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III. METHODOLOGY

3.1. Time and Location of Study

This study was carried out from April until September 2006. It is conducted in Parangtritis Village in Bantul Regency, Province of Yogyakarta. This area is located between $110^{o}16^{'}40''$ to $110^{o}20^{'}20''$ East and between $07^{o}59^{'}15''$ to $08^{o}01^{'}10''$ South. Parangtritis Village is located within Kretek District which covers an area of 967,201 hectares. Figure 4 shows the Parangtritis Village inside of Yogyakarta Province.

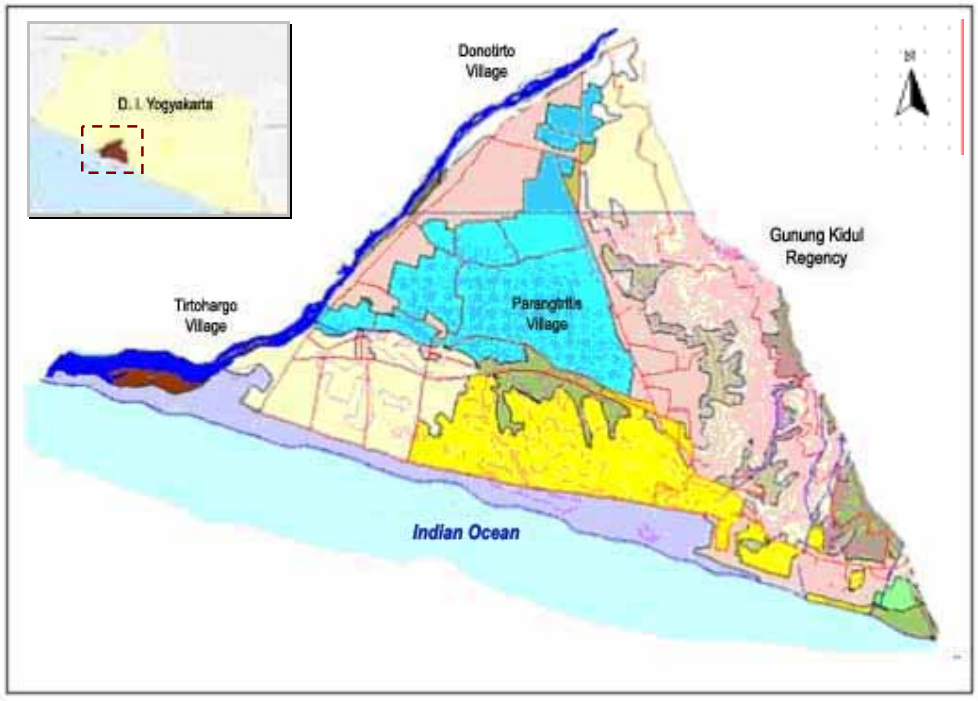

Figure 4. Study Location

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3.2. Method of Study

3.2.1. Flowchart of Study

The process of this study is diagrammatically illustrated in Figure 5.

