HUMAN-ELEPHANT RELATIONS IN PENINSULAR MALAYSIA

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Abstract

In the Malay Peninsula, people have lived alongside Asian elephants (*Elephas maximus*) for around 55,000 years but our expansion now endangers the species. With the aim of gaining knowledge on how to we can live together in future, I reviewed the ecology, history, and management of human-elephant relations in the Peninsula.

I found that indigenous people (Orang Asli) occupied many of the same landscapes as elephants and, despite a degree of ecological overlap, managed to enjoy a convivial coexistence by following the pathways elephants created through the rainforest, and by subsisting off wild yams. Around 6500 years ago, a swidden-farming culture arrived and crop-raiding elephants were killed and occasionally eaten. Around 2500 years ago, new settlers arrived and elephants came to be sought for ivory, to be captured, tamed, and even exported.

Aspects of the traditional forager and swiddener cultures remain in Belum-Temengor, a priority elephant conservation site in the north of the Peninsula. Here, I surveyed 37 villages to examine beliefs, attitudes, and behaviour towards elephants. I found that tough elephants were the main source of human-wildlife conflict, most respondents considered the animals to be worthy of respect. Thre were some indications that younger respondents tended to have less tolerant attitudes.

To get a clearer idea on how to manage elephants in this landscape, I mapped the villages and monitored the movement of four elephants using satellite collars. I found that governement-sponsored rubber plantations, exposed villagers to elephant raids despite the construction of electric fences.

Based on these findings I propose a five-phase strategic intervention approach to elephant conservation: (i) land-use planning; (ii) barriers to protect people (including electric fences); (iii) compensation for losses; (iv) education and engagements; and (v) removal (killing or capture).

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List of Abbreviations

A	ampere
A.	answer
AOO	Area of Occupancy
BMR	Basal Metabolic Rate
BW	body weight
ca.	circa
Carn.	carnivore
CCT	Conservation Conflict Transformation
CFS	Central Forest Spine
DNP	Department of National Parks (Thailand)
DWNP	Department of Wildlife and National Parks (Peninsular Malaysia)
ECG	[Asian] Elephant Conservation Group
EGS	School of Environmental and Geographical Sciences
EOO	Extent of Occurrence
FGD	Focus-group discussion
GIS	Geographical Information System
GPS	Global Positioning System
HEC	Human Elephant Conflict
Herb.	herbivore
HPD	Human Population Density
HWC	Human Wildlife Conflict
incl.	including
IUCN	International Union for the Conservation of Nature
JAKOA	Department of Orang Asli Development, Malaysia
JUPEM	Department of Survey and Mapping, Malaysia
ka	thousand years ago
kcal	kilocalories
Kg	Kampung (village)
kg	kilogram

KII	Key-informant interview
KL	Kuala Lumpur
kV	kilovolts
LGM	Last Glacial Maximum
M.	Malay
MEME	Management and Ecology of Malaysian Elephants (project)
MER	Managed Elephant Range
MJ	Megajoule
MNS	Malaysian Nature Society
MYGAJAH	Malaysian Elephant Alliance
MYR	Malaysian Ringgit
N	north
NECAP	National Elephant Conservation and Action Plan
NGO	Non-Governmental Organisation
Omn.	omnivore
org.	orang (people)
ppl	people
Q.	question
RM	Ringgit Malaysia
RPS	Rancangan Pengkumpulan Semula (regroupment scheme)
S.	sungai (“river”)
Sg	”
SPEG	Sistem Pagar Elektrik Gajah (elephant electric fence system)
SPEGKOM	SPEG Komuniti (community-based elephant electric fence system)
SSI	Semi-structured interview
UNDP	United Nations Development Programme
UNMC	University of Nottingham Malaysia Campus
USD	United States Dollars
USDA	United States Department of Agriculture
WWF	the World-wide Fund for Nature
ya	years ago

1 General Introduction

It was six men of Indostan
To learning much inclined,
Who went to see the Elephant
(Though all of them were blind),

–John Godfrey Saxe (1872)

This chapter examines provides a general introduction to the dissertation, giving the background to human-elephant relations generally and to the situation in Peninsular Malaysia. The aim of the dissertation is to contribute to the conservation of Asian elephants by examining the case of human-elephant relations in Peninsular Malaysia from both ecological and cultural perspectives. Three research objectives will be dealt with by eight chapters, each which is planned to be published separately. The context of the research is presented in terms of the researcher, his team, and the activities carried out under the project. A section on reflexivity examines potential biases that result from this context, as well action taken to mitigate such biases.

1.1 Background

1.1.1 Elephant conservation

With the onset of the Anthropocene, humans have converted natural systems and put wildlife such as elephants in danger of extinction (Smith and Zeder 2013, Malhi et al. 2016). In the 19th century, the Industrial Revolution led to unprecedented sustained growth in the human population. And, in the 20th century, the so-called 'Green Revolution' further mobilised fossil fuels to boost agricultural production worldwide, converting the formerly forested hills of Asia and Africa into cash-crop plantations.

These developments of modernity have led to a surplus in food and prosperity and allowed an unprecedented growth in human population from less than two billion to over seven billion (Shiva 2016). However, this came at the expense of

habitat for wildlife. Large-bodied animals, known as 'megafauna'[1] are particularly at risk of extinction (Cardillo et al. 2005).[2]

In addition to habitat loss, increased demand for ivory has caused rampant elephant poaching, particularly in East Africa. In the decade since 2005, the population of the African savannah elephant (*Loxodonta africana*) declined at a rate of 8% per year (Chase et al. 2016) and is now considered to be 'Vulnerable' by the IUCN Red List (Blanc 2008). In Asia, the population of elephants (*Elephas maximus*) is even lower and more restricted than in Africa, and IUCN has evaluated the Asian elephant as 'Endangered', meaning it has an even higher risk of extinction (Choudhury et al. 2008).

1.1.2 Human-elephant conflict

Asian elephants had previously shared a generally convivial co-existence with humans since the earliest days of our evolution and they have played important ecological roles in the forest landscape (Owen-Smith 1987, Campos-Arceiz and Blake 2011). However, in addition to the threat of poaching for ivory, the Green Revolution has meant that Asian elephants have had to live in areas with increasing densities of people and their crops. This means that elephants are often tempted to eat human crops which creates a cycle of violence that culminates in hundreds of people and elephants being killed each year (Sukumar 1989).

This troubled aspect of our relationship with these large mammals has been characterised as "human-elephant conflict" (or "HEC"), and earlier as "man-elephant conflict" (Anon. 1983), which matches the broader concept of "human-wildlife conflict" (or "HWC"). Woodroffe et al. (2005: 1) define this as "serious conflicts involving people and threatened wildlife: crop raiding, livestock depredation, and killing of people," and include the reprisal killing of wildlife under the same rubric.

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[1] I follow Ripple et al. (2016) in defining "megafauna" as large carnivores (weighing more than 15 kg) and large herbivores (weighing more than 100 kg). I follow Owen-Smith (1987) in using the term "megaherbivore" to refers to very large herbivores (weighing more than 1000 kg), noting that Asian elephants average around 2720 kg.

[2] Indeed, anthropogenic extinction of megafauna probably began during the Pleistocene (see chapter 2 of this dissertation).

However, as suggested by Peterson et al. (2010), the phrase "human-wildlife conflict" is problematic and the interaction is better described in a way that does not suggest that wildlife are conscious human antagonists. Even in the case of elephants – who may be argued to posses a degree of personhood (Bird-David 1999) – it is perhaps misleading to anthropomorphise their acts of depredation. Madden and McQuinn (2014) highlight how conservation conflict can be most productively characterised as differences between competing *human* interests, rather than competition between people and wildlife.

Alternative ways to frame HWC include "human-wildlife competition" (Matthiopoulos et al. 2008); or neutrally as human-wildlife interactions (Hinchliffe 2007, Peterson et al. 2010) and "human-wildlife co-existence" (Madden 2004). Putting a positive slant on the relationship yields "interspecies conviviality" (Illich 1973), and even "human-wildlife harmony" (Jarungrattanapong and Sajjanand 2011). Indeed, authors such as Lorimer (2010) highlight that wildlife such as elephants can play a role as beloved "companion species" and even be considered to be "animistic persons" (Bird-David and Naveh 2008, Naveh and Bird-David 2014). Barkai (in press) notes that the traditional attitudes of treating elephants with respect are not in contradition with subsistence hunting and consumption of elephants.

In this dissertation I use the terms "human-wildlife conflict" and "human-elephant conflict" to refer to refer to all categories of wildlife depredation and the related conflict between conservation and economic interests (these are outlined in Box 1-1, below). I use the term "depredation" to cover both wildlife raiding behaviour and the impact of wildlife raids: the destruction of crops, damage to property, as well as the injury and death of people due to wildlife activity. The term "elephant depredation" thus refers to both elephant raiding behaviour and the impact of raids by elephants. While using terms such as "crop-raiding", I am mindful that, in the context of HWC, such terms can be anthropomorphisms and thus be loaded with connotations that suggest criminal or military activity. Ideally, the term "raid" in this context should be interpreted simply as the temporary movement of wildlife into areas occupied by humans, without making any value judgements regarding their

behavior.

Box 1-1: Categories of Human-Wildlife Conflict (HWC)

I. Wildlife depredation
- **A.** Wildlife raids
- **B.** Impact of raids
  - **1.** Damage to property
  - **2.** Injury to people
    - **a.** Physical injury
    - **b.** Psychological injury
    - **c.** Fatal injury

II. Reprisal attacks against wildlife

III. Complaints about depredation, demands for compensation, etc.

IV. Conflict over wildlife policies, laws, and land-use plans

Regardless of the framing adopted, the concept of human-elephant conflict is embedded in the elephant conservation literature of the last three decades. Lee et al. (2016) reviewed 76 journal articles from 2004 to 2014 and found that human-elephant conflict was the most significant threat to Asian elephants, cited by 41.8% of articles, along with habitat loss and fragmentation (35.4%) and poaching (11.6%). Indeed, Choudhury et al. (2008) suggest that mitigating human–elephant conflict is "one of the largest conservation challenges in Asia today".

Governments and civil society are taking several measures to mitigate human-elephant conflict. Traditional measures focused on culling and translocating elephants are giving way to measures that allow people and elephants to continue to live in the same landscape (Fernando et al. 2008). These measures involve working with local communities, including (i) taking pre-emptive actions, such as zoning land use into strict conservation areas, managed elephant ranges, and strict human areas; (ii) crop-protection measures, such as electric fences; (iii) compensation measures that reimburse people for their losses; as well as (iv) education and public awareness programmes. Crucially, these measures aim to improve communities understanding and beliefs about wildlife, create more tolerant attitudes towards wildlife, and ultimately to inculcate convivial behaviour towards wildlife (Osborn and Parker 2003, Baruch-Mordo et al. 2009, Madden and McQuin 2014).

1.1.3 Rationale of the study

One country that is moving towards a convivial approach to elephant conservation is the southeast Asian nation of Malaysia, which is an important elephant-range state. Malaysia, a federal constitutional monarchy formed in 1965, has an area of 329,847 km² and is divided into three main regions, Sabah, Sarawak, and Peninsular Malaysia. The population of the upper middle-income nation is estimated at 30.5 million, with 80% residing in Peninsular Malaysia (CIA 2017) (the history and economy of Peninsular Malaysia are introduced in more detail in chapter 2). In Peninsular Malaysia, the Malaysian Elephant Alliance 'MYGAJAH' (a collaboration between the DWNP, other government agencies, scientists and civil society organisations) is working to implement a National Elephant Conservation Action Plan ('NECAP'), which covers a ten-year timeframe (2013-2022). The objective of NECAP is to allow elephants and humans to co-exist in the same landscapes, giving priority to elephant conservation in surrounding three priority sites in Peninsular Malaysia (this will be discussed in more detail in chapter 5). Elephants will be permitted to remain in these "Managed Elephant Ranges" and settlements and crops will be protected by using measures such as electric fences. NECAP recognises that co-existence will require resolving issues related to people living within these sites, including determining the extent of any land claims (DWNP 2013: s. 3.5.1, p. 57), the location of these settlements, and the degree to which the human activities and land uses are compatible with elephant conservation.

One of the NECAP actions relates to gauging public attitudes to human-elephant conflict. It calls for perception surveys to be carried out to assess attitudes to wildlife in and around three priority sites (DWNP 2013: Action 4.1.10). Several studies that contribute to NECAP have already been carried out under the Management and Ecology of Malaysian Elephants (MEME) project (Hii et al. 2016). MEME has investigated numerous aspects of elephant ecology (Kromann-Clausen 2015, Yamamoto-Ebina et al. 2016, Tan 2016, Hii et al. 2016, Wong 2016, Hii 2017, Wadey et al. 2018, Terborgh et al. 2018) and also looked at the social dimensions of elephants in Malaysia (Salman et al. 2011, Ponnusamy et al. 2016, Guérin et al. 2017).

NECAP includes several initiatives that involve local communities in elephant conservation. In particular, NECAP notes the importance of engaging indigenous communities living in elephant landscapes and promotes the use of electric fences to protect their villages and crops. The success of these approaches requires a firm understanding of both the communities and their relationship with elephants. This needs to involve both anthropological and zoological perspectives on the history of the relationship, the drivers of violence, and people's values, ontological conceptions (which I refer to below as "world-view", "belief system", or "beliefs"), and attitudes towards wildlife (Knight 2000, Baruch-Mordo et al. 2009). The human dimensions in particular can be highly variable, and are usually affected by socio-cultural factors such as local culture, religion, ethnicity, place of residence, sources of income, and actual experience of wildlife depredation.

Understanding the present dynamics of human-wildlife interactions also requires examining how the relationship has developed since prehistoric time. Similarly, effective resolution of current conservation conflicts requires a depth of knowledge of the historical interactions between communities and the authorities (Madden and McQuinn 2014). Little of this information is currently available for Peninsular Malaysia and an enhanced understanding is required for the effective implementation of NECAP.

1.2 Aim & Objectives

This dissertation presents research that aims to contribute to the conservation of Asian elephants by examining the case of human-elephant relations in Peninsular Malaysia from both ecological and cultural perspectives. The investigation has three research objectives (RO):

RO1: to review the prehistoric, historical and ecological context of human-elephant interactions in Peninsular Malaysia;

RO2: to compare present-day attitudes towards elephants between different indigenous communities in Peninsular Malaysia and to identify cultural factors that influence these attitudes; and

RO3: to assess the effectiveness of electric fences as an elephant management tool in Peninsular Malaysia.

1.3 Study site

The study focuses on Peninsular Malaysia (which is the area covered by NECAP). For ecological and historical reasons, the scope of the project examines the Malay Peninsula as a whole: the geographical region that presently includes Peninsular Malaysia and southern Thailand. I examine several sites within the Peninsula and focus my field research on Belum-Temengor, one of NECAP's three priority sites. Belum-Temengor is the only such site that includes groups of foragers, swidden farmers, and plantation agriculture.

1.4 Dissertation Structure

I have structured this dissertation in nine chapters, including this introductory chapter. Chapters 2–8 are the outcomes of my research, presenting a detailed examination of human-elephant relations in Peninsular Malaysia, from both ecological and social perspectives. The final chapter (chapter 9) is a general discussion of the implications of the research. I include a list of all references after the final chapter. I have ensured that there is minimal overlap between the chapters by making use of extensive cross-referencing. At the same time, I am also in the process of publishing chapters 3-9 as stand-alone papers. Here, I highlight the contents of each chapter.

In chapter 2, I present an overview of the physical and cultural geography of the Malay Peninsula. I use this as the basis for giving an overview of the history of human-elephant relations in the Peninsula, drawing from perspectives of palaeontology and archaeology (RO1). I also provide an ethnographic summary of the main indigenous groups, including a new map of the distribution of the ethno-linguistic sub-groups. I also present a schematic diagram that illustrates the relative spatial patterns of the respective groups, particularly the shift from foraging to farming lifestyles (which represented a turning point in our relationship with elephants).

In chapter 3, I examine the ecological relationship between humans and elephants in the context of the forest environment of the Malay Peninsula (RO1). I focus on the shift from foraging to farming, and highlight how the actions of humans can both increase and decrease the wild food available for elephants. I review the literature and suggest several ways that elephants have had a fundamental influence on human culture in the region. I also note the important connection between values, beliefs, and attitudes held by the various communities.

In chapter 4, I examine the traditional cultural dimension of human-elephant relations among indigenous people in the Peninsula (RO1). I review their traditional beliefs about elephants, as well as their traditional attitudes and behaviour towards elephants. I note the extent to which their relationships with elephants varied depending on the group's primary mode of subsistence: whether foraging, farming, or using fossil fuels – following the approach used by the British archaeologist, Ian Morris (2015).

In chapter 5, I examine the history of human-elephant relations in Belum-Temengor, a landscape in the heart of the Peninsula that is a priority site for elephant conservation (RO1). The history of this landscape illustrates the close ties between indigenous people and elephants. The history of the landscape provides the context for the current challenges faced by the state in balancing human development with elephant conservation.

In chapter 6, I present the findings of a study examining the current distribution of people and elephants in Belum-Temengor (RO2). I show how people from traditionally forager and swidden communities are still living in and around the forest, and still have regular contact with elephants. I note the complexities related to the mapping of the extent of the traditional territories of these people. This information on the location of villages in contact with elephants in Belum-Temengor (and the location of conflict hotspots) allowed me to determine an efficient survey strategy that I used for fieldwork presented in chapters 7 and 8.

In chapter 7, I present the results of a survey of human-elephant relations among indigenous communities in Peninsular Malaysia, with a focus on Belum-Temengor (RO2). This chapter supports the idea that a society's mode of energy

capture influences its values, beliefs, attitudes, and behaviour, with there being an indication that younger respondents in rural communities having less tolerance of elephant depredation than their elders.

In chapter 8, I look at attempts at allowing both people and elephants to continue to live together in Belum-Temengor by erecting electric fences to protect crops and villages (RO2, RO3). Here, I highlight several issues related to the design and maintenance of such fences, and make recommendations on how to overcome them.

