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TOURISM DEVELOPMENT IMPACTS AND AMELIORATION ALONG COASTAL AREAS IN VIETNAM

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ABSTRACT

Coastal tourism is a significant portion of the Vietnam's economy due to diverse coastal environment with variety of ecosystems. These include wonderful natural scenery, sandy beaches, rocky headlands, sand dunes, mangroves, coral reefs, wetlands. However, unplanned tourism development caused obvious negative impacts on coastal environment, which will increase with exploitation unless preventive solutions are adopted. The main purpose of this study is to evaluate the impacts of tourism development along coastal areas with a specific focus on tourism infrastructure such as the construction of hotels, resorts, roads and recreational activities on natural environment in small islands of Nha Trang Bay, Vietnam. Then, propose solutions to minimize negative impacts and aim for sustainable tourism development. The unplanned development of resorts and recreational activities (snorkeling, scuba diving, boating, cruise ships, fishing) to meet increasing demand of tourists have led to consequences such as loss of marine biological diversity, the change of coral reefs cover, discharges into the sea, and environmental pollution.

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INTRODUCTION

Tourism is considered as one of the world's fastest growing industries and is a major economic sector in tropical developing countries and Vietnam is not an exception. The relationship between environmental quality and tourism development is now a major concern to both government and citizens, where coastal degradation takes place gradually and is barely immediately noticeable (Kofoworola, 2013). Tourism development is part of an integrated plan for economic and social progress (Shackley, 1994). Coastal areas have been identified as having a fragile ecosystem and are vulnerable to outside influences, heightened by human activities (Medina and Garcia, 1998; UNEP, 2000) mostly tourism (UNEP and WTO, 2005). Vietnam is a tourism paradise with coastline stretches 3,260 km with totally 125 large and small beaches; approximately 2,273 coastal islands; 44 bays and basins. Coastal ecosystems have high biological diversity and productivity with 1,120 coral reefs; 252,500 ha mangrove forests and sea grass beds are distributed from North to South. These are tremendous potential to develop coastal tourism.

Vietnam ranks second in Asia and 16th in the world for tourism growth potential. Tourism now plays an important role in the economic development of Nha Trang Bay of Khanh Hoa Province. Nha Trang Bay is recognized as one of 29 most beautiful bays in the world (Ministry of Natural Resources and Environment, 2005). Beautiful coral reefs and attractive landscape make the bay an ideal destination for tourism in Vietnam. In 2014, there were 720,480 tourists visited the Nha Trang Bay, up from 400,000 in 2004 (NTB Marine Protected Areas, Management Board, 2014; Tuan *et al*., 2004). The exploitation of natural resources and tourism development in the province has many inadequacies, leading to negative impacts on the environment. Tourism is one of the major disruptors of the marine ecosystem (Zhong *et al*., 2011; Buckley, 2012). Tourism development can cause great pressure on an area and lead to negative impacts such as soil erosion, environmental pollution, discharges into the sea, land degradation, biodiversity loss. The objective of this study is to provide information for understanding the relationship between tourism development and its impacts on natural environment, evaluate the environmental impact of coastal

tourism development and propose some solutions to minimize impacts, improve the environmental quality. This study is mainly targeted to policy makers, tourism developers the best solutions to manage and protect biodiversity, natural resources in Khanh Hoa Province for sustainable tourism development.

MATERIAL AND METHODS

Study area

Nha Trang Bay (NTB) is located south of Nha Trang City of Khanh Hoa Province, Vietnam with coordinates 12°08′–12°24′ N, 109°10′–109°23′ E. It includes nine islands such as Hon Tre, Hon Mieu, Hon Tam, Hon Mot, Hon Mun, Hon Cau, Hon Vung, Hon Rua, Hon Noc. The largest island is Hon Tre (34 km^2) and the smallest island is Hon Noc (1 km^2). It has a total area of 420 km^2 (Figure 1).