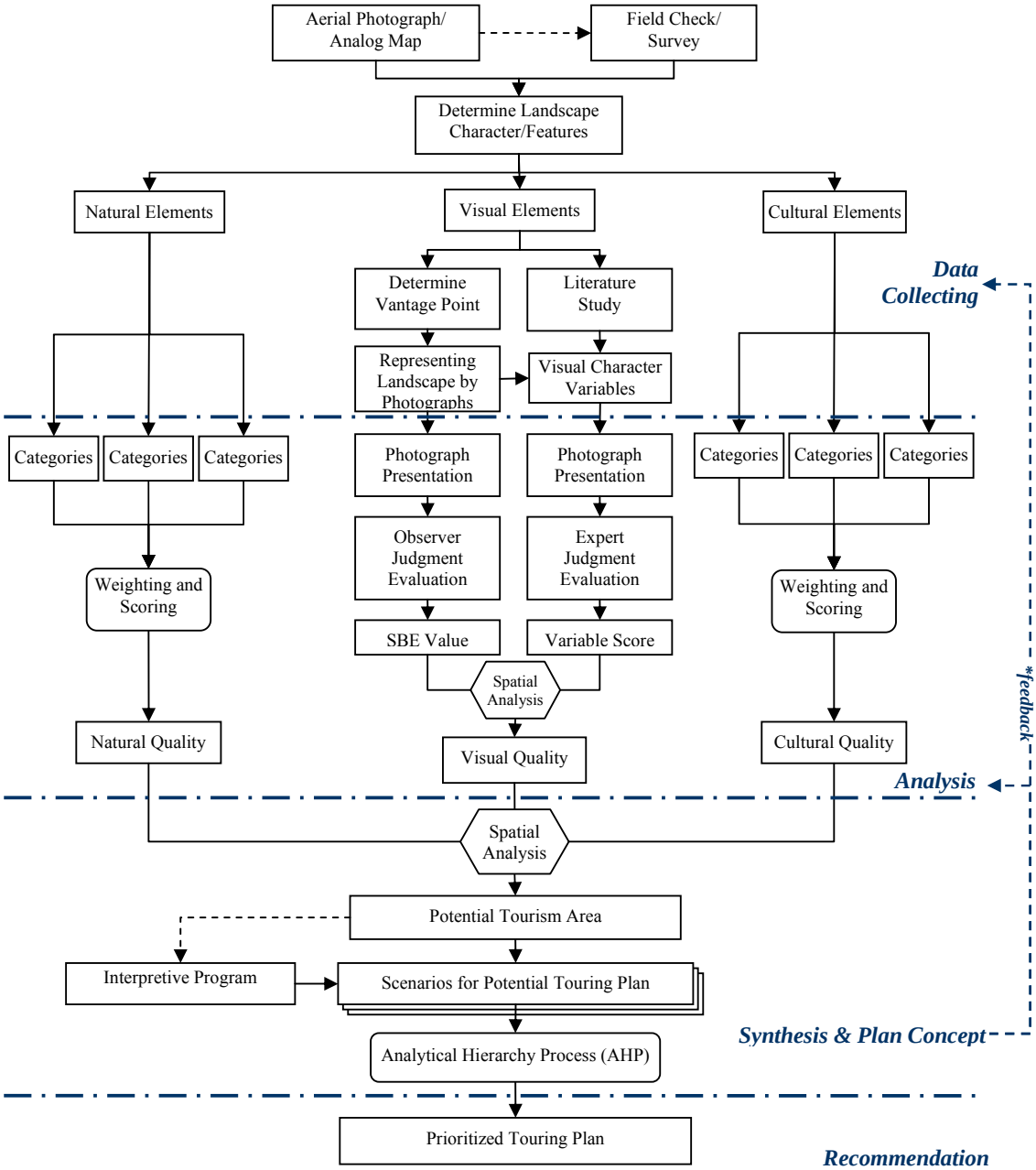

Figure 5. Flowchart of Study

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3.2.2. Data

Two methods will be carried out to collect the data, which are field surveys and document or literature study. The data will be classified in four aspects. The first three aspects are the main aspects to be considered in this study, i.e.: natural (physical) aspect, cultural aspect, and visual aspect. The last aspect is supporting aspect, which is used as additional but not less important than other aspects in determining the most appropriate touring system on the synthesis stage. The list of required data and the method used for collecting the data can be seen in Table 1.

Table 1. Data Inventory and Collecting Methods

Aspect	Factor	Collecting Methods	
		Survey	Literature
Natural/Physical	Hydrology	✓	✓
	Vegetation	✓	✓
	Landform and Topographic		✓
Cultural	Legend/Myth	✓	✓
	Architectural	✓	
	Ethnicity	✓	✓
	Tourism Economic	✓	✓
Visual	Vantage/viewpoint assessment	✓	✓
	Landscape inventory	✓	✓
Supporting	Infrastructure	✓	✓
	Accessibility	✓	✓
	Administrative Boundary		✓
	Law and regulation		✓

Especially for Legend and Ethnicity factors within the cultural aspect, the survey method for data collecting is by interviewing purposively some people who are assumed to have a good knowledge about the legend and some histories associated with Parangtritis Village. This information is also verified by some information acquired from literature study.

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3.2.3. Analysis

This stage will consist of two main types of analysis. It is differentiated by the method used in the analysis. The first stage is analysis for visual quality assessment, and the second one is analysis for natural and cultural element assessment.