In chapter 9, I provide a general discussion on the implications of the foregoing chapters, providing a synthesis of the findings, suggesting directions for future research, and highlighting recommendations for the conservation of the Asian elephant in Malaysia and elsewhere in its range. I present a generic systems-thinking model of human-wildlife interactions to summarise my findings. I note that without interventions there was a tendency for elephants to be eliminated as human population density passed a critical threshold. I suggest a strategic phases approach to interventions that can be made to avert such a scenario and instead promote the conservation of elephants.

1.5 Significance of the study

This study on human-elephant relations in Peninsular Malaysia is significant in both practical and academic terms. The study makes several recommendations for the conservation of Asian elephants, particularly highlighting the importance of considering elephant depredation when encoraging rural communities to settle down and adopt plantation agriculture (chapters 5-9). This study incorporates a novel approach that integrates ecological and cultural perspectives to ethnoelephantology in the humid tropics (chapters 3-4). The study also develops novel approaches to monitoring the effectiveness of electric fences by combining community interviews with tracking elephant movement in the vicinity of these communities using satellite collars (chapter 8). The significance of the study is further discussed in the individual chapters and in the general discussion (chapter 9).

1.6 Publication Plan

I have published chapter 6 of this dissertation (Lim et al. 2017a), and I am in the process of publishing several of the other chapters as stand-alone papers in a selection of journals from various disciplines (Table 1-1).

Table 1-1: Plan for publication of chapters as stand-alone papers

Chapter	Notes
2 (geography)	Plan to submit to a conservation biology journal such as *Biotropica*
3 (ecology)	Plan to submit to interdisciplinary journal such as *Human Ecology*
4 (traditions)	Plan to submit to *Conservation & Society* or *Mammal Review*
5 (history of landscape)	Accepted for publication in *Malayan Nature Journal*
6 (mapping villages)	Already published in *Malayan Nature Journal* (Lim et al. 2017a)
7 (attitude survey)	Plan to submit to interdisciplinary journal such as *Human Ecology*
8 (electric fence survey)	Plan to submit to *Gajah* (the Asian elephant specialist journal)
9 (general discussion)	Plan to submit to a conservation biology journal such as *Biotropica*

1.7 The Researcher

I accept that context can have unintended influence on the results of a research project (Popper 1959). Therefore, in this and the following sections, I provide an overview of the context of the research in terms of my personal background, the composition of my research team, and the additional activities I engaged in during the course of the project (the so-called 'positionality' of the research). I then consider the extent to which the various biases may have influenced the project, noting the steps taken to overcome these biases (a process known as 'reflexivity').

I am a Malaysian citizen, born in 1975, in a suburb of the federal capital of Kuala Lumpur. I was the first of five boys in an upper-middle class family of mixed ethnicity. My father is an English-educated Malaysian Chinese barrister, and my mother is a homemaker and teacher, of British nationality. I attended English-medium primary and secondary schools in Kuala Lumpur, along with classmates belonging to a wide variety of other ethnicities and nationalities. My family regularly attended a Protestant church, and I continue to consider myself to be a Christian, albeit not a particularly devout one. I am married with a young daughter, and continue to live in the suburbs of KL. Of relevance to the present research is the fact

that neither my family nor I have ever been under any threat of elephant depredation, although, living next to the forest, we have occasionally experienced minor forms of human-wildlife conflict, such as raids from long-tailed macaques (*Macaca fascicularis*).

Growing up, I was exposed to wildlife and nature in a recreational setting, enjoying trips to the zoo, and visiting the forest on nature-appreciation excursions as a member of the Malaysian Nature Society (MNS). I have a particular interest in environmental conservation and obtained a degree in forestry from the University of Wales. Upon return to Malaysia, I served as a manager in the semi-governmental Malaysian Timber Certification Council, developing a scheme to assess forest management. I later worked for WWF, the conservation organisation, and was also an active member of MNS, serving a term as honorary secretary of the society. I have also been interested in the rights of indigenous communities and have occasionally assisted some of these communities in lobbying the government to respect their rights.

I am not a member of any political party and have worked with, and also campaigned against, all sides of Malaysia's political spectrum. My personal views are broadly conservative and mildly libertarian, with an emphasis on decentralisation. In 2004, I started my own natural-resource consultancy company and worked on numerous projects related to environmental stewardship, with clients from the private sector, civil society, and the government.

In March 2015 I was awarded a scholarship by the Sime Darby Foundation (YSD) to carry out research on human-elephant conflict in Peninsular Malaysia. The scholarship allowed me to take a sabbatical from my consultancy and carry out research as part of the MEME project under the supervision of Dr Ahimsa Campos-Arceiz. On 29 April 2015, I registered as a student with the University of Nottingham Malaysia Campus and was confirmed as a PhD candidate on 27 September 2016. The scholarship covered tuition fees and all expenses; and did not include any obligations towards the donor.

1.8 Research Team

Since 2011, the MEME project has been contributing to science-based conservation of elephants in Peninsular Malaysia by conducting research on the status of the elephant population and at the same time building local capacity in this regard; much of this work has focused on the Belum-Temengor landscape (Ami 2012, Campos-Arceiz 2013, Hii 2016, Wadey 2018). The principal investigator of MEME, and the principal supervisor of my research is Dr Ahimsa Campos-Arceiz, professor in tropical conservation ecology at the School of Environmental and Geographical Sciences, University of Nottingham Malaysia. Dr Campos-Arceiz is also co-director of Mindset, a research centre whose purpose is to conduct interdisciplinary research on tropical environmental issues. Other members of MEME include staff and students of the university involved in a wide range of fields, including ecology, physiology, sociology, psychology, and policy development. MEME also has a team of full-time field assistants who are all members of the indigenous Temiar ethnic group.

For the publication of my chapters, I have several co-authors. In all instances I took the lead in conceptualising the publication, analysing the data, creating most figures (photographs, maps, and diagrams), and writing the manuscripts. For each publication, I am including my supervisor, Dr Campos-Arceiz as co-author, and for the majority of the chapters he is the only co-author. In the case of chapter 6, I have several additional co-authors that assisted with data collection and fieldwork, the names of these inare listed in the reference to this publication (Lim et al. 2017a). For chapter 7, an additional co-author, Vivienne P. W. Loke, assisted in the conceptualisation, data-collection, analysis, and writing of the chapter.

For chapter 8, additional co-authors include Vanitha Ponnusamy, Ange Tan, and Nurul Azuwa Osman. This chapter integrates data that my co-authors collected over a period of several years, including surveying electric fences, interviewing local communities, and tracking of elephants using satellite collars. I took the lead in analysing the data, producing the maps, and writing the manuscript. I also undertook supplementary data collection (including some fence surveys and interviews). I did not participate in the actual collaring of the elephants.

1.9 Reflexivity

Possible sources of bias in this research include my urban Malaysian upbringing. I acknowledge that this background carries with it elements of institutionalised racism, culturalism, a risk of not challenging existing conventions, and of slanting interpretations to favour the western-oriented urban elite, and industrial activity (so-called "development"). I note my background as a former employee of a government-linked company, and the fact that I own a consultancy company that occasionally engages in work for the government.

The research project was also required to obtain endorsement from several government agencies (see following section). The research was conducted through a university that is owned by the Boustead Group, a company involved with palm-oil plantations; the main source of funding for the research comes from Yayasan Sime Darby, the foundation of Malaysia's largest palm-oil company.

My views on culture are shaped by my natural-science background. I tend towards a functional evolutionist approach, embodying ecological determinism, seeing culture as an "extrasomatic means of adaptation" (White 1959). I approach the ethnozooarchaeology of the research within the framework of processual archaeology (Binford 1978). I consider the ontologies of indigenous people to be those that elicit behaviour that is appropriate to their material situation, i.e. behaviour that leads to the survival of the populations that hold those beliefs (Rappaport 2000, Taleb 2018). Nevertheless, I acknowledge that my background (highlighted above) may contain biases and preconceptions that influence my work in ways that I am probably not aware of.

The research team took several steps to reduce bias in the results of our research. I ensured, from the start, that my research was subject to scrutiny, review and participation of colleagues who were of different ethnic, religious and political backgrounds, including women. I included co-authors from a wide variety of backgrounds, including indigenous people. I submitted drafts of several chapters to a range of experts for review, making an effort to incorporate their suggestions during the revision of the drafts. The positionality of the research is discussed further in some of the individual chapters of this dissertation.

2 A Historical and Geographical Background to Human-Elephant Relations in Peninsular Malaysia

Harimau mati meninggal-kan bĕlang,
Gajah mati meninggal-kan tulang.

"When a tiger dies, he leaves behind his stripes,
When an elephant dies, he leaves his bones."

—Malay proverb (Brown 1959)

This chapter examines the context of present-day human-elephant relations in Peninsular Malaysia by reviewing the nature of the relationship from a historical and geographical perspective. I begin by reviewing the prehistory of elephants and people around the world, in Asia, and in the Malay Peninsula – highlighting the key species of proboscids and hominids present. I then review the history of human occupation of the Peninsula, highlighting the key cultures and civilisations. I note how the present-day communities can be broadly divided based on their traditional modes of energy capture: foraging, swidden farming, settled agriculture, and fossil fuels. I present a series of maps showing the distribution of these groups.

KEY WORDS: Asian elephants, Orang Asli, Sundaland, Pleistocene, megaherbivores.

2.1 Introduction

Elephants (Order: Proboscidea) have been living on earth for millions of years. In the 60 million years prior to the arrival of modern humans, there were at least 175 species of proboscids in 42 genera and 10 families found on four continents (Shoshani and Tassy 2005, Palkopoulou et al. 2018). These included the woolly mammoths (*Mammuthus primigenius*), mastodons (*Mammut* spp.), stegodons (*Stegodon* spp.), gomphotheres (Gomphotheriidae spp.), and *Paleoloxodon namadicus* – possibly the largest land mammal to have ever lived.

Proboscids had no natural predators and therefore they were able to dominate the landscapes which they inhabited. However, over the last few millennia humans have gradually replaced elephants in this dominant ecological position. In order to

appreciate the context of the present relationship between humans and elephants, it is necessary to examine the nature of this displacement. In some parts of the world, it proved impossible for the two taxa to co-exist: with elephants having to be eliminated before human settlement could occur. However, in other cases, both humans and elephants have managed to share the same landscapes, sometimes for thousands of years. An understanding of the factors that allowed such convivial coexistence in the past may be important for managing the relationship in the present and in the future.

One place where humans and elephants have co-existed for millennia is the Malay Peninsula. Here, settlement by anatomically modern humans began around 55 thousand years ago, and subsequent cultural influences have resulted in a patchwork of indigenous groups occupying different parts of the Peninsula. In several parts of the lowlands of the north of the Peninsula, some groups of people continue to practice foraging. However, in the central highlands, swidden agriculture has been the main land use for the last 5000 years or so. In contrast, in the coastal lowlands, the last few hundred years have seen the expansion of permanent agriculture, including tree plantations.

These cultures have changed the ecology of much of the Peninsula, continuing large-scale ecological changes that had already begun by late-Pleistocene rises in sea-level. An examination of the relations that each of the peninsular cultural groups had with elephants (the subject of chapter 4 of this dissertation) first merits a brief review of their history and current status, as well as a review of the archaeological record of their interactions with elephants.

With the aim of informing measures taken to conserve of the Asian elephant, and to provide a background to the main chapters of this dissertation, here I present brief reviews of the following topics:- (i) a history of human-elephants relations around the world, (ii) the history of human occupation of the Peninsula; and (iii) indigenous communities of the Peninsula today; (iv) prehistory of elephants in the Peninsula.

2.2 Methods

For each of the four topics, I carried out a literature review and created a series of figures to summarise and illustrate the topics. In particular, I reviewed a broad range of literature from disciplines including palaeontology, archaeology, history, ethnography, and conservation biology.

To aid in the visualisation of the chronology, I followed an approach used by Reich (2018), and created a series of timelines displaying the main cultures and events in the Peninsula. The timeline covers three nested periods before the present: (i) the time of the arrival of the earliest humans in the region (1,200,000 years), (ii) confirmed presence of humans in the Peninsula (80,000 years), and (iii) the Anthropocene in the Peninsula (5000 years).

To illustrate land-cover changes in the Peninsula since the last glacial maximum, I charted data on pollen and phytolith concentrations from a lake in Trang, southern Thailand reported by Kealhofer (2003).

To give a sense of the geographical context of the study, I prepared a new map of the historical and present distribution of elephants using the ArcView 3.1 geographical information system (GIS) software. I combined paleo-vegetation data from Ray and Adams (2001) with the present range of Asian elephants from Choudhury et al. (2008). I also indicated the location of the present shoreline using free vector data from naturalearthdata.com.

Finally, to illustrate the original distribution of Orang Asli groups in the Peninsula, I used a language-group boundary approach (Vaughan-Stevens 1892: 95) to prepare a new map of the distribution of the various groups. I based this map on a number of existing maps (referenced in the caption to the map), supplemented by recent additional information on groups such as the Jedeks (Yager and Burenhult 2017), and my own field research on the Bateks of the Tanum (Lim 2017).

2.3 Results

2.3.1 Human-elephant relations around the world

2.3.1.1 Introduction

The archaeological record suggests that it was by hunting fat megafauna, primarily elephants, that humans spread around the world (Ben-Dor et al. 2011, Barkai and Gopher 2013). In areas where elephants had gone extinct, they were forced to shift to other forms of subsistence. The absence of elephants seems to have been both an impetus and an enabler of the innovations that led to settled agriculture, and then to civilisation (Barnes 1996, Harari 2011).

Early humans co-evolved with elephants in Africa. However, about 1.8 million years ago humans (starting with *Homo erectus*) developed hunting innovations including driving elephants into pits, off cliffs, and occasionally killing them with spears (Thieme 2005, Agam and Barkai 2018). These were threats that elephants had never faced before, and many of those proboscidean species that were living in the same landscapes (which included Africa, southern Europe, and much of Asia) were driven to extinction (Martin 1984).

In Africa, during the early Pleistocene (i.e. by around 780,000 years ago), 10 out of 12 proboscideans went extinct.Elephants were completely extirpated from parts of east Africa, south Africa, and the Levant (Coppens et al. 1978, Lyons et al. 2004: 353, Ben-Dor et al. 2011). The role of humans in these extinctions is contested, with evidence pointing to climate change as an alternative hypothesis (Faith et al. 2018).

2.3.1.2 Anatomically Modern Humans

If the early humans were good hunters, the anatomically modern humans (*Homo sapiens*) that displaced them around 300,000 years ago, were even more sophisticated – using bows and arrows, poison darts, and complex spear traps (Agam and Barkai 2018). This technology, combined with the use of well-coordinated teamwork, including domesticated hunting dogs (since ca. 40,000 years ago), was devastating for elephants (Martin 1984). Even though the two elephant species

remaining in Africa (*Loxodonta africana* and *L. cyclotis*) had evolved to be wary of the early humans, the new apex predator caused further contractions of their ranges.

H. sapiens was also more adaptable than earlier humans, who do not appear to have been able to live in rainforest environments (Roberts et al. 2016). This meant that *H. sapiens* managed to spread to places that *H. erectus* had not reached, including the Palearctic, the Americas.[3] Having had no previous contact with humans, the proboscidean species in these places suffered from extreme ecological naïveté. This meant that the early advent of *H. sapiens*, perhaps in combination with climate change, led to the fairly rapid elimination of elephants from Europe and the Americas, including mammoths and mastodons (Martin 1984, Sukumar 2003, Lyons et al. 2004, Surovell et al. 2005, Corlett 2013, Sandom et al. 2014, Malhi et al. 2016).

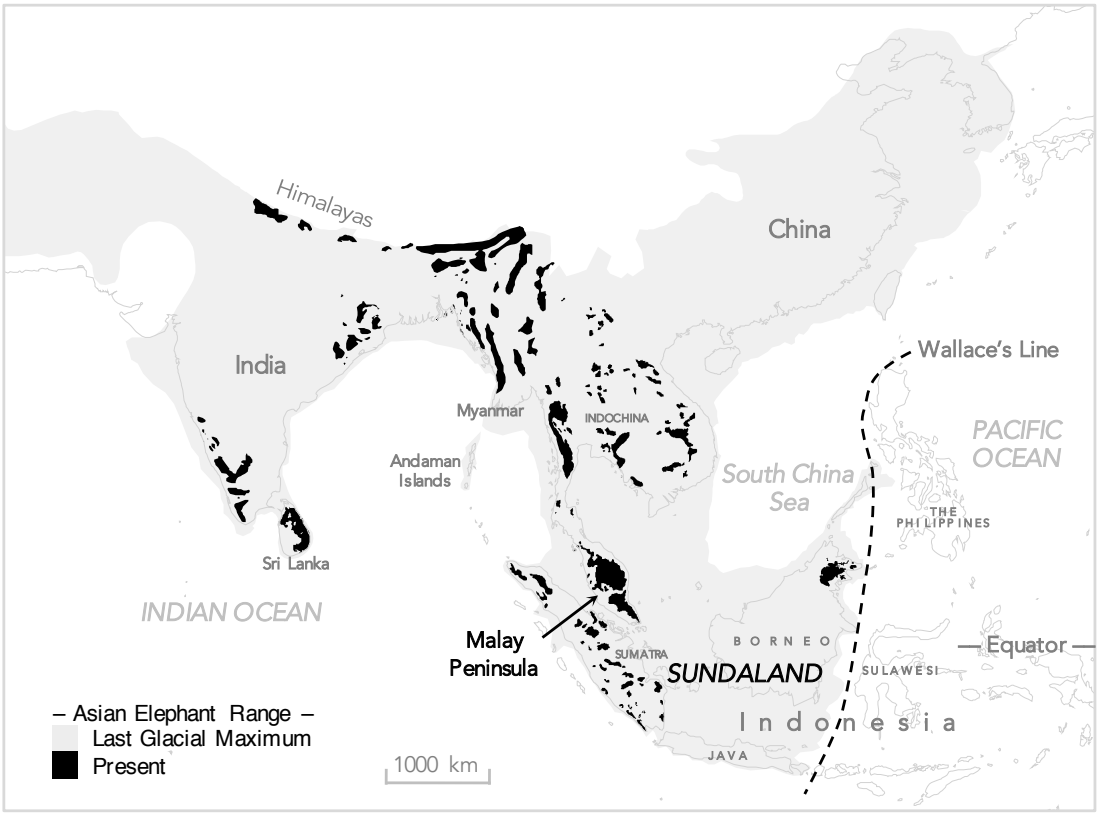


Figure 2-1: Approximate range of Asian elephants at the last glacial maximum (25,000-15,000 years ago), and at present
Note: The species ranged west to Turkey (not shown on this map).
Sources: Ray and Adams (2001); Choudhury et al. (2008). Made with Natural Earth.

