II LITERATURE REVIEW

2.1 Coastal Zone

Coastal zone is the area, on both sides of the actual land – water interface, where the influences of land and water on each other are still a determining factor—climatically, physiographically, ecologically, or economically (Fedra, et al., 1998).

Base on the geomorphologic map (Westi, 2005), Parangtritis beach is divided into four types of coastal geological landscapes. There are tectonic cliffs, coastal watershed floodplain, coastal marine, and coastal sand dune.

The sand dune is distinguished into three zones such as the wetland (Sea, Laguna, and Opak river), active sand dune characterized by tide area and open beach. The last one is passive sand dune that is covered by naturally vegetation, culture vegetation and settlement.

The object tourism takes place in all the types of landscapes. Open beach that is dominated by sandy area is very famous place used for tourism. Usually, the grains sand comes from the dead coral or it came from up land (volcanoes) and by moving water the sands in the river move and deposit to the estuary. Sea current moves sand grains then throw up by the wave to the beach. The next process is that the wind moves the sands then the sands are accumulated as sand dune.

2.2 Sand dune

Wind is an agent of geomorphic change. The work of the wind are erosion, transportation and deposition called Aeolian (Christoperson, 1998). A dune is a wind—sculpted accumulation of sand. Sand grains are generally deposited as transient ridges or hills called sand dunes. An extensive area of dunes, such as one that is found in
north Africa, is the characteristics of an erg desert, or sand sea. The grand erg oriental in the central Sahara exceeds 1200 m in depth and cover 192 000 km². This sand sea has been active for more than 1.3 million years and has average dune heights of 120 m.

Dunes have many wind-shaped styles that make classification difficult. Dune can simply be classified in to three classes: crescentric (exp: barchans, parabolic), linear (exp; longitudinal, sweep) and star dunes. Figures 2.1 and 2.2 show some types of sand dune.

Figure 2.1 Major crescentric dune forms

Figure 2.2 Major linear dune forms
Sand dune is a scarce land form (endangered landscape) usually take place in the beach, unfortunately competition for access to sandy beaches inevitability caused changes in the natural environment at present.

The process of sand dune formation is influenced by available abundant of sand grains, win as agent of grains sand motion and deposition, the clear distinguish of wet and dry season, no material that close the space where the sand dune will be formed (Debyosaputro, 1997). The relationship between wind velocity and sand movement for sand dune formation shows in Figure 2.3.

Figure 2.3 Relationship between wind velocity and sand movement

2.3 Sustainable Tourism

In the Earth Summit, a program for promoting sustainable development throughout the world, known as Agenda 21, was adopted by participating countries. Although tourism as an economic sector was not debated in Rio, five year later in the Earth Summit II in New York, it was debated as a recognized economic sector.

In the report, some recommendations and outcomes were stated as follows. The expected growth in the tourism sector and the increasing reliance of many developing countries, including small island, developing States, on this sector as a major
employer and contributor to local, National, Sub regional and regional economies highlights the need for attention to the relationship between environmental conservation and protection and sustainable tourism.

Tourism industry has adopted sustainability for three reasons: economic, public relations and marketing (Butler, 1998). The five main goals of sustainable tourism were identified as:

a. to develop greater awareness and understanding of the significant contributions that tourism can make to the environmental economy,

b. to promote equity and development,

c. to improve the quality of life of the host community,

d. to provide a high quality of experience for the visitor, and

e. to maintain the quality of the environment on which the foregoing objectives depend.

Others said that tourism should not degrade the resource and should be developed in an environmentally sound manner. It should involve education among all parties, local communities, government, non-government organization and tourists before and after trip. It should provide long-terms benefits – to the resources, to the local community, and to industry (benefits may be conservation, scientific, social, cultural or economic) (Butler, 1991).

Tourism operations should ensure that the underlying ethics of responsible environmental practices are applied not only to the external (natural and cultural) resources, which attract the tourists, but also to their internal operations.

2.4 Planning Principle

The essence of Law No. 24/1992 consisted of Spatial Use Plan Spatial...
Utilization Guidance and Method for Controlling the space utilization. The spatial planning is basically the formulation of space utilization in optimum away based on production orientation and environmental conservation. The technical requirement for spatial utilization in general or can be nationally implemented was not identified yet.

The following principles plan (UNDP, 1999) can be used when preparing management plan:

- Plan must be objective oriented: When the problems or issues are understood, a set of objectives should be framed to address key issues. Objectives should be quantifiable targets that serve to focus management effort and measure performance.
- Plan must try to achieve the greatest good for the greatest number of people in the long run: Minority interest must be weighed in relation to the general well being of larger communities.
- The ecological carrying capacity should never be exceeded and resources sustainability should be given high priority: This is a non-negotiable requirement, if sustainable production is to be achieved.
- The need for the conservation of biological diversity and wildlife should be recognized.
- Planning is an ongoing dynamic process: Planning must be flexible enough to accommodate shifts in demand/supplies and priorities. Because societal values change over time, planning is an on-going dynamic process.
- The plan must provide for improvements in data collection to reduce areas of uncertainty associated with an incomplete or weak information base: The ultimate objective may be achieved in phases, taking in to account an improved
information base over time and applying a conservative approach where the uncertainty is perceived to be great.

The decision-making process must be visible and equitable: Involving the public in the decision-making process is necessary to promote local support and acceptance for integrated coastal management planning. Decision-making should not marginalize the traditional incomes of local people nor their access to reasonable amount of coastal products without offering practical and acceptable alternative.

