure for cultural tourism is being built, cultural events and festivals are being promoted, and local communities' cultural tourism capacities are being bolstered via training and development programs.

Cultural tourism in Kuantan and the rest of Malaysia has been severely impacted by the recent COVID-19 outbreak. Both international and local tourism have dropped significantly as a result of border closures and other travel restrictions. While the cultural tourism industry has been hit hard by the pandemic, the Pahang State Government has taken several steps to ensure its continued success, including providing financial aid to tourism businesses and creating innovative online and virtual cultural tourism experiences.

2.3 Tourism In Kuantan

Travel for pleasure or business is what we call "tourism." Short-term travel is the act of leaving one's regular surroundings for a certain length of time in order to engage in a variety of activities, such as those associated with sightseeing, cultural immersion, leisure, and relaxation. Transportation, lodging, food and drink, entertainment, and other tourist-centric pursuits are all part of the tourism industry's vast product offering. Many nations and regions rely heavily on tourism for their economy and workforce. United Nations World Tourism Organization. (2021). Activities that fall under the heading of "tourism" are many and varied, including but not limited to sightseeing exploring historical and cultural sites, engaging in outdoor pursuits, attending corporate conferences and meetings, and enjoying the region's food and nightlife. The tourism industry has grown to become an important part of many economies, helping to create jobs, bring in foreign currency, and fuel expansion (World Tourism Organisation, 2021).

Kuantan, which can be found on the east coast of Peninsular Malaysia, is a popular destination for travelers who are interested in cultural tourism as a result of its cultural history as well as its natural features. The Sultan Abu Bakar Museum is a must-see while in Kuantan; it records the state of Pahang, where Kuantan is situated, and its people. The museum's collection showcases local culture via displays of artifacts such clothes, musical instruments, and weaponry.



Figure 2.1 (Museum Sultan Abu Bakar)

The Batik Terengganu Karyaneka is a cultural center in Kuantan that showcases traditional batik textiles from the neighboring state of Terengganu. Visitors may see the batik-making process and shop for batik goods, including apparel, accessories, and home furnishings.



Figure 2.2 (Batik Terengganu Karyaneka)

Kuantan's religious landmarks, such as the Masjid Sultan Ahmad Shah, a mosque with unique architecture and complex Islamic design, provide visitors yet another way to learn about the city's rich cultural heritage. The religious variety of the city is reflected in its many temples, both Chinese (like the Kuan Ti Kong Temple) and Hindu (such as the Sri Marathandavar Aalayam Temple).



Figure 2.3 (Masjid Sultan Ahmad Shah)



Figure 2.4 (Kuan Ti Kong Temple)



Figure 2.5 (Marathandavar Aalayam Temple)



Figure 2.6 (Patin Masak Tempoyak)

Kuantan's cultural scene is bolstered each year by the Pahang International Islamic Festival. Highlighting the state's Islamic culture and legacy, the festival presents exhibits, performances, and seminars. Traditional Malay villages may be found in Kuantan, such as Kampung Cherating Lama and Kampung Laut, where tourists can learn about local culture and traditions. Fishing, boat excursions, and

learning about local crafts are just a few of the activities available to tourists in these communities. Last but not least, the Cherating Turtle Sanctuary is one of Kuantan's natural attractions, where guests can learn about sea turtles and see their nest and hatch. You may also do jungle hiking, river rafting, and wildlife-watching at the adjacent Taman Negara National Park, which is a major draw for visitors.



Figure 2.7 (Cherating Turtle Sanctuary)

2.4 Urban sprawl mapping for Cultural Tourism

Mapping urban sprawl involves identifying and studying the spread of cities into previously undeveloped regions. Methods like land-use analysis, GIS, and remote sensing are used to determine patterns and tendencies in urban expansion. Yuan et al.'s (2019) research in China is an example of urban sprawl mapping. The research analyzed the growth of urban areas in 284 Chinese cities between 1990 and 2015 using satellite imagery and geographic information system data. The data indicated that over this time period, urban areas in China grew by 287%, with the most growth happening in the country's center and eastern regions. The work by Li et al. (2020) in the United States is another example. They mapped and analyzed urban sprawl in the Houston metropolitan region by means of high-resolution satellite imagery and GIS analysis.

The research indicated that the region's urban regions grew by 45% between 1984 and 2015, with the most growth coming in the suburbs outside the metropolis.

Kuantan, Malaysia's cultural tourist industry may benefit from urban sprawl mapping. The article "Urban Sprawl Analysis and its Implications for Sustainable Development in Kuantan, Malaysia" by A.G. Puspa and S. S. Subramaniam (2016) is a good example of research that analyses urban sprawl in Kuantan in depth. The authors mapped Kuantan's urban expansion using remote sensing and GIS, then analysed how it affects long-term sustainability. "The Development of Cultural Tourism in Kuantan, Pahang" by N. A. Ahmad and N. F. Norazmi (2017) is another research that focuses on the growth of cultural tourism in Kuantan. The writers explored the opportunities for cultural tourism in Kuantan and provided recommendations for expanding the industry. Kuantan's cultural tourist routes and historical places may be mapped using urban sprawl data.

R. Mahamad et al.'s 2014 "Tourism development and urban sprawl in Malaysia: the case of Kuala Lumpur and Langkawi Island" is another example of research that may be applicable to the application of urban sprawl mapping for cultural tourism in Kuantan. The link between tourist growth and urban expansion is examined, with specific reference to Kuala Lumpur and Langkawi Island, although the findings may be applicable to Kuantan as well. The Kuantan River Cruise, the Wan Fo Tien Temple, and the Sultan Ahmad Shah State Mosque are just a few of the cultural tourist sites that have been highlighted by the Malaysia tourist Promotion Board. Urban sprawl mapping might be used to locate locations with the most potential for cultural tourism growth and infrastructure upgrades based on the location and accessibility of these attractions.

M. S. Hanita et al.'s 2018 "Mapping the Potential of cultural heritage for sustainable tourism development in Penang Island, Malaysia" may also be useful for cultural tourism development in Kuantan. Insights towards mapping and analyzing cultural heritage sites for tourist potential are provided, and not just for Penang Island. Cultural heritage sites are located and evaluated for their potential as tourist destinations using GIS and other cultural heritage evaluation techniques. The

"Heritage for Development" program at the UNESCO World Heritage Centre is another tool that might be useful in promoting cultural tourism in Kuantan. Case studies from all around the globe are included in this program, which aims to facilitate the use of cultural assets for sustainable development. In general, GIS, maps of cultural landmarks, and maps of historic districts may all contribute to cultural tourist promotion in Kuantan. These resources may be used to locate cultural landmarks, map out tourist itineraries, and assess how new tourism infrastructure will affect local ecosystems and populations.

2.5 GIS-AHP for technology mapping

Both the Geographic Information System (GIS) and the Analytic Hierarchy Process (AHP) are useful tools for cartographers. Together, GIS (which is a system for collecting, storing, manipulating, analyzing, managing, and displaying geographical or geographic data) and AHP (which is a decision-making approach for ranking and comparing potential courses of action) may help you make the best possible choice. The integration of GIS and AHP allows for the evaluation and visualization of geographical data according to predetermined standards. It may be used to figure out where people should build houses in relation to amenities like public transit stops, grocery stores, and nursery facilities. An example of research that used GIS-AHP technology for mapping is "Land Suitability Analysis for Urban Development Using GIS and Analytic Hierarchy Process: A Case Study of Hawassa City, Ethiopia" (Belete et al., 2020). The purpose of this research was to use GIS and AHP to identify promising locations in Hawassa City for future urban expansion. Authors used AHP to prioritize factors like slope, land use, and proximity to roads and then mapped those preferences using GIS. For another, see "A GIS-AHP Approach for Identifying Priority Watersheds for Soil Conservation Management" by Qiao et al. (2018). The research focused on the Loess Plateau in China and employed GIS-AHP technology to pinpoint high-priority watersheds for soil conservation management. The scientists utilized AHP to prioritize factors including slope, precipitation, and soil type and then mapped the results using GIS. The GIS component of the model provides a framework

for organizing and analyzing spatial data, while the AHP component enables the decision-maker to weigh the relative importance of different criteria and alternatives. The AHP is a mathematical technique used to prioritize multiple criteria and alternatives by breaking down the decision-making problem into a hierarchy of factors, sub-factors, and alternatives.

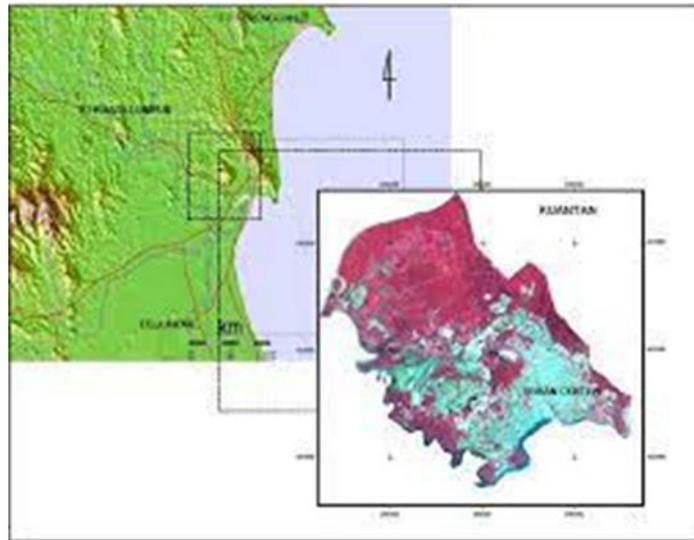


Figure 2.8 (sprawl mapping in Kuantan)

In several industries, including cultural tourism, GIS (Geographic Information System) and AHP (Analytical Hierarchy Process) technology has been employed for mapping and decision-making. "Assessment of cultural tourism resources in Kuantan, Malaysia using GIS and AHP" by S. S. S. Yahaya et al. (2018) is one example of research that used GIS-AHP technology to map Kuantan's cultural tourism.

