

ENVIRONMENTAL PROTECTION

THE LOW CARBON TOURISM PARADOX: EVIDENCE FROM KOH MAK

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***Abstract:** Low carbon tourism management appears to be a contradictory concept. After all, tourism involves travel for purposes of leisure and recreation and that travel, under current technological conditions, inevitably produces carbon emissions. This is quite in addition to the environmental consequences of actions taken in the tourism resort destination or destinations. However, there are actions that can be taken to mitigate negative environmental consequences and some which can even aspire to have a negative overall effect on carbon emissions. Many of these activities take place on the supply side of the tourism industry, such as local sourcing of food and beverage items, locally-produced goods and services and minimally invasive architecture and development. This paper explores the nature of low carbon tourism destination management and highlights the more practical and valuable applications in the context of the low carbon campaign being organized by the Designated Areas for Sustainable Tourism Association (DASTA) in Thailand, with a particular focus on the case study island of Koh Mak. Various recommendations are made in the light of the analysis and the implications of preparing low carbon tourism destination activities on a small island are considered.*

***Keywords:** destination management, low carbon tourism management, island, Thailand, tourism*

1. INTRODUCTION

Tourism is often criticized for being an economic sector that is particularly damaging to the environment (e.g. Brown *et al.*, 1997). Among the many factors leading to this is the need for long distance travel, the intensive use of water in seasons when rainfall is sparse, the generation of waste and the unsustainable consumption of environmental resources through diving, climbing, trekking and so forth. Above all, perhaps, are the problems caused when international markets and national level policies come into contact with local communities and organizations and overwhelm them, particularly in the case of developing countries (Josun, 1988). This can be true when the destination itself takes charge of the development (Davis & Morais, 2004). Attempts have been made to create tourism projects that aspire to be

environmentally sensitive and protective of local ecologies and some success has been achieved in these cases (Cater, 1993).

For more than a decade, Thailand has been one of the more prominent tourist destinations aiming to promote environmentally-sensitive tourism, with mixed results (e.g. He, Jiang & Zhu, 2002; Kontogeorgopoulos, 2005; Duffy & Moore, 2010). The Thai government has been made aware of the problems of unsustainable development, not least because of the enhanced risk of drought and flood that has been caused at least in part by extensive deforestation (Lang, 2002). One of the organizations mandated to promote sustainable tourism in Thailand is the Designated Areas for Sustainable Tourism Administration (Public Organization) (DASTA), which was established in 2003 and tasked with coordinating various resources and policies relating to tourism "...with more flexibility and promptness in operation than that of government agencies and state enterprises (DASTA, 2013)." It was designed, in other words, to take an entrepreneurial or social entrepreneurial approach to promoting sustainable tourism through interacting with private and public sector actors. The importance of DASTA is made evident by the overall importance of tourism to Thailand as a whole. Tourist arrivals reached a peak of 26.6 million in 2013, prior to the military coup of 2014 (Thaiwebsites.com, 2015a) and the negative effects of problems in the Russian economy. Of these, Department of Tourism figures from 2012 show that 6.5 million visitors arrived from the ASEAN region, 6.3 million from East Asia and 5.5 Million from Europe. In monetary terms, European visitors are the most important (Thaiwebsites.com, 2015b). As 2015 continued, the Bangkok bombings (which killed 22 people) and continued economic decline under military control saw tourist numbers decrease all across the country.

Tourism is, therefore, an industry of central importance to Thailand and one which provides employment to a significant proportion of the workforce. The exact number of people involved is difficult to specify because so many are involved in the informal economy. One of DASTA's principal roles is to try to strike compromises between the desire to maintain and, preferably, increase tourist arrivals and expenditure on the one hand with the increasingly evident need on the other hand to protect the fragile environment. This has led to the low carbon destination campaign led by DASTA and conducted at various sites in Thailand, including islands in the Gulf of Thailand, notably Koh Mak, which is the site studied for this paper. The purpose of the paper is to investigate DASTA's low carbon tourism campaign in the context of the contradictory nature of such an approach and evaluate the extent to which it can be said that the campaign has been successful.

