Journal of Modern Education Review, ISSN 2155-7993, USA
September 2016, Volume 6, No. 9, pp. 639–647
Doi: 10.15341/jmer(2155-7993)/09.06.2016/008

http://www.academicstar.us

The Impact of Tourism on the Marine Environment of Small Islands: The Case of Pangkor Island, Malaysia

Ahmad Masduki Bin Selamat, Murugadas A/L Ramdas Chelamuthu, Mohamad Sobri Bin Suhaili
(Politeknik Mukah Sarawak, Malaysia)

Abstract: Tourism is one of the leading contributor to service industry in Malaysia and is gradually growing. Tourism industry in Malaysia was given a more important spot in the country's administration with the establishment of Ministry of Culture, Arts and Tourism in 1987. The growth of this industry brings impact towards the environment, specifically the environmental attributes of islands. The most visible impact around the small islands would be to its marine biodiversity such as coral reefs and fisheries. This paper reviews closely on the impact of tourism to the environmental attributes of Pangkor Island. Pangkor Island as one of the leading small island tourist destination faces increasing number of tourist and development. This increase and development lead to impact on environmental attributes of the island. Excessive admittance of tourists to this island with unmonitored activities could also bring possible damage to natural forest trails exist. Soil erosion, imbalance to the habitats of flora and fauna and piling up of rubbish are some of the effects that occurred. It has been reviewed clearly that tourism has brought impacts to the environmental attributes of Pangkor Island due to the increase in the number of tourist and infrastructure development. A possible solution to address the problem would be implementing the concept of willingness to pay. It is suggested that an investigation to the Willingness to Pay (WTP) may serve as a way to compensate these impacts.

Key words: tourism, islands, environmental issue, Pangkor Island, Marine biodiversity

1. Growth of Tourism Industry in Malaysia

Tourism industry is one of largest service industry in Malaysia behind the manufacturing and petroleum industry (Rosniza Aznie et al., 2011). The contributing factors to Malaysia becoming a major tourist are low foreign exchange, political stability, eye-catching tropical environment, attractive beaches and islands, variety of food and historical background from different cultures and ethnics (Loganathan Nanthakumar et al., 2012).

Tourism in Malaysia began post-colonial by private enterprise as mean to promote the country a place of migration for young men. The first emergence of tourism as an industry itself began when the country was promoted as a stopover destination. Tourism began to receive more serious attention from the government when Malaysian Tourist Development Corporation was formed in 1972. This led to country hosting the first Pacific Asian Tourism Association in 1972 (Pazim Othman & MohdRosli, 2011; Salmond, 2010)

Ahmad Masduki Bin Selamat, Politeknik Mukah Sarawak; research areas/interests: tourism industry.
Murugadas A/L Ramdas Chelamuthu, Politeknik Mukah Sarawak; research areas/interests: tourism industry.
Mohamad Sobri Bin Suhaili, Politeknik Mukah Sarawak; research areas/interests: tourism industry.

Tourism industry in Malaysia was given a more important spot in the country's administration with the establishment of Ministry of Culture, Arts and Tourism in 1987. The tourism industry started to emerge as a prominent money making industry in the country with the successful Visit Malaysia Year campaign 1990. Since then, the industry has placed itself as an important component of the service with great influence on the balance of payment (Badaruddin et al., 2003; Voon P.K., 2000; Pazim Othman & MohdRosli, 2011; Salmond, 2010).

From the year 2000 to 2012 the average increase in number of tourist is 11% and average increase in receipt is 3.3 billion (Tourism Malaysia, 2013). In 2012, the country received 4 to 6 billion tourists per year and is the 9th most visited country in the world and contributed up to RM146.4 billion to the Gross Domestic Product (GDP). The contribution is expected to rise 6.0% in the year 2013 and by the year 2023, to reach RM 248.2 billion (World Travel and Tourism Council (WTTC), 2013; Economic Transformation Plan, 2010).

The tourism industry is a major contributor to the foreign exchange, employment, payment for imported input goods while accumulating investments for new infrastructures (Bhattarcharya & Sankar, 2000; Lee & Chang, 2008; Lee, 2010; Lozano-Oyola et al., 2012; Schubert et al., 2011). For the year 2012, tourism is Malaysia's is third largest foreign exchange earner (UNWTO, 2012).

The total contribution to employment in the year from tourism is at 1,708,500 which include supporting industries which assumes 13.6% of total employment. The total investment brought by tourism for the year 2012 amounts at 18.8 billion which compromises 7.7% of total investment to the country. In the year 2023, it is expected that total employment in the tourism industry will increase to 2,461.000 jobs and total investment will amount at 33.7 billion (WTTC, 2013).