Historical landmarks, museums, cultural events, and traditional crafts are only some of the examples of Kuantan's many cultural tourism resources that the authors gathered data on for this research. Using GIS and AHP, we analyzed the data to create a map of Kuantan's cultural attractions for tourists. Cultural tourism resources were prioritized using the AHP in order of relevance and growth potential.

According to the research, the Pahang State Museum, the Kuantan Batik Centre, and traditional Malay homes are the city's three most valuable cultural tourist resources. Visitors to Kuantan may use the GIS and AHP-created cultural

tourism map as a planning tool, and officials can utilize it to formulate plans to foster the industry. Once the criteria and sub-criteria have been ranked and weighted, the GIS-AHP model combines them to create a composite index or map that reflects the overall suitability or desirability of different alternatives. The model can then be used to evaluate different scenarios or alternatives, such as identifying the best location for new development or selecting the most appropriate land use for a particular area.

2.6 Advantages of using GIS-AHP for Urban Sprawl in Kuantan

Many cities around the world face the challenge of urban sprawl, which is a complicated problem. It's characterised by the loss of open spaces, the growth of traffic, and other negative environmental consequences when metropolitan centers expand into formerly undeveloped or agricultural territories. Managing urban sprawl calls for a holistic strategy that considers land use, transportation networks, and environmental sustainability, among other things. GIS-AHP, or Geographic Information System Analytical Hierarchy Process, has become more important in recent years as a method for strategic city administration and planning. The benefits of employing GIS-AHP for urban sprawl are discussed, as well as some instances of its use.

The capacity of GIS-AHP to do spatial analysis is a major selling point for its use in the study of urban sprawl. Decision-makers may utilise GIS-AHP to determine which locations are most suited for urban development based on criteria including land use, transportation networks, and environmental considerations by integrating spatial data and analysis. Areas less likely to be affected by natural disasters like floods and landslides may be found, for example, with the use of a GIS-AHP study. In locations with high population density or limited land, where development must be carefully managed to minimise environmental problems, this kind of research may be invaluable.

GIS-AHP also has the added benefit of facilitating multi-criteria decision-making. Using AHP, decision-makers can weigh the relative importance of various aspects of urban development, such as population growth, economic growth, and environmental sustainability. Assigning relative importance to various considerations and weighing potential outcomes is made possible. A decision-maker, for instance, may weigh their own values and interests against the costs and benefits of balancing economic growth with environmental protection in a certain region.

Understanding complicated geographical connections and spotting patterns and trends is made easier with the visual representation of data provided by GIS-AHP. This is especially helpful in pinpointing high-biodiversity or protected natural areas that are at risk from urban growth. Decision-makers may benefit from a visual depiction of the possible implications of development in these regions in order to make educated choices.

Stakeholder interaction is essential for effective urban planning and management, and GIS-AHP makes it possible. Decision-makers, such as local people, environmental organizations, and corporations, may benefit from GIS-AHP since it provides a platform for exchanging data and performing analysis. Better choices and wider support for development programs may result from this.

Finally, GIS-AHP is an effective method for controlling urban sprawl. It is a useful tool for urban planning and management because of its capacity for spatial analysis, multi-criteria decision-making, and stakeholder interaction. It may be used for things like figuring out where to put new cities, pinpointing places in danger of urban sprawl, and weighing the pros and cons of economic growth vs environmental protection. GIS-AHP will remain an essential tool for city planners as they attempt to address the complexities of urban expansion.

2.7 Disadvantages of using GIS-AHP for Urban Sprawl in Kuantan

Although there are numerous benefits to using GIS-AHP for urban sprawl management, there are also a few potential disadvantages that should be taken into account. The tool's complexity is a major disadvantage. Decision-makers without a background in spatial analysis or multi-criteria decision-making may find it challenging to employ GIS-AHP. A failure to understand the significance of the findings or an incorrect interpretation of the data may follow.

Another drawback of GIS-AHP is that it might lead to biased decisions. Individual preferences and subjective evaluations may have a role in the weights given to various aspects in an AHP analysis. This might cause inaccurate judgments, especially if those making the call have feelings about in the result.

The cost and accessibility of data are a third issue with GIS-AHP. In order to do geographical analysis and multi-criteria decision-making, GIS-AHP needs a large quantity of data. In locations with few resources or data, it may be difficult and time-consuming to collect this information. This may restrict the use of GIS-AHP in certain settings, especially in developing nations or areas with sparse data resources.

In the end, GIS-AHP might not work for every decision scenario. It may not be applicable in all decision-making settings, but it may be a helpful tool for controlling urban sprawl. For instance, it's possible that a less complex decision-making method might perform better in some circumstances. In sum, GIS-AHP is an effective method for controlling urban sprawl, but its limitations should not be ignored. The complexity of the instrument, the possibility of bias, the cost and availability of data, and the suitability of the tool for the decision-making environment are all factors that should be taken into account by decision-makers. By doing so, policymakers will be better able to choose when and how to use GIS-AHP in the fight against urban sprawl.

2.8 Impact urban sprawl on city development by cultural tourism

Urban sprawl refers to the unplanned, rapid and uncontrolled expansion of cities and their suburbs, resulting in the development of new urban areas. While urban

sprawl can have positive effects such as economic growth, it also has significant negative impacts on the environment, society, and culture. Cultural tourism, on the other hand, refers to the travel to experience the culture and history of a particular place, including its architecture, arts, customs, and lifestyle.

The growth of cultural tourism in cities may also benefit from urban sprawl. The development of new cultural tourist possibilities is one of the beneficial effects. As new cities emerge, they present opportunities to serve as tourist hubs and cultural centers. Chen and Li (2018) investigate how urbanization has affected cultural tourism in China's Pearl River Delta. New cultural tourism destinations like theme parks, museums, and cultural centers were discovered in the study, all of which can be attributed to urban sprawl. The influx of travelers to these fresh hotspots has boosted the region's cultural tourism industry. Urban sprawl may also benefit cultural tourism by generating new chances for employment and economic growth. Jobs, especially in the service industry, might be created if new cultural hotspots are established in a given area.

New cultural destinations and attractions have appeared up in Kuantan as a result of urban sprawl and its effect on cultural tourism there. The Sultan Ahmad Shah State Mosque, the Kuantan Art Museum, and the Kuantan Heritage Gallery are just a few examples of the cultural institutions that have contributed to Kuantan's rise to prominence. Cultural tourism in Kuantan has increased in part because of the city's recent investment in new retail centers, hotels, and resorts. Incorporating cultural and traditional features into the design and architecture of these commercial projects gives tourists a taste of the area's rich history and legacy.

Urban sprawl may have a major effect on how well a city attracts tourists interested in its culture. Loss of green space, eradication of historic landmarks, and cultural assimilation are all potential outcomes of unchecked urbanization. This may make a city less appealing to visitors, especially those who go for the purpose of immersing themselves in the local culture. The effects of Guangzhou, China's urban expansion on the city's cultural tourist industry were studied by Yang and Wong in 2016. The research concluded that urban growth in Guangzhou had contributed to the

decrease of cultural tourism by causing the destruction of historical landmarks, lowering environmental standards, and erasing the city's unique cultural character. The report recommends that the government take steps to maintain cultural heritage sites, promote cultural identity, and safeguard the environment in order to boost cultural tourism in the city.

2.9 Summary

In a nutshell, The impact of urban sprawl on city-based cultural tourism may go either way. Although urban sprawl can result in the creation of new cultural destinations and attractions, it can also result in the destruction of historic landmarks and open areas, diminishing a city's appeal to visitors who seek to learn about and experience the region's distinctive cultural traditions. Because of the recent changes in the population of Kuantan, it had an effect on the city's once-thriving cultural tourist industry. The rise of international visitors, a maturing Malay and Chinese community, and the presence of foreigners have all played a part in the development of Malaysia's cultural tourism industry. So the sprawl will be will spread through the Kuantan district. So we have to make sure that the sprawl will have a positive impact on the state and the people living in the area. It may cause some negative side but we have to prevent it so that negative impact will decrease.

CHAPTER 3

METHODOLOGY

3.1 Introduction

This chapter outlines the methodology of the study to achieve the objectives to map the urban sprawl in evaluating the suitability of beach tourism in the Kuantan District. This chapter too will explain in detail the criteria of AHP in the GIS model. For our project, several data were collected from our fieldwork such as satellite data and questionnaires. These data play important roles to analyze and classify urban sprawl, especially in cultural areas in Kuantan. Thus, this chapter also explains the data verification for accuracy assessment by keying in the data in GIS. The end of the chapter would be explained the outcome of urban sprawl mapping for beach tourism in Kuantan District.

3.2 Methodology of the study

Figure 3.1 shows the study's flowchart. Satellite data, road data, demographic data, topographic data, and questionnaires from field trips are all examples of data that may be used to create an accurate map of urban sprawl. Only satellite data, demographic data, and a local questionnaire were employed in our research for AHP modelling. Our fieldwork produced these data, which were then entered into a GIS and used in an AHP model. Whether or whether a destination is conducive to tourism is determined using AHP's weighted pair-wise comparisons technique, which use a basic numerical scale running from 0 to 1. Final findings of urban sprawl mapping for cultural tourist appropriateness in Kuantan District will be acquired if AHP modelling in GIS is successful in achieving suitability in the first place.