2. LITERATURE REVIEW

Carbon emissions are produced by the tourism industry in various ways, including transport, accommodation and recreation (Chenoweth, 2009). The proportions of carbon produced within each vary depending on the specific tourism visit involved. Physical geography, for example, means that there can be significant distances between a destination and the home of the tourists targeted, as is the case for Australia (Zeppel, 2012). Thailand, similarly, requires long-haul transportation for most of its visitors from Europe, while the burgeoning China market remains dominated by charter groups. Climate change mitigation policies which target the aviation industry in major western economies would be likely, therefore, to have a disproportionate effect on Thailand's industry (Gössling, Peeters & Scott, 2008). Consequently, the various approaches that have been taken to try to reach agreement on mitigating climate change would have uneven effects on the tourism industry worldwide. Curbs or taxes on intercontinental flight and cruise ship travel would intensify that unevenness (Chenoweth, 2009), with probably mixed results. Since it has been notably difficult to achieve measurable progress in actually reducing carbon emissions or retarding the rate of acceleration of the emissions (Bulkeley & Moser, 2007), more attention is being placed on the supply side of the low carbon tourism issue. In part, this is because it is unlikely that tourists will be willing to acknowledge a direct link between their activities and global climate change (Becken, 2004) and, further, that those individuals who do are sensitive to the issues are less likely to do the travelling. However, empirical research in this respect shows at best mixed results, with some at least of those most aware of the issues the least likely actually to change their behaviour (McKercher *et al.*, 2010).

There have been three principal approaches to creating and promoting low carbon tourism destinations and they are somewhat contradictory in nature. The first approach is technocratic in nature, focuses on a wide range of physical infrastructure and development and is led by a generally top-down, public sector approach (Cai & Wang, 2010; Huang & Deng, 2011; Winkler & Marquand, 2009). A second approach focuses more on the role of tour operators or other members of the private sector and the opportunities available to them in promoting low carbon tourism (Gössling *et al.*, 2011), as well as working in conjunction with the public sector (Weston & Mota, 2012) and linking changes in resource use with state-level development policies (Yung & Chan, 2012).

The third approach is a bottom-up one, which concentrates on specific local communities and their sustainable development with respect to tourism (Kontogeorgopoulos, 2005; He *et al.*, 2002; Jones, 2006). For successful low carbon destination management to take place, it is likely to be necessary for the three levels of action – government, private sector and communities – to have to work together effectively. It has been argued elsewhere that, in the context

of Thailand at least, the central contributors to successful destination management with respect to the creative city concept depends on the presence of genuine social capital, the stable distribution of resources and connectivity.

3. METHODOLOGY

DASTA's approach to promoting sustainable tourism development centres on the selection and study of certain specific areas which can act as a 'model' for other areas. These include natural sites, historical sites, artistic and cultural sites and, finally, man-made sites (DASTA, 2013b). Various criteria have been adopted for identifying sites of particular interest and then for reviewing and studying them. In terms of low carbon tourism, one of the central designated sites is that of Koh Chang and related areas, which was defined as Koh Chang islands, Koh Mak islands, Koh Kut islands and related coastal areas in Trat province (DASTA, 2013c).

Koh Mak is one of more than 50 islands in the Gulf of Thailand and is the third largest with an area of 16 km² and a coastline of 27 km. It has been a tourist destination since the late 1980s. Much of the land is owned by a small number of families, who are all related to each other. This has helped to maintain the permanent population at a comparatively low level, at around 800 people. Many of the hoteliers and tourism business operators signed an agreement to treat Koh Mak as a low carbon tourist destination and to continue to limit beach facilities and restrict completely jet skis, banana boats, night clubs and similar disruptive activities. The island markets itself as a laid-back, peaceful location where it is possible to relax in the bosom of nature (Karnjanatawee, 2015).