[3] *H. erectus* presence outside Africa incidentally coincides with the original distribution of the Asian elephant, including China and Sundaland.

2.3.1.3 The Asian Elephant

In Asia, several species of elephant and stegodon had lived alongside *Homo erectus* and other hominids for more than a million years and were probably more wary of the threat that they posed. One elephant genus, *Elephas,* originated in Africa in the Miocene (around 7 million years ago) and spread to Asia during the Pliocene (around 3.7 million years ago) (Haynes 1991, Cerling et al. 1999, Todd 2010). About the same time as the emergence of *Homo sapiens* in Africa around 250,000 years ago, the Asian elephant, *E. maximus* emerged in what is modern-day Myanmar (Figure 2-1). By around 125,000 years ago, the species had dispersed throughout Asia reaching as far as Java in the south, and what is now Beijing in northern China (Wen 1995, Elvin 2001, Vidaya 2009, van der Made 2010).[4] It is now the region's sole surviving proboscid.

There are probably several reasons for the survival of *E. maximus.* Ecologically, the Asian elephant is more flexible than other elephants: while it prefers to eat grasses, it is also able to survive in the jungle by browsing on other vegetation and, in particular, by eating palms (Olivier 1978a). During the glacials and inter-glacials of the Pleistocene, there were fluctuations in the relative proportion of grasslands and forests (Kealhofer 2003). With the arrival of modern humans in Asia, it is likely that in the presence of humans the Asian elephant survived by retreating into the forest – and only at night being brave enough to enter open clearings to graze (Olivier 1978b). The proboscideans that could only survive in open areas, such as the stegodons, went extinct in the late Pleistocene and did not survive to the Holocene (Van den Bergh 2001).

Homo sapiens was probably the first human to be able to survive in tropical rainforests (Roberts et al. 2016). There is no evidence that the humans that entered the rainforest killed elephants in large numbers (Lim 2013). It is dangerous to antagonise elephants humans probably tried to avoid elephants. Those that did hunt elephants appear to have done so at levels that did not deplete the populations (Agam

[4] It is possible that *E. maximus* only reached Borneo during the late Pleistocene, via a circuitous route; the reason being that an inter-glacial savannah corridor separated the forests of Borneo from those of the Peninsula (Heaney 1991, Bacon et al. 2018). The distribution of elephants in Borneo is discussed in chapter 3.

and Barkai 2018). Elephant hunting in the rainforest was probably more sustainable than in open areas due to the low human population density and the fact that elephants could more easily evade hunters. The relationship between elephants and humans in the rainforest is examined in more detail in the following chapters of this dissertation.

2.3.1.4 Elephants in History

In history, elephants have had varied relationships with people in different parts of the world. In north Africa, elephants appear to be incompatible with human civilisation. The first civilisation arose in Egypt after the elephant population had already been hunted-out, and by ca. 3750 BC, the only elephant remains found in the region are believed to have been those of captive elephants (Van Neer et al. 2017).

In sub-Saharan Africa, settled agriculture only developed much later, during the Bantu expansion (ca. 1000 BC to ca. AD 500), and risk of crop damage by elephants can still cause farmers to abandon an area (Githiru et al. 2017). On the other hand, most foraging communities manage to cope with competition from elephants (Hitchcock and Ebert 1984: 333). Some pastoral communities such as the Masai of Kenya even appreciate the fact that elephants keep grasslands open for cattle, often having taboos against hunting elephants (Gadd 2005). Similar taboos are shared by many other groups around the world (Lev and Barkai 2016).

Human relationships with elephants in some parts of Asia are similarly varied: in areas with settled agriculture, elephants are usually eliminated, but foraging communities and shifting cultivators managed to co-exist. In China, people and elephants lived alongside one-another until the expansion of settled agriculture, about 4000 years ago. Paddy rice farming meant cutting down forests, and the elephants' forest refugia came under threat. At the same time, elephants were attracted by this new concentration of food, and became a pest to the farmers who gradually eliminated the elephants (Wen et al. 1995; Sukumar 2011).

The Chinese farmers found many uses for their ivory tusks, and considering their trunks to be a "gourmet's delicacy" that resembled fatty and crisp roasted piglet (Elvin 2001). Elephants did manage to survive in the hilly south of China, where the

local Tai people practise swidden farming, which does not result in deforestation, and actually increases the wild food available for elephants (Elvin 2001).

In India, as in China, the spread of agriculture meant the eradication of elephants from the arable lowlands. However, the Indians learnt how to tame the elephants and, unlike the Chinese, took measures to ensure their conservation. By around 4600 years ago, the Indians of the Harappan civilisation found that tamed elephants could be useful as beasts of burden and in warfare. Due to the high cost of raising captive-born elephants, the Indians developed a culture of capturing and taming young elephants from the wild (Sukumar 2011). Around 2000 years ago, the rulers decreed in the *Arthasastra* that the hill forests be set aside as a source of elephants, and made it a capital offence to kill an elephant (Gadgil 1985).

Elephants are slow breeders, and, by around 1000 years ago, the supply of elephants from India's hill forests could not keep up with the demand for tame elephants, often for use in warfare. India began to find sources of live elephants from populations overseas, such as those of the Malay Peninsula, a place where Indianised civilisations had already adopted the art of elephant taming (Andaya 2008: 123).

2.3.2 The History of the Malay Peninsula

2.3.2.1 The Malay Peninsula

The Malay Peninsula runs around 1500 km down from Thailand and Myanmar to Singapore (7°–1° North, 99°–104° East) (Figure 2-1). It is presently the southernmost point of the Eurasian supercontinent, but, during the numerous glacial maxima of the last 2.6 million years, sea levels dropped to around 120 m, and the mainland was connected with the islands of Borneo, Sumatra, and Java to form the landmass known as Sundaland (Figure 2-1). The Peninsula is generally hilly, with narrow coastal plains making way for a series of mountain ranges, the highest peak being Mount Tahan at 2,187 m.

The climate and vegetation of the Peninsula have seen dramatic change over the last 10,000 years (Figure 2-2, below). At the time of the last glacial maximum, around 20,000 years ago, the Peninsula was covered mainly by grasslands and savanna. However, the melting of the polar ice led to a rise in sea levels and the

flooding of the South China Sea. This meant that annual monsoonal north-easterly winds now bring around 3000 mm of rainfall each year, causing evergreen rainforest to expand to almost completely cover the Peninsula (Whitmore 1975, Kealhofer 2003).

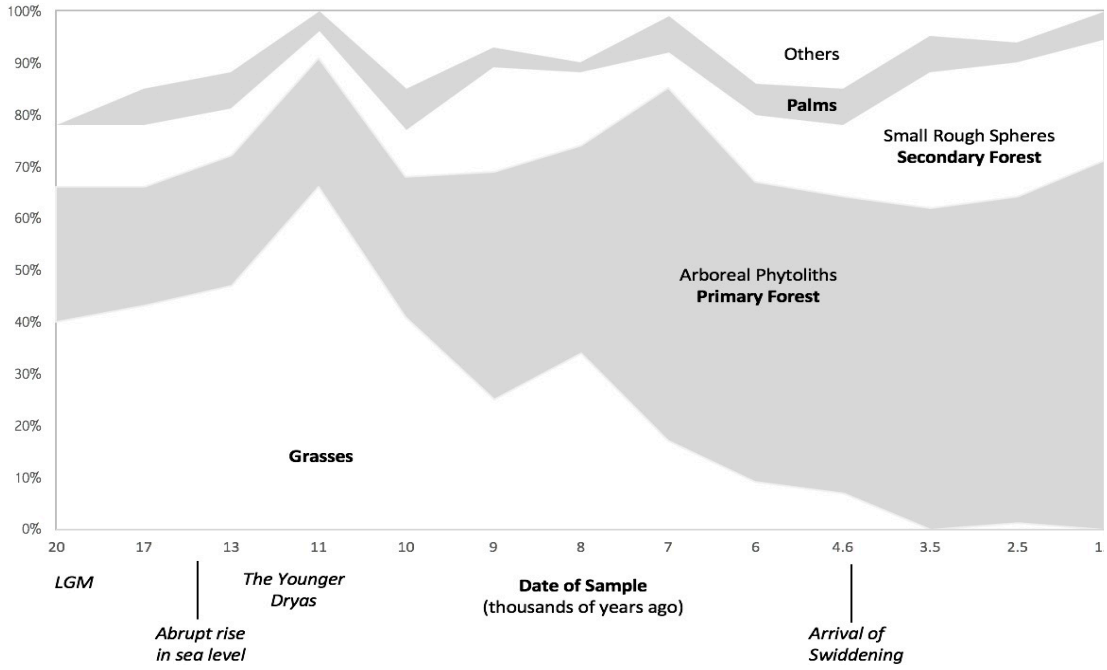


Figure 2-2: Changes in pollen and phytolith concentrations indicate forest replaced grassland during the Holocene of the Malay Peninsula
Notes: figure drawn from data from a 220-cm sediment core from a small lake, Nong Thalee Song Hong, in Trang, southern Thailand (Kealhofer 2003). LGM – last glacial maximum.

2.3.2.2 Early Humans in the Malay Peninsula

Due to its strategic position as the southernmost tip of the Eurasian supercontinent, the Malay Peninsula has long been the meeting point for east and west as well as a land bridge to travel south to Indonesia, New Guinea, and Greater Australia (Sahul) (Figure 2-1). This strategic location has meant that many different species of large mammals that lived in what is presently Indonesia (including early hominids) probably were also present in the Peninsula during the time when it would have been part of the isthmus of Sundaland.

As with many other species, there is only indirect evidence tying early human species to the Peninsula, however fossil remains from Java indicate that *Homo erectus* arrived on the Sunda Shelf at least around 1.2 million years ago (Corvinus

2004, Argue et al. 2017). Similarly, while there is no direct evidence from the Peninsula, it is believed that the early groups of *Homo* arrived in the region around 600,000 years ago (Cooper and Stringer 2013). A timeline showing the occupation of the Peninsula and the region is given in Figure 2-3.

The aborigines of Australia, New Guinea and parts of the Philippines can trace between 3% and 5% of their genome to a group of early humans dubbed Australo-Denisovans (Reich 2018: 189). Genetic evidence suggests that the mixing took place around 50,000 years ago, and the fact that there are no similar genes in the natives of the Andaman Islands, or in a group of indigenous people from the Peninsula (the Jahais (see section 2.3.3)), leads to the suggestion that the mixing took place east of the Peninsula, possibly in Indonesia or New Guinea (Cooper and Stringer 2013).

Table 2-1: Prehistorical and Historical Periods in the Malay Peninsula

Period	Characteristics
Paleolithic (>74,000–28,000 ya)	Foragers with pebble-flake tools (Tampanian, Perak; Lang Rongrien, Krabi)
Hoabinhian (13,000–3000 ya)	Foragers with flaked river cobbles (various sites, e.g. Gua Cha, Kelantan)
Neolithic (6500–2500 ya)	Swiddeners with polished stone adzes, pottery, domestic plants & animals; Austroasiatic languages
Early Metal (2500 years ago)	Settled farmers with copper, iron, bronze tools; seafaring; Austronesian languages
Protohistoric (5th century–)	Wet (paddy) rice farmers; Hinduism, Buddhism; stone buildings, capturing and taming elephants
Islam (12th century–)	Sultanates: Melayu, Minang, Bugis, Javanese; Age of Commerce (1450–);
Colonialism (1511–1957)	Portugal (1511), Holland (1641), Britain (1791), Japan/Siam (1941)
Anthropocene (ca. 1800–)	Fossil-fuel Era: industrial tree plantations (rubber & oil palm), urbanisation, independent Federation of Malaya (1957), Malaysia (1963–present)

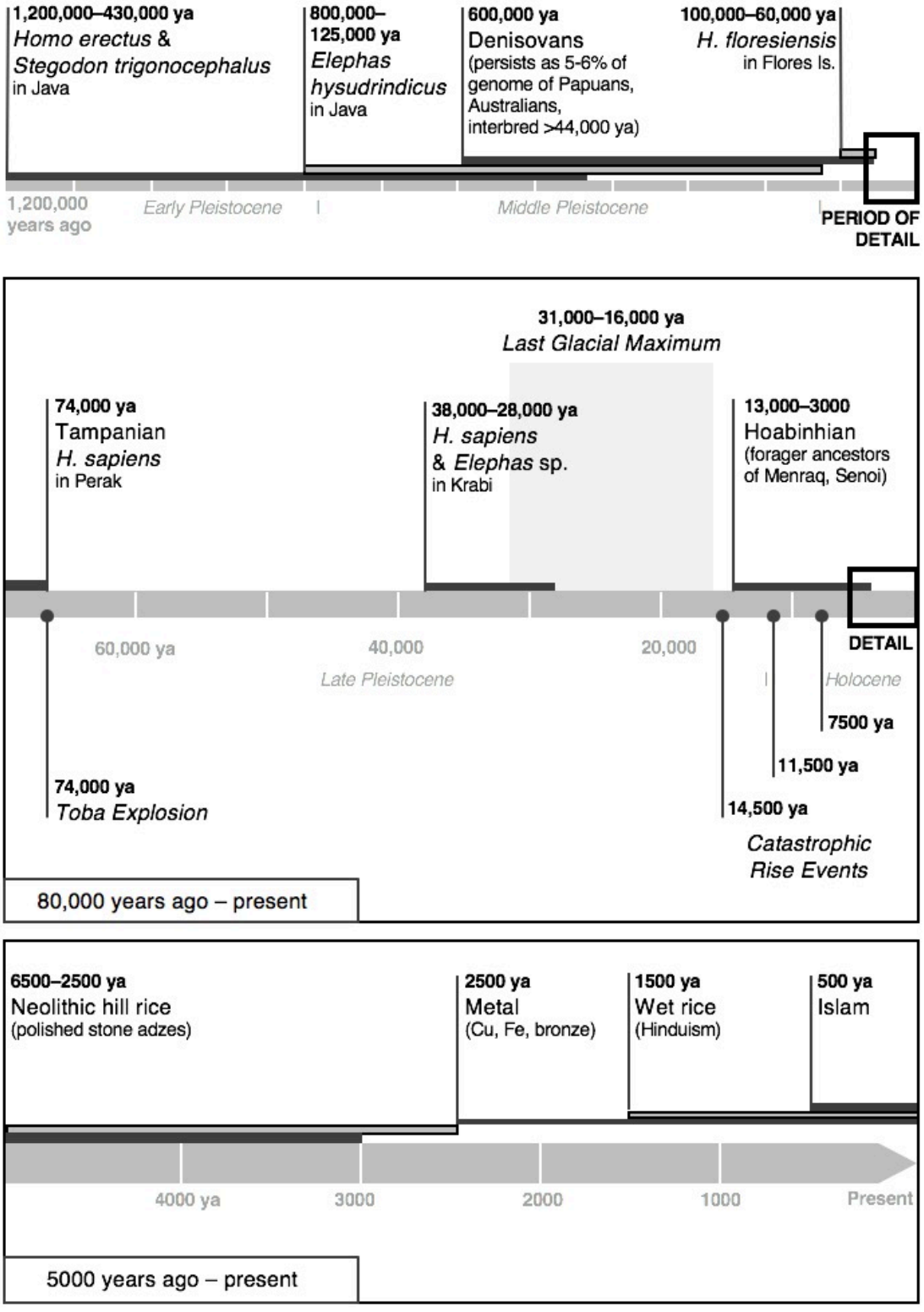


Figure 2-3: Timeline of human and elephant occupation of Sundaland, with a focus on the Malay Peninsula: a. dated human presence in the region (1.2 million years; b. dated human presence in the Peninsula (80,000 years); c. the Anthropocene. *Sources*: van den Bergh et al. (2001); Macaulay et al. (2005); Bellwood (2007: 137, 255); Soares et al. (2008); Storey et al. (2012); Cooper and Stringer (2013); Bulbeck (2016); Reich (2018).



Figure 2-4: The mainland of the Malay Peninsula, showing state boundaries
Notes: solid lines: boundaries of the states of Malaysia and provinces of Thailand; dashed lines: ancient trans-peninsular portage routes (modified from Benjamin (2013)).

There are a series of stone-age industries known from the Malay Peninsula (Table 2-1). The first of these industries to have been definitively dated is represented by a collection of flaked stone tools covered in ash from the explosion of the Toba super-volcano in Sumatra, dated to around 74,000 years ago (73.88 ± 0.32 ka) (Storey et al. 2012). These tools were found in a site known as Kota Tampan, in the Lenggong Valley, in the state of Perak (Figure 2-4) (Zuraina 1990). Another site in Lenggong,

Bukit Bunuh, dates to 39,000 ±2,600 years ago; it consists of a lithic workshop comprising of hand-axes and pebble-flake tools (Mokhtar 2006).

The next well-dated archaeological finds come from around 38,000 to 28,000 years ago, and include several hearths, bones, and pebble-flake tools from the Lang Rongrien rock-shelter, in Krabi, peninsular Thailand (Figure 2-4). After these artefacts, there is a void throughout the period of the last glacial maximum. There is evidence for continued human presence elsewhere in the region, but finds have not been found in the Peninsula until after the first of three catastrophic rises in sea level that occurred around 14,500 years ago (Bellwood 2007: 160).