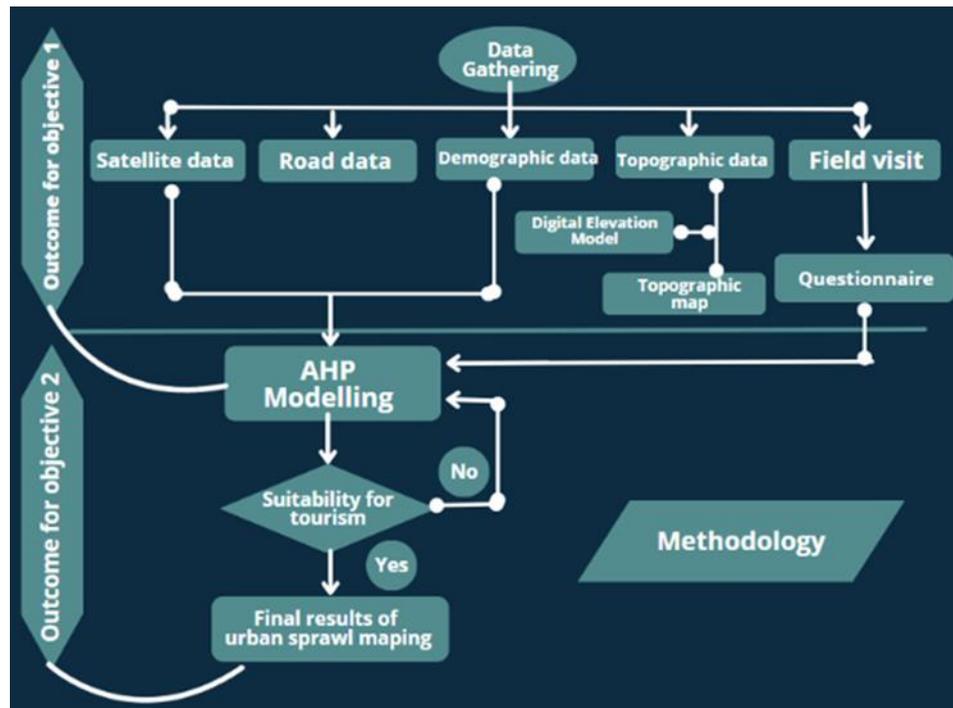


Figure 3.1 Methodology flow chart

3.3 Field Data Collection

Fieldwork was carried out during this project. This fieldwork is to get the data for the AHP to make sure that the pairwise we used is more accurate according to the questionnaire. This fieldwork is also to find out where is located cultural places around Kuantan. So we have to take the coordinate of the place by using HandGPS to take the actual coordinate.



Figure 3.2 Cherating Cantik Art shops



Figure 3.3 Masjid Sultan Ahmad Shah

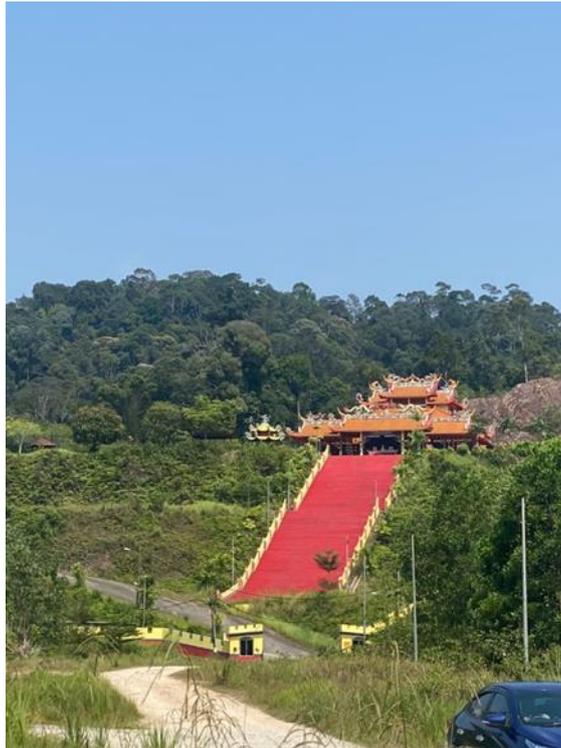


Figure 3.4 Tokong Kuan Tee

3.4 Satellite GPS for Coordinate

Figures 3.5 and 3.6 provide GPS (Global Positioning System) coordinates for a few cultural location that we visited throughout our research. This global positioning system (GPS) employs orbiting satellites to pinpoint a ground-based receiver. Satellite signals are processed by GPS receivers to pinpoint the user's location on Earth in terms of latitude and longitude. The GPS receiver's determination of the user's location on Earth is based on measurements of the distances to numerous satellites. At the location, we noted our coordinates. These locations will need to be included in Google earth pro first and then converted in a TIF file. After that, put it in GIS in order to validate urban sprawl using AHP modelling.



Figure 3.5 GPS coordinate at Tokong Kuan Tee, Kuantan.

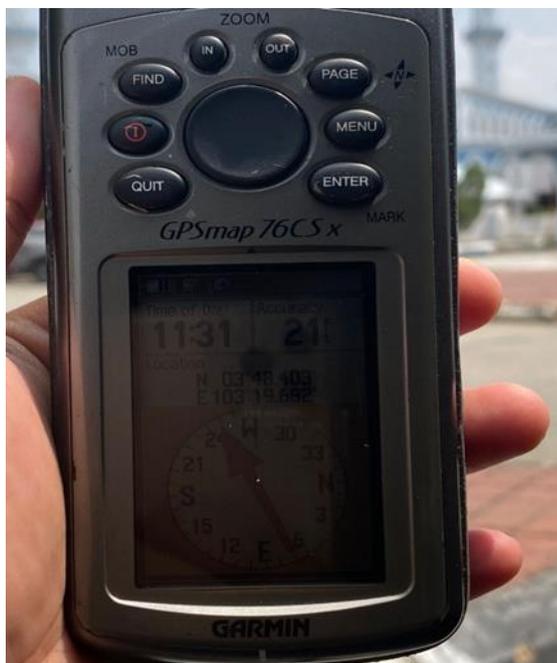


Figure 3.6 GPS coordinate at Muzium Diraja Sultan Haji Ahmad Shah, Kuantan.

3.5 GIS-based AHP

In this part of the research, previous studies and expert opinions were used to identify the significant factors that influence the determination of appropriate sites for urban sprawl. All maps were generated based on density, distance, elevation, and all criteria affecting the suitability of urban growth. Euclidean distance, reclassification, conversion, union, raster calculator, and model builder are the major GIS tools that were used in this part of the research. For suitability analysis using GIS-AHP, it is important to assign scores to each of the factors based on their suitability for urban growth. To do this, a pairwise comparison matrix using Saaty's nine-level scale for identifying relative weights was used. The calculation of factor weights was applied after the formation of the pairwise comparison matrix. The next step involves the computation of the Consistency Ratio (CR), which is used to measure the consistency between the experts' opinions. The acceptable Consistency Ratio (CR) should be $CR < 0.10$, which refers to a reasonable level of consistency in the pairwise comparisons. In contrast, $CR > 0.10$ refers to ratio values that are indicative of inconsistent judgments.

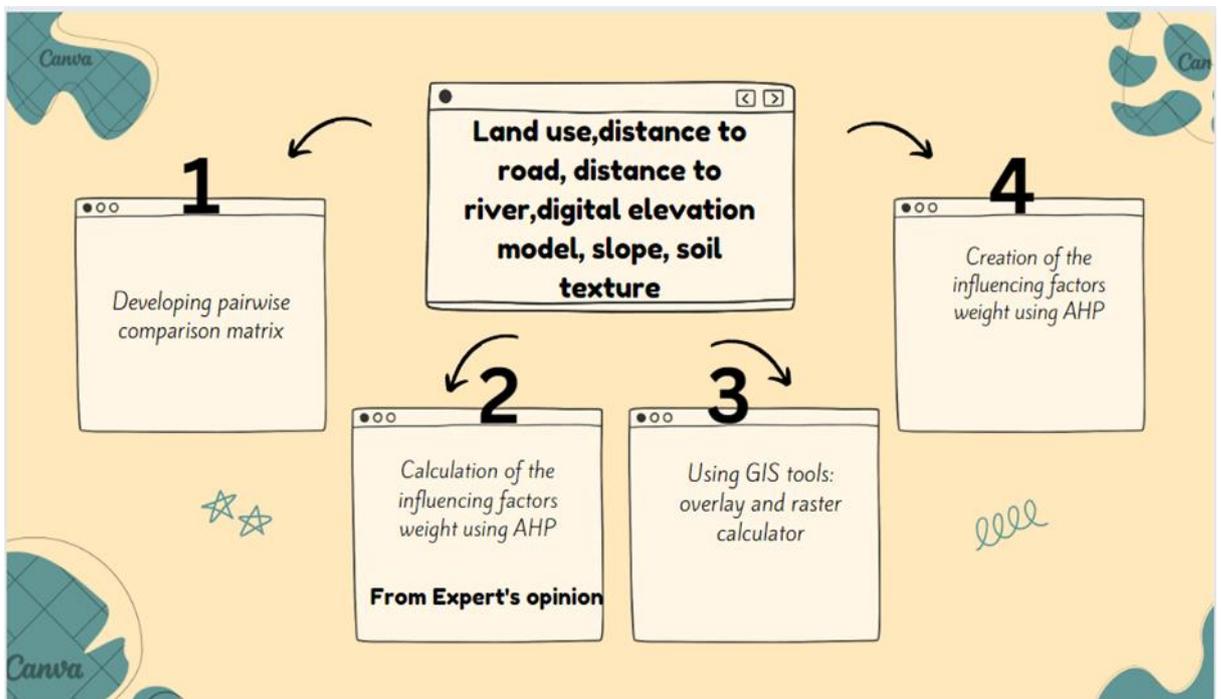


Figure 3.7 Stepwise of GIS-AHP for developing final land suitability map of urban sprawl