Koh Mak was selected as the research site because its size means that all (or nearly all) business owners could be met and interviewed and that it provided a single offer to customers. By contrast, Koh Chang offers a diverse range of customer offers, from get away from it all relaxation to vibrant night life. International tourists would often choose to visit both islands as part of a multi-destination trip, thereby taking advantage of a variety of different environments.

The research reported on here is based on ethnographic observation of the research site together with intensive personal interviews and a focus group discussion with business owners, government agents and other relevant stakeholders (both Thai and English languages were used). Interviews were conducted with extensive note-taking and subsequent incorporation into a database for analysis through a recognised content analysis approach. A quantitative study of visitors to the island was also conducted but is not used in this study.

4. FINDINGS

4.1. DASTA's Activities

DASTA's activities on Koh Mak, similar to those in other low carbon destinations, may be divided into practical support and consciousness-raising. In terms of practical support, DASTA has worked with private sector actors to promote the use of solar panels, reduce wastage and enable recycling. As a tropical country, Thailand has extensive potential for solar energy which had been largely unexploited until recently. However, in 2015 plans were announced that Thailand would aim to diversify from declining natural gas deposits in the Gulf of Thailand and imported energy by investing up to US\$2.7 billion in solar energy to add some 1,200-1,500 MW to the national grid (Hill, 2015). Small-scale solar panel use has been introduced at a number of resorts, although currently only at the level of powering accessory facilities such as outdoor lighting and partial operation of a hotel swimming pool. DASTA and operators face the problem of limited supply of solar panel technology, relatively high cost and subsidized local energy costs. However, awareness of the importance of renewable energy is increasing and overseas business owners, especially from Europe, tend to have a relatively higher level of awareness of the impacts and threat of global climate change. For Thai island residents, solar power (provided with assistance from a public sector university) is a useful alternative to diesel generators in the absence of a central electricity system (Roumjit, 2014).

Reducing wastage builds on already existing campaigns with hotels and other accommodation to minimize water use and the energy used by needless laundering of towels and bedding. In this regard, there is a constraint imposed by the geography of the island. The fact that it is a small island means that it is not possible to store sufficient water resources and food producers cannot obtain enough good land to grow crops for local consumption at a sustainable rate. Agriculturists interviewed noted that growing conditions were poor and that rubber was the only feasible option. There was some scope for interspersing pineapples among the rubber trees. Rubber as a commodity has for nearly a century in mainland Southeast Asia been subject to volatile demand and price conditions, susceptibility to substitution and over-production. There may be some scope for hydroponic or similar technique to grow food plants for consumption but this too has yet to be developed on a significant scale. Consequently, much of the food or water consumed as the island is imported from the mainland with a notable carbon cost. However, the policy of restricting loud or extravagant beach and nightlife facilities does have the (perhaps not directly intended) effect of reducing overall and per capita carbon emissions. Other activities involved with reducing wastage are covered under consciousness-raising.

For recycling, waste is collected from households and businesses and stored at a central facility. This is similar to the practice throughout Thailand and households pay a small annual fee to the local authority. Disposal of the waste thereafter is the responsibility of the authority involved. Although there is no formal system of recycling in operation, many if not most households are part of an informal system whereby scavengers or rubbish-pickers will go from house to house to search through waste ready for collection hoping to find items that can be sold. The amount of money involved is small but evidently enough to provide a living for some people in the informal sector. Household members may choose to isolate certain items and sell them to rubbish-pickers or other individuals, knowing that these items (e.g., glassware, newspapers, tin cans and metal ware) do have a resale value. The situation on Koh Mak is slightly more developed in this respect as householders are encouraged to be aware of different categories of waste and these are kept separately at the central facility for subsequent reuse. The problem with this is that it means waste is kept for longer than it would normally be and there is, therefore, a problem with the smell of decomposing organic waste. Since the facility is an open-air one, there is only limited ability to reduce this problem. What is needed is better technology that would convert the waste into a more socially useful form of material.