2.3.2.3 The Hoabinhian

About 13,000 years ago, a significant cobble-tool industry appeared in the Peninsula. This industry is known as the Hoabinhian, after the Vietnamese province of Hòa Bình. Evidence for the industry has been found throughout Southeast Asia, dating from around 17,000 years ago (Bellwood 2007). In the Peninsula, Bulbeck (2016) notes that the occupation of closed sites fluctuated between 10,000 and 4000 years ago, suggesting that this was in response to the rising sea levels and changes in forest cover.

The Hoabinhian stone tool industry ceased around 3000 years ago, but the people behind the industry are believed to be ancestors of the Menraq and Senoi communities (Hill et al. 2006, Bellwood 2007: 158, Gomes 2007) (see below). Indeed, genetic data supports the claim that the Menraq descended *in situ* from the first group of anatomically modern humans that left Africa around 70,000 years ago and arrived in the Peninsula around 55,000 years ago (Oppenheimer 2005, Hill et al. 2006, Aghakhanian et al. 2015, Baer 2016, O'Connell et al. 2018).

2.3.2.4 The Neolithic

Following further catastrophic rises in sea level, 11,500 years ago and 7500 years ago, a significant cultural shift in the Peninsula occured when, around 6500 years ago, a new culture arrived from the north (Bulbeck 2016). This Neolithic culture brought technologies including polished stone adzes, pottery, and an Austroasiatic language. The culture saw an important shift from foraging to the exploitation of

domestic animals and swidden farming hill rice and other crops, while shifting from rock-shelters to open-air hamlets (Bellwood 2007: 255, Bulbeck 2016). Reich (2018: 195) uses genetic data to show that this culture, along with most of the people of present-day Southeast Asia, originated from what he terms the 'Yangtze River Ghost Population', which arose in the Yangtze River Delta, China (it is a 'ghost' population in the sense that there is only indirect evidence for its existence). In the Peninsula, these people mixed with the people of the Hoabinhian culture and produced the group that is known today as the Senoi (Hill et al. 2006).

2.3.2.5 Settled Agriculture

Around 2500 years ago, an Austronesian culture, originating in Taiwan, arrived in the Peninsula with knowledge of settled agriculture (Bellwood 2017: 97). This new 'early metal-age' culture also brought knowledge of copper, iron and bronze smelting, Austronesian languages, and significant knowledge of seafaring (Reid 2018: 199). This cultural group are ancestors of the group presently known as the Aboriginal Malays (see below).

In historical times, starting around 1500 years ago, there have been a series of further settlements by other Austronesian groups, primarily the Malays (see section on Malayic settlers, below). These groups had been influenced by the Indian civilisation and had hierarchical societies, knowledge of wet-rice culture (cultivating paddy fields), stone architecture, and Hindu-Buddhist religions (Bellwood 2007: 137). Their settlements were mostly restricted to the coast and the main river valleys.

In the 15th century, these Hindu-Buddhist cultures were largely supplanted by a series of Muslim sultanates established by a diversity of groups from neighbouring regions including the Melayu and the Minang from Sumatra, and the Bugis from Sulawesi. These historical settlers are ancestors of the modern Malays, also known as Deutero-Malays (Hill et al. 2006, Soares et al. 2016). The sultanates loosely form the basis for the present day states of the Peninsula (Figure 2-4).

From early historical times, there has also been a significant influence from the Buddhist Thais and Bamars from north of the Peninsula. The northern part of the Peninsula remains part of Thailand and Myanmar. At several points during the

colonial period, the northern states of Peninsular Malaysia were also part of Thailand (then known as Siam), and these states continue to have Thai minorities.

2.3.2.6 The colonial era

The colonial era, beginning in the 16th century, witnessed a series of further external cultural influences on the Peninsula. The colonial powers included Portugal, The Netherlands, Great Britain, and Japan. Very few people from these colonial countries actually settled in the Peninsula, but during the colonial period, large numbers of migrants arrived from China, India, and Sumatra and Java (then part of the Dutch East Indies). The colonial era saw the start of extensive clearance of forest for the planting of cash crops.

2.3.2.7 The Fossil-Fuel Era

The British granted independence to its colonial possessions in the Peninsula in 1957 and these states joined together with Singapore, Sabah, and Sarawak, to form Malaysia in 1963. This dissertation focuses on Peninsular Malaysia, which is the political entity that covers around 131,600 km² on the southern half of the Malay Peninsula. It comprises the 11 states and two federal territories that are also known as West Malaysia, and were formerly British Malaya (Figure 2-4).

In the 20th century the population of the Peninsula underwent rapid changes. From being more than 80% rural at the start of the century, by 1990, the majority of the population lived in urban centres. By 2010 the population was 72% urban, with a 2.4% annual increase in the percentage of the population that was urban (Department of Statistics, Malaysia 2010). This urban trend is particularly important for the relationship between humans and wildlife such as elephants, as will be discussed in the following chapters of this dissertation.

In 2010 Peninsular Malaysia had a population of around 25 million (80% of the population of Malaysia as a whole), growing at around 1.5% per year (Department of Statistics, Malaysia 2010). Approximately 46% of the population was under 24 years of age, while just over 5% were aged over 65. The government categorised the population of Malaysia into three main ethnicities, Malays (50%), Chinese (24%), and Indians (7%), with other ethnicities (predominantly the natives

of the Borneo states of Sabah and Sarawak, and migrant workers from Indonesia and the Philippines) comprising around 19%. The predominant religion was Islam, practised by 60% of the population, with Buddhism, Christianity, and Hinduism also having significant numbers of adherents.

Since its formation, Malaysia has undergone rapid economic development. The United Nations (UNDP 2011) considers Malaysia to be a middle-income country, having a Gross Domestic Product (GDP) per capita of USD16,900, less than 5% unemployment, and less than 3% poverty. The country's prosperity rests largely on its rich natural resources, including fossil fuels (petroleum and natural gas), tin, and hardwood timber. In 2016 the GDP was derived mainly from the services sector (56%), and industry (37%), with agriculture contributing 7% (CIA 2017).

Another important part of the Malaysian economy is based on industrial plantations of introduced species, particularly monocultures of the Pará rubber tree (*Hevea brasiliensis*) (Figure 2-5) – native to South America, and of the oil palm (*Elaeis guineensis*) – native to Africa. The rubber trees are tapped for latex with many industrial uses such as vehicle tyres and rubber gloves, while the palm plantations produce fruit that contain oil used for food, biodiesel, and as an ingredient in a wide range of consumer goods. Forest cover in Peninsular Malaysia, from over 90% in 1900, dropped to 60.8% in 1970, mostly due to the expansion of the rubber plantations (Miyamoto et al. 2014). In the latter part of the 20th century, forest cover continued to fall, and reached 44.3% in 2010, mostly due to the expansion of the oil palms (Miyamoto et al. 2014).



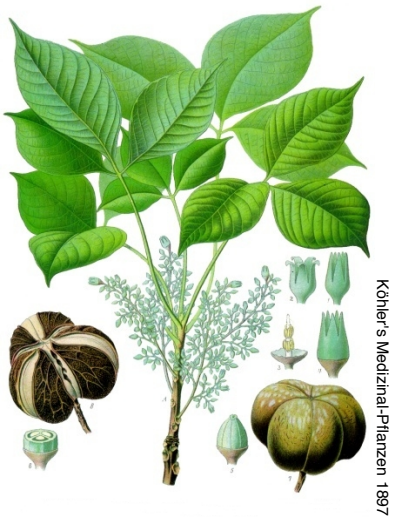


Figure 2-5: Seedlings of rubber trees (*Hevea brasiliensis*) supplied by JAKOA to Temiar villagers of Kampung Semelor, Banding Forest Reserve, Hulu Perak.

2.3.2.8 Modes of Energy Capture

Each new culture that arrived in the Peninsula brought significant innovations in farming. This is illustrated in the relative productivity of the various forms of foraging and farming practised by each group (Table 2-2). The increased per-hectare yields of the newer cultures vastly increased the number of people that a particular piece of land could support.

Table 2-2: Annual productivity of foraging and farming systems

Farming system	Inputs (per hectare)		Yield		Productivity	
	Labour (mandays)	Energy (MJ)	Crop (kg)	Energy (MJ)	Labour kg/manday	Energy output/input
Foraged yams[1]	1	13	3	15	3	1.2
Swidden rice[2]	294	4,763	250	18,575	1	3.9
Settlement rice[3]	122	2,275	1600	20,022	13	8.8
Fossil-fuel rice[4]	3	45,662	6500	82,192	2167	1.8

Sources: [1] estimates based on indicative data for wild yam foraging by the Batek (Endicott and Bellwood 1991) – wild yams in African rainforests occur in densities of up to 218 stems/ha, and usually yield >1 kg of tubers per pit (Yasuoka 2009); [2] hill rice in Lao (Roder 2001); [3] paddy rice in Lao (Roder 2001); [4] modern paddy rice in California, dependant on mechanisation and mineral fertilisers (Roder 2001).

Despite the remarkable innovations, the new systems of farming were not adopted uniformly throughout the Peninsula. Swidden farming was generally restricted to the hills, and paddy farming was only appropriate in the coastal plains. Even with the

arrival of modern agriculture, some of the people of the lowland rainforest of the northern interior of the Peninsula continued to rely largely on foraging. The distribution and cultures of these various groups are discussed in more detail in the following section.

2.3.3 Indigenous Communities of the Peninsula

2.3.3.1 Introduction

In Peninsular Malaysia, the various groups of indigenous people are referred to collectively as "Orang Asli". In 2010, they numbered around 178,000, which is less than 1% of the population of the Peninsula (Endicott 2016). The Orang Asli include at least 20 distinct sub-groups that can be clustered in three broad cultural groups: the Menraq foragers, the Senoi swiddeners and the Aboriginal Malay settlers.

Table 2-3: Indigenous Cultures of the Malay Peninsula

Group	Culture [1]	Age[2]	HPD[3]	Group Size[4]	Beliefs
Menraq	Foragers	55.0	~1	~10	Animist
Senoi	Swiddeners	4.5	~7	~50	”
Aboriginal Malays	Settlers	2.5	~15	~200	Animist/Theist
Malays/Thais	”	1.5	>20	~200	”

Notes: [1] Traditional cultural group, which denotes the mode of energy capture employed; [2] Age of culture in the Malay Peninsula (thousands of years); [3] Human population density (people per km²) – figures refer to estimates derived from Endicott and Bellwood (1991), and Whitmore (1975); [4] Typical size of group (settlement, village, town).

2.3.3.2 The Foragers

The main group of indigenous people of the Peninsula that were traditionally foragers are the Menraq, who are believed to be descended largely from the first group of humans who arrived in the Peninsula around 55,000 years ago (Oppenheimer 2005, Hill et al. 2006, Bellwood 2007: 158, Gomes 2007, O'Connell et al. 2018) (Table 2-3). The Menraq were previously referred to as "Semang" and "Negrito" (Lye 2001), and include several sub-groups, including the Bateks and the Jahais (Table 2-4). One other sub-group of Orang Asli, the Semaq Beri, were also traditionally foragers, although they are considered to be part of the Senoi group.

The archaeological record suggests that the foraging culture of the Peninsula has not been static, with significant shifts in patterns of hunting and places of dwelling. At Gua Madu, Kelantan, Tweedie (1940) noticed a clear correlation of types of food remains with the cultural stratification, with mammalian bones and artefacts being abundant in the upper layers, and freshwater snail shells predominating the deposits below one metre. He concluded that, "It would appear that the early inhabitants of the shelter were of a food gathering rather than a hunting type, and that they evolved into (or were succeeded by) a race of skilful hunters." Even within the last 200 years, the Menraq seem to have shifted from hunting large terrestrial game using bows and arrows, to focusing on hunting arboreal prey using blowpipes – possibly due to reasons of practicality in the dense rainforest (Rambo 1978, Endicott 1979, Endicott and Bellwood 1991, cf. chapter 3 of this dissertation). The shift away from

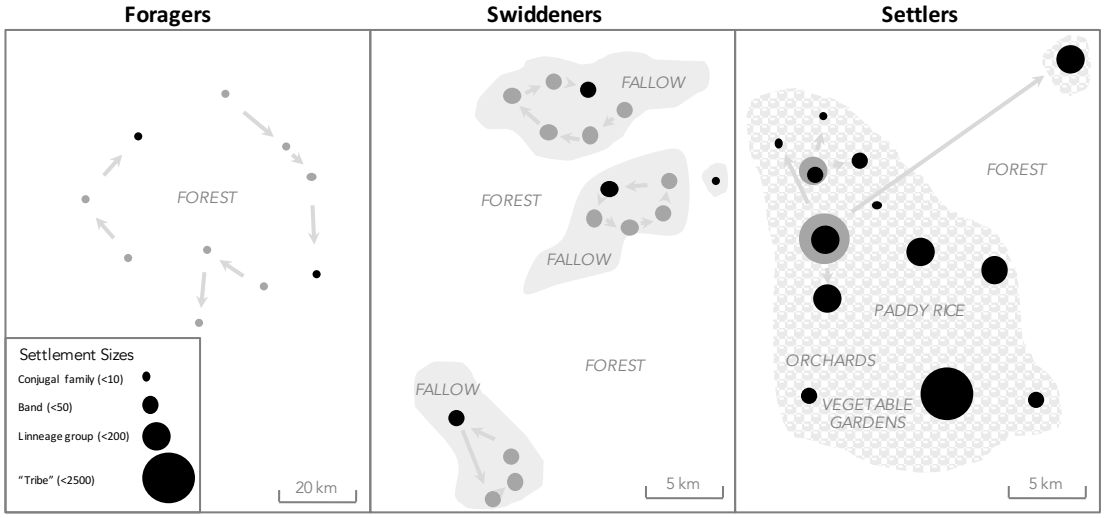


Figure 2-6: Land-use patterns of indigenous cultures of the Peninsula
Note: the scale for forager groups is on a much broader scale than the other groups.

What does appear to be constant, however, is that foragers have lived in small family groups hunting, fishing, and gathering forest produce. Prior to the 1950s, most Menraq lived in conjugal family groups, usually less than 10 people. Such small communities have been termed "nanoscale societies" (Bird-David et al. 2017) and later chapters of this dissertation will highlight how the issue of scale (particularly human population density) is key to human-elephant relations.

Traditional Menraq societies practised a nomadic hunter-gatherer lifestyle (Figure 2-6), meaning their population density was less than one person per square kilometre. Today, some families still continue to subsist largely by foraging (Lye 2004). The various sub-groups of Menraq presently have a collective population of around 5000 (Endicott 2016), living in the forested lowlands of the north of the Peninsula, below an altitude of 500-m above sea level (Rambo 1988) (Figure 2-7). My research in Pahang in 2016 (Lim 2017) demonstrates that even areas shown as blank or "unoccupied" by maps such as Jimin (1968), Rambo (1982), and Benjamin (1983), are actually home to groups of Menraq.

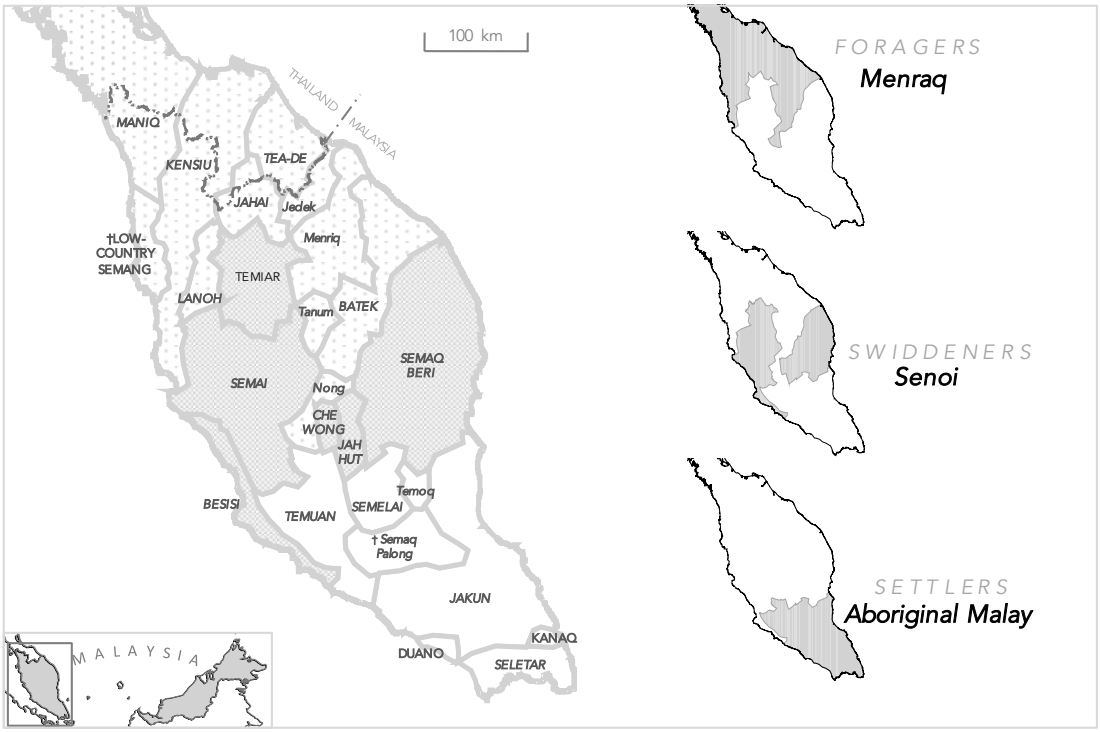


Figure 2-7: Approximate Pre-Colonial Distribution of Mainland Orang Asli
Note: †Extinct languages. *Sources*: language group boundaries are based on Vaughan-Stevens (1892: 95), with adaptations following Benjamin (1983), Razha and Wazir (2001: xii), Phaiboon (2006), Dunn et al. (2011), Simons and Fennig (2017), Lim et al. (2017b), and Yager and Burenhult (2017).