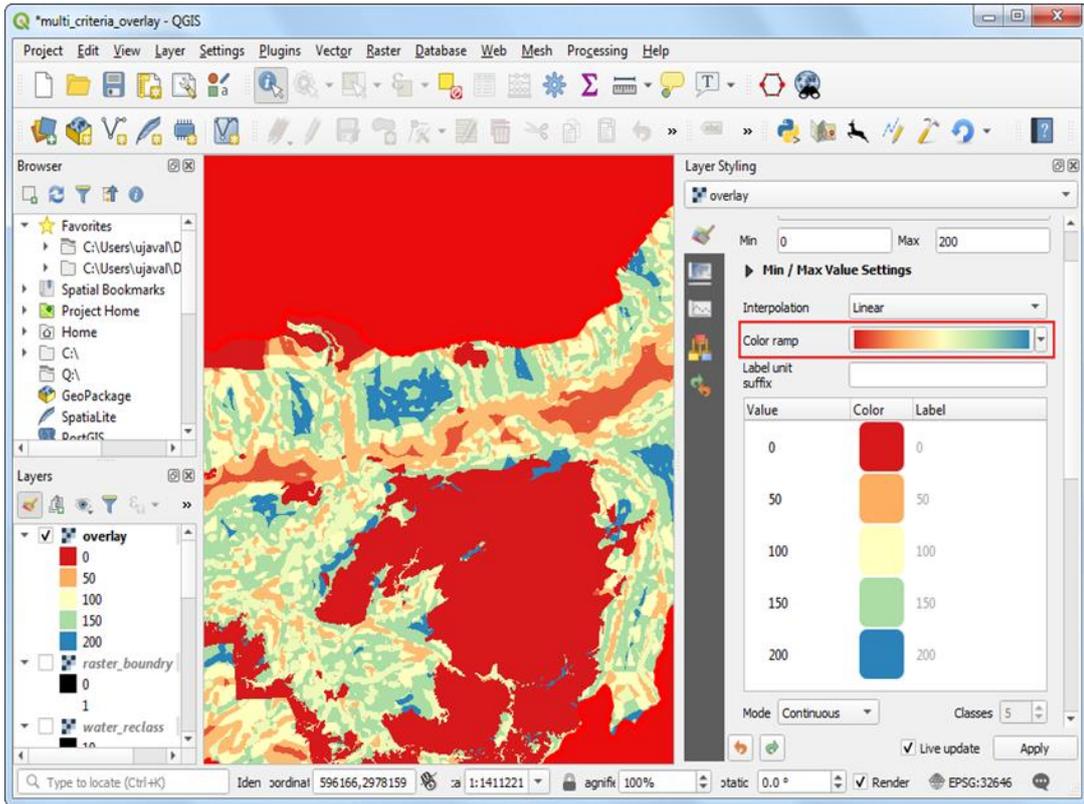


Figure 3.8 result of overlay in QGIS application

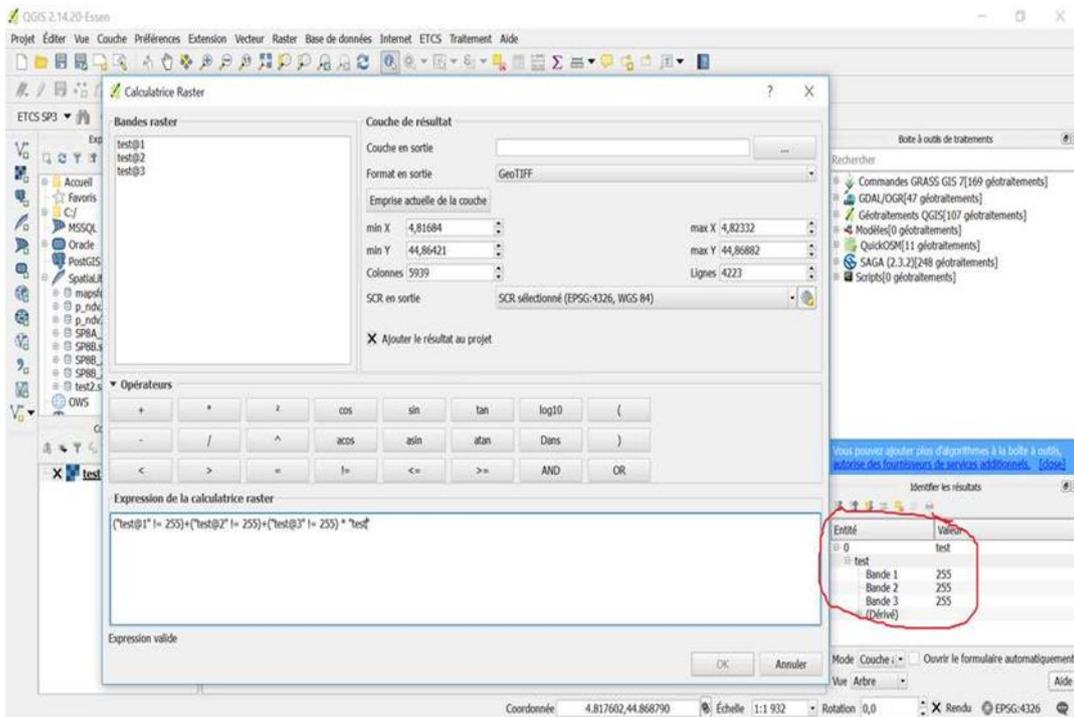


Figure 3.9 Raster Calculator in QGIS application

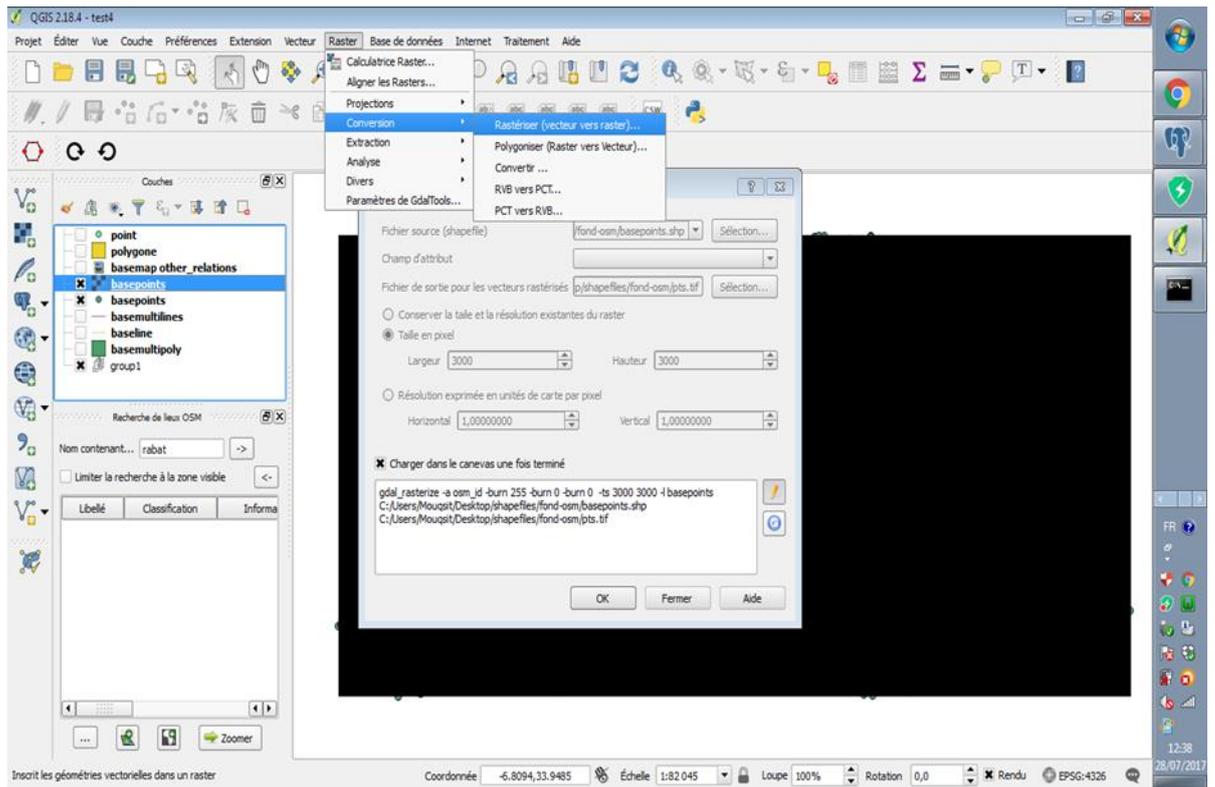


Figure 3.10 Vector to Raster

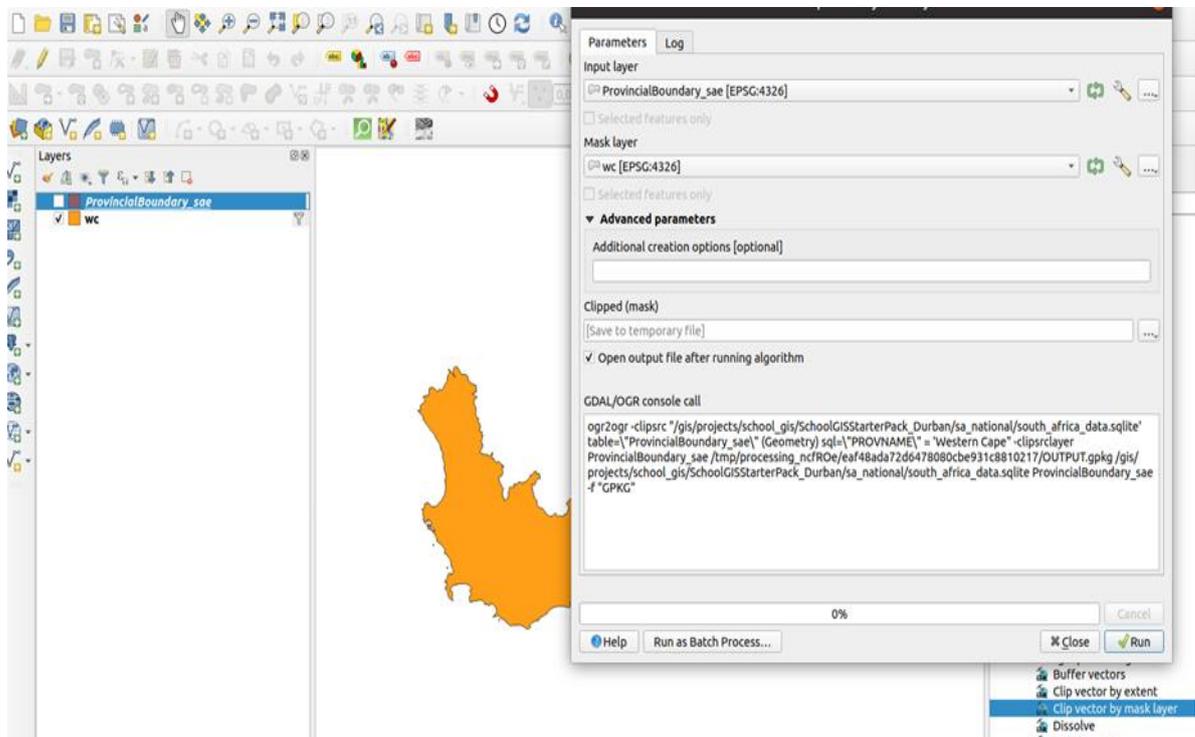


Figure 3.11 Clipping tools in QGIS for Layers

QGIS provides a number of methods for clipping or removing a portion of spatial data inside a specified area. The Clip tool is a simple and easy way to cut off a section of a vector layer along a certain line. The input layer is trimmed to match the contours of the clipping layer, and only the characteristics that fall inside the clipping region are kept. The Clip tool may be used from the Vector menu, under Geoprocessing Tools. Mask-Release Extract: You may use a vector layer to trim raster data using this tool. It creates a new raster layer that covers the same area as the mask layer you specify, but only keeps the values of the pixels that are within the mask. The Extract by Mask option may be accessed through the Raster > Extraction > Clipper menu.

3.6 Expected Outcomes

Firstly, During the course of the inquiry, we are able to learn more about urban sprawl from a cultural perspective. When researching the link between urban sprawl and culture, it is necessary to take into account the direct as well as indirect consequences that sprawl has had on social relationships, local identity, cultural infrastructure, traditional practices, and environmental awareness. Researchers are able to get insight into how urban expansion affects how culture operates inside communities by researching these features and how they interact with one another.

Second, To be able to depict, via a perspective of culture, the urban sprawl that surrounds Kuantan and how it affects the city. The perspective of culture enables us to appreciate the expanded and changing character of Kuantan's increasing urban landscape, despite the fact that urban growth poses issues like as increased traffic, environmental concerns, and pressure on resources. It shows the city's capacity to adapt, develop, and grow while simultaneously welcoming cultural variety as an essential component of its character.