For consciousness-raising, DASTA works mainly with permanent residents and business-owners to make them aware of the potential benefits of the low carbon concept and encourage them to participate in specific projects through a series of public consultations or town hall meetings, as well as personal interviews. This is supplemented by public relations and marketing materials both in hard copy and also online. As a public organization, DASTA is obliged to audit its activities and submit these to the relevant government agency and is judged accordingly.

4.2. The Private Sector

The private sector on Koh Mak may be broadly divided into two parts. The first part is that owned by permanent residents who may or may not be connected or related to the land-owning families. Those that are so connected tend to be better financed and to be able to expand their businesses into, in one category, integrated resort businesses. Tourists arrive at Koh Mak via ferry or speedboat, mostly from the mainland port of Trat. At the island, the vessels tie up to a pier and the tourists disembark, along with any luggage. However, instead of there being a single, publicly-owned pier which is funded in part by port fees charged of vessel operators, a series of different piers has been built by different families and operated as a virtual monopoly since, through vertical integration, the business owns the boats that transfer passengers to and fro, the

pier and its supporting infrastructure and, also, the hotels and restaurants to which the piers give most convenient access. It is, of course, possible for tourists to travel independently, by buying boat tickets and then looking for transport to another destination. However, there is a clear incentive for tourists to restrict themselves to the offerings of the single business. This appears to be particularly true for those visitors travelling as part of a group within the marketing, incentive, conference and exhibition (MICE) sector. Non-connected businesses tend to be lacking in capital and value-adding capacity and are mostly related to small grocery outlets, local food stalls and personal transportation. Many necessary social services are deficient, such as clinics and schools. Although there are some services of this sort, they are limited in scope and quality and some respondents complained about them. There are also no banks or ATMs on the island and this can be inconvenient for unprepared tourists and a business opportunity for some entrepreneurs. Comparatively rapid travel between the island and with the mainland can be organized in the event of an emergency. Some of the local business-owners have become involved with DASTA schemes. The well-connected business-owners tend to be more able to identify the benefits of such schemes and to be able to take advantage of them.

Foreign business-owners tend to be either permanent or long-term seasonal residents of the island. Their businesses are almost entirely wholly related to the tourism industry, either directly or indirectly. Most but not all of these owners are male and most of them have female Thai partners who help in the business, although these women tend to be from other parts of Thailand. Most business-owners are originally from western Europe and were aware of issues relating to the low carbon concept. Respondents in this category displayed the same range of complaints about the business and social environment that seems to be common to expatriate businesspeople in every country: lack of support from the public sector; lack of market development; insufficient business infrastructure and so forth. However, they also had concerns about the nature of the governance of the island and the research took place during a period when a number of scandalous stories about Thailand's southern islands were entering the public realm (e.g. Walker, 2014).

In terms of DASTA, most business owners interviewed had been previously identified by DASTA staff as potential respondents and so were aware of the agency and its work, particularly when it would contribute to profitability in a business sector that is always sensitive to events in the external environment. However, respondents tended to be skeptical about the ability of DASTA to bring about the quite large-scale improvements they had in mind. There was certainly interest in embracing low carbon approaches and increasing the use of renewable energy and local production. Renewable energy

production in the private sector would be facilitated with greater facility to feed surplus energy when available into the main grid and to be compensated for this. Details of how this should be managed are still being considered (Wongsomboon, 2014).

4.3. Tourists

Tourists are either Thai or international and there are approximately equal numbers of both. Respondents were drawn from both categories but they were approached in tourist locations, so those visitors who were using private accommodation would not have been found or at least less frequently.

In contrast to Koh Chang, where there are now substantial numbers of tourists from the former Soviet Union and eastern Europe, as well as from East Asian countries, the majority of international tourists found and interviewed were from western Europe. They tended to travel in small groups or family units and to be visiting Koh Mak as part of a multi-destination holiday. Commonly, this would not be their first visit to Thailand but it would be the first time to Koh Mak.