2. Impacts of Tourism in Small Islands of Malaysia

The small island tourism industry in Malaysia is believed to major attraction specifically for international tourist from Europe, North America, Australia and New Zealand. Small islands in Malaysia compromise from unoccupied islands to islands which are the centre of administration of state or owned by the federal territory. There are total number of 25 small islands that are considered popular destination which drives valuable income for the tourism industry (Fatihah Ismail & Turner, 2008; Voon P. K., 2000).

The stand out circumstances of small islands compromising of beautiful beaches and coral reefs, limited population, water based activities, duty-free shopping, natural mangrove parks, variety of wildlife and ecotourism activities plays a major part in making small island a popular destination (Mohd Safee Sapari et al., 2012; Pazim Othman & MohdRosli, 2011; Voon P. K., 2000).

Small islands not only serve as an income generator for the tourism industry but are also beneficiary to the economic aspect of the local community. Islanders who used to be fishermen become travel boat entrepreneurs catering for recreational boating and other water activities such diving, snorkeling and recreational fishing. Residents who are than fishermen chose establish small tourism-related businesses which produce significant income (Badaruddin et al., 2003; Pazim Othman & MohdRosli, 2011).

The vast development of the tourism industry also increases the intensity of its supporting industries such as construction and transport. Hotel, chalets, bungalows and resort needs to build in order to accommodate the surging number of visitor to the island. In order to support the inbound transportation of tourists, piers and airstrips needs to be build. Passenger boats also need to be built for tourist to commute from the mainland to the designated islands (Badaruddin et al., 2003; Fatihah Ismail & Turner, 2008).

The intense and increased velocity of development in small island tourism in Malaysia will have adverse impact on its environmental attributes (Lim H. S., 2008; Mastura Jaafar & Siti Aishah Maideen, 2012; Mohd Azlan Abdullan et al., 2012; Teh & Cabanban, 2007). The most visible impact around the small islands would be to its marine biodiversity such as coral reef and fisheries.

Apart from the usual activities such as snorkeling, diving, uncontrolled coral picking and swimming, other human activities also play a part damaging coral reefs. The accelerating construction of accommodation facilities after there was insurgence of tourist post Visit Malaysia Year, 1990 damaged abundance of coral reefs through sediments from the construction process. (Voon P. K., 2000). This added by the irresponsible behaviour of tourist such pulling out reefs when riding in a boat (Fisher, 2008).

Tourism has also effected the abundance fisheries in the sea waters. Fishing which were once served as source living to the local communities has turned into a tourist recreation sport. The irresponsible attitude fishing resort owner who allows tourist to overexploit the source fisheries has resulted in the reduction in quantity and variety of fisheries. Dynamite blasting of fisheries by local fisherman to cater for the need of fishes for tourist adds on to existing damage (Hall, 2001; Teh & Cabanban, 2007).

Excessive admittance tourists to an island with unmonitored activities could also bring possible damage natural forest trails exist. Soil erosion, imbalance to the habitats of flora and fauna and piling up of rubbish are some of effects that occur. The wildlife in the forest also disturbed by noise and air pollution that derives from tourists activities such open burning and use of motored vehicles. Moreover, the smuggling of endangered species would be the most feared damage to the wildlife (Johan Afendi Ibrahim & Mohamad Zaki Ahmad, 2008).

The impact of the water attribute of the small island was equally devastating as the coral reefs. The irresponsible action of local resorts owner of pumping sewage waste in to sea topped by excessive littering by tourist has deeply reduced the quality of the waters in small islands. Oil spillage and leakage from recreational add further to already existing contamination. (Lee K. T., 2010; Mohd Azlan Abdullah et al., 2012). The worst part the impact is that severe contamination to this ecological attribute may need a long time for recovery or lead to extinction (Johan Afendi Ibrahim & Mohamad Zaki Ahmad, 2008)

Beside seawater, groundwater in the surrounding area of the small islands is also feeling the impact from the tourism industry. In certain islands, groundwater is the main source of freshwater and is high in demand especially by tourists. Hence, the increasing demand of groundwater will consequently lead to overexploitation of the resource. This may lead to shortage of fresh water on only for the tourism industry but also to the local residents. (Sarva Mangala Praveena et al., 2010; Teh & Cabanban, 2007).