Having the capacity to detect, investigate, and understand urban sprawl mapping with a particular focus on the cultural tourism potential of the Kuantan area. For this kind of study to be carried out, we would need access to relevant data sources, to work along with local authorities, and to have competence in GIS and urban planning. Engaging with local stakeholders, including as community people, tourist organizations, and government agencies, will not only give useful insights, but it will also guarantee that the study is aligned with the particular requirements and objectives of the Kuantan area.

3.7 Summary of chapter

This chapter concludes with a brief explanation of the types of approaches used to gather data and information regarding urban sprawl, with a focus on the Kuantan District and its potential as a site for cultural tourism. This approach reveals the sequence of steps necessary to acquire data in order to satisfy the needs of GIS-AHP modelling for cultural tourism. We feel that the satellite data and local survey results we gathered during our fieldwork will be crucial in establishing the Kuantan District's urban sprawl as an appropriate location for cultural tourism. The reliability of research findings relies heavily on the validity and specificity of the data used to evaluate them.

CHAPTER 4

RESULTS AND DISCUSSION

4.1 Introduction

This chapter highlights the outcomes of the urban sprawl that has occurred around the Kuantan district and outlines the research areas that we have selected. The techniques that are used to this study of urban sprawl are provided by the QGIS program. The location that has been proposed is appropriate by utilizing the criteria that has been determined, however there is not yet a cultural location that has been recommended for the region. Therefore, the government may implement or make use of this strategy in order to promote the cultural location in and around Kuantan in order to attract tourists.

4.2 Identification of influencing factors

In this part of the research, we identify the significant factors that influence Urban Sprawl Mapping for Culture. Additionally, the local level of influencing factors was determined based on statements gained from local experts working in related Government authorities such as the Town Planning Departments, Local Councils, and Federal Planning Departments. Six main criteria were chosen to achieve the aim of this study. Slope, DEM, Soil Texture, Distance To River, Distance To Road, and Land Use were the main criteria used in this research.