By contrast, Thai tourists commonly came in groups as part of the MICE sector and, therefore, would be most likely to remain in the same destination resort for the duration of their visit. Partly because the focus of their visit was related to an organizational purpose, the Thai visitors in this sector tended to be less aware of the low carbon concept or to be very interested in it. The international visitors tended to be more aware of low carbon issues and to recognise their importance. However, as holiday-makers, they also tend to display contradictory behaviour to how they would behave at home. One example of this was smoking. In western Europe, smoking is deeply discouraged and this extends to restricting areas of public space where people are allowed to smoke. As a result, many people give up smoking or severely restrict themselves to certain special occasions. However, on Koh Mak there are no such restrictions in place, since in Thailand smoking is only restricted in public spaces which are enclosed and where air conditioning is provided and there is very little such space on the island. The result is that those people who had effectively given up smoking in their daily lives take the holiday as an opportunity to practice the habit quite extensively. Other forms of contradictory behaviour might be more evident in other destinations which do not promote Koh Mak's particular brand of quietism. However, in general they were aware of their inconsistency in terms of being alert to carbon emission issues while having taken inter-continental flights to reach their destination. Offsetting activities such as planting trees could only reduce this contradiction to a limited extent and there remained a measure of cognitive dissonance nevertheless.

5. DISCUSSION

Contradictions may seem to be inimical to progress because they see two opposing sides with no obvious means of reconciliation unless one side is able to dominate the other. However, in such cases it is possible to resort to the Hegelian dialectical method to bring about that progress. According to the dialectical method, as is well-known, two opposing forces interact with each other and each both changes the other and is changed by it. In this case, then, the opposing forces are the carbon emissions caused by the very act of tourism and the opportunity to reduce carbon emissions by various lifestyle choices when performing the act of tourism. Is it possible for these two forces to affect each other directly, such that missions reduced during the holiday could be applied immediately to those caused by the travel necessary to bring it about? Under the current level of technology, this seems to be impractical.

Should such a thing be possible, then DASTA will certainly have a role in causing it to happen. DASTA works, as has been suggested, at a variety of temporal and spatial scales. First, it works to identify and designate the sites at which state-mandated and state-supported sustainable development will take place, whether this is related to tourism or not. In common with all forms of special economic areas, then, DASTA offers a degree of exceptionalism and gradated sovereignty, where different rules and laws apply within the area compared to those outside it. The changes implied might be relatively minor in nature but they can mean the difference between success and failure when comparing similar operations on different sides of the border. This creates a reason for organizations to move their activities to within this area, thereby providing opportunities for productivity improvements and efficiency gains through proximity. The more intense use of the resources might, in another seeming contradiction, turn out to be a more sustainable form of development.

Harvey (2014) points out that there is a second form of contradiction distinct from the two apparently irreconcilable forces. This occurs when there are tensions within a single entity that tend to work against each other. Classically, of course, it is said that capitalism contains within itself the seeds of its own destruction and this is the result of such a contradiction. In the present case, it is the act of travel itself that contains the contradiction that it, idiomatically, broadens the mind while contributing to environmental degradation. In an era in which virtual reality tools would enable people to embrace the benefits of travel without actually having to complete the physical act, renewed emphasis is being placed on the value of authenticity of the experience economy. Internet digital reproduction, for example, has meant that media producers can now rarely claim the full value for their intellectual property and, instead, derive their revenue from fees charged from attending a live event. Travel has become, in other words, a renewed means of personal

self-actualisation for those who can afford it. This contradiction seems to be insoluble for the foreseeable future.

6. CONCLUSION

DASTA's work for the tourism economy has focused on mitigating global climate change to some extent through working with the supply side of tourism service providers to reduce carbon emissions caused in their daily activities. While this may be of limited absolute value, given the scale of carbon emissions and their impact on global climate change, perhaps the greatest value of the activities is as an exemplar of what might be achieved through large-scale action. For example, the use of solar panels to reduce the need for electricity generation by fossil fuels has indicated what might be achieved through the application of this technology on a large-scale. It would be necessary either for intensive investment to take place through the private sector in respect to state-provided incentives to do so or, else, investment by the state itself for it to take place. Some form of public private partnership would seem to be the approach most likely to be successful.