3. Pangkor Island: A Review

This review focuses on Pangkor Island which is a small island whose attributes are impacted by the tourism industry. It is located in the Straits of Melaka and 85 km south west the state of Perak in the Manjung district. The exact location of Pangkor Island according geographical coordinate would be a latitude of 4°12’50”N and longitude of 100°34’30”E (Rosniza Aznie et al., 2011; Pazim Othman & Mohd Rosli, 2011).The name Pangkor is believed to be originated from the Thai word “Pang Ko” which means beautiful island and there are some others believe that it is dedicated to a famous Chinese adventurer Pang Kui who helped the islanders to get rid of problems they faced with pirates (Rosilawati et al., 2006).

Pangkor Island has very strong historical background that dates to the 17th century under the rule of the

Dutch. Pangkor Island was chosen to where of fort was built to control tin trade which Perak was known for back then. During the British rule, Pangkor Island stood as the location where an agreement between the Perak throne contenders, secret Chinese societies and the British Government called the Pangkor Treaty was signed 1874. (Pazim Othman & Mohd Rosli, 2011).

Post-independence in the 60s and 70s, Pangkor Island was well known as a production centre for salted fish, anchovies produce, dried shrimps, shrimp paste and other variety of seafood products. Currently, Pangkor Island reprises the role as a small island tourist destination that comprises an area of 22km^2 which is inclusive of Pangkor Lautisland with an area of 1.3 km^2. However, only 1/10 of the island has suitable land surface to support the tourism industry and the local residents. This compromises of 236.7 hectare in 1999 and is projected to reach 650.88 in 2015 (Rosilawati et al., 2006; Mohd Ekhwan Toriman, 2008; Rosniza Aznie et al., 2011).

Pangkor Island is blessed with five main attractions that are able to lure tourist to the destination. These attractions include coastal beaches, resort islands, historical sites, rainforest, seafood and cultural activities. The coastal beaches which are well to tourist are Teluk Nipah, Coral Bay and Pasir Bogak. There are also other namely Pantai Puteri Dewi, Teluk Belanga and Teluk Cempadak.

These beaches mainly offer scuba diving, snorkeling, windsurfing and fishing activities as main attractions to the tourist. Pangkor Lautisland is also popular tourist destination which has a premier class resort owned by Berjaya Group. As for accommodation, there are in total of 42 registered hotels and chalets with a total number of 2300 rooms (Pazim Othman & Mohd Rosli, 2011; Rosniza et al., 2011).

Beside chalets and hotels, tourists also have an option for gazing the lifestyle of fishermen along with their activities that are available in the three fishermen settlements namely Sungai Pinang Besar, Sungai Pinang Kecil and Kampung Teluk Kecil. The activities in these villages include visiting traditional houses built on stakes, boat making in Sungai Pinang Besar and visiting the fish factory in Sungai Pinang Kecil (Rosilawati et al., 2006).

The historical site in Pangkor Island which is famous for sightseeing is the Dutch Fort which was built in the year 1670. The fort is located in Teluk Gedang and served as a safekeeping place for tin. The other historical site that available for tourist viewing is the Batu Bersurat (Sacred Stone) which is a large granite depicting unique drawings (Rosniza et al., 2011).

Pangkor Island is most populated by the Chinese ethnic group which consist almost 50% of the total population. The cultural adversity of the Chinese ethnic is projected to the tourist through their temples. Fang Ku Lin Chinese temple and the mini Great Wall of China are the most popular cultural tourist attraction in Pangkor Island.

4. Impacts of Tourism on Environmental Attributes of Pangkor Island

Pangkor Island receives a very large number of local and foreign tourists every year and number seems to be increasing. Data obtained from the Manjung City Council (2013), shows the total number of tourist recorded an average increase of 84720 or 34% for local tourist between the year 2004 to 2007. Foreign tourist on the other hand recorded an average increase of 32086 or 14% for the same time period. Tourist increase is believed to be one most significant and dominant factor the will affect the attributes of an island. This will increase the impacts on the attribute caused by increase in damaging water activities, littering, water and noise pollution.

Increase in the number of tourist is also synonym with increase in construction of accommodation facilities and amenities. This would lead to more land clearing of forest and pollution to the waters which would intensify

the impact on the attributes of the island (Briasoullis, 2002; Davies & Cahill, 2000; Hall, 2001; Lee K. T., 2010; McLachlan et al., 2013; Mohd Azlan Abdullah et al., 2012; Reopanichkul, 2009; Saenger, 1990; Silva & Ghilardi-Lopez, 2012; Vousdoukas et al., 2009).