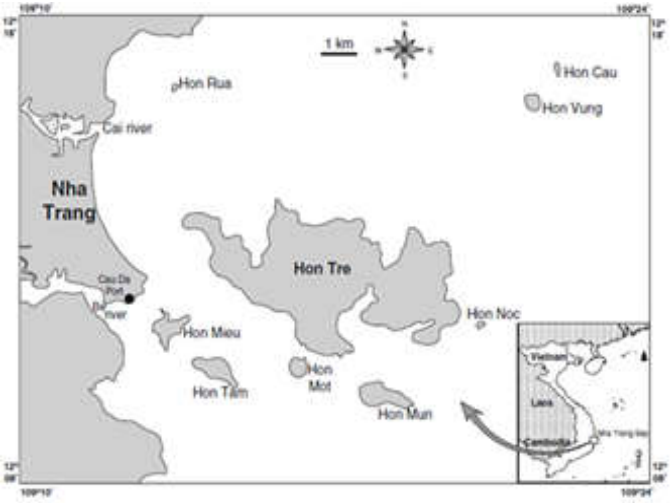

Figure 1. Map of Nha Trang Bay

The NTB is connected with the mainland by two main rivers, Cai River and Tac River. The Bay is a valuable environmental and tourism resource (Pham *et al*., 2005). It is considered Vietnam's highest priority for marine conservation and coastal tourism due to its rich biodiversity and coral reefs of high economic value. Many important habitats and ecosystems can be found, including coral reefs, mangrove, and sea grass. Specifically, there were more than 350 types of coral reefs which accounted for 40% of the world's coral species, red coral which is very rare (Ministry of Natural Resources and Environment, 2005), more than 230 fish species, 122 crustacean species, 112 mollusc species, 69 seaweed species, and other environmental attributes (Tuan *et al*., 2007). The rich biodiversity contained by the NTB is an attractive element to tourist attraction. The NTB contains valuable economic resource due to its recreational value. The annual recreational value of the islands valued at approximately US$ 17.9 million (Pham and Tran, 2001). The islands of Hon Mun, Hon Mieu, Hon Tam, and Hon Tre are the most attractive destinations in Nha Trang Bay. Hon Mun, Hon Tam and part of Hon Tre are well known for luxury accommodations and catering. Hon Mieu offers an aquarium, water sports, and catering services.

Data Sources

The data for this study are collected from both secondary and primary sources. The secondary data are sourced both electronically, from government, individual databases, and combined with the information gathered from other studies. The primary data are collected from the field surveys and observations. Field observations are carried out to identify activities that are taking place and their status within the NTB. It also allows the accurate determination of the information gained by other means.

RESULTS AND DISCUSSION

Impact sources

Resort development

Islands are greatly desired for resort development, as they often provide an ideal combination of beaches, clear water, reefs and dramatic landform. They are highly vulnerable as their resources, such as beaches, coral reefs, mangroves, etc., are often concentrated in small areas. NTB has 250 accommodations establishments supplying approximately 5,000 rooms in total, 20 properties are rated 3 to 5 star standards by the Vietnam National Administration of Tourism (VNAT) in 2015. Comprising of 10 properties that are rated 5-star, 3 properties that are rated 4-star. In addition, a number of properties exist which are officially unrated (Figure 2).

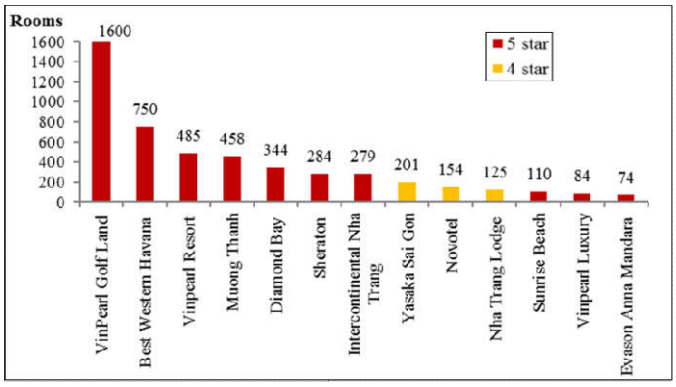

Figure 2. Largest resorts in Nha Trang Bay (Khanh Hoa Statistical Office, 2015)

NTB is being ruined by the environmentally irresponsible construction of resorts and pollution caused by tourism activities.