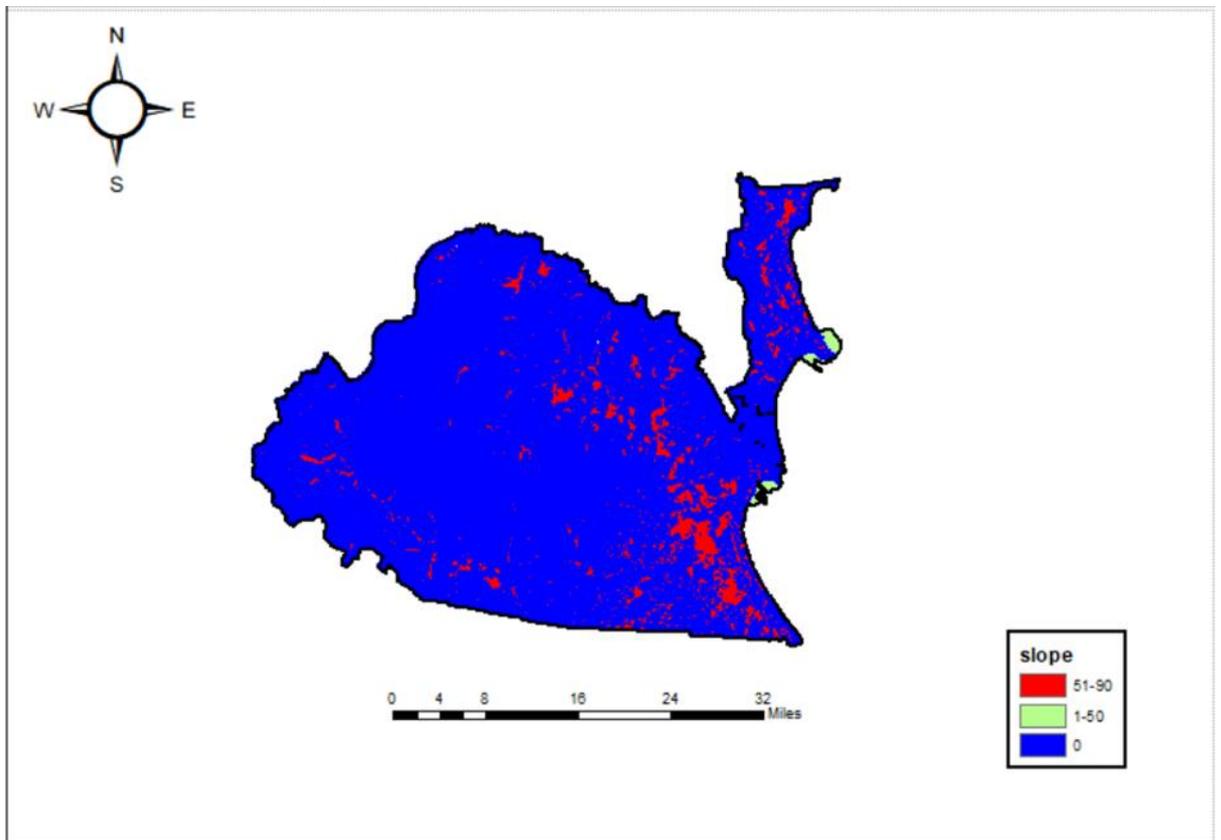


Figure 4.1 Data of Slope

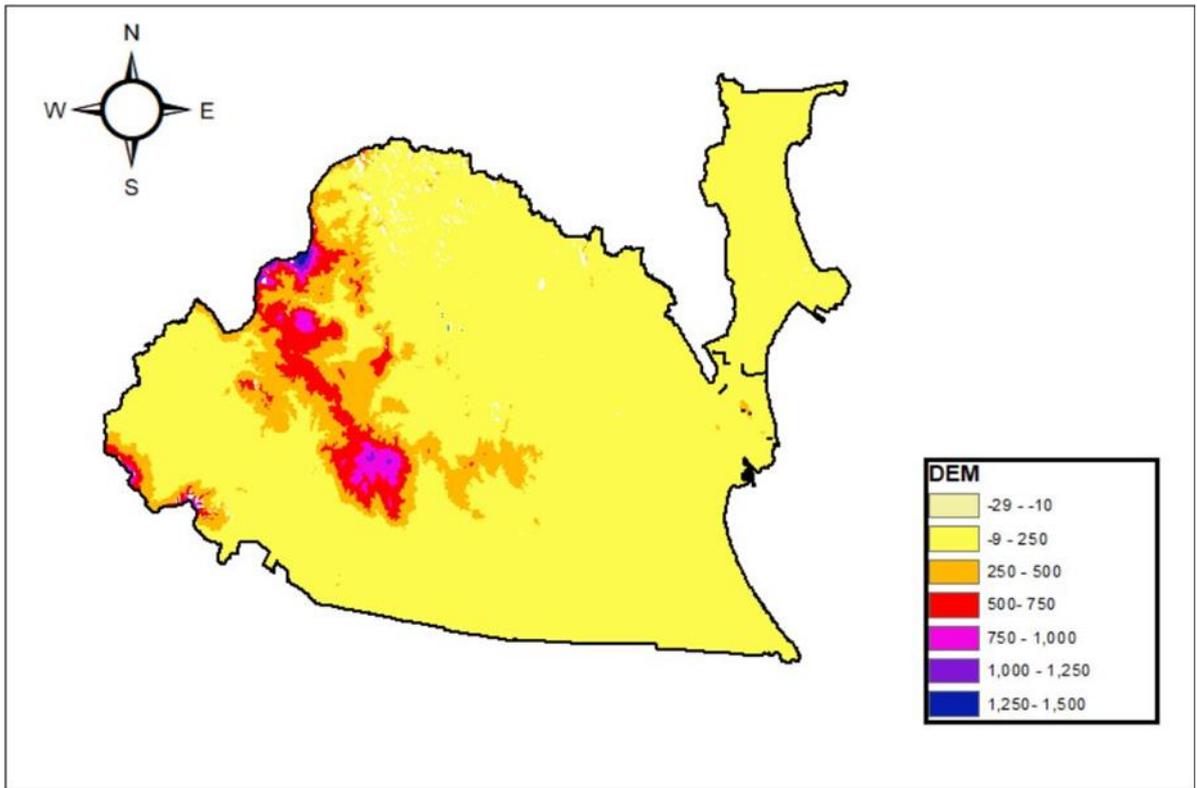


Figure 4.2 shows the Data of DEM

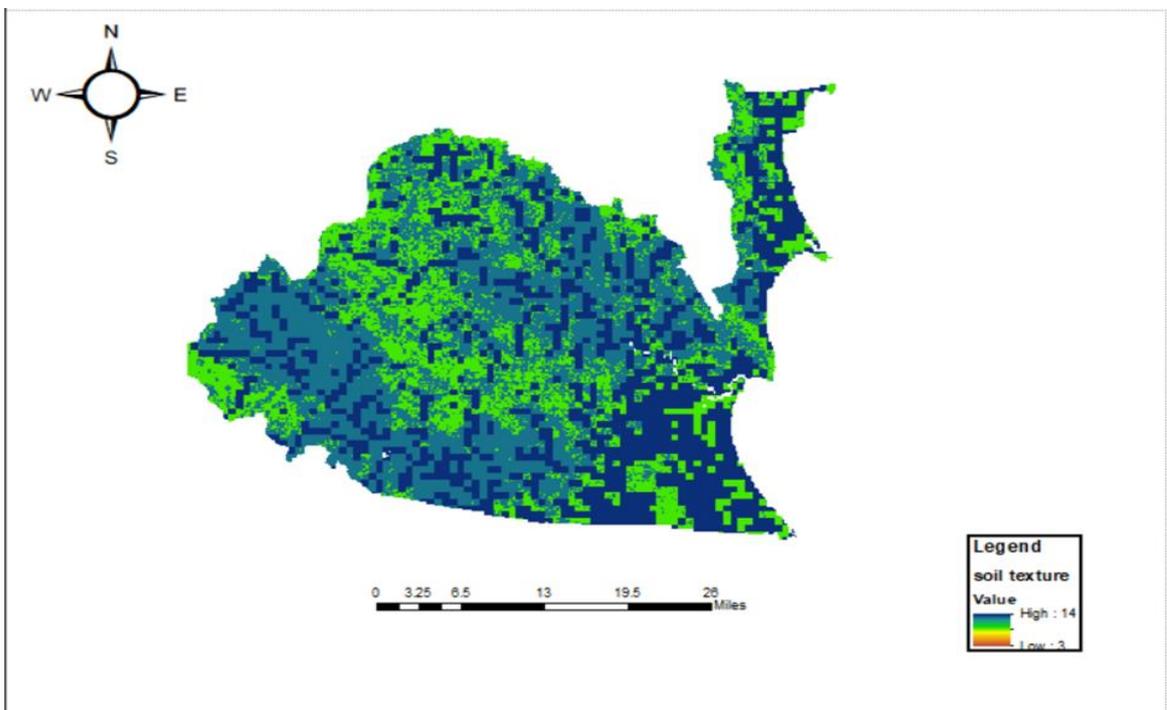


Figure 4.3 shows the Data of Soil Texture

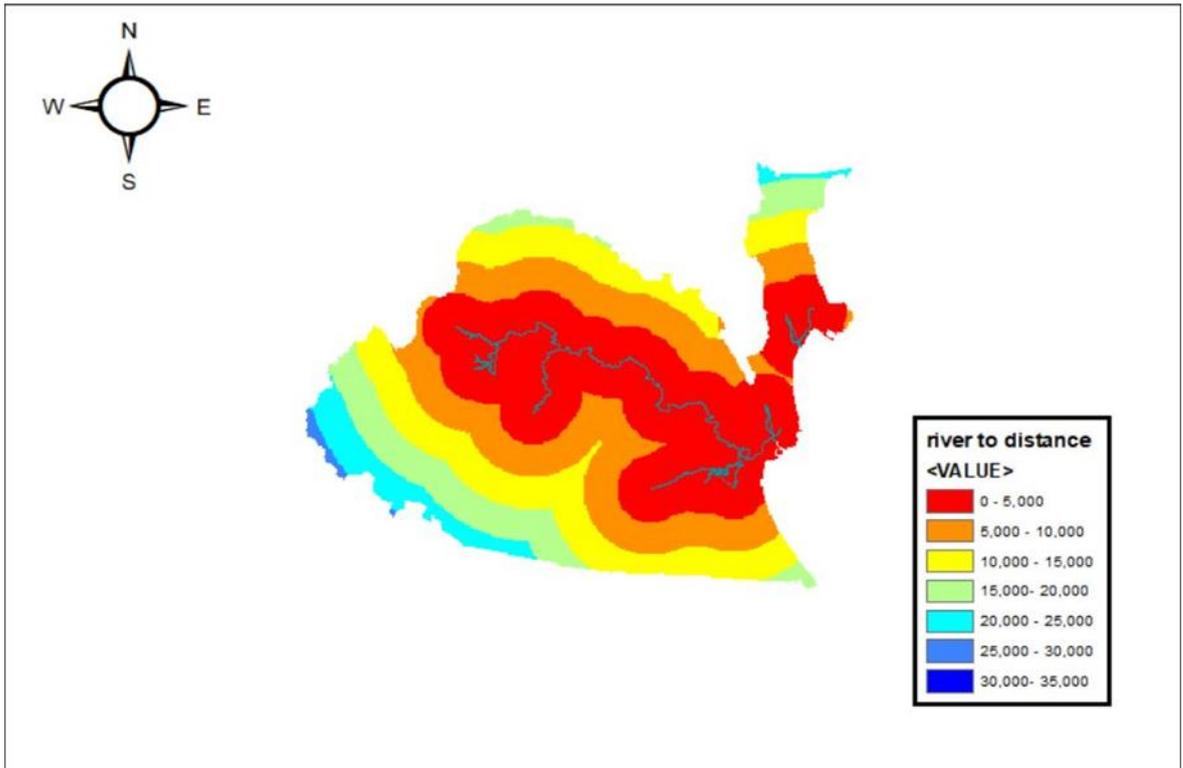


Figure 4.4 shows the Data of Distance to the river

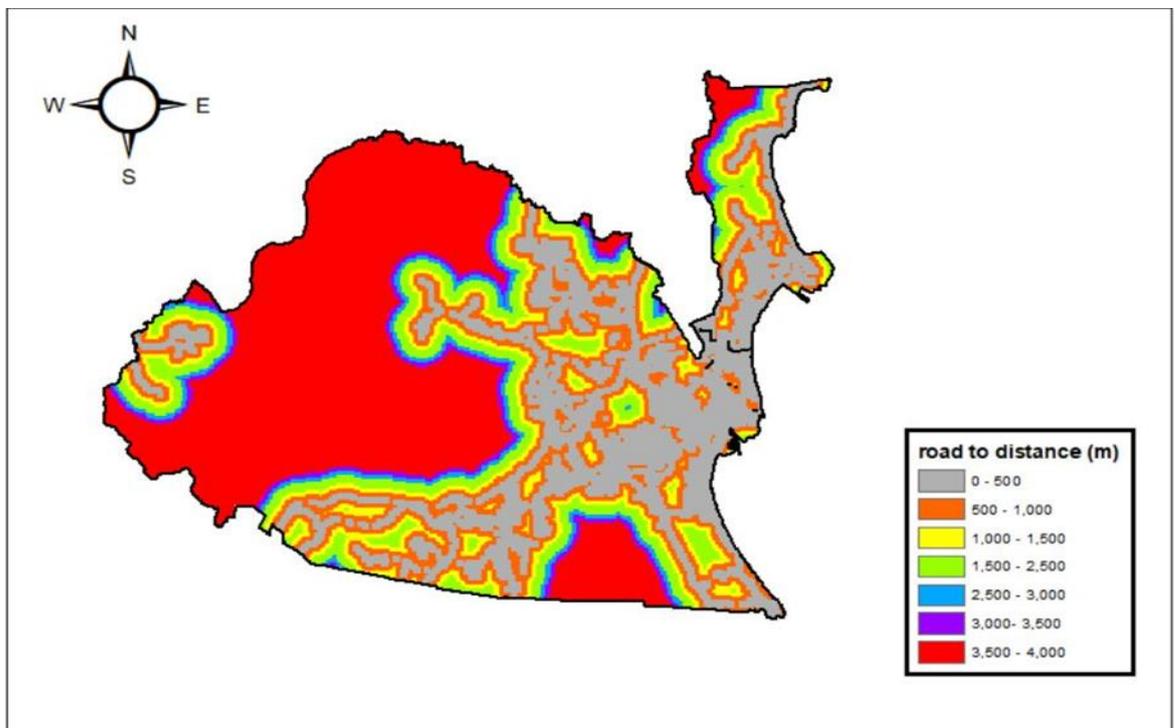


Figure 4.5 shows the Data of Distance to the road

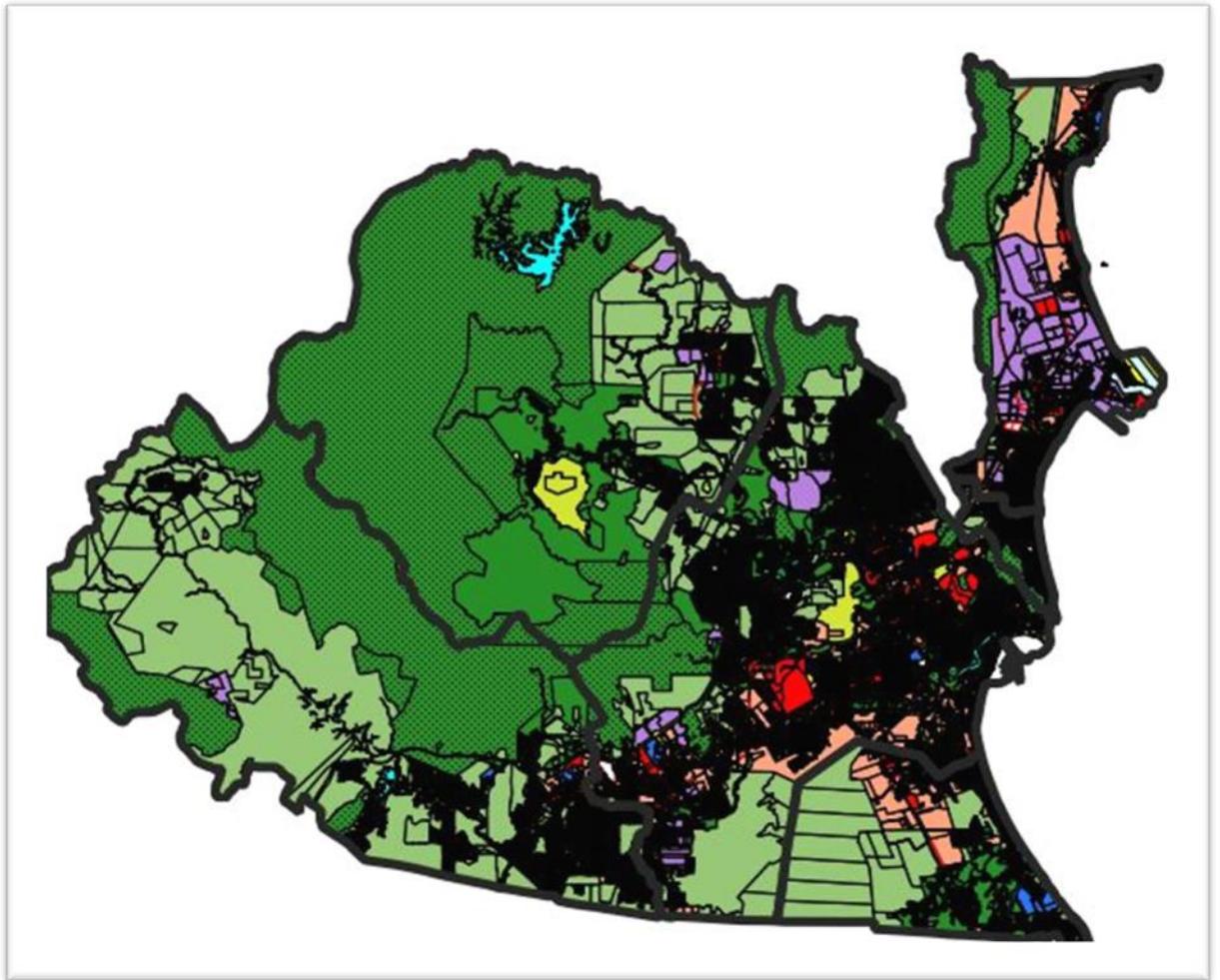


Figure 4.6 shows the Data of Land Use

Those Factors are used in GIS-AHP analysis are Data of Slope, DEM, Soil Texture, Distance to River, Distance to Road and Land Use

4.3 Development of the pairwise comparison matrix

A pairwise comparison matrix was developed with the support of the main factors. After the development of the ratio matrix, main factor was normalized. Then, the relative weights were calculated for each factor using the pairwise comparison method.

The Fundamental Scale for Pairwise Comparisons		
Intensity of Importance	Definition	Explanation
1	Equal importance	Two elements contribute equally to the objective
3	Moderate importance	Experience and judgment moderately favor one element over another
5	Strong importance	Experience and judgment strongly favor one element over another
7	Very strong importance	One element is favored very strongly over another; its dominance is demonstrated in practice
9	Extreme importance	The evidence favoring one element over another is of the highest possible order of affirmation