The increase in the number of tourists also directly increases the number of trips conducted by passenger ferries. The trip from the mainland jetty of Lumut to Pangkor Island takes about 40 minutes and surpasses the essential attributes surrounding the island (Rosilawati et al., 2006).

Table 1 depicts that in an overall situation the number ferry passengers have increased tremendously about 187% from the year 2004 to 2007. Although, there were some decreases in the 2005, 2006 and 2010, but the number of ferry passenger still stand at a very large figure. The large number of passengers directly increases the number of passenger ferries and their trips to Pangkor Island.

Table 1 Number of Ferry Passengers from the Year 2004–2011

Year	Number of Passengers
2004	1,246,632
2005	947,348
2006	865,512
2007	2.824,856
2008	3,129,549
2009	3,519,549
2010	4,131,899
2011	3,598,620

Source: Marine Department of Malaysia, 2012

This will endow more impact towards the environmental attributes surrounding the island. The most visible and significant impact derive from oil spillage and heavy metals released from the motor of the ferries. The spillage and metals have the potential to increase pollution increase the turbidity and suspended solids in the waters (Davies & Cahill, 2000; Lee K. T., 2010; Mohd Azlan Abdullah et al., 2012).

Besides that, these motorized vehicles have also the potential to destroy coral reefs and fisheries in the waters through anchoring and noise that they produce. The damage is intensified by the irresponsible behaviour of a handful of tourist discarding garbage to the waters from the ferry (Johan Afendi Ibrahim & Mohamad Zaki Ahmad, 2008).

Improper management of solid waste has also becoming looming threat to the attributes of the island. Previously, Pangkor Island resort used to open dumping in landfills as a method of disposing their solid waste. However, when the landfills have reached its limit, an alternative method to dispose solid waste had to be sorted out by the Manjung City Council.

The council later used incinerator to eradicate the solid waste in the island. The incinerator later had some technical problems in 2000 and a new incinerator needed to be built. The completion of the new incinerator has taken 10 year to build and still has not operated fully due to technical issues, Currently, the state government has allocated a certain budget to upgrade the current landfills to dispose the solid waste (Mohd Sharil Salihan, 2011).

PP Wong (1998) states that improper planning of solid waste disposal could have a devastating effect on an island's attributes. Poor solid waste management could is believed detrimental to coastal areas, wildlife and also waters surrounding the islands (Dibajnia et al., 2012, Patil & Patil, 2003). The method of using landfill to dispose

solid could lead the exhaustion of valuable lands that can useful for other purpos (Gossling, 2002).

The increase the number of tourist of also demands a substantial supply clean water to fulfil their needs (Fisher et al, 2008). The need of water supply to fulfil the needs booming development related to the tourism industry adds pressure on water management of an island (Wong P. P., 1998). Mohd Ekhwan Toriman in his study on the water resources management in Pangkor Island found that the island is due face major water shortage in the short period of time. This will lead to island has to resort to other means of water supply such as groundwater. Groundwater is an important attribute in an island and using it for fresh water supply will reduce its quantity and quality (Gossling, 2002; Teh & Cabanban, 2007).

The effect on the water quality of by tourism in Pangkor Island is very visible. Department of Environment (2013) monitors parameters such as suspended solid and heavy metals that is present in the water that determine the standard of water quality. There are a total of 3 stations situated in Pangkor Island which includes Teluk Gadong, Puteri Dewi Beach and Pangkor Laut.

Based on the Environmental Quality Report (2011) from Department of Environment, stations in Pangkor scored a lower percentage than stations in islands from other states in terms of samples within standard for suspended solids, oils and gas, cuprum and chromium. Suspended solids would reduce the water clarity and disrupt the life cycle of plants, microorganism and planktons in the water which would lead to their reduction.

Oil and gas on the other hand would reduce the amount the sunlight and oxygen received by life being and plants in the waters. Heavy metal such as cuprum and chromium would lead growth of algae that deface the landscape beaches surrounding the island (Bash & Bolton, 2001; Davies & Cahill, 2000; Reopanichkul, 2009; Saenger, 1990).

5. Conclusion and Suggestions

It has been reviewed clearly that tourism has brought impacts to the environmental attributes of Pangkor Island due to the increase in the number of tourist and infrastructure development. A possible solution to address the problem of these impacts would be the concept willingness to pay.