Table 1. Damage of biodiversity due to activities

Location	Area (ha)	Description
Dam Gia (Hon Tre Island)	500	Dead coral and seagrass due to tourism construction
Bich Dam (Hon Tre Island)	360	Dead coral due to lobster aquaculture
Mui Ke Ga	1500	Disappearance of coral due to Rusalka tourism project
Bai Tien	2100	Disappearance of coral due to tourism activities
Song Lo	3000	Dead coral due to Song Lo tourism activities

Source: Khanh Hoa Environmental and Resource Department, 2013

Coastal resorts development in NTB has been unplanned and spontaneous in order to meet increasing tourists demand. Coastal resorts are virtual clones of one another, with apartment like blocks located near the beach, well-equipped

with recreational amenities, facilities and a swimming pool. Building complex in a continuous row along a road, as beachfront land is utilized. Many resort developers were also ignorant of the physical environment, even in simple aspects that affected their resorts. The unplanned development has resulted in negative impact on coastal environment. Environmental degradation when the natural tree cover has been removed, wetlands filled in or converted into open sewers. The sea and beach are polluted by poorly treated wastewater as a result of inadequate infrastructure for waste and wastewater treatment. Coral reefs have been destroyed by wastewater. Beach erosion has occurred due to poor design of structures. The construction of large tourist complexes such as the Vinpearl Land Resort on Hon Tre Island and the Diamond Bay Resort in mainland to the south of Nha Trang City in the period from 2001 to 2003 has led to increase excessively sedimentation rates with all relevant damaging activities including land leveling, sea dredging and sea filling. It has been shown that the construction of the Vinpearl Land Resort resulted in the disappearance of 50 ha of a coral reef and 12 ha of sea grass beds in Dam Gia Bay in the northwest of Hon Tre Island by 2004 (Son *et al*., 2007). The coastal development and the construction and operation of related tourism infrastructure can cause increased runoff and sedimentation (Buckley and Pannell, 1990; Spellerberg, 1998; Newsome *et al*., 2002). Sedimentation is one of the main reasons for reef degradation. From field trip to some small tourist islands in NTB, potable water supply, sewage, wastewater treatment and solid waste disposal constitute the basis problems of both small islands and coral islands. The resorts have septic tanks, but no safeguard against leakage of wastewater into the groundwater. Wastewater also threatens the quality of the seawater.

Recreational activities

Recreational activities at the islands include snorkeling, scuba diving, glass bottom boating, fast power activities (jet skiing, parascending) sunbathing, swimming, visiting fishing villages, and relaxing on the beach. Diving and snorkeling have been the main activities operating in the NTB and have brought the majority of tourists to the area. The number of divers has increased over the years. At present, about 20 diving clubs have regular operations within the NTB with about 100 divers per day and often serve approximately 9,800 dive trips annually. Most divers were foreigners, 13,500 foreigners compared with 4,500 Vietnamese divers (Michael *et al*., 2005). On the daily survey carried out in July 2006, a total number of 83 divers were observed at eight diving clubs and Cau Da port. Cruise ships create several biological diversity problems. Illegal mainly discharge of oil or other hydrocarbons is common. Cruise ship anchoring in tropical waters and dredging channels for the larger vessels causes severe long-term damage to coral reef and sea grass beds (Lewis *et al*., 1985). Cruise ships produce substantial quantities of garbage, wastewater and sewage that are often discharged untreated into pristine marine habitats. The International Maritime Organization estimates that each passenger produces 3.5 kg of garbage and solid waste per day. A typical cruise ship discharges around 1 million liters of 'black water' (sewage) during a 1-week voyage (United States Environmental Protection Agency, 2000).

