Limits of acceptable change as tool for tourism development sustainability in Pangandaran West Java

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Abstract. Pangandaran since 2006 has become a model of sustainable tourism development. A program aimed to empower local communities to prepare work plans and activities to enrich the various potential development of sustainable tourism. By empowering local community, business competition has led to the undesired development of the tourism sector. This becomes the concern of the negative impact of physical changes in the area. This study aims to identify and measure the acceptable changes (limits of acceptable change-LAC) of tourism development in Pangandaran to remain adaptable as a tourist attraction. This study considers how to determine acceptable levels of impact that occurs in the Pangandaran area. This method involves stakeholders in determining the values, issues, and concerns the acceptable levels of impact for this region. The result of acceptance rate then compared with the effects of the current state. Through review and analysis methods used in this study, the LAC situation in Pangandaran outlined. Results from this study are expected to identify indicators of sustainable development of tourism sector through LAC approach.

1. Introduction

The development of tourism after the 2006 tsunami in Pangandaran West Java Indonesia has changed the landscape especially in the of Pangandaran beach coastal area. The development of many semi-permanent tourist facilities in the area not only reduces the quality of the landscape of this region but also threatens the sustainability of Pangandaran Beach area in supporting a variety of tourism activities. The unrestrained development was due to the widely opened business opportunities but not accompanied by proper sustainable management practices in this area. Considering the condition of Pangandaran beach tourism recently, the tourism development in this area needs to be re-evaluated, especially to determine any impact that caused by the development of tourism.

Pangandaran since 2006 has become a model of sustainable tourism development through energy efficiency as well as adaptation and mitigation activities (Sustainable Tourism through Energy Efficiency with Adaptation and Mitigation Measures - STREAM). The program initiated by the Ministry of Tourism of Indonesia together with UNWTO aimed to empower local communities to prepare work plans and activities to enrich the various potential development of sustainable tourism. Somehow during the field study, it is discovered that local community empowerment is not running as it planned. The empowerment interpreted by the local community as an opportunity to open the business as wide as possible without considering the impact they might cause on the area. However,
the impact of tourism development in the area has changed the physical condition and activities throughout the coastline area and its resources. The utilization of tourism resources by local small enterprise in this area resulting in unfairly business competition and various other negative impacts.

There are several frameworks to control the tourism development especially to limit excessive land use such as Recreational Opportunity Spectrum (ROS), Limits of Acceptable Change (LAC), Visitor Experience and Resource Protection (VERP), Visitor Impact Management (VIM), and Benefits-Based Management (BBM). For the case of Pangandaran coastline area, there is an excessive land use for tourism development. For the case of Pangandaran, the authors suggest LAC framework be used to measure how much the changes and impacts occurred because of a variety of tourism activities in this region. Limits of acceptable change is a framework for planning development based on an impact threshold which can be received in a natural environment [1].

2. Literature review

2.1. Limits of acceptable change (LAC)

In the field of tourism management, carrying capacity is considered as a concept that can serve as guidelines for the control of progressive tourism development or in other words can be used as a tool of policy interventions in tourism development. This approach is applied into the tourism destination management tool with an objective approach, such as LAC – the threshold of changes which are still acceptable. The resources need to be protected from damage and for the benefit of local community regarding of providing jobs for the future.

Carrying capacity and the number of acceptable change (LAC) is the key to progress in the development of recreation and tourism management [2]. LAC approach is applied to limit how much an area can tolerate a change due to a variety of tourist activity and development. This approach used to manage the human-induced changed area. The LAC concern in how much change is acceptable and what strategy should be taken to avoid unacceptable impact [2]. LAC offers a framework for a broader spectrum of the public participation in nature-based regional planning [3], which is in Pangandaran area many tourism activities are managed or run by local community. LAC approach also considers the availability of resources and social conditions [4] which at Pangandaran coastal area there is a conflict of interest in the utilization of natural resources by the local people. This LAC approach is applied to mitigate conflicts between recreational activities, tourism and the conservation of resources based on the limits of acceptable change.