Willingness to pay (WTP) is an economical method applied to calculate the amount that stakeholders are willing to pay in money amount to maintain the changes in quantity and rehabilitation in quality of environmental attributes. It is believed that the application of WTP is able to alter the behaviour of tourist towards environmental attributes protection and conservation. The value of WTP refers not only to the financial values to enjoy the current benefits of the destination but also preserving it for future generation (Baysan, 2001; Budeanu, 2007; Gosken et al., 2002; Ku & Chen, 2013; Nowacki, 2013; Sharpley, 2010; Stern, 2000; Togridou et al., 2006; Uyarra, 2005; Wattage, 2002).

References

Akhmad Farid and Budi Setiawan (2013). "Importance-Performance analysis of the marine tourism in Bawean islands", *Indonesia*, Vol. 1, No. 2, pp. 33–41.

Arabatzis G. and Grigoroudis E.(2010). "Visitors' satisfaction, perceptions and gap analysis: The case of Dadia–Lefkimi–Souflion National Park", *Forest Policy and Economics*, Vol. 12, No. 3, pp. 163–172, doi: 10.1016/j.forpol.2009.09.008.

Arrow K., Bolin B., Costanza R., Dasgupta P., Folke C., Holling C. S. and Jansson B. O. et al. (1995). "Economic growth, carrying capacity, and the environment", *Science*, Vol. 268, No. 5210, pp. 520–521. doi:10.1126/science.268.5210.520.

Ballantyne R., Packer J. and Sutherland L. A. (2011). "Visitors' memories of wildlife tourism: Implications for the design of powerful interpretive experiences", *Tourism Management*, Vol. 32, No. 4, pp. 770–779, doi:10.1016/j.tourman.2010.06.012.

Bash J. and Bolton S. (2001). "Effects of turbidity and suspended solids on salmonoids", Research Project.

Baysan S. (2001). "Perceptions of the environmental impacts of tourism: A comparative study of the attitudes of German, Russian and Turkish tourists in Kemer, Antalya", *Tourism Geographies*, Vol. 3, No. 2, pp. 218–235, doi: 10.1080/14616680010030284.

Best J. W. and Kahn J. V. (1998). *Research in Education*, New York, Prentice Hall.

Bimonte S. and Punzo L. F. (2007). "The evolutionary game between tourist and resident populations and tourist carrying capacity", *International Journal of Technology and Globalisation*, Vol. 3, No. 1, p. 73, doi: 10.1504/IJTG.2007.012361.

Budeanu A. (2007). "Sustainable tourist behaviour? A discussion of opportunities for change", *International Journal of Consumer Studies*, Vol. 31, No. 5, pp. 499–508, doi: 10.1111/j.1470-6431.2007.00606.

Buckley R. (2012). "Sustainable tourism: Research and reality", *Annals of Tourism Research*, Vol. 39, No. 2, pp. 528–546, doi: 10.1016/j.annals.2012.02.003.

Byron C., Link J., Costa-Pierce B. and Bengtson D. (2011). "Calculating ecological carrying capacity of shellfish aquaculture using mass-balance modeling: Narragansett Bay, Rhode Island", *Ecological Modelling*, Vol. 222, No. 10, pp. 1743–1755, doi: 10.1016/j.ecolmodel.2011.03.010.

Castellani V. and Sala S. (2010). "Sustainable performance index for tourism policy development", *Tourism Management*, Vol. 31, No. 6, pp. 871–880, doi: 10.1016/j.tourman.2009.10.001.

Choi H. C. and Sirakaya E. (2006). "Sustainability indicators for managing community tourism", *Tourism Management*, Vol. 27, No. 6, pp. 1274–1289, doi: 10.1016/j.tourman.2005.05.018.

Cross G. H., Johnson J. E. and Wood-arendt A. E. (2003). "The Role of Outreach Education in Achieving the Role of Outreach Education in Achieving : UNEP."

Davies T. and Cahill S. (2000). "Environmental implications of the tourism industry", *Resources for the Future: Discussion Paper.*

Diedrich A., BalaguerHuguet P. and Tintoré Subirana J. (2011). "Methodology for applying the limits of acceptable change process to the management of recreational boating in the Balearic Islands, Spain (Western Mediterranean)", *Ocean & Coastal Management*, Vol. 54, No. 4, pp. 341–351, doi: 10.1016/j.ocecoaman.2010.12.009.

Dibajnia M., Soltanpour M., Vafai F., Jazayeri Shoushtari S. M. H. and Kebriaee A. (2012). "A shoreline management plan for Iranian coastlines", *Ocean & Coastal Management*, Vol. 63, pp. 1–15, doi: 10.1016/j.ocecoaman.2012.02.012.