Tourism impact

Loss of biological diversity

Tropical coral reefs are the most biologically rich and productive ecosystems on Earth, providing vital services and playing a crucial role in nature and human life. However, they face a wide and intensifying number of global and local threats including global warming, ocean acidification, coastal development, pollution, overfishing, tourism development, coral mining and shipping (Kleypas and Eakin, 2007; Wilkinson, 2008; Burke *et al*., 2011). The biodiversity in the islands of NTB are evaluated to be different. Regarding species abundance of coral, Hon Mun Island has the highest species in number with 197 species, Hon Mieu has 70 species (Tuan *et al*., 2005). Other islands are characterized by low coral cover and species. Increased tourism caused the reduction in the hard coral cover in the main areas attracting tourists. Figure 3 presents changes in hard coral cover in Hon Mun and Hon Mieu Islands. The protected areas (Hon Mun) have the highest live coral cover of more than 50% and Hon Mieu of the lowest 3%. These indicate that setting core zones is helpful to protect the coral even if tourism is introduced in this area. The biggest decline occurred in Hon Mieu, where hard coral cover decreased heavily, from 27% in 1994 down to 10% in 2002, 4% in 2009 and 3% in 2015.

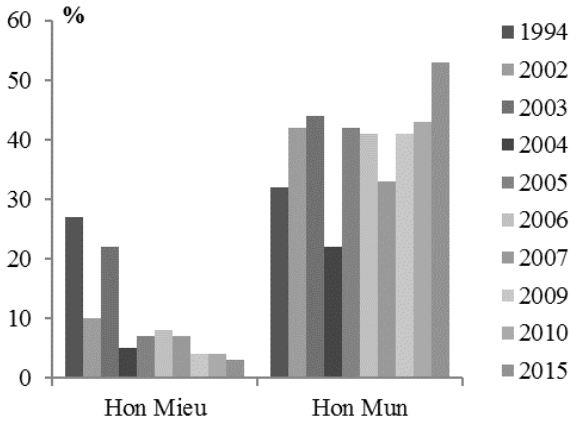

Figure 3. Changes in hard coral cover (%) at tourist destinations, 1994-2015 Tuan (2011); Ben *et al*., (2015)

The *Acropora* species are one of the major reef corals responsible for building the immense calcium carbonate substructure that supports the thin living skin of a reef. They are also considered as the crown jewel of the small polyp stony world" (http://en.wikipedia.org/wiki/Acropora, 2015), completely disappeared after 2002 (Figure 4). Unlike in Hon Mun, there are human settlements in Hon Mieu. The fact that the areas around this island saw the biggest reduction in coral cover may therefore be due both to tourism and to the activities of the local residents. The dramatic decline in live coral cover at Hon Mieu observed for the last decade has resulted in massive destruction of the limestone coral framework and almost full depletion of coral fish communities. Coral reef degradation is closely associated with reef species degradation.

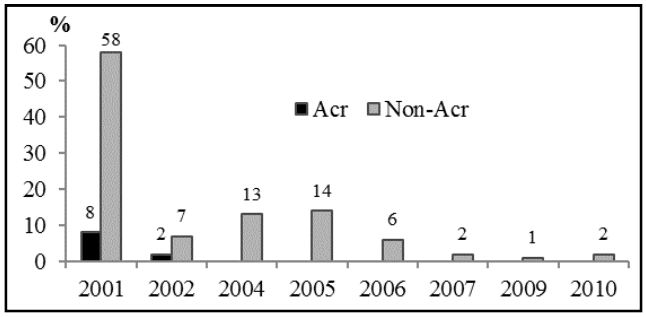

Figure 4. Changes in coral cover of *Acropora* and *non- Acropora* in Hon Mieu Tuan (2011)

The decline in coral cover in the bay resulted in increase sedimentation from several development projects (Nguyen *et al*., 2013). There are (1) dredging and seaward expansion of the Nha Trang port from 2000 to 2002; (2) road construction parallel to the shoreline, which extended up to 60 km to the north and to the south from the central Nha Trang City with land clearing and flattening activities from 2001 to 2003. During these projects approximately 2,000,000 m^3 of dredged materials have been excavated and dumped in the sea (Son *et al*., 2007). In addition, excessive sedimentation rates, detrimental to nearby coral reefs, may have come from construction of large tourist complexes. The most obvious impacts on biodiversity are diving, snorkeling, swimming. These impacts result in changes to the ecosystem, reduction in cover, and change in species composition.