Table 2-4: **G**roups of Indigenous Peoples of Mainland Peninsular Malaysia

Ethnic Group:	Menraq ("Negrito", "Semang")	Senoi ("Sakai")	Malayic (Aboriginal Malays, Malays)
Lifestyle Group: (Pre-1950s)	Foragers	Swiddeners	Settlers
Language family:	Northern Aslian	Central Aslian, Southern Aslian & Jahut	Austronesian
Sub-groups:	Batek Batek Nòng Batek Tanum Jahai Jedek Kensiu (incl. Kintaq) Lanoh(1) Maniq Mendriq	Besisi Chewong(2) Jahut Semai Semaq Beri(3) Temiar	Aboriginal Malay ("Proto-Malay"/"Melayu Asli"): Jakun, Orang Kanaq, Orang Kuala, Org. Laut, Semelai/Temoq(1), Temuan Malay ("Deutero-Malay", "Melayu Malay", "Mainstream Malay"): Batak, Bugis, Jawa, Kerinci, Madura, Melayu, Minang

Notes: (1) speak a Central Aslian language; (2) speak a Northern Aslian language; (3) this group traditionally practiced a foraging lifestyle. Names generally follow Lye (2001: 269-273) and Gomes (2007).

A popular and yet racist view held by authors such as Burkill (1935: 1628) holds that these people were "too backward to grow rice", however, a far more enlightened and broader perspective suggests instead that their exploitation of forest resources filled a foraging niche in a symbiotic relationship with neighbouring farming communities (Schebesta 1929, Benjamin 1973, Endicott 1974, Rambo 1979). Similarly, I do not consider the forager:swiddener:settler sequence to be a progression of advancing races or cultures, but rather a response to alternative applications of technology to particular portions of the Peninsula: the forested lowlands of the north; the central highlands; and the coastal plains.

2.3.3.3 The Senoi Swiddeners

As noted, the swidden culture arrived during the Neolithic period. The main indigenous group that practised swidden farming are the Senoi, although many groups of Menraq also learnt swidden farming, and the more recent groups such as the Malays also practised swiddening. Most sub-groups of Senoi, including the Temiars, the Semais, the Besisis and the Jahuts, practised swidden-farming up until

the 1950s (Table 2-4). The Senoi now number around 107,000 (Endicott 2016), and, unlike the Menraq, they are primarily found in the central highlands of the Peninsula, above 500 m elevation (Figure 2-7); although the Besisis are a coastal community.

The traditional Senoi farming has been described as destructive and wasteful "slash-and-burn" and "shifting cultivation". However these terms can be misleading and the term "shifting" has been said to deliberately mischaracterise the rotational nature of the agroforestry swiddening system in order to set it apart from "permanent agriculture" of the kind more favoured by the state (Dove 1983, Peluso 1995, Majid Cooke 1999, Nicholas 2003, Vandergeest and Peluso 2006). Unlike the Menraq, the Senoi are primarily a sedentary culture and not continually on the move. Swidden farming involves felling a small patch of forest (usually less than one hectare), controlled burning of piles of dried wood and undergrowth in the patch, and then planting amid the ashes with food crops, including rice (*Oryza sativa* var. *japonica*), foxtail millet (*Setaria italica*), or cassava (*Manihot esculenta*) (Benjamin 2014). Such a jungle clearing is known as a ladang (this Malay term is used generally to refer to a field under cultivation). After for two or three years, a new ladang will be opened up and the old ladang will be left fallow (termed *belukar*) for at least 10 to 20 years (Strong 1932, Wyatt-Smith 1958, Cole 1959). Whitmore (1975) notes that traditional long-rotation swidden farming is usually in equilibrium with the surrounding habitat and can support around seven people per km².

Although the Senoi are sedentary compared to the Menraq, they do occasionally move their entire village to a new location. For example, once all of the forest surrounding a village is under fallow, a Senoi village may shift its location further upstream or downstream to get close to new swidden sites, all the while usually remaining within the same river basin. This is in contrast to the Malayic groups (i.e. the Aboriginal Malays and the Malays) that I refer to below as "settlers", in the sense that their villages are usually fixed in one place.

In addition to farming, the traditional Senoi culture also involved a lot of hunting, fishing and gathering of forest produce. While Morris (2015: 25) considers swidden "horticulturalists" as a type of forager, in the context of the Peninsula, it is convenient to make a general distinction between the Menraq and the Senoi, as well

as between the Senoi swiddeners and the Malayic settlers (discussed in the following section).

2.3.3.4 Malayic Settlers

The final group of Orang Asli are the Aboriginal Malays (also known as Proto-Malays). There are several sub-groups of Aboriginal Malays, including the Jakuns, the Temuans and the Orang Kuala (Table 2-4). Prior to the 1950s they practised a mixture of swidden farming and settled horticulture (also known as "permanent agriculture"), and planting fruit orchards in the lowlands of the centre and south of the Peninsula (Figure 2-6, Figure 2-7). They also engaged in some temporary foraging (hunting of forest animals and gathering of forest produce for subsistence and for trade) but tended to return to fixed settlements or kampongs. The Aboriginal Malay settlers, number around 64,000 (Endicott 2016) and have a somewhat more hierarchical society than the Menraq or Senoi, with villages occasionally having hereditary leaders "*batin*".

In addition to the Orang Asli, the Malays, can also be considered to be one of the traditional societies of the Peninsula. Unlike the Orang Asli, the Malay settlers' hierarchical society centred around a sultan who provided spiritual as well as political leadership. The Malays traditionally practised some swidden farming but their lifestyle focuses on permanent kampungs situated along the coast and on the banks of the main rivers. These villages were surrounded by established fruit orchards, coconut groves, and paddy fields. The Malays engaged in fishing, hunting, and also the collection of forest produce from the woods in the vicinity of their kampung. The Malays also obtained forest produce through trade with the Orang Asli.

2.3.4 Prehistory of Elephants in the Malay Peninsula

In the 21st century, Peninsular Malaysia is considered one of the most important strongholds of wild animals in tropical East Asia, harbouring populations of around 230 species of mammals. In addition to the Asian elephant, these include iconic species such as tigers (*Panthera tigris*), leopards (*P. pardus*), clouded leopards (*Neofelis nebulosa*), sun bears (*Helarctos malayanus*), tapirs (*Tapirus indicus*),

seladang (*Bos gaurus*), sambar deer (*Rusa unicolor*), gibbons (three species), and numerous species of smaller mammals (Davison and Zubaid 2007). In addition, the Peninsula is home to large reptiles include pythons (several species) and crocodiles (*Crocodylus porosus* and *Tomistoma schlegelii*). However, the current diversity masks the fact that the Peninsula was not exempt from the wave of megafaunal extinctions that swept the globe during the Quaternary.

When *Homo erectus* (or other *Homo* species such as *H. floresiensis*) arrived in Sundaland, there is evidence that they preyed on or at least scavenged on proboscideans such as stegodons and *Elephas hysundrindicus* (Saegusa 2001, Morwood et al. 2005). While there is evidence that *H. erectus* co-existed with proboscideans for hundreds of thousands of years, hunting possibly contributed to the extinction of numerous large animals such as the giant tortoise *Megalochelys* spp. (Rhodin et al. 2015), and also several proboscidean species, such as *Sinomastodon bumiajuensis*, prior to 1.2 million years ago – around the same time as the arrival of *H. erectus* (van den Bergh et al. 2001). These extinctions could also have been due, in part, to the loss of open habitats (Louys et al. 2007, Louys and Meijaard 2010, Louys 2012). The extinction of grassland elephants (such as stegodons) could also have accelerated the advance of the rainforest causing the loss of the savannahs and ultimately leading to additional extinctions (Owen-Smith 1987, Pringle 2018). At any rate, *Elephas*, along with the other extant megafauna managed to survive, probably due to their ability to live in closed forests (Surovell et al. 2005, Corlett 2010, Corlett 2013).

In the Peninsula, the tools of the Tampanian culture were of quartz cobbles, sharpened on one side, and Baer (2016) speculates that these tools were used for hunting. However, the first compelling evidence of early hunting in the Peninsula dates to 27,000 years ago, from a faunal assemblage in the Lang Rongrien rockshelter, Krabi, peninsular Thailand (Figure 2-4), where Mudar and Anderson (2007) identify a large collection of human-associated faunal remains, including *Elephas* skull elements, primarily tusk fragments, as well as remains of several ungulate species, including *Cervus unicolor* and *C. eldii,* amid stone choppers, and hearth and ash deposits.

Hoabinhian hunting is indicated by animal remains including pigs (*Sus scrofa* and *S. barbatus*) and deer (several species), that have been found in association with Hoabinhian tools (Mudar and Anderson 2007). It is possible that hunting at this time, in combination with climate change, contributed to the extinction of a number of large mammals in the Peninsula (Louys et al. 2007). These Pleistocene extinctions included a hippopotamus (*Hexaprotodon sivalensis*), an antelope (*Duboisia santeng*), the Asiatic black bear (*Ursus thibetanus*), and an orangutan (*Pongo* sp.) (Hooijer 1962, Ibrahim et al. 2013).

Other species were found both on the Asian mainland and in Java, but have not yet been recorded from the Peninsula, and are now globally extinct. These Pleistocene extinctions include *Homo erectus*, the great ape *Gigantopithicus blacki* (Sofwan et al. 2016) that weighed 200-300 kg (Zhang and Harrison 2017), and stegodons (van den Bergh et al. 2001, Louys et al. 2007).

Several other large animals have gone extinct or experienced significant range contractions in the Peninsula during the Anthropocene. During the 20th century, five species became functionally extinct in the wild in Peninsular Malaysia: the leatherback turtle *Dermochelys coriacea*, the green peafowl *Pavo muticus*, the banteng *Bos javanicus*, and two species of rhinoceros (*Rhinoceros sondaicus* and *Dicerorhinus sumatrensis*) (Kiew 1991, Chua et al. 2007). A sixth species, the bearded pig *Sus barbatus*, has experienced significant range contractions. Corlett (2007, 2010) points out that the influence of hunting by *H. sapiens* on the loss of these species is not clear and the existing fauna of the Peninsula would probably already have been exposed to hunting by *Homo erectus.*

There is limited prehistoric evidence of hunting of elephants in the Peninsula. Lim (2013) notes that of 19 recorded elephant specimens (all isolated teeth of *E. maximus*) from a dozen or so sites in Peninsular Malaysia, only three specimens were found under an archaeological context with associated artefacts. All three specimens were found in Perak and included a section of tusk (discussed in chapter 4), as well as two molars found in association with a Neolithic adze from a site at Kampar.

Lim (2013) notes that, extensive investigations since the 1990s in a number of sites in Peninsular Malaysia had failed to reveal further material, and “it remains

unclear what taphonomic factors [i.e. factors affecting the fossilisation process] may have contributed to such an apparent lack of elephant fossils". Elephant are large mammals with heavy bones, and, as Agam and Barkai (2018) note, if elephant fat and meat had been transported to caves sites, they would have left no archaeological signature. I would also suggest that, in addition to taphonomic factors, it would be worth considering ecological and cultural factors. In particular, the fact that the natural population density of elephants in the dense rainforests of the Peninsula during the late Pleistocene and Holocene was probably very low, and, as will be highlighted in the following chapters, many communities in the Peninsula have taboos against hunting the species.

2.4 Conclusion

Around the world, elephants and people have had a long and varied relationship. The Malay Peninsula presents itself as one location where human-elephant coexistence has proved possible in the past. Despite rapid development in the 20th century, Malaysia still maintains a population of elephants. By delving further into the nature past and present human-elephant interactions in the Peninsula, the following chapters of this dissertation identify lessons for maintaining convivial relations in future.

3 A Review of Human-Elephant Ecological Relations in the Malay Peninsula: Commensalism, Mutualism, and Predation

Q. How can you tell that an elephant has been in your refrigerator?
A. By the footprints in the butter.
—a schoolyard joke (Cray and Herzog 1967)

This chapter reviews the ecological relationship between humans and elephants in the rainforests of the Malay Peninsula, examining the extent of differentiation of spatial, trophic, and temporal niches. I highlight the strategies that people and elephants use to partition an overlapping fundamental niche. When elephants are present, people often built above-the-ground shelters. People are able to access several foods that are out of reach of elephants or inedible, for example, people use water to leach poisons from tubers of wild yams, use blowpipes to kill arboreal game, and climb trees to access honey. I present a systems-thinking model that illustrates this arrangement and I discuss how the transition to agriculture affected the human-elephant relationship by increasing the potential for competition.

KEY WORDS: human ecology, ethno-elephantology, niche partitioning, sympatric megafauna, hunter-gatherers.

3.1 Introduction

Elephants and people have remarkable similarities in terms of physiology, behaviour, and conceptual abilities (Lev and Barkai 2016). And, in many parts of Africa, we have been described as "complete competitors" which cannot co−exist on the same range (Parker and Graham 1989). However, as noted in the previous chapter, there are actually groups of people around the world that have managed to live with elephants for millennia, usually extending these animals with deep respect and perceiving them as other-than-human-persons (Naveh and Bird-David 2014). As sympatric megafauna, our ecological relationship is complex and involves elements of commensalism, mutualism, and predation. In order to design appropriate measures for enabling people and elephants to be able to live together in the future, it is necessary to understand the nature of these interactions.

There is an emerging trend for the study of human-elephant relations to be examined using an interdisciplinary "posthumanist" approach (i.e. one that moves

beyond conceptually segregating humanity from other life forms (Castree et al. 2004). Locke (2013) characterises this approach as "ethnoelephantology", an approach based on the principles that humans and elephants are symbiotic sentient beings; and that there is a need to examine our relationship by combining the natural sciences with social sciences.

Existing studies on ethnoelephantology have taken approaches that could be characterised as anthrozoology, multispecies ethnography, and more-than-human geography (all within the field of field of human-animal studies). In this context, the principles of ethnoelephantology have been applied to a wide range of subjects including animal handling (Locke 2013, 2017; Münster 2016; Lainé 2018); epidemiology (Lowe and Münster 2013); morality and ethics (Deane-Drummond 2015); traditional food taboos (Lev and Barkai 2016); transport (Keil 2016); and human-wildlife conflict (Thekaekara and Thornton 2016; Santiapillai and Wijeyamohan 2016). There is still much scope for examining the human-elephant relationship from new perspectives, particularly from the disciplines of ethology (the science of animal behaviour), and cognitive psychology (building on the work of Thuppil and Coss 2012, Gunn et al. 2014, Thuppil and Coss 2016). In addition, the basic discipline of ecology has several principles that can help illuminate the nature of human-elephant interactions.

One of the most fundamental ecological principles is the competitive exclusion principle (Darwin 1859, Gause 1934, Hardin 1960, Chase and Leibold 2003). This principle states that two species cannot persistently occupy the same ecological niche.[5] Co-existence of two species requires that the species' fundamental niches be partitioned into two "realised" niches, to which the species are restricted due to interspecific interactions (Hutchinson 1957). This principle would have applied to human-elephant relations in the past, and it may shed some light on the present nature of our inter-species interactions.

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[5] The synthetic niche concept includes a species' basic ecological requirements, as well as its impacts on the surrounding ecosystem. Technically, the ecological niche of an organism can be defined as the joint description of its zero net growth isocline, along with the impact vectors on that isocline in the multivariate space defined by the set of environmental factors that are present (Chase and Leibold 2003).

The similarities between humans and elephants mean that we have fundamental niches that overlap, despite us belonging to different mammalian orders. We are both fairly generalist terrestrial megafauna taxa, and have K-selected (Pianka 1970) life history strategies, investing heavily in longevity rather than in producing a large number of offspring (see section 3.3.4). The overlap in our fundamental niches have led some to suggest that inter-species competition means that "elephants and humans each suffer from the presence of the other when they occupy the same forests" (Barnes 1996).

Despite the partial overlap, our respective niches often prove to be sufficiently differentiated, sufficiently broad, and the overlaps sufficiently plastic, to permit sympatry (living in the same landscape). The ecological differences between humans and elephants include our obvious disparity in body size; our diets: elephants are herbivorous grazers and browsers, while humans are omnivores; and the fact that elephants have no natural predators, while humans face attacks from other groups of humans, tigers, leopards, pythons, and crocodiles. Humans are also occasionally killed by large herbivores such as seladang, and even by elephants themselves. Aspects of this differentiation and plasticity in niche breadth (versatility) are worth examining in order to evaluate strategies to enable humans to continue to live alongside elephants in future.

With the aim of creating a firm scientific basis for measures to conserve elephants in multiple-use landscapes, I carried out a review of the literature to identify the main ecological drivers that underpin human-elephant relations in the Malay Peninsula. My objectives include examining the extent to which people and elephants influence each other in terms of their realised ecological niches, including (i) spatial; (ii) trophic; and (iii) temporal dimensions.

3.2 Methods

My approach has been to take an approach to elephants that is similar to that taken to orangutans by Spehar et al. (2018). I review the literature related to the interactions of humans and elephants in the Peninsula from a wide range of disciplines, dating back to the colonial period. In addition, I include some examples from elsewhere in Asia, and also from Africa. I include a comparison of the ecological characteristics

(habitat and food preference) of elephants and humans with a selection of other sympatric megafauna, including tigers (the apex predator); rhinos (the next-largest animals); as well as orangutans and bears (as they, like humans, are both omnivores). I refer to both ethnographic and ethno-historical sources. The latter include a small number of colonial-era accounts that I have cited while recognising the tendency for such sources to be exaggerated (Hannigan 2018), biased towards the colonial-capitalist discourse of the period (Noor 2016), and to lack an explicit consideration of their positionality and reflexivity. I follow Agam and Barkai (2018) in considering that, while such sources should be treated with caution, they can still be of use.

I analyse the potential effect of the presence of elephants on the realised niche of humans using the logic of contraposition to examine the effect of the absence of elephants (by reference to sites such as Sarawak). I examine the extent to which several aspects of local culture appear to be adaptive to the presence of elephants, taking a functionalist approach guided by the principles of ecological anthropology (Rappaport 2000) and genetic determinism (Reich 2018).