Del Bosque I. R. and Martín H. S. (2008). "Tourist satisfaction a cognitive-affective model", *Annals of Tourism Research*, Vol. 35, No. 2, pp. 551–573, doi: 10.1016/j.annals.2008.02.006.

Deng J. and Bender M. (2007). "Visitors' perceptions of tourism development in west virginia", in: *Proceedings of 200 Northeastern Recreation Research Symposium*, pp. 181–188.

Ezebilo E. E. (2007). "*Willingness to Pay for Biological Diversity Conservation in Simbu Province, Papua New Guinea*."

Fathilah I. and Turner L. (2008). "Host and tourist perceptions on small island tourism: A case study of Perhentian and Redang Islands , Malaysia", pp. 401–410.

Fisher J. B., Nawaz R., Fauzi R., Nawaz F., Said MdSadek E. S., AbdLatif Z. and Blackett M. (2008). "Balancing water, religion and tourism on Redang Island, Malaysia", *Environmental Research Letters*, Vol. 3, Vol. 2, pp. 024005, doi: 10.1088/1748-9326/3/2/024005.

Frauman E. and Banks S. (2011). "Gateway community resident perceptions of tourism development: Incorporating importance-performance analysis into a limits of acceptable change framework", *Tourism Management*, Vol. 32, No. 1, pp. 128–140, doi: 10.1016/j.tourman.2010.01.013.

Garcia L. M. (2007). "Estimation of willingness to pay for environmental user fee for puerto galera tourists", World Wildlife Foundation, Philippines.

Gladstone W., Curley B. and Shokri M. R. (2012). "Environmental impacts of tourism in the Gulf and the Red Sea", *Marine Pollution Bulletin*, doi: 10.1016/j.marpolbul.2012.09.017.

Gore S. (2007). "Framework development for beach management in the British Virgin Islands", *Ocean & Coastal Management*, Vol. 50, No. 9, pp. 732–753, doi: 10.1016/j.ocecoaman.2007.03.004.

Gosken F., Adaman F. and Zenginobuz E. U. (2002). "On environmental concern, willingness to pay and post materialist values", *Environment and Behavior*, Vol. 34, No. 5, pp. 616–633.

Gössling S. (2002). "Global environmental consequences of tourism", *Global Environmental Change*, Vol. 12, No. 4, pp. 283–302, doi: 10.1016/S0959-3780(02)00044-4.

Hall C. M. (2001). "Trends in ocean and coastal tourism: The end of the last frontier?", *Ocean & Coastal Management*, Vol. 44, No. 9–10, pp. 601–618, doi: 10.1016/S0964-5691(01)00071-0.

Holden A. (2009). "The environment-tourism nexus", *Annals of Tourism Research*, Vol. 36, No. 3, pp. 373–389, doi:

10.1016/j.annals.2008.10.009.

Hsu S. and Roth R. E. (1998). "An assessment of environmental literacy and analysis of predictors of responsible environmental behaviour held by secondary teachers in the Hualien area of Taiwan", *Environmental Education Research*, Vol. 4, No. 3, pp. 229–249, doi: 10.1080/1350462980040301.

Jalal K. C. A, Faizul H. N. N., Naim M. A., John B. A. and Kamaruzzaman B. Y. (2012). "Studies on water quality and pathogenic bacteria in coastal water Langkawi", *Malaysian Journal of Environmental Biology*, Vol. 33, No. 4, pp. 831–835, available online at: http://www.ncbi.nlm.nih.gov/pubmed/23360015.

Jonge V. N., Pinto R. and Turner R. K. (2012). "Integrating ecological, economic and social aspects to generate useful management information under the EU Directives' 'ecosystem approach'", *Ocean & Coastal Management*, Vol. 68, pp. 169–188, doi: 10.1016/j.ocecoaman.2012.05.017.

Kilipiris F. and Zardava S. (2012). "Developing sustainable tourism in a changing environment: Issues for the tourism enterprises (Travel Agencies and Hospitality Enterprises)", *Procedia-Social and Behavioral Sciences*, Vol. 44, pp. 44–52, doi: 10.1016/j.sbspro.2012.05.003.

Kim K., Uysal M., and Sirgy M. J. (2012). "How does tourism in a community impact the quality of life of community residents?", *Tourism Management*, doi: 10.1016/j.tourman.2012.09.005.

Ku K. C. and Chen T. C.(2013). "A conceptual process-based reference model for collaboratively managing recreational scuba diving in Kenting National Park", *Marine Policy*, Vol. 39, pp. 1–10, doi: 10.1016/j.marpol.2012.09.008.