As DASTA's work continues and develops, further monitoring of the impact and value of its activities is warranted. In common with many state agencies in Thailand (and, indeed, further afield), DASTA suffers from the replications of activities and multiple ministries seeking to enact jurisdiction over particular areas of interest. Rather than attempting to be another competitor in this respect, DASTA is better placed to be an advocate and a catalyst for change that might be taken up at a larger scale by ministries. Further research is required to determine how if at all these events take place.

Islands, as previously discussed, are areas bounded in space and links must be created to ensure appropriate connectivity with resource-bearing mainland areas. As identifiably independent areas, they offer useful opportunities for studying how certain projects may be conducted. As part of a chain of islands, they also offer the opportunity to compare impacts and developments on similar but not identical geographical contexts. In the case of Koh Mak, it is evident that it is possible to maintain a commitment to a comparatively low level of tourism development, which then has an effect on overall carbon emissions, so long as there is a means of expressing the consensus that might be achieved. The size of the island has a clear impact on the ability to reach consensus and so, too, perhaps more importantly, does the pattern of land ownership. Even so, the current settlement does appear to be somewhat precarious and subject to sudden significantly negative external change.

7. REFERENCES

- Becken, Susanne, "How Tourists and Tourism Experts Perceive Climate Change and Carbon Offsetting Schemes," *Journal of Sustainable Tourism*, Vol.12, No.4 (2004), pp. 332-45.
- Brown, Katrina, Kerry R. Turner, Hala Hameed and Ian Bateman, "Environmental Carrying Capacity and Tourism Development in the Maldives and Nepal," *Environmental Conservation*, Vol.24, No.2 (1997), pp.316-25.
- Bulkeley, Harriet and Suzanne C. Moser, "Responding to Climate Change: Governance and Social Action beyond Kyoto," *Global Environment and Politics*, Vol.7, No.2 (May, 2007), pp.1-10.
- Cai, Meng and Yu-Ming Wang, "Low Carbon Tourism: A New Mode of Tourism Development," *Tourism Tribune*, Vol.25, No.1 (2010), pp.13-7.
- Cater, Erlet, "Ecotourism in the Third World: Problems for Sustainable Tourism Development," *Tourism Development*, Vol.14, No.2 (April, 1993), pp.85-90.
- Chenoweth, Jonathan, "Is Tourism with a Low Impact on Climate Possible?" *Worldwide Hospitality and Tourism Themes*, Vol.1, No.3 (2009), pp.274-87.
- Davis, Jeffrey Sasha and Duarte B. Morais, "Factions and Enclaves: Small Towns and Socially Unsustainable Tourism Development," *Journal of Travel Research*, Vol.43, No.1 (August, 2004), pp.3-10.
- Designated Areas for Sustainable Tourism Administration (DASTA), "History" (2013a), available at: <http://dasta.or.th/en/about-eng.html>.
- Designated Areas for Sustainable Tourism Administration (DASTA), "Hua Hin-Cha-Am Areas and Connecting Area" (2013b), available at: <http://dasta.or.th/en/about-achievements-eng/huahinchaam.html>.
- Designated Areas for Sustainable Tourism Administration (DASTA), "Designated Area of Koh Chang Islands and Related Areas" (2013c), available at: <http://dasta.or.th/en/sustain/1034-1034.html>.
- Duffy, Rosaleen and Lorraine Moore, "Neoliberalising Nature? Elephant-Back Tourism in Thailand and Botswana," *Antipode*, Vol.42, No.3 (2010), pp.742-66.
- Gössling, Stefan, Paul Peeters and Daniel Scott, "Consequences of Climate Policy for International Tourist Arrivals in Developing Countries," *Third World Quarterly*, Vol.29, No.5 (2008), pp.873-901.
- Harvey, David, *17 Contradictions* (2014).
- He, Yi-Ling, Chun-Qian Jiang and Zhao-Hua Zhu, "How to Develop Community-Based Eco-Tourism (CBET): Experiences Learned from Ban Huay Hee, Thailand," *Tourism Tribune*, Vol.6 (2002), pp.57-60.
- Hill, Joshua S., "Thailand in Midst of Big Solar Boom," *CleanTechnica* (July 16th, 2015), available at: <http://cleantechnica.com/2015/07/16/thailand-in-midst-of-big-solar-boom/>.
- Huang, Can and Hongbing Deng, "The Model of Developing Low-Carbon Tourism in the Context of Leisure Economy," *Energy Procedia*, Vol.5 (2011), pp.1974-8.
- Jones, Samantha, "Community-Based Ecotourism: The Significance of Social Capital," *Annals of Tourism Research*, Vol.32, No.2 (April, 2006), pp.303-24.
- Josun, Cevat, "Roots of Unsustainable Tourism Development at the Local Level: The Case of Urgup in Turkey," *Tourism Management*, Vol.19, No.6 (December, 1988), pp.596-610.