To illustrate the ecosystem dynamics, I follow the methodology of Galanakis (2006) to create a systems-thinking diagram that summarises the trophic relationship between the main megafauna groups of the peninsular rainforest. I highlight the differences in their trophic niches by performing rough calculations of the relative energy and protein requirements of elephants and people. I also identify the potential food supply available from a selection of food sources.

3.3 Results

3.3.1 Human-Elephant Ecology

In the Peninsula, there was no overlap in six out of 11 (55%) characteristics examined (Table 3-1). There was only a high degree of overlap in one characteristic: frugivory. Both humans and elephants belong to the trophic sub-guild of forest-floor frugivores, although humans can also climb trees to access fruit in the canopy.[6]

[6] Harrison (1962) identified six mammalian communities in Malayan rainforests, assigning elephants to the "Large Ground Animal" community, along with 16 other mammal species; with humans not being assigned. However, Lintulaakso and Kovarovic (2016) found that body size was not a useful ecovariable.

During the main fruit season of the Peninsula, from July to September, both humans and elephants exploit the abundance of fruit on the forest floor. Elephants attempt to dominate this resource and can be aggressive to people in the vicinity of the fruit.

3.3.2 Spatial niche: the elephant in the room

3.3.2.1 Eurytopic sympatry: from coast to mountain crest

Studies in India, Indonesia and Java show that elephants are present in reasonable numbers over a wide range of habitats, although they cannot survive in extremely dry environments (Eisenberg and Seidensticker 1976). When people first arrived in the Peninsula, they would probably have found that elephants had already occupied the entire land, from the coastal mangroves to the montane forest, 2000 m above sea level (Olivier 1978a).

Table 3-1: Ecological characteristics of megafauna of the Malay Peninsula during the Late Quaternary, including habitat preference and tropic strategy

Characteristic	Elephants	Humans	Tigers	Rhinos	Orangutans	Bears
Arboreal locomotion	–	*	–	–	**	**
Troglodytism	*	*	*	–	–	–
Trophic strategy	Herb.	Omn.	Carn.	Herb.	Omn.	Omn.
Grazing/Browsing	**	–	–	**	–	–
Palmivory	**	*	–	*	–	–
Root vegetables	*	**	–	–	–	–
Terrestrial predation(1)	–	*	**	–	–	–
Lots of little things(2)	–	**	*	–	*	**
Arboreal predation	–	*	–	–	*	–
Honey predation	*	**	–	–	*	**
Frugivory	**	**	*	**	**	**

Notes:** -typical; * -occasional; "–" -very rare/not known. Herb. -herbivore; Omn. -omnivore; Carn. -carnivore; (1) predation on terrestrial megafauna (pigs, deer, etc.); (2) predation on "animals in holes" (porcupines, pangolins, etc.), grubs, molluscs, fish; (3) see section 3.3.3.7.
Sources: various, including Olivier (1978a), Endicott (1979), and Rambo (1988).

Although elephants and people are generalist eurytopic species (i.e. we can survive in a wide range of habitats), we do have preferences for certain habitats. These habitat preferences include aspects of altitude, topography, and latitude. While we may be able to climb the highest peaks of the Peninsula, we both have a preference

for flat terrain at lower altitudes. Elephants in montane forests are almost exclusively lone males as solitary elephants are better able to exploit dispersed foods than are groups (Olivier 1978a). Similarly, human communities in the Peninsula usually camp on flatland in the valleys, and trips to less hospitable terrain are normally the preserve of males – out hunting alone or in very small groups (Evans 1937, Lye 2004). Endicott and Bellwood (1991) note that the Bateks claim to be able to subsist in all types of forest except montane forest (*te' langeh*) – where they can only sustain themselves during the fruit season.

Elephants and people also have a preference for semi-open habitats such as along the coast, on the banks of large rivers, and as afforded by gaps in the canopy created by tree-fall, by topography, and by latitude (Figure 3-1, below) (Evans 1937, Lye 2004, Corlett 2007). These areas often have the richest soil and the open canopy of early seral forest allows for food plants that support both species (see section on trophic niche, below). For similar reasons, the wet seasonal evergreen dipterocarp forest/Schima-bamboo forest of the northwest of the Peninsula (Whitmore 1975, Ashton 1995, Symington 2004) has a significantly higher carrying capacity for elephants than the mixed dipterocarp forest that dominates most of Sundaland (Olivier 1978a). As the climate changed since the last glacial maximum (Figure 2-2, section 2.3.2), grazing by elephants probably slowed the advance of the rainforest (Olivier 1978a, Owen-Smith 1987).

While elephant generally prefer a forest with plenty of openings, there are limits to this preference. Olivier (1978a) notes how elephants strongly identify with a habitat that provides grassland and forest cover in roughly equal proportions; grass represents food, while forests provide relative safety from human attacks. Furthermore, this kind of ecotone provides a greater variety of food-plants than either forest or grassland alone. Several recent studies have supported these habitat preferences in elephants (Campos-Arceiz 2013, Wadey et al. 2018).

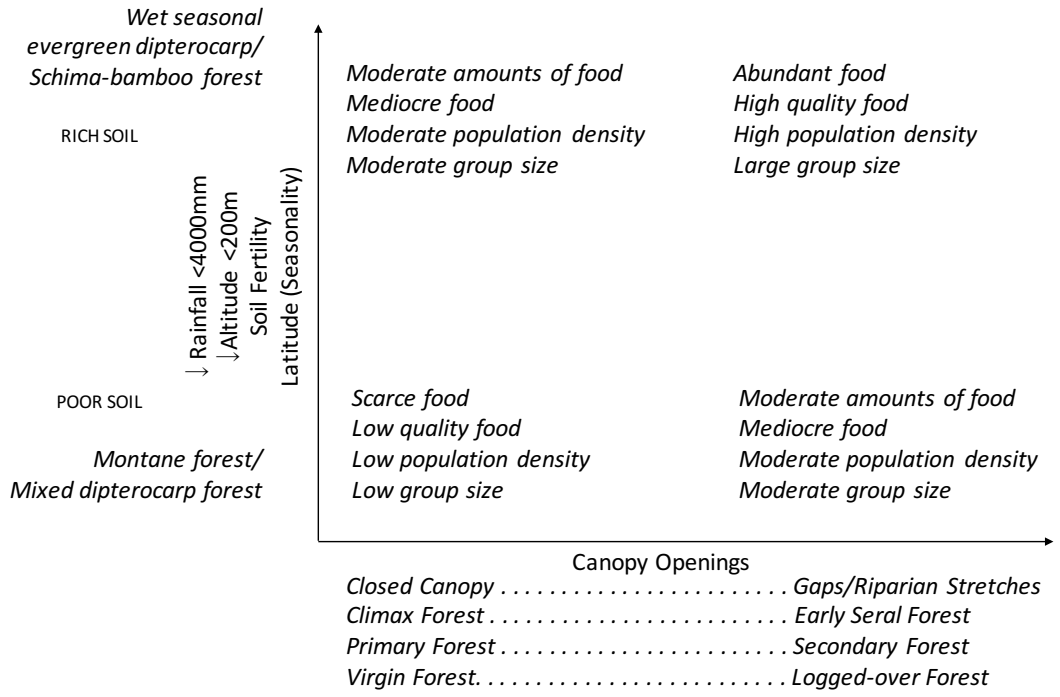


Figure 3-1: A model of human-elephant carrying capacity in the Malay Peninsula. *Note*: Cut-off latitude is presently ~6°26' N at the Kangar-Pattani line (Figure 2-4). *Source*: adapted from Eisenberg and Seidensticker (1976), and Olivier (1978a), with refinements in forest terminology from Ashton (1995), and Symington (2004).

3.3.1.2 Shared pathways: Elephant forest trails

As they move through the forest, elephants create and maintain pathways that connect the places that they frequent, such as salt licks, fruit trees, and bathing spots (Haynes 2006). These routes usually follow the most accessible topography (Wall et al. 2006, Wadey et al. 2018), and elephants' movement and feeding along the paths clear them of vegetation. The smaller animals of the forest, including humans, can then make use of these pathways (and to locate and acquire the resources along them), and their actions in-turn also contribute to keeping the paths open (Blake and Inkamba-Nkulu 2004).

In closed-canopy tropical forest, calories are scarce (see section 3.3.3), and thus ease of movement is especially critical. In Africa, Kingdon (2013) suggests that elephant paths were crucial for the evolutionary survival of other mammals, "especially flesh-footed, soft-toed hominins". Laden (1992) found that the Mbutis of the Congo made some use of the trails of African forest elephants (*Loxodonta cyclotis*), but had several exceptions. The Mbutis were wary of following elephant

trails up steep stretches as there was the danger of coming across an elephant going down the other way: "An elephant going down the steep slope cannot turn around and go back, so it is likely to become upset and trample any people going up the trail." Laden (1992) also found that elephant trails were inappropriate for people in wetlands and at stream-crossings, as elephants tended to favour the swampiest areas, and the deepest parts of the streams.

In Southeast Asia, elephants trails have also been important for humans to access the forest. Keil (2016) highlights how elephant paths enabled the human occupation of difficult upland terrain through the interconnected hilly range extending from India to South China. In the Peninsula, Lye (2004) notes that the Batek sub-group of the Menraq living in Pahang preferred living in standard lowland forest (*həp ləy*) as it was the easiest kind of forest to travel in "simply because elephants also use *həp ləy* and they open up passageways that people can then use". Indeed, I found that most groups of Orang Asli appreciate the fact that elephants keep paths through the forest accessible (see chapter 6).

While elephants and other megafauna keep pathways clear, they also disperse seeds alongside these routes (Blake and Inkamba-Nkulu 2004). Their role as dispersers of large-seeded and large-fruited trees (Campos-Arceiz and Blake 2011, Kromann-Clausen 2015) means that elephants' dung alongside a pathway can enrich the vegetation that grows on the sides of the path, and thus make such routes doubly attractive for people. Non-elephant frugivores (including humans) using the trail can also contribute to this enrichment as they scatter the seeds of fruit that they themselves eat while walking along the trail – to the mutual benefit of all (see section 3.3.3.5).

When walking on elephant trails, the Orang Asli employ various means to avoid encountering dangerous animals. While studying the ethno-ornithology of the Temiars, a Senoi sub-group (Lim et al. 2017b, which is attached as Appendix II), they reported that several birds can give warning of large animals approaching. For example, an agitated *malik*, the bushy-crested hornbill *Anorrhinus galeritus*, warns of an approaching person, elephant or tiger. Similarly, the calls of the *bərɛlkuul*, a trogon *Harpactes* sp., warn Temiars on the presence of elephants (A. Solana-Mena

pers. comm., 3 Oct. 2017). In addition, many groups of Orang Asli take dogs with them into the forest; also taking advantage of their more acute senses of smell and hearing to guard residences on the edge of the forest.

3.3.1.3 Arborealism and the Pygmy Problem

People avoid competing with elephants by avoiding them in space and time. While people are most active during the day (see section on temporal niche) people can avoid elephants at night by building their resting places in inaccessible locations such as up trees and in houses on stilts. Above-the-ground resting places are found in many parts of the world and function as protection against attacks (from wildlife, or from other people), safety from floods, for ventilation, and protection against termites (Noble 2007). The adaptive significance of human climbing has been underestimated and experimental studies with children suggest that humans generally have an innate recognition of climbing as a means of escaping predators (Coss and Moore 2002). Where elephants are present, they can be the main reason people build tree houses (Baker 1854, Santiapillai 1996).

Table 3-2: Height of Orang Asli tree houses reported in the colonial literature

Group of Orang Asli	Author	Height above ground
“Benua-Jakun” (Ab. Malay), Johore	Skeat & Blagden (1906a)	1.5–2.7 m*
“Jacoon” (Temuan), Selangor	Hornaday (1879, 1885)	3.7 m
“Semai”, Pahang	Kelsall (1894)	4.6–6 m
“Jacoons” (Aboriginal Malays)	Cameron (1865)	9 m
“Sakai” (Senoi?), Selangor	Skeat & Blagden (1906)	9–12 m

*The authors note that in localities where elephants abounded the houses were generally built high up. NB. *Elephas maximus* average shoulder height ranges from 2.3 m to 2.9 m, with the world record at 3.4 m (Larramendi 2016).

In the Peninsula, all groups of Orang Asli (Menraq, Senoi, and Aboriginal Malays) occasionally construct above-the-ground shelters, usually as temporary retreats (from elephants, tigers, and from other people), and as a means of guarding crops (Table 3-2, above). Kraft et al. (2014) found that the Menraq are surprisingly competent in trees, allowing them to reach food sources that are out of reach of terrestrial fauna

such as elephants. The Menraq's increased use of tree shelters during the fruit season are discussed in the sections on honey hunters and fruit gardeners (sections 3.3.3.4 and 3.3.3.5), below. In the present section I review records of Orang Asli tree houses and examine potentially related adaptations.

In Perak, Skeat and Blagden (1906) note that the Menraq, "in places where the elephants, tigers, and other wild animals are most abundant, make their temporary dwelling upon the cliffs and on branches of large trees"; this finding is echoed by Schebesta (1929) and Evans (1937). There are also several examples of above-the-ground shelters built by the Senoi (Figure 3-2). Dentan (1968) notes that when dangerous animals such as elephants were present, people from smaller houses moved into the sturdiest longhouse until the elephants moved on.

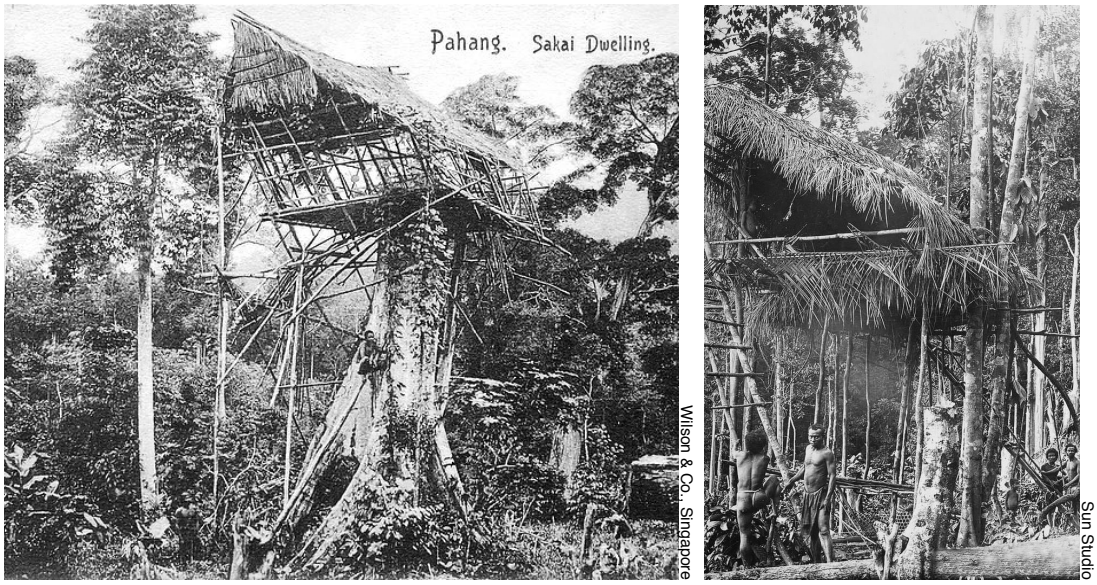


Figure 3-2: Postcards of Senoi tree houses, ca. 1900, **a.** (left) ~8m, **b.** (right) ~4m.

Similarly, among the aboriginal Malays, there are examples of tree houses (Figure 3-3, below). In the 19th century, elephant marauding caused the Temuan (a sub-group of Aboriginal Malays) of Selangor to build their homes on very tall and sturdy pilings and even in trees (Hornaday 1879, Skeat and Blagden 1906) (Figure 3-3 a & b); Dunn (1975) notes that such houses were still being built by this group in the 20th century.



Figure 3-3: Aboriginal Malay tree houses **a.** (left) ~4m, and (centre) ~6m, both in Batu, Selangor, ca. 1880-1900; **b.** (right) ~4m above ground, in Ma'okil, Johore, 2007.

Williams-Hunt (1952) notes that tree-top shelters for refuge from elephants were a regular feature of Orang Asli ladangs (fields). In 2015, I found that the Chewong (a sub-group of Senoi) of Krau (where elephants were no longer present) built houses on stilts of less than 2-m in height (photograph in Appendix IV: 4). In 2016, I found that tree-top shelters were being used by Temiars (another sub-group of Senoi) in Belum-Temengor[7] for guarding fields of cassava and banana (*Musa* spp.) (chapter 7); although houses were usually built at ground level (Figure 6-4 in section 6.3.1).

Tree shelters also protect from attacks by tigers. Roseman (1998) notes that contemporary Temiars in Kelantan build "off-the-ground shelters" when in areas where tigers are a known threat; she also notes that the rice fields of the Temiars were occasionally attacked by elephants. In Johore, a 19th-century account reported that the Jakuns (another group of Aboriginal Malays) would sleep in trees "if a place has too many animals", mentioning tigers as a particular threat to sleeping on the forest floor (Manickam 2015).

Trees can also be used to hide from other humans. Roseman (1998) and Dentan (2002) both mention attacks by slavers (see chapter 5) as one particular threat that resulted in Orang Asli building tree houses. Tree houses built for protection against people tend to be built much higher up than those built solely to evade

[7] I describe the history of the Belum-Temengor site in chapter 5 of this dissertation.

elephants and tigers. In New Guinea (which has no elephants), Henderson and Mornement (2005) note that the threat of attacks from slavers and cannibals caused the Korowai people to build houses as high as 35 m. Similarly, in the Philippines (which had stegodons but no *Elephas*), groups such as the Illongot head-hunters of Luzon built houses as high as 18 m (Kroeber 1919). Other examples of arboreal living in modern humans are scarce (Kraft et al. 2014).