Environmental pollution

Tourism development in the various islands of the NTB faces different environmental pollution such as air and noise pollution from tourist transportation, solid waste disposal, littering, sewage from tourist activities, oil and chemicals from recreational vehicles and also aesthetic pollution. It is the same forms of pollution as any other industries. In some islands, where the increase in the number of tourists, high concentrations of tourism activities and attractive natural scenery, waste disposal is a serious problem and improper disposal can degrade natural environment. Waste and sewage pollution are considered severe environmental threats from tourist visits to the NTB. On average, it is estimated that each visitor to the NTB generates 0.7 kg of solid waste and 96 liters of sewage per day (Khanh Hoa Department of Natural Resources and Environment 2009). In other words, in 2014, tourists produced approximately 5,700 tons of waste and 780 million liters of sewage, which is equivalent to 16 tons and 2 million liters per day, respectively. Unfortunately, much of this sewage is dumped into the sea without proper treatment and removal of toxic substances. This causes nutrient enrichment, which favors certain species (algae in particular) at the expense of corals. Litter from tourists is a problem in Hon Mun and Hon Mieu Island. Discarded plastic, polymer bags and drinking bottles are left on the islands and pollute the sea, as there is no formal mechanism for handling garbage on the islands. Tour boats, cruise ships cause significant petroleum hydrocarbon pollution, especially when oil and fuel spills occur (Loya and Rinkevich 1980; UNEP 2015). These boats are also responsible for a considerable amount of sewage and waste. A large percentage of the sewage generated by the tour boats is discharged into the sea without adequate treatment. This has led to eutrophication and substantial negative effects on the ecosystem. Although bins and toilets have been requested on board all tour boats since 2013, these requirements have not been fully implemented. As has been observed, solid waste is still dumped into the sea in the harbor by irresponsible vessel owners. The construction of hotels, resorts, recreation and other tourist facilities often lead to increased sewage pollution. It is estimated that approximately 100 ha of the NTB has already been cleared to make way for tourism projects.

Damage is not only restricted to the initial removal of the natural environment but also to coastal development. In addition to the impacts of tourism activities that require no fixed infrastructure, such as boating, there are impacts associated with tourist facilities. The construction and operation of tourism infrastructure usually cause an increase in runoff and sedimentation (Buckley and Pannell, 1990; Newsome *et al*., 2002; Spellerberg, 1998). Tourist infrastructure development can involve extensive earthworks that have harmful effects on biodiversity and ecosystems. There are often tracks, trails, roads and accommodation provided in tourist areas. In building huts, lodges, hotels, resorts and extensive paving of shorelines can result in destruction of habitats and disruption of land-sea connections such as sea-turtle nesting spots.

Propose solutions to sustainable tourism development

Group solutions on planning

This is the group of solutions which need to develop tourism in the right direction, exploit the potential and preserve sustainable tourist resources. In order to do so, there should be a master plan for tourism development and general orientations, objectives and solutions, besides, each cluster of tourist sites should have a detailed plan defining the functional areas and investment projects in order of preference in accordance with demand. Parallel to the sectoral planning, it is necessary to conduct territorial environmental protection orientations that define areas to be strictly protected, areas restricted to tourism activities, etc.

Group solutions on organization management

This is a group of important solutions contributing to ensure the success in environmental protection and sustainable development of Khanh Hoa tourism. This group of solutions is proposed in the following way. To formulate rules and regulations on the rationality between tourism exploitation, business, the protection of natural resources and environment with the propagation and education of people and tourists. To define roles and responsibilities for all levels of the sector as well as the general public in terms of social awareness of tourism and tourism development. Implement state management in all areas in accordance with laws and regulations to create a natural and humanist environment conducive to the development of tourism. There is a form of reward and strict punishment for violations of the environmental protection rules.