- Karnjanatawee, Karnjana, "Island in the Sun," *Bangkok Post* (March 5th, 2015), Life, pp.1&6.
- Kontogeorgopoulos, Nick, "Community-Based Ecotourism in Phuket and Ao Phangnga, Thailand: Partial Victories and Bittersweet Remedies," *Journal of Sustainable Tourism*, Vol.13, No.1 (2005), pp.4-23.
- Lang, Graeme, "Deforestation, Floods, and State Reactions in China and Thailand," in Arthur P.J. Mol and Frederick H. Buttel, eds., *The Environmental State under Pressure (Research in Social Problems and Public Policy, Vol.10)*, Emerald Group Publishing Ltd. (2002), pp.195-220.
- McKercher, Bob, Bruce Prideaux, Catherine Cheung and Rob Law, "Achieving Voluntary Reductions in the Carbon Footprint of Tourism and Climate Change," *Journal of Sustainable Tourism*, Vol.18, No.3 (2010), pp.297-317.
- Roumjit, Phumpetch, "Solar Power Lights up Distant Isles," *The Nation* (December 15th, 2014), available at: <http://www.nationmultimedia.com/national/Solar-power-lights-up-distant-isles-30249832.html>.
- Thaiwebsites.com, "Tourism Statistics Thailand 2000-14," (May 6th, 2015), available at: <http://www.thaiwebsites.com/tourism.asp>.
- Thaiwebsites.com, "Revenue from Foreign Tourists Visiting Thailand" (2015), available at: <http://www.thaiwebsites.com/tourism-income-Thailand.asp>.
- Walker, Peter, "Koh Tao's Dark Side: Dangers of Island where Britons Were Murdered," *The Guardian* (November 23rd, 2014), available at: <http://www.theguardian.com/uk-news/2014/nov/23/briton-thailand-murder-hannah-witheridge-david-miller-mystery-mafia-fear>.
- Weston, Richard and José Carlos Mota, "Low Carbon Tourism Travel: Cycling, Walking and Trails," *Tourism Planning and Development*, Vol.9, No.1 (Feb, 2012), pp.1-3.
- Winkler, Harald and Andrew Marquand, "Changing Development Paths: From an Energy-Intensive to Low-Carbon Economy in South Africa," *Climate and Development*, Vol.1, No.1 (2009), pp.47-65.
- Wongsomboon, Supanida, "Tariff Analysis for Integration of Renewable Energy Sources to the National Grid," *AORC Technical Meeting 2014* (2014), available at: http://www.cigre-thailand.org/tncf/events/aorc2014/full_paper/1050R.pdf.
- Yung, Esther H.K. and Edwin H.W. Chan, "Implementation Challenges to the Adaptive Reuse of Heritage Buildings: Towards the Goal of Sustainable, Low Carbon Cities," *Habitat International*, Vol.36, No.3 (July, 2012), pp.352-61.
- Zeppel, Heather, "Collaborative Governance for Low-Carbon Tourism: Climate Change Initiatives by Australian Tourism Agencies," *Current Issues in Tourism*, Vol.15, No.7 (2012), pp.603-26.

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