Lee C. C. and Chang C. P. (2008). "Tourism development and economic growth: A closer look at panels", *Tourism Management*, Vol. 29, No. 1, pp. 180–192, doi: 10.1016/j.tourman.2007.02.013.

Lee K. T., and Othman S. S. (2010). "Pertumbuhandan Pelestarian Industry Eko-Pelancongan: Kajian Pulau-Pulau Peranginan Sekitar Pantai Timur Sabah", Vol. 3, No. 2, pp. 273–294.

Lei K. and Zhou S. (2012). "Percapita resource consumption and resource carrying capacity: A comparison of the sustainability of 17 mainstream countries", *Energy Policy*, Vol. 42, pp. 603–612, doi: 10.1016/j.enpol.2011.12.030.

Liebe U., Preisendorfer P. and Meyerhoff J. (2010). "To pay or not to pay: Competing theories to explain individuals' willingness to pay for public environmental goods", *Environment and Behavior*, Vol. 43, No. 1, pp. 106–130, doi: 10.1177/0013916509346229.

Lim H. S., Tan F., MatJafri M. Z. and Abdullah K. (2011). "Water quality study using oceans at imagery over Penang Island", in: *2011 IEEE International Conference on Imaging Systems and Techniques*, pp. 65–69, doi: 10.1109/IST.2011.5962224.

Lozano-Oyola M., Blancas F. J., González M. and Caballero R. (2012). "Sustainable tourism indicators as planning tools in cultural destinations", *Ecological Indicators*, Vol. 18, pp. 659–675, doi: 10.1016/j.ecolind.2012.01.014.

McLachlan A., Defeo O., Jaramillo E. and Short A. D. (2013). "Sandy beach conservation and recreation: Guidelines for optimizing management strategies for multi-purpose use", *Ocean & Coastal Management*, Vol. 71, pp. 256–268, doi: 10.1016/j.ocecoaman.2012.10.005.

Marin V., Palmisani F., Ivaldi R., Dursi R. and Fabiano M. (2009). "Users' perception analysis for sustainable beach management in Italy", *Ocean & Coastal Management*, Vol. 52, No. 5, pp. 268–277, doi: 10.1016/j.ocecoaman.2009.02.001.

Malaysia: *Economic Transformation Plan: 2010*

Malaysia: *New Economic Model:2010*

Mastura Jaafar and Siti Aishah Maideen (2012). "Ecotourism-related products and activities, and the economic sustainability of small and medium island chalets", *Tourism Management*, Vol. 33, No.3, pp. 683–691, doi: 10.1016/j.tourman.2011.07.011.

Ministry of Science, Technology and Information (2000). *The Public Awareness of Science and Technology*, Report: Percetakan Negara: Putrajaya.

Mohd Ekhwan Toriman (2008). "Pengurusan Sumber Air Mapan di Pulau Pangkor (Sustainable water resource management in Pangkor Island)", *Akademika*, Vol. 73, pp. 71–92.

Mona ErfanianSalim and Osman MohdTahir (2012). *Kish As A Small Island Towards Sustainable Tourism*, Alam Cipta. Universiti Putra Malaysia

Moody G. L. and Hartel P. G. (2007). "Evaluating an environmental literacy requirement chosen as a method to produce environmentally literate university students", *International Journal of Sustainability in Higher Education*, Vol. 8, No. 3, pp. 355–370, doi: 10.1108/14676370710817192.

Needham M. (2008). *Recreation Carrying Capacity and Management at Kailua Beach Park on Oahu* , Hawaii Final Report.

Negev M., Sagy G., Garb Y., Salzberg A. and Tal A. (2008). "Evaluating the environmental literacy of Israeli elementary and high

school students", *The Journal of Environmental Education*, Vol. 39, No. 2, pp. 3–20, doi: 10.3200/JOEE.39.2.3-20.

Norlida H. M. S., Redzuan O., Kalsom Z. and Tamat S. (2011). "Pengukuran Kepuasan Pelancongterhadap Kualiti Perkhidmatan di Destinasi Pelancongan PulauKapas: Pendekatan Faktor Analisis", *Malaysian Journal of Environmental Management*, Vol. 12, No. 2, pp. 23–32.

Nowacki M. (2013). "Determinants of satisfaction of tourist attraction visitors", *ACTIVE Poznan*, New Zealand.

Reopanichkul P. (2009), "The effects of tourism on water quality and coral reef communities", Ph.D. thesis.