Intensities of 2, 4, 6, and 8 can be used to express intermediate values. Intensities of 1.1, 1.2, 1.3, etc. can be used for elements that are very close in importance.

Table 2 The Fundamental scale for Pairwise Comparison

From Table 2 We can decide the Scale for Pairwise Comparison. So we can get result at Table 3.

PARAMETERS	Distance to river	Distance to road	DEM	slope	Land use	Soil texture	PRIORITIES	RANKING
Distance to river	1	1/5	1/7	1/2	3	5	0.065	5
Distance to road	1/7	1	5	5	7	3	0.433	1
DEM	7	1/7	1	1/2	1/5	1/5	0.089	3
slope	1/7	1/5	1/2	1	1/7	1/9	0.077	4
Land use	3	7	1/2	3	1	1/7	0.307	2
Soil texture	1/9	1/7	1/5	1/7	1/7	1	0.029	6
							Total = 1	

Table 3 the matrix for Pairwise Comparison.

4.4 Calculation of Consistency Ratio

The CR is important for identifying whether the study's comparisons are consistent. Condition 1: λ must be equal or greater than the number of factors used. The value of λ in this study = 4.1, which means that it satisfies this condition. Computation of consistency index (CI) is done using equation (1):

$$I = (\lambda - n)(n - 1)$$
$$CI = (4.1 - 4)(4 - 1) = 0.033$$

Computation of consistency ratio (CR):

$$CR = \frac{0.033}{0.9} = 0.4 * 100 = 4\%$$

Condition 2: Consistency ratio, CR (0.04) < 0.10, refers to the reliable level of consistency in the pairwise comparisons. Thus, the CR value meets the requirement of condition 2, indicating that the weights obtained are accepted.

