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Establishing a multi-criteria evaluation structure for tourist beaches in Taiwan: A foundation for sustainable beach tourism

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ABSTRACT

The objective of this paper is to identify factors affecting beach environments and to establish a multi-criteria evaluation structure for tourist beaches. This structure is intended to inform beach managers on where and how they should invest resources to achieve sustainable beach tourism. A critical review of literature related to beach quality criteria was made. Interviews with experts were conducted in the identification of factors with respect to a high-use tourist beach in southern Taiwan. Four major dimensions were extracted from a number of factors using factor analysis: cleanliness of beach environments, safety, beach protection and management, and facilities and services. The fuzzy analytical hierarchy process (AHP) approach, a decision-making method based on pair-wise comparisons between criteria, was then used to construct a three level evaluation structure with criteria and associated weights for beach managers. The results show that *cleanliness of beach environments* and *safety* are considered relatively important factors in the second level. Among 15 attributes, *water quality standards, clean beaches, safe access to beaches, management of different uses, sediment and habitat management, information provision, controlled waste discharge, and a beach management committee* are the top half rankings in the third level. Management implications from the findings were discussed, with an emphasis on managing beach in an integrated manner. At last, a step-by-step model was highlighted as a practical way to assist policy makers to find priority factors and engage in effective beach management.

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1. Introduction

Marine and coastal tourism is one of the fastest growing areas within the world's largest industry (Orams, 1999; Hall, 2001). Increasing marine and coastal tourism makes marine environments increasingly important in the provision of open spaces and opportunities for tourism and recreation activities (Kentchington, 1993; Needham and Szuster, 2011). Beaches are important resources for tourism and make potential valuable economic contributions to tourist destinations (Botero et al., 2014; Houston, 2002). The attractiveness of beaches has spurred destinations to proactively pursue the marine recreational market. It is noted that the future competitiveness of destinations will be based on the extent to which they are concerned about the sustainability of their natural, economic and culture resources (Laws, 1995). Beaches, as one of the major tourist destinations and featuring 'sea, sun and sand' and 'a relaxed friendly' atmosphere, are no exception (Botero et al., 2013). However, as beach tourism continues to increase, this activity has started to show signs of degrading the environment, which affects both ecological status and the recreational experience of tourists and thereby becomes counterproductive for host communities (Roca et al., 2009; Williams et al., 2013). For instance, in 2011 a large amount of marine debris washed up on the beaches of Geoje Island, South Korea, causing a huge decrease in the number of visitors by 63% from the previous year and a tourism revenue loss of USD 29-37 million (Jang et al., 2014). In Southeast Florida, alteration of beaches for human activities has resulted in substantial loss of naturally functioning beach habitats and reduced biological diversity (Marshall et al., 2014).

Due to the significant economic contribution of beaches to tourist destinations, it is of great importance to beach managers to understand the crucial factors affecting beach environments such that the flow of tourists and tourism industry could be sustained. Beaches are not just viewed in physical terms. Instead, they are social-ecological systems where plainly physical, ecological, social and economic dimensions interact, providing several functions and services leading to improved human well-being (Lozoya et al.,

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2014). Namely, beaches are multidimensional environmental systems that are nested within in larger coastal systems and comprised of interacting natural, social-cultural, and management systems (James, 2000). Specifically, the natural (or biophysical or ecological) systems of beach environments consist of the biota, sediments and water occurring on beaches, their interactions and the ecological processes and physical processes that shape them. The social-cultural systems are comprised of many, varied and interacting human uses of beaches, including diverse recreational activities (e.g. sunbathing, sightseeing, swimming, angling, surfing, jet-skiing, boating), developments for coastal defense, housing or infrastructure and waste discharge. The management systems encompass many interacting governmental agencies, NGOs, regulations, policies and programs. This multi-dimensional perspective indicates that factors influencing beach environments are diverse and beyond the scope of physical terms (James, 2000; Birdir et al., 2013; Marshall et al., 2014).

Beaches can provide several protective, recreational and natural functions, only recreation has been traditionally prioritized by managers, leading to homogenization of beach management practices, which are poorly adapted to beach settings and beach users (Lozoya et al., 2014). To counter this problem, managing beach environments seeks to maintain or improve a beach as a recreational resource and a means of coastal protection, while providing facilities that meet the needs and aspirations of those who use the beach (Bird, 1996). In addition, it facilitates resource management in a manner that is able to cater to socio-economic and environmental interests as part of an overall long-term coastal area management approach determined by policy-makers' goals and priorities (Williams and Micallef, 2009). Identifying factors affecting beach environments and improving them is therefore essential to their management. These factors are relevant to beach characteristics – natural, social-cultural, or management.