Regulation and laws that are based on sector’s interest and not operational part of reasons allow the deviation occurred in space utilization from the current spatial use plan. Deviation in space utilization from spatial use plan is potential toward conflict in space utilization. Studying the conflict is carried out through spatial analysis and conflict analysis approaches. The spatial analysis is conducted through Geographic Information System in evaluating the situation to obtain tourism suitability.

2.5 Planning Techniques

All planning process begin with some study of existing characteristics of land and development. Often this is called inventory. Regional studies often begin with lists of services and facilities –number and categories of lodging, food service and attractions. Others begin with statistics on economic impact-numbers of people employed in tourism, income and tax revenues produced. Still others identify a broad range of resources factors, both natural and cultural.

Tourism inventory focuses as foundation for future policy and planning by both private, government and public sector. An example of the Objective of the Coastal
Tourism Resource Inventory Project (CTRIP) by British Columbia (1991) are:

1. To develop and implement a rigorous and credible tourism resource mapping methodology that:
   - identifies and maps tourism resources based on the needs and expectation of tourism operator and consumers;
   - reflect the present and future resource needs of the coastal tourism industry;
   - document existing tourism resource use and infrastructure;
   - respect, where appropriate, the need for confidentiality of data and;
   - is compatible with emerging local or provincial government geographic information system standard.

2. To ensure that the inventory provides a cost effective tool to support tourism planning and specifically:
   - enables the derivation of tourism resource values in a credible and technically sound manner;
   - highlights areas requiring land and resource use protection and or management to maintain present and future tourism development option;
   - increases the capacity of the ministry to present tourism interest in integrated resource management processes and;
   - provides the basis for preparation of a coastal tourism plan.

2.6 Planning Measure Techniques

There are a variety of other land-use planning measure that can be encouraged by government to mitigate the negative effects of tourism. Zoning can provide a proper recognition of resources that exist in the area and subsequently identify where tourism can and cannot take place. With specific reference to the use of zoning in
protected areas the WTO (1992) remark: a protected area can be divided into zones of strict protection (a ‘sanctuary zone’, where people are excluded), wilderness (where visitors are permitted only on foot), tourism (where visitors are encouraged in various compatible ways), and development where facilities are concentrated’.

Example of land use zoning takes place in The Canadian National Park system. Five zones have been designated for application in the national park, categorized by resource base of the area and the amount of recreational access that is allowed there:

Zone1: Special preservation- areas that contain strictly protected rare or endangered species and where access is strictly controlled;

Zone2: Wilderness –areas that use only dispersed with limited facilities;

Zone3: Natural environment- this area acts as buffer zone between zones 2 and 4, and access is primarily non-motorized;

Zone4: Recreation- overnight facilities such as campsites are concentrated

Zone5- Park services- this area is highly modified providing many services but represent less than 1 percent of the Tourism resort.

2.7 Geographic Information System (GIS)

GIS is a set of computer tools designed to efficiently capture, store, update, manipulate, analyze, and display all forms of geographically reference information (ESRI 1992). The power of a GIS steams from its ability to combine many data sets and display them in a common framework as thematic maps (Fedra and Feoly, 1998). Users will expect to get support from the system to enter data, to analyze it in various ways and to produce presentation on map. By GIS technology, the integration of all methods and tools can be useful to establish a decision support system for spatially related problem.
GIS is widespread acceptance as a tool for decision support in land, infrastructure, resources, environmental management and spatial analysis, and in urban and regional development planning. GIS use an extensive background in the digital data management, mapping sciences and information technology, because this technology is built upon very broad base of scientific disciplines ranging from cartography, remote sensing, computer science, statistics and so on. Recently, development of GIS software and Web Technology has made more user-friendly, therefore useable and accessible to more user (Gerrtman 2002, Sharifi, 2002).

2.8 Spatial Multi Criteria Analysis

Spatial Multi Criteria Analysis is a conjunctive application of Remotely Sensed data, GIS and MCA Technologies. The potential of remotely sensed materials to contain immense data/information from remote areas, coverage of large area in a cheaper way relative to the data captured, renders them to be cost effective and time saving. Therefore, remotely sensed products may be viewed as instruments of trust among stakeholders, even the local communities because of the above reason.

GIS on its own offers limited application potential for use in ill-structured complex community based natural resources management decision problem where multiple and conflicting criteria and objectives are great concern. The use of GIS alone in participatory decision-making would provide a real challenge on how to incorporate local conflict in to the decision process especially those arising from more qualitative perceptions of space place, locality and relationship between ecological and socio-economic concerns of difference stakeholders.

MCA is a multiple criteria decisions making technique to assist the decision-maker in selecting from number of choice alternatives. On the other hand, MCA alone
provides very limited application potential for ill-structured complex community
based natural resources management decision problems with strong spatial
component. Using MCA alone would present a real challenge for participants to
visualize the spatial dimensions of the decision problem. These limitation can be
overcome by the integration of GIS and MCA.

2.9 The previous research

Spatial Multi Criteria Analysis has ever been applied for the coastal
management in Rayong Province Thailand by Joan Looijen, Netatua Pelesikoti and
Marc Staljanssens. The main problem is conflict interest between mangrove forest
conservation and the development of shrimp culture in mangroves. The objectives
were to analyze the conflict of interest, to apply suitability assessment, to identify
areas of conflict, to formulate policy alternatives, and to compare the alternatives
using different policy schemes. By using Multi Criteria Analysis method the best
alternative land use were derived.

The same method will be tested to apply in land coastal of Parangtritis Bantul
Yogyakarta. The existing land uses are mainly for tourism and farming. The problem
are different, they are the conflict between sand dune conservation and development
of tourism/infrastructure, and utilize of land for paddy field and others. This situation
are challenges on how the use of Spatial Multi Criteria Analysis for land coastal
sustainable tourism planning.