Having to regularly seek refuge in trees may be one reason for the relatively short stature of the Menraq. Rambo (1988) suggest that their adaptation to the lowland rainforest means that the Menraq are usually quite small, with adult male heights averaging around 145–155 cm. Bulbeck and Lauer (2006) note that the height of foraging communities in the Peninsula has reduced since the middle Holocene.

Several reasons have been put forward for the pygmy phenotype apparent in the Menraq and other so-called "Negritos" of the Philippines, New Guinea and Africa (Schmidt 1910, Perry and Dominy 2009, Venkataraman et al. 2018). Most theories relate to the density of vegetation and to food scarcity (Bellwood 2007, Roberts et al. 2016). However, Migliano et al. (2007) suggests that positive selection for small stature was a by-product of selection for early onset of reproduction under circumstances of significant young and adult mortality. Venkataraman et al. (2013) and Kraft et al. (2014) found no anatomic adaptations for climbing but suggest that small body size might be beneficial for climbing relative to walking.

Diamond (1991) had earlier made the obvious point that clambering around in trees was "not a safe lifestyle for a sumo-wrestler". Indeed, Rambo (1988) noted that the Menraq stature could be partly due to smaller individuals being likely to suffer less from falls. Further studies confirm that the energetic cost of climbing and risk of falling from trees are directly related to body mass, but stature itself is not correlated with climbing ability (Mermier et al. 2000, Giles et al. 2006, Perry and Dominy 2009).

What these studies do not mention is that both stature and body mass matter when using a tree as a refuge. One of my respondents, from the Chewong sub-group of Senoi, Tok Kueh (Kuɛ̃) from Pahang (chapter 7), noted how his entire family had

once had to escape from a herd of elephants by climbing up a tree. With such a group of people travelling together and encountering a tiger or an elephant, both high mass *and* height would have been maladaptive in utilising limited off-the-ground shelter space.

3.3.2.4 Trogloxenes: Caveman and Cave-elephant

In addition to fitting into tree houses, short stature may also have been an advantage when seeking refuge in cliffs, rock shelters, and caves. There are pockets of limestone throughout the Peninsula, and the forest of the interior is dotted with more than 400 karst towers (Liew et al. 2016). These hills are the home to species that are known to be adapted to epikarst and cave ecotones. Examples include the Sumatran serow (*Capricornis sumatraensis*) and the Malayan horseshoe bat (*Rhinolophus malayanus*). Less appreciated is the fact that the Orang Asli and their ancestors also used these localities as refugia, and occasionally have had to compete with elephants to occupy them.

As noted in chapter 2, there is archaeological evidence of human occupation of caves in the Peninsula dating back to 43,000 years ago (Tweedie 1953, Peacock 1971, Anderson 1997, Bulbeck 2016). Hornaday (1879) visited the famous Batu Caves in Selangor and, with reference to the Aboriginal Malay community now known as the Temuans, found that "the Jakun are in the habit of taking refuge in them when the elephants become too neighbourly." Ridley (1899) investigated the same caves and found signs of recent occupation by "the Sakai" (i.e. the Temuans), including rough charcoal sketches on the walls. In Perak, similar sketches include depictions of elephants (Figure 3-4) (these will be discussed in more detail in the section on Menraq artwork in chapter 4).



Figure 3-4: 19th-century Menraq charcoal sketches of elephants, humans and other figures in Gua Kelawar, Sungai Siput, Perak



Figure 3-5: Gua Gajah, Pahang, with recent signs of elephants inside the cave
Note: The author (left) accompanied by two members of the Batek Tanum community, who refered to the outcrop as Batu Bidan, and noted that it was occasionally a place of refuge for their ancestors and were wary about entering.

While caves offer shelter from the elements, not all caves are appropriate as refugia from elephants. The floors of caves are often rich in minerals such as calcium that can be important dietary supplement for ruminants including elephants that scratch at and eat the deposits, a process known as geophagy (Lundquist and Varnedoe 2006). Price (2002) notes that elephants are a fear for people sleeping in caves in the Peninsula. Indeed, there is a cave in Pahang known as Gua Gajah ("elephant cave") (Lim 2016 (Appendix IV)) in which I found elephant dung present some 20-m from the entrance (Figure 3-5).

3.3.3 Trophic niche: One bite at a time

3.3.3.1 Finding Food in the Rainforest

In addition to finding ways to avoid bumping into each other, people and elephants in the Peninsula also had to find ways to avoid competing for the same source of food. In the primary rainforests of the Peninsula, filling both human and elephant nutritional requirements (Table 3-3) posed difficulties because, despite an abundance of greenery, most of the biomass in the jungle is locked up in wood and in tannin-rich leaves which neither species is able to digest, and key food sources such as fruits are largely seasonal or unpredictably available (Whitmore 1975). Closed-canopy primary rainforest is marginal habitat for both humans (Hart and Hart 1986) and elephants (Olivier 1978a, Wadey et al. 2018).

Table 3-3: Daily energy and protein requirements of elephants and people.

	Energy	Protein
Elephant (1)	290.3 MJ (2)	2400 g (6.7 g per kg BW)
Human (3)	10.9 MJ	46 g (0.65 g per kg BW)

(1) Needs for an adult (37 years old), with a body weight (BW) of 3605 kg; elephants also practice geophagy to supplement Na, Ca, Mg and K (Dierenfeld 2006);
(2) 60 kg dry matter (1.65% BW, assuming 50% digestibility and 1790 kcal per kg);
(3) Needs for an active adult male (2600 calories), 70 kg BW, assuming good-quality animal protein (Institute of Medicine 2005).

While there is food available in the forest (Table 3-4), humans and elephants must contend with each other and with other species to access this food (Table 3-1, Figure 3-6, below). In the case of true competition, the dominant species tends to displace the lesser species. Olivier (1978a) suggests that "in the face of reduced food availability, or increased inter-specific competition" the herd, or part of the herd, can move to another area. He cites Strickland (1967) who highlighted a suggestion that food availability restricts elephants' local sympatry with Sumatran rhinoceroses. Olivier (1978a) notes that Batek people had "confirmed" to him that elephants and rhinos rarely share the same range. However, while Strickland (1967) does note the possibility that elephants and rhinos may avoid each other, his fieldwork in Peninsular Malaysia actually caused him to reach the opposite conclusion: finding that the elephant and rhinoceros "exist in the same areas, sharing them at least

spatially if not temporally." He finds that it is "unlikely that they occupy competitive niches or are intolerant of one another." In one instance in Ulu Selama, Perak, he even found them using the same wallow. Strickland (1967) also notes that while closed forest is also marginal habitat for the rhinoceros, "even untouched primary forest will provide an adequate habitat for a limited number of these animals around land slips, wind falls, and along river banks, etc."

Table 3-4: Alternative food returns for one day's effort for a family of foragers

Food source	Gross MJ*	Nett MJ**	Protein	Notes
Elephant (3605 kg whole animal)	9361	8392	283,738 g	(1)
Sago (90 kg starch from 1 tree)	1314	1149	180 g	(2), (3a)
Pig (50 kg meat from 1 animal)	310	246	8195 g	(3a), (3b)
Yam (14.4 kg @ 0.8 kg per hr)	71	31	220 g	(4)
Honey (4.2 kg)	53	15	13 g	(5)
Arboreal game (7 kg)	51	13	2170 g	(4)
Durian (27 kg fruit; 5.4 kg pulp)	33	-3	79 g	(6)

*Gross energy (MJ) is the caloric value of the processed substance calculated using the USDA Food Composition Database <ndb.nal.usda.gov>, using "tapioca, pearl, dry" (cassava) for sago; "pork, fresh, loin, center loin (chops), bone-in, separable lean and fat, cooked, broiled" for pig; "yam, raw" for yam; "honey"; "game meat, squirrel, cooked, roasted" for arboreal game; and "durian, raw or frozen".
**Caloric yield (MJ) nett of acquisition & processing costs (for one day with three adults spending six hours of effort each, plus their basal metabolic rate (BMR); i.e. 18 hours of work and 72 hours BMR = 32.7 MJ) and the thermic effect of food (estimated here at 10% of the gross caloric value).
Sources:- (1): I adjust the figures that Ben-Dor et al. (2011) give for *Elephas antiquus*, noting that they use fat-to-protein ratios based on the buffalo. (2): Dentan (1991). (3a): Brosius (1991). (3b): refers to a moderately fat *Sus barbatus*. (4) Endicott and Bellwood (1991). (5): These figures are from Kitanishi (1996) for the Mbutis of the Congo but levels of Menraq harvests are likely to be similar since honey makes up 9% of Batek wild-collected food by weight (Endicott and Endicott 2008). (6): Assuming 18 fruit @1.5 kg each; nett caloric values for durian are negative assuming three person-days' foraging effort to obtain them; however, in practice, there is the option of camping next to the fruiting trees and incurring minimal effort, although this risks encountering elephants.

In the case of humans, it has been similarly proposed that the shortage of a readily available supply of natural food sources also makes it difficult to live in primary rainforest without some reliance on cultivated food (Hart and Hart 1986). The scarcity of food such as tubers has been characterised as "the wild yam problem" (Headland 1987), and more generally as the "carbohydrate scarcity", or "green desert" hypothesis (Bailey et al. 1989, Bailey and Headland 1991, Headland and Bailey 1991, Headland 2002). In the following sections I highlight how the

presence of elephants aggravates the natural scarcity of food in the rainforest, and also highlight some potential adaptations to the situation.

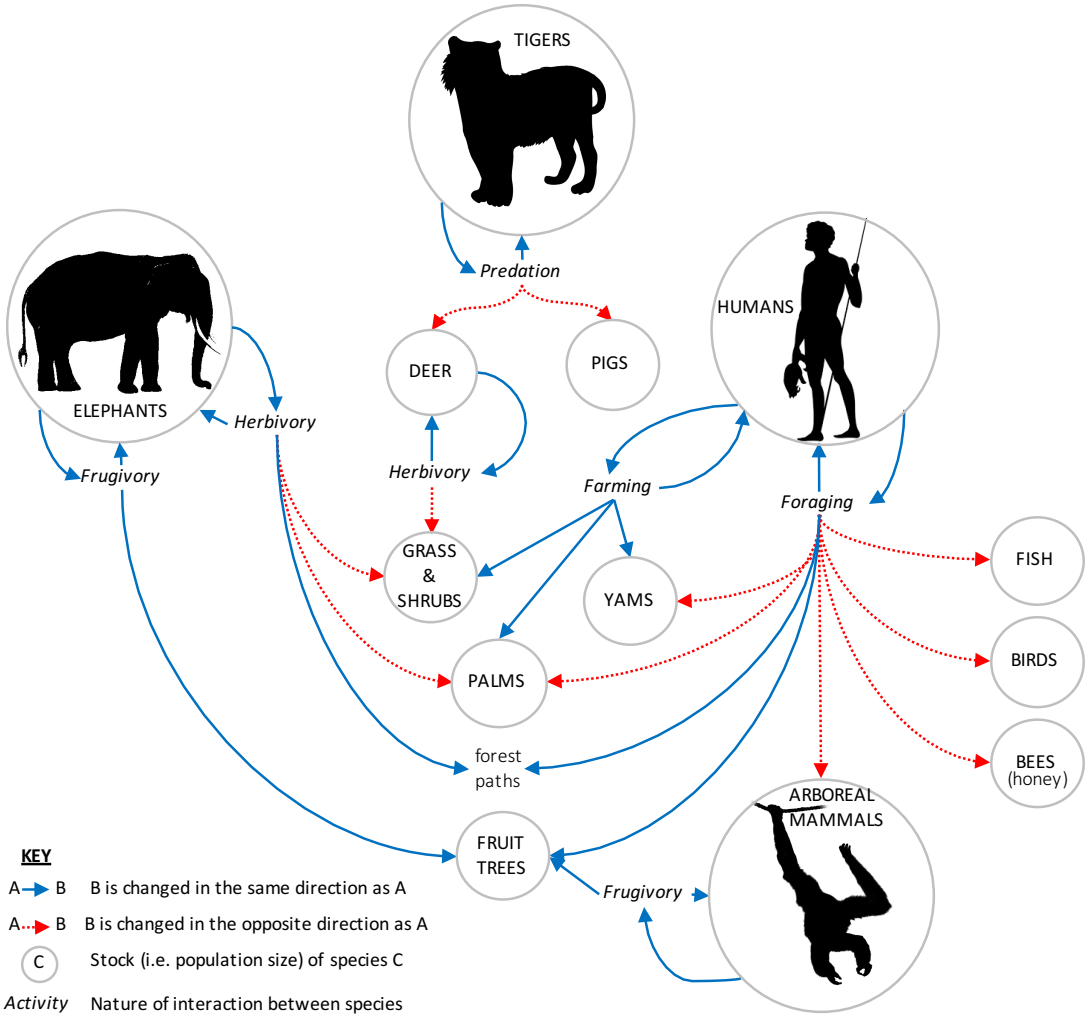


Figure 3-6: Systems-thinking diagram showing niche partitioning between keystone megafauna in the forests of the Malay Peninsula in the Holocene.

3.3.3.2 Dessert in the Green Desert: Carbohydrates from Palms

Countering the green desert hypothesis, Brosius (1991) puts forward the case of the Penans of Sarawak on the island of Borneo. While identifying imprecision in the definition of "pure" foraging, he demonstrates that the Penans successfully subsist in the forest by exploiting the endemic calorie-rich sago palm (*Eugeissona utilis*), and hunting the bearded pig (*Sus barbatus*).

Sago (locally known as *sagu*) is the carbohydrate-rich flour that is extracted from the trunk of several monocarpic palm species. Sago from *Metroxylon sagu* (native to New Guinea), is planted widely and is a staple food for many native communities in Borneo. Sago is also used in many food products internationally, and is a variant of tapioca (i.e. cassava) pudding which, while having fallen out of use in some countries, remains a popular sweet dessert in several others (Stanton 1993).

Despite the attractiveness of sago as a source of energy (Table 3-4, above), the Penan seem to be the only hunter-gather community to rely on it. Their harvest of sago is a form of paracultivation (i.e. managing the wild plants' production while keeping them in their original environment (Dounias 2001)). Brosius (1991) notes that the Penans are an unusual case, and only the long-trunked reproducing sagos such as *E. utilis* and *Metroxylon sagu* seem to provide exceptions to Headland's carb-scarcity rule. In the Peninsula, the genus *Metroxylon* is not native, and the two native species of *Eugeissona* (*E. brachystachys* and *E. tristis*) are stemless (Turner 1997). Indeed, *E. utilis,* which is endemic to Borneo, is the only *Eugeissona* species with a trunk tall enough (up to 15 m) to produce sago (Phillipps and Phillipps 2016); although Burkill (1935) notes that some Orang Asli eat the very short stalk and inflorescence of *E. tristis* (known as bertam in Malay) which does contain a little sago.

In the Peninsula, *Corypha utan* is probably the only significant native source of sago, producing up to 90 kg of starch per palm (Dentan 1991). Here, *C. utan* is found in the lowlands of Perlis, Kedah, Kelantan and Selangor (Turner 1997). The Menraq are not known to harvest any sago, although some Besisi Senoi of Selangor are recorded as preparing it from the introduced *Metroxylon* palm (Dentan 1991, Endicott and Bellwood 1991).

There are several reasons put forward for the Menraq not exploiting sago. Dentan (1991) suggests that: (i) the riparian habitat of sago was replaced by rice paddies; (ii) the Menraq have adequate carbohydrates from trading forest produce for rice; and (iii) slave raiding made it too risky to live near the banks of the large rivers where sago palms grow. Endicott and Bellwood (1991), looking at the Batek,

question whether there are in fact any suitable species of sago palm growing in the Menraq territories to begin with.

Through the lens of ethnoelephantology, the threat of elephant depredation appears as another reason for not cultivating sago in the Peninsula. The presence of elephants here means that sago palm paracultivators would face significant competition. A single elephant could wipe out a sago grove overnight and people would put themselves at risk of elephant attacks if they camped close to such groves. Olivier (1978a) notes that elephants eat most species of palms, and specifically includes the palms *M. sagu, E. tristis,* and *C. utan* (as *C. elata*) among the species of food plants of the elephant in Malaya and Sumatra.

Indeed, the vulnerability of large palms to elephants is possibly the reason for the short stature, limited diversity, and restricted distribution of sago palms in the Peninsula. Terborgh et al. (2018) found significantly higher numbers of palms in a forest where elephants had been removed, compared with a forest where elephants still lived; in particular, large palms (>1 m tall) were eight times more abundant in the forest without elephants.

In Borneo, sago palms face attacks from bearded pigs that are able to push over small palms rip them up with their tusks (Dentan 1991). However, in Sarawak, it does not appear that the large palms of *E. utilis* face such risks. While there is fossil evidence of large herbivores in Sarawak, including two species of rhinoceros and tapirs (Cranbrook 2010), there is no record of elephants from Sarawak, and no fossil evidence of elephants anywhere in Borneo (Cranbrook et al. 2008). Some recent genetic analysis suggests a late-Pleistocene introduction of elephants to the north-east of the island (Sharma et al. 2018), but this population does not range into the central highlands. The Borneo elephant population does not overlap with the sago-cultures of the Penan, or that of the lowlands communities of Sarawak – and there is no evidence of any such overlap in the past.

In the forests of the Peninsula, despite the relative absence of sago, palm parts are the main source of carbohydrates for elephants. Paleontological research by Kealhofer (2003) suggests that, during the Holocene, populations of palms remained stable as the grasslands of the Peninsula were replaced by forests (Figure 2-2, section

2.3.2). Olivier (1978a) emphasises that elephants are uniquely pre-adapted to overcome the physical defences of palms, "being capable of intelligently combining the use of its size, strength, toenails, tusks, and particularly the manipulative abilities of its trunk". He adds that the ability to exploit a palm niche is so unique that he proposes that the term "palmivory" as distinct from other forms of herbivory, such as browsing and grazing. Thus Asian elephants are "facultative palmivores" with palm beetles (*Rhyncophorus* spp.) as their main natural competition.