Previous studies have established beach quality criteria or examined users' perceptions and expectations on beach characteristics as a way to improve beach quality. Phillips and House (2009), for example, established a beach rating checklist comprising 50 physical, biological and human use factors and weightings were established in response to priorities of three tourism markets: surfing, eco-tourism and family. The Blue Flag developed a list of criteria for certification (FEE, 2015). Ariza et al. (2008a) selected 14 general criteria from one beach performance standard (the Blue Flag) and three rating systems (the CA, CEDEX, and Cantabria indexes). A few studies examined users' perception or expectations on beach characteristics as a way to improve beach quality (Tudor and Williams, 2003; Roca et al., 2009; Lozoya et al., 2014). Botero et al. (2014) established recreational parameters as an assessment tool for beach quality. In addition, while not specifically targeting beaches, Ergin et al. (2004) and Philips et al. (2010) established a scenic evaluation checklist system to rate coastal scenic quality. These studies showed that establishing criteria or factors pertaining to beach characteristics is important in pursuing beach quality.

While huge efforts have been made to improve beach quality, few studies of such kind have been carried out in Asian countries. Furthermore, understating and prioritizing factors crucial to beach environments is practically important for beach managers. The reasons are two-fold. One is that different kinds of beaches (i.e., natural protected vs. urban) necessitate differential management (Lozoya et al., 2014), indicating that factors to beach quality might be different and need to be tailored to specific cases. The other is that the relative importance of each factor is essential in informing managers of what priorities need to be improved given that the resources for strategic planning of beaches are limited. Therefore, in order to facilitate beach managements in a practical way, this paper aims to establish a multi-criteria evaluation structure to inform beach managers on where and how they should invest resources to achieve a quality tourist beach. For this purpose, a specific beach, Nanwan, in Taiwan is selected as the subject to which an evaluation structure will be established.

Nanwan is located in the south tip of Taiwan, where coral reefs are abundant (Fig. 1). It is a high-use beach with approximately 700 m in length and 60 m in width. Beach sediment is dominantly comprised of biogenic grains. The beach is a typical setting for recreational activities such as swimming, jet-skiing, sailing, and scuba diving. The reasons for selecting Nanwan are two-fold. One is that it is the most popular beach in the southern Taiwan in terms of the number of visitors. Around 350 thousand visitors, including domestic and foreign, visit this beach every year (TB, 2014). The other is that it has a high level of human development, though it is in situated within a national park. Specifically, a major coastal road, parking lots, shower and restroom facilities, and buildings used for restaurants, water sports shops, and hotels are adjacent to the beach. Due to its popularity and coastal developments nearby, the beach has faced with issues such as beach litter, waste discharge, conflicts among different, and sand loss. Establishing a multi-criteria evaluation structure to Nanwan is inherently a multi-criteria decision-making (MCDM) problem, which will be addressed by using the fuzzy analytical hierarchy process (fuzzy AHP). The rationale for using this method is that it can integrate opinion and evaluation of experts into a hierarchy decision-making system, reduce subjectivity of decision makers and obtain criteria weights.

2. A review of potential factors affecting beach environments

This paper focuses on the studies that deal with beach characteristics – natural, social-cultural, or management– that are important in improving beach environments or facilitating beach management, particularly for recreational purpose. These characteristics are considered to be potential factors for beach environments.

The review starts at beach ecolabels/awards. Given that ecolabels are a tool to pursue quality assurance, environmental sustainability, interpretation/education and return to local communities (Black and Alice, 2007), the criteria pertaining to

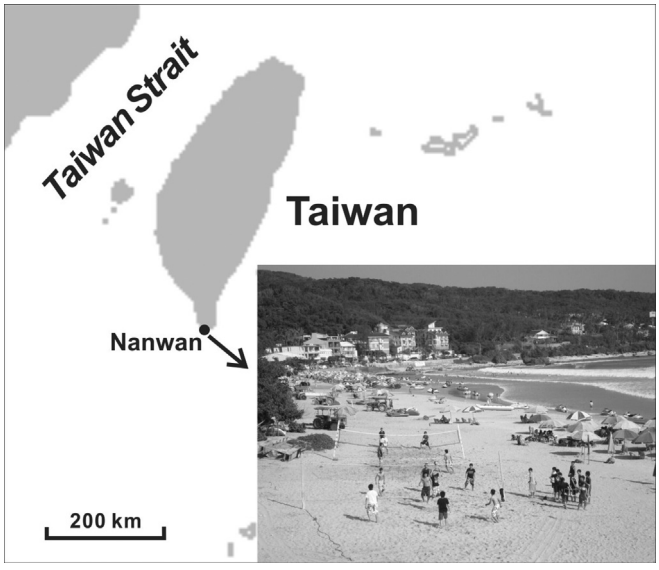

Fig. 1. Location map of the beach in this paper: Nanwan in the south tip of Taiwan.

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