3.2.3.1. Visual Quality Assessment

In this stage, visual resources will be analyzed based on visual preferences and visual character variables using Scenic Beauty Estimation (SBE) procedures (Daniel and Boster 1976). The application of SBE method involves three main steps: representing landscapes by color photos, presenting the photos to observers, and evaluating observer judgments.

a. Visual Preferences Analysis

Daniel and Boster (1976) argued that to avoid introducing the biases as to what is representative, an impartial sampling procedure is used here in determining the vantage point. But first of all, the area needs to be stratified into approximately equal sub areas based on certain characteristics. For this study, land cover is used as the main classifier for the area's diversity derived from Bakosurtanal's analog map at 1:25,000 scales and aerial photograph of Parangtritis Village at 1:20,000 scales from Puspics UGM (2002), and verified by field survey. This classification area consequently will affect the number of photos required. Based on the previous study, three photos were considered to be sufficient to be taken for each location with certain characteristics.

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For this research, there are seven types of landscape character determined based on land covering, which are:

1. beach,
2. sand dune,
3. rivers,
4. bushes (scrubland),
5. woodland,
6. agriculture area (farmland),
7. settlement area.

Three locations are taken within each landscape character to represent the sub area with certain character, while within each location three photographs are taken with different angles, so that there are totally 63 selected photographs to be presented and being judged by the observers. Figure 6 shows the landscape character map of Parangtritis Coastal Island.

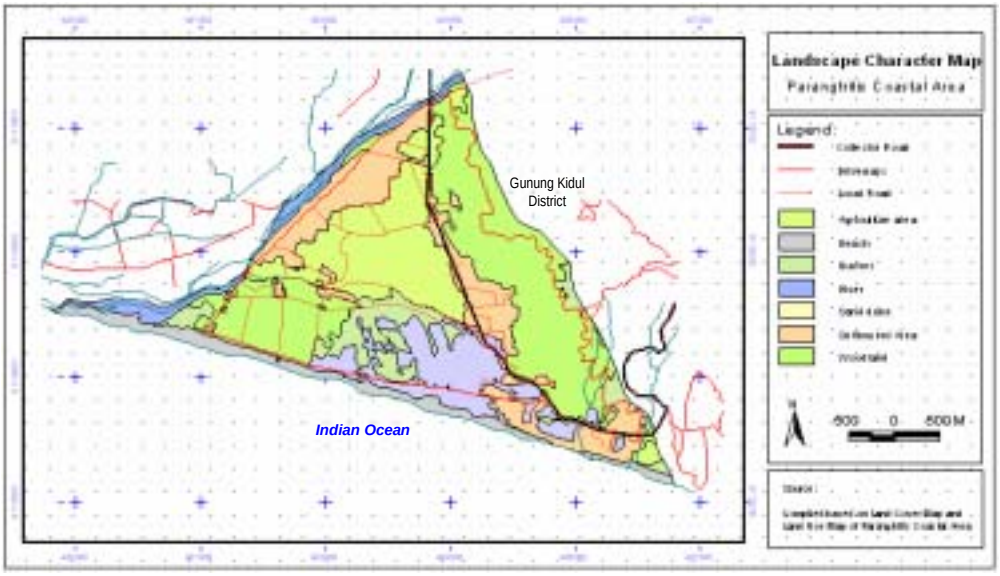

Figure 6. Landscape Character Map of Parangtritis Coastal Area

The photographers will be equipped with a GPS and a camera when pacing across each sub areas following randomly determined directions, and

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stopping at locations dictated by a pre-determined pacing distance. At each viewpoint, a picture is taken at an eye level along a randomly determined heading. This procedure is repeated until the desired numbers of pictures are taken.

The acquired photos are then scrambled into a random order and presented one at a time, using LCD projector device, about 8-10 seconds for each photo, and being judged directly by the observer. The judgment values range from 1-10 in scale, where 1 represents the lowest, and 10 represent the highest judgment of visual preferences.

The observers selected here are college students, as for purpose of developing, testing, and refining the method, college student served very well, and also they can represent the total population in many respects (Daniel and Boster, 1976). Parts of the students are from landscape tourism planning class and the rest of them are students of landscape architecture program. The other observers are some practitioners in Landscape Architecture field and Mapping and Survey field. They are selected based on their supporting background for scenic assessment and also for their acknowledgments about varied landscape characters. The number between 20 and 30 observers is assumed to be adequate by Daniel and Boster (1976), and in this research, 60 observers were participated which consist of 30 numbers of students and 30 numbers of practitioners.