For some reasons, the development of tourism facilities and equipment will enhance the quality of social and environmental at the destination if developed with proper planning, design, and mitigation [5]. After the devastating tsunami hit Pangandaran in 2006, local community of the affected area used this moment to rebuild facilities without proper planning and design

Document issued by the Pangandaran Tourism Management Plan (2009) has set several indicators to measure the impact caused by tourism activities in Pangandaran such as (1) the natural environment, (2) built environment, (3) socio-culture, and (4) social economy. So far, there is no analysis of the magnitude of what has happened on the indicators compiled. There are nine stages in the application of LAC used to assess and evaluate the changes on a region as shown on Table 1.

| No. | Stage | Remarks |
|-----|-------|---------|
| 1   | Identification of problems/issues and concerns of the area | This stage is important for stakeholders to understand the issues surrounding resources in affected areas and underlying decisions on taking action what to do next |
| 2   | Define and describe class recreational opportunities | This step is intended to identify the type of recreational experience available and determine the condition of the existing regional and desired future conditions. |
| 3   | Select indicators of resources and social conditions | Indicators are specific elements of the biophysical and social environment chosen to represent (or be “indicative”) appropriate |
and acceptable conditions in every class of recreational opportunities

|   | Inventory of resources and social conditions that exist today | Information generated from the results of inventory used to evaluate what actions will be taken based on the conditions that exist today. |
|---|---|---|
|   | Sets the standard for resource and social indicators | The determination of these standards provides the measurement and value of current conditions can be accepted or not. |
|   | Identify alternatives | This stage is used to allocate various management actions. |
|   | Identification of management actions | Identification of actions needs to consider when the condition of the area is already close to or below the acceptable change level. |
|   | Evaluate and select alternatives | This phase stakeholders can already choose an option of action to perform. |
|   | Implementation and monitoring | It is the final stage in which the selection of the actions carried out and supervised |

The indicator is an effective way to reflect the changes in condition due to visitor use [6]. The indicator used to apply for the desired condition in certain area especially has a risk of impact of degradation. For example, the hosts may develop negative attitudes towards tourism and tourist presence [7].

2.2. Previous limits of acceptable change implication in Pangandaran

By the year 2009 Pangandaran Tourism Management Plan (TMP) issued a document contained impact assessment indicators on the Pangandaran area. The indicators were consisting the aspects of the natural environment, built environment, socio-economic and socio-cultural. The application of tourism development impact indicators in Pangandaran was intended to avoid the excessive impact of changes accepted in the tourist area of Pangandaran.

Table 2. LAC indicators Pangandaran based on Pangandaran Tourism Management Plan

| Indicators          | Measurement                                                                 |
|---------------------|-----------------------------------------------------------------------------|
| Culture             | - The influence of local cultural traditions and to the development of coastal recreational activities (unique games) and local fishing activities (special fishing techniques).  |
|                     | - Complaints from local communities concerning changes in lifestyle, especially youth |
|                     | - Number of cafes with negative image |
| Physical            | - The number of animals (deer) seen in public area |
|                     | - The volume of waste |
|                     | - Density of vehicle |
| Infrastructure      | - The ratio number of public toilets |
|                     | - Percentage (%) of the composition of sports or games in the area |
|                     | - Density of traders on the beach (density of the vendors at the beach) |
| Safety and security | - The density of visitors at the beach |
|                     | - Percentage of visitor satisfaction towards nature-based tourism products and services |
| Local community     | - Local community attitudes toward changes in local culture |

The exploitation of natural resources in pursuit of economic development as well as in fulfilling the socio-economic needs of local communities as is currently happening in Pangandaran plays a part in changing the natural and physical condition. Some (tourism) sites may be ecologically fragile to human intrusion, that tourism should not be allowed or should be (partly) restricted [8]. This situation also affects the development of tourism which is highly depending on excessive use natural resources as a tourist attraction, although local communities were benefiting from tourism economically [9].
Over-exploitation can affect the tourism business in the future for its sustainability primarily on the management of its resources to meet the needs of present generation, while protecting and enhancing opportunities for the next generation [10]. The policy intervention through LAC is necessary to support sustainable tourism development to: (1) Set a tolerable limit for the sustainability of tourism activities in the area; (2) Measuring tourism carrying capacity.

Therefore, changes that are acceptable in Pangandaran the needs to be set to keep area carrying capacity to support local communities in economic, cultural, and environmental through tourism sectors.

