ENERGY CONSUMPTION AND THE ECOLOGICAL FOOTPRINT OF TOURISM IN AN ISLAND DESTINATION: THE CASE OF KOH SAMUI, THAILAND

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to the University of Exeter as a thesis for

the degree of Doctor of Philosophy in Management Studies

June 2011

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ABSTRACT

This thesis aims to apply the concept of the Ecological Footprint (EF) to examine the impact that the tourism industry has on the environment through energy consumption and also investigates patterns of energy-consuming behaviour among tourists and tourism businesses. EF is becoming an increasingly popular analytical tool in tourism studies. However, at present most attention has fallen on its value for studying tourism in international level. Moreover, very few studies have taken account of the influence of social factors when making EF calculations linked to tourism. As a consequence of these biases, there is currently a need for studies of tourism which take account of EFs at the destination level and how the behaviour of tourists and tourism businesses affects energy consumption at holiday destinations. This study addresses this gap by investigating the EF of energy-consuming behaviour linked to tourists and tourism businesses at a particular holiday destination, namely Koh Samui in Thailand, and also by exploring the factors which influence this kind of behaviour.

The findings of this study show that most tourists rely on modes of transport which release high levels of CO_2 (especially long haul flights). In the case of Thailand, a majority of tourists fly from Bangkok to Koh Samui and then use private cars to get around the island. Energy intensive electrical appliances such as air conditioning and tankless hot water heaters were widely used in accommodation, while beach activities, which generally have a low carbon footprint, attracted the largest numbers of tourists. It was also found that demographic factors, including travel behaviour and concern for the environment, influenced these kinds of behaviour in various ways.

As regards different types of tourism business, in the accommodation sector hotels used the largest quantities of electricity while tour operators used more diesel and petrol than any other type of tourism business. Furthermore, it was also found that even though respondents who stayed in five-star hotels expressed the greatest level of concern for climate change, they still considered their own convenience and satisfaction to be their highest priorities. Tourism on Koh Samui consumed about 54.55 PJ of energy in 2007 and thus needed 3.41 gha of forest land to absorb the resulting CO_2 emissions. Given that this figure exceeds the current world-average biocapacity of 1.8 gha, it can be stated that tourism on Koh Samui is currently unsustainable.

This study highlights the relationship between the EF of tourism at a particular holiday destination and the energy-consuming behaviour of both tourists and tourism businesses. In this way, it is shown here that excessive energy consumption combined with a lack of effective energy management in the business sector can lead to the development of an unsustainable EF. In response to this finding, practitioners and policy-makers should consider ways of mitigating EFs linked to tourism.

ACKNOWLEDGEMENTS

This thesis would not have been possible without the support, encouragement and friendship of many other people. My greatest thanks and appreciation goes to my two supervisors Prof. Gareth Shaw and Prof. Tim Coles for their guidance throughout this entire process, for their patience and for making me feel that I could always count on them.

My appreciation goes to the Ministry of Energy, Thailand for its financial support through the Ph.D scholarship, in the second and third year of my study. I would like also to acknowledge all the tourists traveling to Koh Samui who took time from their trips to answer questionnaires, and the managers and owners of businesses who kindly accepted to be interviewed for this research. I would also like to express my gratitude to Provincial Electricity Authority (PEA) who takes in charge of power distribution and Koh Samui City Municipality who take in charge of waste and sewage treatment on Koh Samui. It was valuable assistance in a variety of ways, including coordinating and providing relevance data.

I cannot forget my PhD colleagues who have gone through the process with me and have provided a wonderful social environment filled with laughter and encouragement. Thank you and best wishes to Hiroyuki Yakushiji, Paul Cleave, Pimprae Buddhichiwin and Sukanya Sompiboon. I would also like to express a very special thanks to my friends - Caroline, Terry, Songsiri and Sawita for their friendship, understanding, and support in all sorts of ways. My deep thanks to Karin, Bonnie and Christ - for sharing your time, taking care of Goya for me sometimes and welcoming me to stay with you on the last semester. You guys just completely brighten my day in Exeter.

A deep sense of appreciation goes to my husband Siwarit for his unconditional love, his understanding, encouragement and belief in me and for supporting me wherever possible. You are just the best husband ever. This thesis represents to me more than an academic accomplishment - it has been a great chapter in my life. Certainly, Goya, my little angel, had been an important part of this hard process - thank you, for your patience and for being a good girl.

Finally, my immense gratitude also goes to my parents, Aon and Areewan Khanluang, for their boundless love, for the emotional support and for giving me a loving environment to develop. To my sisters and brother – Sirada, Siripatsorn, Siriporn and Sirichai - thank you for variety supports in every way. The last and most important person is my granny for putting me through school and believing that I could get through this. To her I dedicate this thesis.

TABLE OF CONTENTS

LIST OF APPENDICES

LISTS OF TABLES

LISTS OF FIGURES

LIST OF ABBREVIATIONS

ANOVA	=	Analysis of Variance
CO_2	=	Carbon Dioxide
DEDE	=	Department of Alternative Energy Development and Efficiency
EF	=	Ecological Footprint
EGAT	=	Electricity Generating Authority of Thailand
EIA	=	Environmental Impact Assessments
EIO	=	Environmental Input-Output Model
EPPO	=	Energy Policy and Planning Office, Ministry of Energy, Thailand
GHG	=	Green House Gas
IPCC	=	Intergovernmental Panel on Climate Change
Koh Samui	=	Koh Samui Island, Surattani, Thailand
KSMC	=	Koh Samui City Municipality
LAC	=	Limit of Acceptable Change System
LCA	=	Life Cycle Assessment Model
LPG	=	Liquid Petroleum Gas
PEA	=	Provincial Electricity Authority
PWA	=	Provincial Waterworks Authority
SMEs	=	Small and medium sized enterprises
SMTEs	=	Small and medium-sized tourism enterprises
SPI	=	Sustainable Process Index
TAT	=	Tourism Authority of Thailand
UNFCCC	=	United Nations Framework Convention on Climate Change
WWF	=	World Widelife Fund

UNITS OF MEASUREMENT AND CONVERSION FACTORS

Prefix	Symbol	Value	Example
Kilo	K	10^3	Kilowatt/ kW
Mega	M	10^6	Megajoule/ MJ
Giga	G	10^9	Gigajoule/ GJ
Tera	T	10^{12}	Terajoule/ TJ
Peta	P	10^{15}	Petajoule /PJ

Type	Unit Name	Symbol
Energy	joule	J
Power	watt	W
Time	hour	h
Energy (electricity use)	kilowatt-hour	kWh
Temperature degree	Celsius	°C
Fuel	litres	l
Distance	passenger-kilometre	pkm
Area	global hectare	gha

Type	Unit Name	Symbol	Value
Energy (Electricity use)	kilowatt-hour	kWh	3.6×10^6 J = 3.6 MJ
Energy	terawatt-hour	TWh	3.6×10^{15} J = 3.6 PJ
Energy	litre of petrol	L	3.2×10^7 J
Energy	m^3 of natural gas at STP		3.4×10^7 J
Power	kWh per year	kWh/y	0.114 W
CO_2	Tonnes	CO_2	1 tonnes = 1,000 Kg
Area	hectare	hectare	1 hectare = 10,000 m^2