After the photo judgment session, SBE values collected from observers are calculated for each photo from an area based upon the judgments from observers. The calculation starts by calculating the frequency of each score (f), the cumulative frequency (cf), and cumulative probability (cp). Then the z values is determined using the z table as the standard normal deviates associated with each

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of the cumulative probability values, with adopting the convention of cp = 1 – 1/2n or cp = 1/2n for the cases where cp = 1.00 or cp = 0 ($z = \pm \infty$) respectively (Bock and Jones, 1968 in Daniel and Boster, 1976). Then the mean value of z for each sub area can be determined to be further used to estimate SBE value of particular sub area using the following formula:

$$SBE\ x = (Zx - Zo) \times 100,$$

where: x = 1, 2, 3, …, 63

SBEx = SBE value for sub area 'x'

Zx = mean value of z for sub area 'x'

Zo = determined z value of certain sub area as standard value

The acquired SBE values for each area of certain landscape character then are put back to the area of each landscape character to obtain the spatial information of SBE value distribution of the study area.

b. Visual Character Analysis

Akin with visual preferences analysis, this stage also evaluate the visual resources of the study area. Other than evaluating based on observer's preferences, this stage analyzed visual resources with considering several particular visual character variables adopted from ASLA (1979), which can be distinguished by two levels of attributes: visual pattern elements and visual pattern character. Visual pattern elements are primary visual attributes of objects, which include: (1) form; (2) line; and (3) color. Visual pattern character is the visual contrast between the visual object and its visual environment by considering of four aspects: (1) dominance; (2) scale; (3) diversity; (4) continuity.

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The same with visual preference analysis, the judgment procedure also perform based on observation of the photo representing each area of landscape character, but the judgment of the photos is based on several criteria associated with seven selected visual character variables mentioned before. Regarding many variables to be considered on the judgment for each photograph, therefore the total photos to be judged is not as much as the total number of photos used in visual preferences analysis method. In this stage, every area of each landscape character is represented only by three photos taken from three different locations which are believed as the best representation of the landscape character. Therefore, there are only 21 photos that are judged by the expert.

There are nine experts who are invited to give their visual judgment to this research. They are come from two different background of professional field. There are four of them are come from Mapping and Survey environment, while the rest are majoring landscape architecture, including the lecturers and practitioners (detail information about the experts can be seen in Appendix 1). They are selected based on their expertise, experiences, as well as acknowledgments about varied landscape characters and their visualization, so that they are believed to be able to give their expert judgment.

The given judgment are presented as scores that can be classified into a range between 1 (low quality) to 3 (high quality). There are some criteria determined as the guideline for the expert in giving the scores, so that the experts can have the same prescription about the range of the scoring. The criteria for each variable for scoring are determined based on literature study and discussion

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with several experts in Landscape Architecture. Table 2 shows the criteria used as the guideline in scoring activity.

Table 2. Criteria for Scoring the Visual Character Aspects

Visual Attributes	Aspects	Score 1	Score 2	Score 3
Visual Pattern Elements	**Form**	There are some visual mass or shapes among the landscape components that look very annoying within the visual landscape.	The visual mass or shape cannot be identified easily among the landscape components	The visual shapes of landscape components can be easily identified and look harmonized with the natural surrounding
	Line	There are some lines introduced by the edges of objects or part of object that interrupt the natural pattern of the landscape visually	There are some line that look unnaturally but not very annoying the visual landscape	The pattern of line among the landscape components can be noticed well and looks harmonized with natural pattern
	Color	There are some colors of the landscape components that are annoying the visual landscape	There are some unnatural colors among the landscape components but visually they are still harmonized with the natural surrounding	All the landscape components have natural color that can create the natural harmonization of the visual landscape
Visual Pattern Character	**Dominance**	There is no visual dominancy among the landscape components	There are some landscape components that are visually dominant within a landscape setting	There is a landscape component that is visually dominant and has good contrast with its natural landscape setting
	Scale	There is one or more landscape components that interrupt the apparent size relationship to its surroundings and it is annoying to the visual landscape	There are some interruption in size relationship but it is not causing the annoyance of the visual landscape as a whole	The landscape components apparently have a good size relationship to the natural surroundings
	Diversity	The landscape view appear to be monotone	A number and variety of visual pattern can be noticed within the landscape view	The visual pattern of the landscape looks varied and intermixed but give the harmony to the view
	Continuity	The flow of pattern elements and visual relationship are interrupted and cannot be maintained between the related landscape components	The flow of visual pattern can be noticed though has interrupted visual relationship between landscape components	The flow of pattern elements is uninterrupted and has good maintained visual relationship between related landscape components

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The given scores from the experts are then calculated to obtain the average score for each variable of visual character in every area of landscape character to acquire thematic map of visual character variables. The last step of this visual character analysis is by superimposing all those 7 acquired thematic map of visual character variables to get the distribution of visual character scores map based on the expert judgment.