3. Methodology
This study conducted by determining indicators based on issues and conditions the tourist area of Pangandaran to establish and apply limits of acceptable change (LAC) to be used to monitor and identify violations of acceptable change limits because of tourism activities. Changes that occur used as a guideline to identify acceptable threshold changes that are related to land carrying capacity limits. These indicators enable tourism stakeholders in tourism destinations to cope with increasing pressure from tourism development. There are three types of indicators proposed to reflect the acceptable limit of change. The physical, social, and natural environment.

The determination of these three indicators based on several main considerations. As understood that tourism is an activity where the planning and development need a balance in the management of the physical environment. Therefore, the implementation of development should have based on the carrying capacity of the environment. Carrying capacity is often seen as a management tool to protect sites and resources from overuse. One form of carrying capacity is the physical environment, a quantitative measure of the number of people or the variety of uses that a site can support [11]. In the case of Pangandaran, there is an excessive physical use of the land, especially for accommodation business development and the utilization of shoreline for various tourism supporting facilities and activities. This excessive development affects the density of buildings in the tourist area of Pangandaran and the mobility of tourists especially during the holiday season (high season). Excessive use of land results in a decrease in the carrying capacity of the area.

Hall and Page [11] suggest that social carrying capacity is the ability of individuals and groups to tolerate others following their various activities and levels of acceptance (specific conditions). The social carrying capacity first triggered by Pigram and Jenkins [12] who suggested social support as the maximum limit of recreational activities both on the number of visitors and the activities performed and measured through the deterioration of the quality of the visitor experience from the participants. As a framework for controlling the social impacts of tourism, the social carrying capacity mentioned in this paper is not only as a maximal measure in the utilization of tourism resources and activities in involving tourists and community, but as a maximal measure of involvement in a tourism activity in an area.

This social carrying capacity can serve as a framework in limiting social contact between tourists and the community, as well as communities with the community in tourism activities of course with concerning rules and norms that apply and still make tourism as an inclusive activity. This social support relies on community involvement in tourism development planning. This carrying capacity applied through the community involvement in tourism (community-based tourism). This carrying capacity framework can be: (1) Zoning of tourism business undertaken by local community, (2) regulation in involving the community in tourism activities serves as a prevention in avoiding negative impact such as prostitution, (3) the workers age limit involved in tourism businesses, (4) development of special areas of recreation for people who are not directly involved in tourism activities. For some cases, the development of tourism infrastructure in a region creates conflicts with the surrounding community due to the reduced comfort of the people as the activities in the area increase, while the community can not enjoy the facilities. (5) Continuous and consistent guidance to the local community about the consequences of tourism presence in an area and what can be done by the community.
The exploitation of natural resources for the economic sector in meeting the socio-economic needs of local communities, has contributed to reducing forest area and reducing biodiversity. The case that occurred on the west coast of Pangandaran is the number of wild animals (deer) that roam the tourist area. The interaction with these wild animals causes a change of dietary pattern because of hand-feeding by tourists. Repeated disturbance can lead to displacement and reduced population fitness [13]. The method of applying acceptable change limits illustrated in the Table 3 below:

| Aspects               | Assessment of tourism development | Proposed LAC indicators                                      |
|-----------------------|----------------------------------|-------------------------------------------------------------|
| - Physical environmental aspects | - Level of development           | - Limits of acceptable physical environment changes          |
| - Social environment aspects | - Assessment of tourist attraction| - Limits of social change                                    |
| - Ecological aspects   | - Assessment of tourist activity  | - Limits on changes in ecological environment                 |
|                       | - Tourist characteristic assessment|                                                            |

4. Research findings

4.1. Issues on Pangandaran

Some of the issues or problems addressed in Pangandaran: (1) Setting up zoning for recreational activities, (2) Relocation the physical building of street vendor, (3) Restructuring the waste management, (4) Restructuring parking area.

The above issues based on point rating system conducted in Pangandaran that shows some impacted aspects in the area as shown in Figure 1.

![Figure 1. Percentage level of impacts occurred in Pangandaran](image)

The most significant impact occurred in Pangandaran caused by a high number of tourist arrivals in the 1990s has turned the local people to become more dependent on tourism than in the fisheries sector which is economically more profitable and have better sustainability level if managed properly [14].
The golden era of tourism from 1990s to late 2000s has significantly changed the livelihood local people surrounding the coastal area from fisherman to street vendors led to the transformation of shoreline landscape into a neighborhood of street vendors with semi-permanent buildings. As the area developed, the occurrences of impact also arise in the area.