4.5 Generation of final land suitability map for aspect of culture.

All six-factor shapefiles were converted into a raster format. Therefore, a score can be identified for each pixel. Next, all factor maps were combined and overlaid, and a final location suitability map was generated (Figure 4) using the following formula:

Land suitability map=(slope*0.077+ DEM*0.089 + soil texture*0.029 +distance to river*0.065 + distance to road*0.12 +land use*0.307)

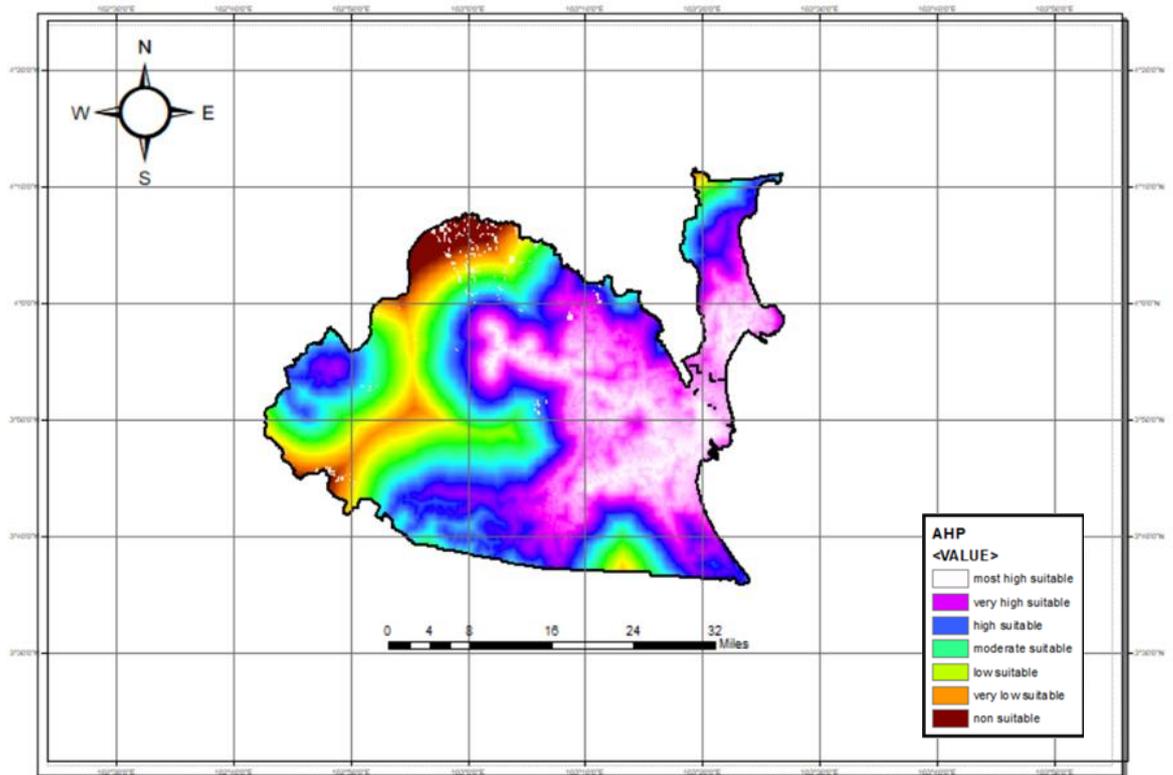


Figure 4.7 shows the land suitability for cultural place

The land suitability for cultural places reveals that Kuantan can be divided into seven suitable categories. This result shows that many places that suitable for cultural places around Kuantan. The figure below shows some of the cultural places that already exist in Kuantan for now and place that are suitable for cultural places in the future according to the factors used in this project.

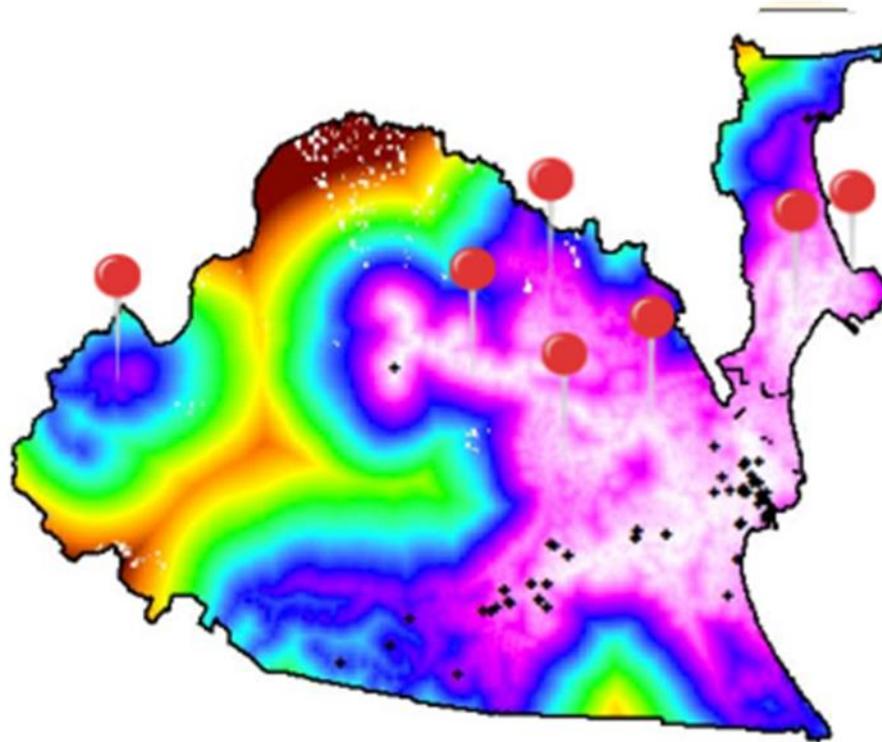


Figure 4.8 shows the cultural places

	<ul style="list-style-type: none"> • Cultural places that already exist in Kuantan
	<ul style="list-style-type: none"> • Cultural places that are suitable for cultural places

4.6 Conclusion

This study conducted a Land Suitability Analysis (LSA) to determine the best locations for urban sprawl in Kuantan using an integrated GIS-AHP model. The results confirm that the GIS-AHP model is a useful technique for urban planning. In addition, So to achieve the second objective, by using the factors we can get the suitable place to assess tourism suitability in the Kuantan district. At the pin point in the result's picture, we can see that there many more places that we can build according to the six factors to attract the tourist. So, it will not be only concentrated in the center of Kuantan city.

CHAPTER 5

CONCLUSION

5.1 Introduction

In this final chapter, elaboration on investigation study is made based on literature reviews. The conclusion is being made to ensure every objective is achieved. Recommendations will be listed out regarding this research. Suggestion and recommendation are provided based on the given solution, so this study made would offer awareness certain parties. The achievement in the objectives will be discussed from the outcome of the study obtained.

5.2 Conclusion for Objectives

The primary purpose of this research is to classify and geographically map urban sprawl with a special emphasis on cultural tourism. Understanding urban growth necessitates classifying and mapping urban sprawl with a concentration on cultural tourism. The growing popularity of urbanization and cultural tourism has led to serious challenges in managing and preserving coastal habitats.

By categorizing and mapping urban sprawl, we may get valuable insight into growth patterns and their environmental impacts. This insight may be used to create policies and initiatives that mitigate the negative impacts of urbanization on cultural tourist destinations. One of the key benefits of categorizing and mapping is the identification of locations that are more vulnerable to urban expansion and its consequences. Legislators and city planners may utilize this data to establish land use limits and conservation measures that will better safeguard the area's natural and cultural treasures. In addition, sustainable urban planning and design may benefit from information gleaned from the categorization and mapping of urban sprawl in cultural tourist hotspots. To better manage transportation systems, optimize resource allocation, enhance tourist experiences, and lessen environmental impacts, knowing where tourism infrastructure and development are located is essential.

Tracking and monitoring urban sprawl over time also allows decision-makers to assess the performance of conservation and development measures and make any required modifications. This flexible approach is crucial for protecting cultural tourism hotspots and the coastal ecosystems that sustain them over time.

This study demonstrates the use of the GIS-AHP methodology for determining if cultural tourism in the Kuantan District is warranted. This research sheds light on the geographical dynamics and variables influencing the acceptability of cultural tourism, providing important insights for stakeholders, policymakers, and tourist planners. Integrating Geographic Information Systems (GIS) with the Analytic Hierarchy Process (AHP) has allowed for the study of multiple factors and sub-criteria related to beach tourism appropriateness. By considering factors including cultural quality, accessibility, infrastructure, environmental sensitivity, and tourist preferences,

the GIS-AHP model has provided a thorough framework for decision-making in the tourism business.

The results of the research have identified the areas of the Kuantan District that are optimal for the development of cultural tourism. These results might be used by tourist planners to better target infrastructure development, environmental preservation efforts, and advertising campaigns. To maximize the positive impacts of cultural tourism while minimizing any negative ones, limited resources should be spent appropriately by focusing on the sites with high appropriateness. Together, these features make the GIS-AHP model a dynamic and adaptable instrument with room for future improvement. As more information becomes available or priorities shift, the model may be updated to account for these changes and guarantee the long-term viability of cultural tourism in the Kuantan District. By allowing for regular checks and balances, this iterative process promotes the use of data in decision-making.

It is equally important to acknowledge the caveats of this research. The GIS-AHP model relies heavily on the data it collects, thus their accuracy and consistency are crucial. The evaluation process may also be biased and vulnerable to subjectivity since the model's outputs are dependent on the criteria and weights specified by experts or other stakeholders. Future studies should focus on adjusting the model's criteria and adding additional variables to boost its robustness and accuracy.

5.3 Recommendation

If I want my data and findings from Urban Sprawl Mapping for Cultural Tourism Suitability using GIS-AHP Model in Kuantan district to be more reliable, I need to extend the study maybe from 20 to 30 years prior to compare how the urban development has occurred over the years. This would allow me to see how the urban growth has changed over time. The final findings will be able to demonstrate the pattern of the landscape in the region if these strategies are used. In order to ensure that we are able to compare the findings, the pictures of urban sprawl will be created using the program known as QGIS. This indicates that every time there is expansion of the urban growth we can observe how the spread of the urban so that we can make sure that the tourist does not just concentrate in the city core.

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APPENDICES

Appendix A:

Title: Helping one of my groupmate to get the coordinate of Teluk Cempedak Beach



Appendix B:

Title: Doing the fieldwork with our supervisor to find the cultural place around Kuantan



Appendix C:

Title: Borrow hand GPS from UMP which is Garmin GPSmap 76CS x