Finally, the visual quality of the study area is obtained by integrating the result of visual preferences analysis with the result of the visual character analysis. It is performed by overlaying the map of SBE values distribution with the map of visual character scores distribution until the Visual Quality Map is acquired.

3.2.3.2. Natural and Cultural Elements Assessment

For both natural and cultural elements assessments, the method is adopted from the technique of potential zones mapping applied by Gunn (1994) combined with cartographic regionalization (Smith, 1989). The analysis pertain descriptive quantitative analysis and spatial analysis based on spatial distribution of important area characteristics. Any important or 'critical' features are being identified and assessed spatially in this analysis stage.

For natural elements assessment, the critical features are classified into 3 factors based on the physical characteristics of the study area which are considered to be important factors in tourism development. The three factors are: (1) landform and topography; (2) vegetation; and (3) hydrology. The spatial distribution of these factors are mapped to obtain the spatial distribution within the study area. Landform and topography factor are spatially mapped based on

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Land Form Map (Figure 7), and it is categorized based on its uniqueness of the forming process and the topographic characteristics. Vegetation factor is categorized based on its vegetative structure and environmental location and its spatial features are identified based on Land Use and Land Cover Map. Hydrology factor which is categorized into 2 categories: beach and river, is mapped based on Land Use and Landform Map. River category is drawn as an area using the assumption area as what has been applied by Roslita (2001) by developing buffering area of 50 m alongside the river based on Keppres No. 32/1990. Beach feature is determined by the beach area adopted from the Landform Map.

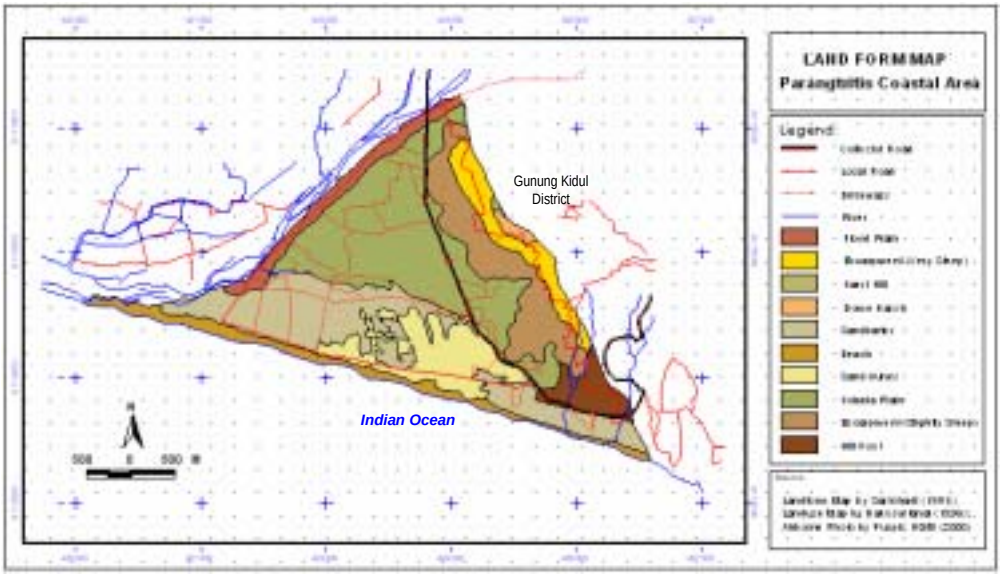

Figure 7. Land Form Map of Parangtritis Coastal Area

The critical features of cultural elements are classified into four factors which are: (1) legend/myth; (2) tourism economic; (3) ethnicity; and (4) architectural. The legend factor is categorized based on how well the legend is known and believed by the community. Tourism economic is classified into three categories based on its economic activity, such as tourism service activity,

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fishery activity, and also agriculture activity. For the ethnicity factor, it is classified based on its authenticity of the community ethnic within a certain area. At last, the architectural factor is classified based on the architectural style of buildings within the area of study.