In the other hand, the growing tourism development in this area has a good economic impact on the community, such as community efforts in the form of small enterprises such as water sports equipment’s rental, souvenir shops, homestays, etc. But the growing tourism sector also has left a negative footprint on the environment.

As the purpose of this study was to establish limits acceptable change (LAC) based on the impact that has been and is happening in Pangandaran, there are four types of indicators can be proposed which can be used for planning, analysis, monitoring, and evaluation of tourism development [15]: (1) Warning indicators, which is used to alert decision makers to the critical situation that requires immediate action, (2) Stress indicator for the level of pressure on the natural environment, (3) Baseline indicators for the rate of change in the environment, (4) Impact indicators used to monitor problems arising from environmental destruction.

4.2. Proposed LAC indicators

Based on the results of analysis of the impact occurring in Pangandaran the authors suggest the indicators used as boundary level of changes that can be accepted.

| Indicators | Type of impact | Impact management |
|------------|----------------|-------------------|
| 1. Percentage (%) area lost due to tourism development | Natural environment | - Restrictions of maximum built area for tourism activities based on regulations - Zoning |
| 2. Percentage (%) wild animals roam out of natural habitat | Natural environment | - Environmental zoning between the visitors with wildlife |
| 3. Percentage (%) of waste discharged into the sea without any purification process | Natural environment | - Water purification treatment - Improvement of drainage system |
| 4. Percentage (%) of tourists experienced a certain density level | Natural environment | Zoning of tourist activity area |
| 5. Percentage (%) change of local livelihood | Social | - Skill assessment, assistance to local communities |
| 6. Percentage (%) of people who depend on tourism | Social | - Diversification of SMEs |
| 7. Ratio number of built environment to open space | Physical (built environment) | - Spatial planning - Control of physical development business permit restrictions |

Those indicators proposed for several reasons. First, the indicators above illustrate the current situation in the tourist area of Pangandaran affected by high tourism activities needs to be managed to avoid further conflict between community involved in tourism sector especially in land use for business. Secondly, overcrowding often seemed like a problem during holiday high season in the area due to lack of zoning for various tourism activities. This situation becomes a factor for reducing tourist experience during the holiday. Finally, the sustainability of tourism development was put at stake if there is no evasive response over impacts along the coastline of Pangandaran tourist area. No clear management after tsunami stroke the area in 2006 has caused excessive land use for tourism with no boundaries between activities in the area.
5. Discussions and conclusions

This study conducted in Pangandaran has some limitations, for example the response from the respondent cannot be said fully represent the overall condition of Pangandaran due to low season the of the area. The result might be different if the study conducted during peak/high season. This study results may illustrate some of the areas of the Pangandaran west coast have exceeded the acceptable carrying capacity, but it should be underlined that Pangandaran as a tourist area is in declining by number, especially foreign tourists compared to the 1990s, so the acceleration toward the acceptable threshold changes not as fast as expected. The physical changes that occur in the Pangandaran allegedly more influenced by efforts to accommodate the needs of tourists who prefer recreational activities which highly depend of infrastructures.

In practice, LAC is a managerial tool in providing a framework for the management to diversify the recreational experience and not to provide standard amenities for recreationist [16] as suggested in Pangandaran, thus, the LAC can be applied as a tool for managers to "curb" in developing infrastructure or facilities in protected areas.

The application of LAC as a framework is intended to limit the physical development on a massive scale, the contact between the traveler with the community, and society to the tourism activities with referring to the applicable rules and norms. Setting the framework limits of acceptable change is highly dependent on the government and the involvement of local communities in tourism development planning. This framework can be arranged within community involvement in tourism (community-based tourism). Some important considerations establishment of indicators can be: (1) Zoning of tourism business conducted by the local community; (2) Standard rule for community involvement in tourism activities such as performing arts and culture. This rule also serves as a prevention to avoid commodification and commercialization of culture; (3) The age limit for workers involved in the business of tourism; (4) Development of dedicated recreation area for local people who are not directly involved in tourism activities. Often the development of tourism infrastructure in an area of conflict with resident due to the comfort of residents decreased with increasing activities in the area, while the public can not enjoy such facilities; (5) Continuous and consistent guidance to local communities about the consequences of the presence of tourism in an area.

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