Rosilawati Zainol (2006). "Gis application in identifying tourism resources", *Jati*, Vol. *6.*

Rosniza Aznie (2011). "Persepsi dan Tingkat Kepuasan Pelancong di Pulau Pangkor" , *Geografia Online*, pp. 155–168.

Saenger P. (1990). "Environmental impacts of coastal tourism: An overview and guide to relevant literature", in: *SEOMOR-BIOTROP, Indonesia: Conference*, July 1989.

Schubert S. F., Brida J. G. and Risso W. A. (2011). "The impacts of international tourism demand on economic growth of small economies dependent on tourism", *Tourism Management*, Vol. 32, No. 2, pp. 377–385, doi: 10.1016/j.tourman.2010.03.007.

Silva J. N. and Ghilardi-Lopes N. P. (2012). "Indicators of the impacts of tourism on hard-bottom benthic communities of Ilha do Cardoso State Park (Cananéia) and Sonho Beach (Itanhaém), two southern coastal areas of São Paulo State (Brazil)", *Ocean and Coastal Management*, Vol. 58, pp. 1–8, doi: 10.1016/j.ocecoaman.2011.12.009.

Simón F. J. G., Narangajavana Y., and Marqués D. P. (2004). "Carrying capacity in the tourism industry: A case study of Hengistbury Head", *Tourism Management*, Vol. 25, No. 2, pp. 275–283, doi: 10.1016/S0261-5177(03)00089-X.

Siri R. (2009). "Indian tourists' motivation, perception and satisfaction of Bangkok, Thailand", Msc. dissertation, University of North Texas.

Song H., Dwyer L., Li G., and Cao Z. (2012). "Tourism economics research: A review and assessment", *Annals of Tourism Research*, Vol. 39, No. 3, pp. 1653–1682, doi: 10.1016/j.annals.2012.05.023.

Tang Z., Shi C. B. and Liu Z. (2011). "Sustainable development of tourism industry in China under the low-carbon economy", *Energy Procedia*, Vol. 5, pp. 1303–1307, doi: 10.1016/j.egypro.2011.03.226.

Tanrivermis H. (1998). "Willingness to Pay (WTP) and Willingness to Accept (WTA) measures in Turkey: May the WTP and WTA indicators to share the environmental damage burdens: A case study", *Journal of Economic Cooperation Among Islamic Countries*, Vol. 19, No. 3, pp. 67-93.

Taylor B., Sinha G. and Ghoshal T. (2006). *Research Methodolgy*, New Delhi, Prentice Hall.

Teh L. and Cabanban A. S. (2007). "Planning for sustainable tourism in southern PulauBanggi: An assessment of biophysical conditions and their implications for future tourism development", *Journal of environmental management*, Vol. 85, No. 4, pp. 999–1008, doi: 10.1016/j.jenvman.2006.11.005.

Torres-Delgado, A. and López Palomeque F. (2012). "The growth and spread of the concept of sustainable tourism: The contribution of institutional initiatives to tourism policy", *Tourism Management Perspectives*, Vol. 4, pp. 1–10, doi:10.1016/j.tmp.2012.05.001.

Tosun C. (2000). "Limits to community participation in the tourism development process in developing countries", *Tourism Management*, Vol. 21, No. 6, pp. 613–633, doi: 10.1016/S0261-5177(00)00009-1.

Uyarra M. C., Côté I. M., Gill J. A., Tinch R. R. T., Viner D. and Watkinson A. R. (2005). "Island-specific preferences of tourists for environmental features: Implications of climate change for tourism-dependent states", *Environmental Conservation*, Vol. 32, No. 1, pp. 11–19, doi: 10.1017/S0376892904001808.

Verbic M. and Slabe Erker R. (2007). "An econometric analysis of willingness to pay for sustainable development: A case study of the Volčjipotok landscape area", *European Network of Economic Policy Research Institutes.*

Vousdoukas M. I., Velegrakis A. F., Kontogianni A. and Makrykosta E. N. (2009). "Implications of the cementation of beach sediments for the recreational use of the beach", *Tourism Management*, Vol. 30, No. 4, pp. 544–552, doi: 10.1016/j.tourman.2008.09.007.

Wang P. W. and Jia J. B. (2012). "Tourists' willingness to pay for biodiversity conservation and environment protection, Dalai Lake protected area: Implications for entrance fee and sustainable management", *Ocean & Coastal Management*, Vol. 62, pp. 24–33, doi: 10.1016/j.ocecoaman.2012.03.001.