Neighborhood unit of the Parangtritis Village acquired from Parangtritis Village Map taken from Parangtritis Village Office (Figure 8) is used to map all of the categories of the cultural factors. This assumption area is used to present all of the critical features of cultural elements spatially. It is based on Smith (1989) who argued that the used of political unit as an operationally defined spatial characteristics has given the advantage that the data sources will often be available for them.

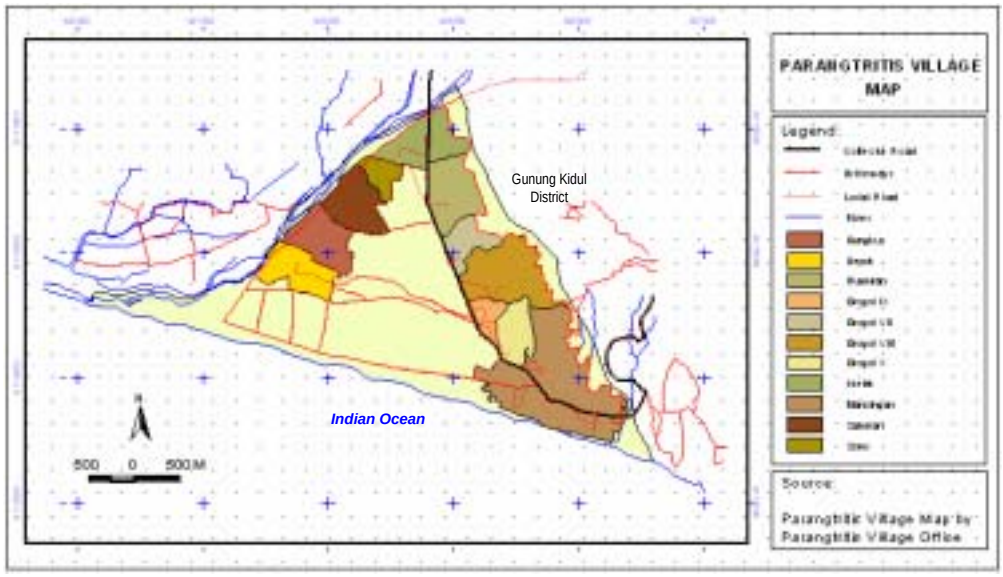

Figure 8. Village Map of Parangtritis

Acquiring from analog map of Parangtritis Coastal Area, spatial features of infrastructure can be obtained. Infrastructure is taken into account as a supporting factor in determining the potency of an area to be developed as a tourism object or attraction. Infrastructure is the main access to a tourism object.

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In this research, it is categorized based on road class classification. There are three categories used: collector road, local road, and driveways, which are considered as an area by using assumption area of road based on PP RI No. 26/1985, as what has been applied by Roslita (2001), especially for collector and local road buffered with 7 m and 6 m successively, while driveways are buffered with 3 m (Harris and Dines, 1988).

A measurement score for each characteristic is defined by using the criteria that used by Gunn (1994) and Roslita (2001) that has been modified based on the site condition of this research. The measurement criteria of categorization and scoring are shown in Table 3.

Table 3. Measurement Criteria of Natural, Cultural, Supporting Features Scoring

Factor	Categories	Score	Factor	Categories	Score
Landform and Topography	Unique	3	Legend/ Historic	Dominant	3
	Dominant	2		Good	2
	Fair	1		Fair	1
Hydrology	Beach	3	Tourism Economic	Tourism Service	3
	River/Stream	2		Fishery	2
Vegetation	Sensitive environment	3		Agricultural	1
	Woodland	2	Ethnicity	Authentic	2
	Cultivated plants (crop)	1		Less authentic	1
Infrastructure	Collector Road	3	Architectural	Unique	3
	Local road	2		Dominant	2
	Driveways	1		Fair	1

Source: Gunn, 1994 and Roslita, 2001 (modified)

Each resource is rated based on supportive characteristic for tourism activities, which consists of three classes: 1 (low), 2 (medium), and 3 (high). All of those factors are weighted according to their influence in potential for future development. The weighting process is adopted from Gunn (1994) with the modification based on the study area characteristics (Table 4). These weighting factors are further used to determine spatially potential resources capability resulting in thematic map of each resources factor. Furthermore, by using GIS,

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all of those resources factor maps are overlaid to obtain superimposed factors to produce a composite map showing both Natural and Cultural Quality of Parangtritis Coastal Area (Figure 9).