Group solutions on policy mechanism

In order to preserve the natural resources and the environment for sustainable tourism development, it is necessary to study and promulgate a number of basic policies in following. There are policies for the development of key economic sectors in a rational manner as well as the selection and determination the suitable economic structure in each territory. Besides the solutions on the exploitation and rational use of resources, there should be the solution to protecting the environment on the basis of sustainable development by region and territory. There are policies on investment and key market development, to facilitate the development of tourism activities in clusters and to have specific regulations for the restoration and protection of the environmental resources. There are policies of development and support linkages between economic sectors and management levels to unify the management and control of the ecological environment.

Environmental solutions group

This is the highly integrated solution to effectively utilize all potential and resources of the region and to ensure sustainable development. This group of solutions includes the following main linkages. Tourism programs and projects at sites, zones and clusters should be considered in a reasonable manner, especially the immediate and long-term environmental impact assessment are required by the law on environmental protection. There is a general coordination in propaganda, advertising, management, control and treatment of environmental sanitation among branches, levels and business establishments. There is coordination, cooperation and exchange of experience between domestic and foreign organizations on monitoring, analysis, management and handling of impacts.

Group solutions for linking with local communities

Any economic sectors that do not have the interest, support for economic development, sharing with local communities will make the economy and life of the local population difficult. This means that the community must maximize the resources of the area to serve the life, will cause the resources to wear out leading harmful to the ecological environment and that is the consequence of bad impacts on sustainable development. Therefore, the sharing of benefits with local communities, encouraging community participation in tourism activities, and jointly resolving conflicts that arise during development is essential to being able to ensure the preservation of resources and potentials for the long-term development of tourism at all tourist spots and clusters by synchronous measures between exploitation and conservation and the fostering of natural resources. Linking with the community can be done in a variety of forms such as job creation, cognitive education, benefits sharing, and so on.

Group solutions for training, environmental education

A comprehensive and long-term solution, environmental education and training not only provide environmental knowledge to managers and business travelers, but also to local visitors and communities, creating a sense of security. Protect the environment and resource for tourism development.

Group solutions for the application of scientific and technical progress

It is extremely important to protect the natural and human resources that serve the cause of sustainable development as well as the management of tourism activities. It is also the duty of all levels of local people and sectors. In addition to the aforementioned solutions, the application of scientific and technical advances in the management and use of resources as well as the processing of information from tourism activities and services to make timely and appropriate decisions in each stage with each development activity are essential. The tourism industry needs to coordinate with functional agencies to utilize technical means and equipment and environmental monitoring regularly at tourist sites to make appropriate adjustments to ensure proper operation environmental sustainability.

CONCLUSION

The NTB is facing a tension between mass tourism and ecotourism. Conflicts are likely to increase between competing industries, and there are threats to marine biodiversity, environmental degradation, and other hazards. In other words, it is feared that tourism in the NTB, as in many other developing countries, is not being managed sustainably. In order to avoid unfortunate consequences, tourism must be adequately controlled. However, the effective management of tourism requires more than legislation, enforcement, and monitoring to ensure that negative impacts are controlled. Effective tourism management also needs to ensure that stakeholders are able to reap the same benefits that are accrued by management. This is especially true for local residents, tourism operators, and tourists themselves. Therefore, conservation is of critical importance to local residents, tourists, tourism agencies, tourism developer. Sustaining tourism not only sustains the regional economy but also sustains resources and local communities, which provide the foundations needed for economic growth and the diversification of employment.

These objectives cannot be achieved in the absence of appropriate planning, monitoring, and enforcement. Sustainable tourism development can be achieved when the behaviors of all the beneficiaries are ecological, economical, and ethical responsible (Deng *et al*., 2002). In other words, if tourism is encouraged, it must not be seen to take priority over existing traditional activities but should be promoted so that it complements other resource-based users (Hall and Boyd, 2005).

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