Table 4. Weighted Factors in Parangtritis Coastal Area

Natural Factors	Weight	Cultural Factors	Weight
Landform and Topography	35	Legend/Myth	33
Vegetation	28	Tourism Economic	26
Hydrology	27	Ethnicity	21
Infrastructure	10	Architectural	10
		Infrastructure	10
	100		**100**

Source: Gunn, 1994 and Roslita, 2001 (modified)

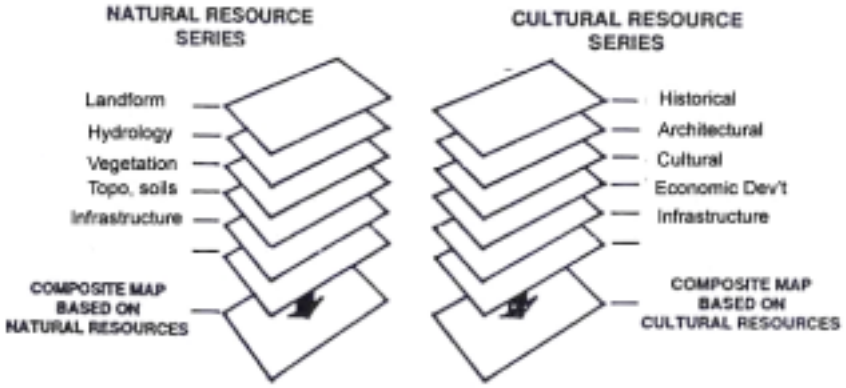

Figure 9. Composite Mapping Process Based on Resource Factors

3.2.4. Synthesis

3.2.4.1. Acquiring Potential Tourism Area

Spatial analysis will be implemented in this stage. Spatial analysis is used by overlaying the map of Visual Quality Map with Natural Quality Map, as well as with Cultural Quality Map. The result of these maps overlay will be the Map of Potential Tourism Area derived from visual, natural, and cultural resources assessment, especially showing the distribution of natural and cultural factors

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integrated with esthetical factor within the study area, as Gunn (1994) concurs that the concept of beauty is essential for tourism.

3.2.4.2. Developing Touring Plan Alternatives

To develop a touring plan, there must be a pattern or sequencing to be followed as a basic for tourist movement within the site. Orderly touring development does not need to be rigidly oriented but should make the flow of movement or walking, viewing, and experiencing places a pleasurable and unobstructed event. It also has to provide a logical story and flow of thought with a clearly defined themes, purposes, and objectives (Gunn, 1994). It may be satisfied by developing an interpretation program of the site.

The main purpose of interpretation is to enrich the recreational experiences of the visitors. Interpreters seek to produce enrichment of experience. They add value to leisure time and activity (Knudson *et.al.*, 1995). Self guided or guided tours can be used to interpret natural and cultural resources within a destination (Knudson and Orbasli in Damayanti 2003). A tourism track can invite visitor to view the place and discover things there and also learn the values of them.

Damayanti (2003) applied 10 steps in developing an interpretive network:

1. to develop the vision that states what interpretation should be on site based on site inventory,
2. to define the main theme and objective(s) of interpretation network,
3. to identify the potential stops, which in this research it would be based on the existing tourism objects with also considering the acquired tourism potential area,

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4. to determine the theme and objective(s) of each stop; elaborated based on some literature study of site information, such as Center for Tourism Research and Development UGM (1998 and 2000), Ismoyo (1994), and some tourism leaflet about Parangtritis Tourism Area,
5. to study the sequence of stops that provides a logical story and flow of thought or viewing with also considering the existing site infrastructure in order to link the stops and decide the route; by considering the start and end points of the network, making the loop track that bring the visitor back to a clearly identifiable starting point, and interpreting about 10-20 stops varying with the length of the track, where it is the number that most visitors can remember for interpretive stops (Pilley *in* Knudson *et.al.*, 1995),
6. to analyze the touring track restriction and opportunities to plan service and transportation program,
7. to plan the transportation mode and select the interpretive media for the trail as well as the individual stops,
8. to create information and promotion programs,
9. to conduct the implementation and operation, and
10. to evaluate the effectiveness of the interpretation network in achieving the objectives.

Those steps are used in this study in developing the alternatives of tourism track within the Parangtritis Coastal Area. Those three alternatives are differentiated by the main theme of each touring track in step 2, but will have the same vision of interpretation. The developing process would be only performed as far as the

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touring route is defined (step 1-5). It will not extend to analyze the touring track restriction and opportunities to plan service and transportation program.

3.2.4.3. Analytical Hierarchy Process

There are three alternatives of touring plan developed based on interpretation concept. Each touring alternative represents one particular interpretive theme of several defined interpretive themes which can further determined as a potential tourism movement. But it has to be evaluated first whether it is appropriate enough to be selected as the preferable tourism movement route or not. A comparative judgment is needed here to select the most preferable alternative of touring plan that is appropriate to be developed in Parangtritis Coastal Area.

This study used Analytical Hierarchy Process (AHP) method in selecting the most preferable alternative of touring plan by setting some relevant and required criteria in weighting the priority factors of defined alternatives in pair wise comparisons. These priority weights are obtained by capturing some experts' perception towards the most preferable alternative of tourism track based on certain considerations. In this regard, five experts that come from different professional background, such as landscape architects, tourism planner and expert, and coastal planner or expert, would be asked to give their judgement to rank the alternatives in order to determine one of the most appropriate tourism track. The detail information about the experts can be seen in Appendix 2.

A hierarchical structure is an illustration of the problem that need to be solved. The hierarchy is structured from the top (Level 1: the goal of the study), through intermediate levels (Level 2: criteria on which subsequent levels depend)

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to the lowest level (Level 3), which is usually a list of alternatives (Saaty and Kearns, 1991). The goal or objective of this stage is to select the most preferable alternative track that can enrich the visitor experience in Parangtritis area by helping them to gain a sense of place, to respond to the beauty of their environment, the significance of their legend and history, as well as their cultural surroundings. The hierarchy structure of the process can be seen in Figure 10.

A pairwise comparison is arranged to compare the relative importance of criteria at the second level with respect to the objective or goal at the first level. The criteria used in this study are adopted from the perspectives of benefits of interpretation received by individuals concurred by Knudson *et. al.* (1995), where the benefits can be classified as educational, recreational, and inspirational benefits. Other pairwise comparisons are also constructed to compare each alternative at the third level with respect to the criteria at the second level.

In the AHP, elements of a problem are compared in pairs with respect to their relative impact on a property they share in common. A 1–9 scale is used in the comparison, with 1 for representing the comparison value if the two objectives are equal in importance, 3 if an element is weakly more important than the other one, 5 if the element is strongly more important than the other one, 7 if it is very strongly more important than the other one, and 9 is for absolutely more important than the other. The values of 2, 4, 6, and 8 will represent the scale of intermediate values between two adjacent judgments (Saaty and Kearns, 1991).

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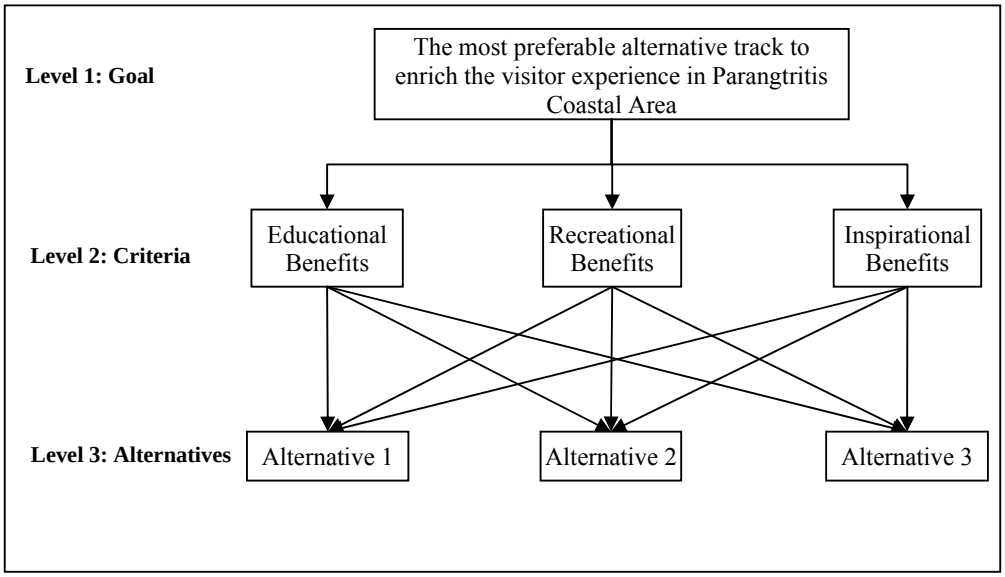

Figure 10. Hierarchy Structure of AHP Method