Asian elephants' only significant mammalian competitors for palms are human beings (Olivier 1978a). Although sago starch itself is rarely exploited by forager communities in the Peninsula, Endicott and Bellwood (1991) found that palm cabbage and palm pith, particularly that of *Arenga westerhoutii*, were one of the staple foods of the Bateks. They also regularly ate palm fruit (including those of *E. tristis*), and palm kernels, and drank palm inflorescence sap (which is rich in sugar) (Dentan 1991). Orang Asli have even been found to eat palm beetles, both grubs and adults (Dentan 1968, Dentan 1991).

In conclusion, I suggest that the presence of elephants is the main reason that reliance on sago is not an option for the foragers of the peninsular rainforests. Palms do provide a source of food but it is a source that is also exploited by elephants in elephant landscapes does not provide humans with enough calories for subsistence. In this way, elephants can be seen to exacerbate the problem of food scarcity in the rainforest.

3.3.3.3 A Proboscidean Perspective on the Wild Yam Problem

Without the support of sago, there remains the question of whether foragers such as the Menraq could instead rely on wild yams as their staple source of energy. Headland (1987) suggests that in evergreen tropical rainforests, wild yams were so scarce and so hard to extract that foragers could not have lived without recourse to cultivated foods. In the Peninsula, similar findings are made by Schebesta (1929), Rambo (1988), Bailey et al. (1989), and Kuchikura (1993). However, Endicott and Bellwood (1991) highlight archaeological evidence that showed human occupation of caves deep in the forested interior of the Peninsula suggesting that independent rainforest subsistence was actually possible. This evidence caused Bailey and

Headland (1991) to revise their hypothesis to: “humans have subsisted in tropical rain forest independently of cultivated foods only in Malaysia”. Here, I examine the extent of subsistence on tubers in the Peninsula and consider the wild yam problem from the perspective of ethnoelephantology.

The cultivation of introduced species of root crops has probably been taking place in the Peninsula for 10,000 years (Dunn 1975). The main four species of tubers (belonging to four different families) cultivated here are taro (*Colocasia esculenta* (Araceae)), purple yam (*Dioscorea alata* (Dioscoreaceae)), sweet potato (*Ipomoea batatas* (Convovulaceae)), and cassava (*Manihot esculenta* (Euphorbiaceae)). All of these species are introduced, but some of them were probably domesticated in the region, or in New Guinea, during the Pleistocene (Barton and Denham 2011). In addition, there are roughly 20 native yam species of the genus *Dioscorea* (Turner 1997). In addition to Endicott and Bellwood (1991), Dentan (1991) and Lye (2004) both conclude that wild yams are sufficiently abundant in the Peninsula to support foraging human communities. Lye (2004) notes that the Batek practise a form of paracultivation of some of these wild yams, replanting tuber heads and returning to harvest them.

Elephants, like people, also eat forest tubers. In the Congo, African forest elephants compete with people for the largest forest yam, known as ‘Bà’ (*Dioscorea mangenotiana*) (Kohler 2000, Dounias 2001, Yasuoka 2006, Yasuoka 2009). Dounias (2001: 141) notes the special place of the elephant as the “only [non-human] mammal capable of removing the heavy yam head”. This digging might be of some benefit to the plant if it results in propagating parts of the tuber.

In the Peninsula, Olivier’s (1978a) elephant food list includes all four species of introduced cultivated tubers mentioned above but does not include any of the wild species. Other studies on the diet of Asian elephants do not mention wild tubers either (Sukumar 2003, Yamamoto-Ebina et al. 2016, and Suba et al. 2018).

L. Ong (pers. comm., 5 Aug. 2018), observed elephants feeding in Pahang (Ong et al. in prep.) and found that elephants do frequently uproot plants to eat, but she did not observe wild *Dioscorea* spp. in her study site. Separately, interviews of

Jahai and Temiar individuals in Belum-Temengor found that they did not report *Dioscorea* spp. as among the plants that they knew that elephants ate.

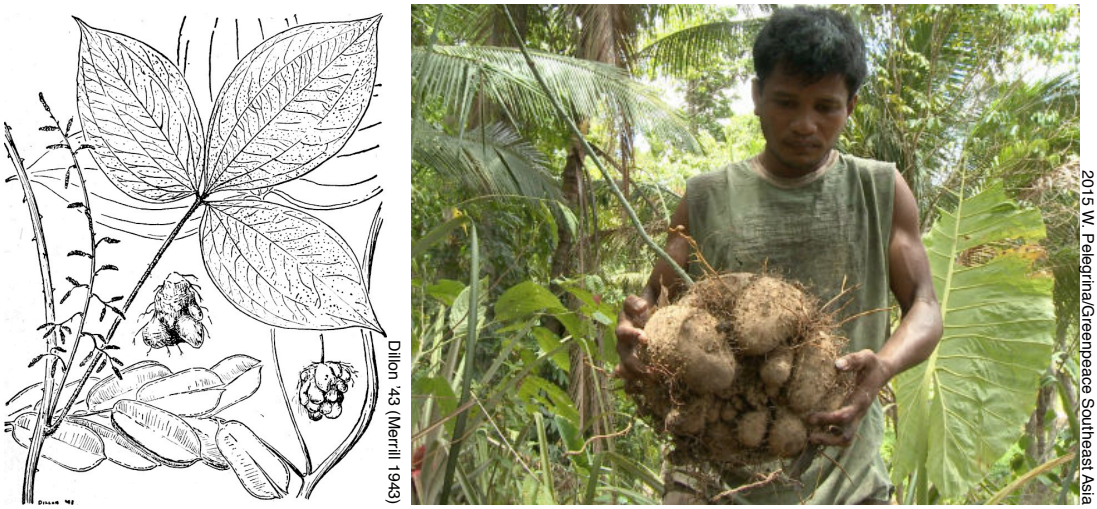


Figure 3-7: The poisonous wild yam *Dioscorea hispida* known as gadong (*gədɔŋ*).

African elephants are adapted to dig up yams, with both males and females having well developed tusks. In Asian elephants, no females and only a proportion of males have tusks (although females can still dig up plants by kicking the soil). Tubers in the Peninsula are also smaller and more scattered than the giant African species. Another reason elephants might not seek wild yams in the Peninsula is the fact that some native species of *Dioscorea* (e.g. *D. hispida* (Figure 3-7, above), and *D. prazeri*) possess toxins (cyanic acid and the alkaloid dioscorine).

Even the introduced tuber, *M. escuelenta*, needs to be cooked because it has highly toxic tubers which contain cyanogenic glucosides. This defence is not effective against elephants – they are more able to consume toxic compounds because their large guts contain significantly more bacterial and protozoan symbionts that detoxify plant defenses (Zaya and Howe 2009). Nevertheless, detoxification does incur a cost on elephants, and thus they prefer eating non-toxic plants such as grasses and palms (Olivier 1978a).

The Menraq know how to identify toxic species of yam and process and cook them safely (Dentan 1991, Endicott and Bellwood 1991). Indeed, evidence from the Niah caves in Sarawak suggests that people in Southeast Asia have had the ability to

detoxify poisonous plants (including *D. hispida* and the poisonous nut *Pangium edule*) for at least 40,000 years (Barton and Denham 2011). People in the Peninsula may thus be better adapted than elephants at exploiting the wild yam niche.

3.3.3.4 Honey Hunters

In addition to the gradients of altitude, latitude and seral succession shown in Figure 3-2, the abundance and quality of food such as fruit, seeds, and honey often increases as one moves from the forest floor up through the canopy of primary rainforest (Nadkarni 1994). By hunting with blowpipes and climbing trees humans manage to access resources that are not available to ground-dwelling animals (Latinis 2000, Kealhofer 2003). In this section I consider a particular arboreal trophic resource that is available to people and not normally to elephants: honey from bee hives.

In addition to complex carbohydrates, simple sugars can also be an important source of calories. Dentan (1991) points out that Headland (1987), by focusing on starch and animal fat, fails to adequately consider the importance of calories obtained from sugar. In the Peninsula, honey from several bee species including *Apis dorsata* can be a particularly important source of sugar calories for Menraq groups such as the Batek who climb up to 50 m into the canopy to access it (Endicott 1979, Lye 2004, Endicott and Endicott 2008, Kraft et al. 2014). In pursuing this resource, the people of the Peninsula have long had a "social partnership" with honey guides (*Indicator archipelagicus*), while they compete with honey buzzards (*Pernis ptilorhynchus*) and honey bears (*Helarctos malayanus*) (Hediger 1965, Seeley et al. 1982, Winston 1987). Indeed, human remains from the time of the Hoabinhian show signs of dental caries, leading Bulbeck (2005) to suggest that Malayans have had a diet that was rich in fruit and honey for thousands of years.

Elephants also have a sweet tooth and do eat honey if they can get it. In Africa, Estienne and Boesch (2015) note how forest elephants prey on the grubs and honey of ground-dwelling Melipone bees (*Meliplebeia lendliana*). However, in the Peninsula, the hives of bees such as *A. dorsata* are usually out of reach of elephants, and even the lower-nesting *A. florea* are probably not attractive due to the aggressive stinging behaviour of *Apis* bees, which King et al. (2018) has shown to be a deterrent

of elephants in Sri Lanka. On the other hand, there is a genus of stingless bees (*Trigona* spp.) that are found in crevices that are often low enough for elephants to reach, and I found that in Belum-Temengor the elephants do attack the hives and eat the honey of these bees when the opportunity arises (see chapter 8).

3.3.3.5 Fruit Gardeners

The other sweet resource of the canopy of peninsular rainforests comes from the abundant seasonal fruiting of several tree species. These include the durian *Durio* spp. (Bombacaceae) (Figure 3-8, below), mango *Mangifera* spp. (Anacardiaceae) and rambutan *Nephelium lappaceum* (Sapindaceae). People eat these fruits and play an important role in the dispersal of their seeds.



Figure 3-8: Durians (*Durio* spp.) are sought-after by both elephants and people.

Elephants are also important consumers of this fruit when they can reach it, when it falls to the forest floor, or when the fruiting tree is small enough for them to push over (Ridley 1893, Corlett 2009); one of my respondents in Perak reported that an elephant had pushed over a rambutan tree full of fruit (chapter 7). Subsequent dispersal of fruit seeds throughout the forest maintains the fruit tree populations, and thus is an activity that ultimately benefits all frugivores. Here, I consider the extent of human and elephant consumption of wild fruit and the extent to which fruit represents an overlap in their trophic niches.

The size of its fruit means that the durian relies primarily on elephants for dispersal (Rutten 1939, Corner 1949, Kitamura et al. 2007, Campos-Arceiz and

Blake 2011, Campos-Arceiz et al. 2012). The durian's strong smell attracts many creatures, but elephants have an exceptionally good sense of smell (Plotnik et al. 2014), and can remember the location of fruit trees and detect the location of a fruit as they hear it fall (Hart et al. 2008, Corlett 2011). Their social flexibility means that, during the fruit season, groups of elephants as large as 60 individuals can congregate together around the fruiting trees (Mayer 1922, Olivier 1978a). Corner (1949) describes how elephants' dominance in terms of size means that they have first choice of the fallen durian fruit, before "tigers, pigs, deer, tapir, rhinoceros, monkeys, squirrels, and so on down to ants and beetles".

Humans of the Peninsula are also particularly fond of durian. While humans do not have as developed a sense of smell as elephants, members of foraging communities tend to have exceptional olfactory abilities (Majid and Kruspe 2018) and good spatial memories (Kearins 1986). Like elephants, humans also have social flexibility, and the size of a Menraq camp may increase during the fruiting season – the unity of a camp being based solely on the "moral obligation each family has to share food with all other families in the camp" (Endicott and Bellwood 1991).

While people can climb trees to collect smaller fruit such as rambutans, durians are too big, heavy and spiky to harvest from high up in the trees that they grow on. It is also not practical to collect durian fruit and to take them off to eat in a remote camp (Table 3-4). Instead, during the durian season, people usually wait for durians to fall from the tree. This raises the problem of having to contend with elephants for the first choice of the fallen fruit.

The main strategy people took to beat elephants to fallen fruit was to build above-the-ground shelters next to fruiting trees. Corner (1949) describes how "jungle-folk" build tree shelters next to the durian groves so they can grab a fallen fruit and then climb again to eat them in safety. He describes the floor of a fruiting durian grove as follows: "Under the big trees are leaning saplings, frayed bark, trampled shrubs, and churned ground, as scenes of elephantine supremacy." Hornaday (1879) describes a group of Malay durian gatherers' failed attempt at building huts as high as 6-m above the ground, "But the rascally elephants … had torn down the highest platform of all, as if to show the Malays that it was of no use

trying to build a hut out of their reach." This appears to be a case of interference competition: elephants demonstrating behavioural dominance by physically preventing people from accessing the durians.

Another possible strategy for people is to ensure that durian trees are spread out widely enough that both elephant and people would be able to access to them without encountering one-another. Over the millenia, human campsites were often deliberately enriched and were planted as *dusun* – orchards or agro-forestry fruit gardens. Moore et al. (2016) notes that fruit gardens in the Krau Wildlife Reserve, in the centre of the Peninsula, contained five times as many fruit-producing trees as the surrounding forest. John Terborgh (pers. com.) suggests that, compared to monocultures, these mixed plantations are less vulnerable to elephant depredation. In the forest of Temengor, on the route to Kg. Lengweg (chapter 6), I noticed that the Temiars had planted durian trees – both *D. zibethinus* and a forest durian species (Figure 3-9, above) – at intervals of at least 500-m apart. Presumably these strategies would reduce the ability of elephants to dominate the entire durian crop and thus ensure that people had a chance to get their fill as well.

In summary, the general abundance of food during the fruit season means that, from the perspective of frugivory, humans and elephants are not necessarily competitors in the ecological sense, since the supply of fruit is not a factor limiting the population of either species. Thus, in terms of multiple aspects of foraging behaviour, ranging including starches (palms and yams), animal fat and protein, and sugars (honey and fruit), humans and elephants have succeeded in partitioning the trophic resources of the forests of the Peninsula to enable a degree of convivial coexistence.

3.3.3.6 Swidden Farming: Elephants in the Fallow Field

While foraging communities may have established a way of life that avoided encounters with elephants under the dense canopy of the rainforest, the advent of agriculture during the Neolithic period created new dynamics. Swidden farming opens up the dense forest canopy, and the secondary forest that grows back after a swidden is left fallow and contains grasses and herbs which can be eaten by herbivores such as elephants (Dentan 1968, Wharton 1968, Rambo 1979: 48, 54;

Kathirithamby-Wells 1997: 215–220). This development had a mixed impact on elephants: on one hand it made more food plants available (both crop and fallow), but, on the other hand, it increased the number of dangerous humans, and increased the potential for conflict.

On balance, several findings from around the world suggest that swiddening can actually be compatible with elephant conservation. As noted in chapter 2, the one location in China where elephants survived was in the south, where the local Tai people practise swidden farming (Wen et al. 1995, Elvin 2001). Similarly, in India, Sukumar (1989) finds that shifting cultivation, practised on a small scale (i.e. still maintaining significant forest cover), does not damage elephant habitat. And, in Sri Lanka, traditional "chena" swiddening has been shown to be compatible with elephant conservation (Fernando et al. 2005, Lorimer 2010). In the Peninsula, Olivier (1978a) found that the fallow swiddens (known as "belukar" in Malay) contained 36% more trunkfuls of elephant food plants (trees, palms, herbs, bamboos and grasses) and thus supported significantly more elephants compared with primary forest. Olivier (1978a: 323) says that the reliance of elephants on human swiddens meant that they may perhaps be thought of as "having entered a sort of commensal relationship with man". Kathirithamby-Wells (1997: 228) concurs that, in the uplands of Perak and Pahang, Malay and Senoi cultivation resulting in secondary forest is associated with large concentrations of elephants.

Swidden farming likely increased the populations of both humans and elephants in the Peninsula. This increase probably meant that people and elephants were more likely to have come into contact with one another. The nature of the interactions were probably more confrontational, with people now having the occasion to view elephants as pests, and as threats to assets (crops and buildings) in which they had invested time and energy. Their investment and commitment to a particular area would also have meant that swidden communities would have been less inclined to flee the area in the face of elephant depredation. All this would probably have increased the likelihood that people would have resorted to defending themselves by killing elephants.

3.3.3.7 Predation: calories from animal protein

As omnivores, humans have an advantage over elephants in our ability to catch and consume animal fat and protein. Animal fat is a known substitute for starches as a source of energy in periods of scarcity (Headland 1987) and, while an over-reliance on lean meat can be unhealthy, in normal circumstances, humans can also rely on protein for up to 35% of our total caloric needs without ill effect (Speth and Spielmann 1983, Speth 2010, Ben-Dor et al. 2011). Hunting is therefore an important way humans can overcome the scarcity of carbohydrates in the rainforest. In this section I review the relationship between hunting by humans and elephant ecology in the rainforests of the Peninsula.

Predation is a key selective pressure on prey animals and the introduction of a predator species can cause substantial differences in the prey population's morphology, physiology and behaviour (Brow and Warburton 1999). Prior to the arrival of humans, elephants did not have natural predators (although elephant calves can occasionally be attacked by large carnivores).[8] However, when humans arrived on the scene, elephants of all ages were potential prey (Agam and Barkai 2018), and since elephants can also kill people, the two taxa faced the potential for symmetrical interspecific killing.

However, in the Peninsula the Asian elephant did not succumb to hunting. In Sri Lanka, millennia of selective hunting of tuskers have led to a current population where only about 3% of male elephants have tusks (Kurt et al. 1995). In the Peninsula, there is little archaeological evidence of elephants being hunted (as noted in chapter 2), and at present most males do have tusks (pers. obs.).

There are very few references of the Menraq hunting large game such as elephants, banteng (*Bos javanicus*), or seladang (*B. gaurus*) (Rambo 1978, Endicott 1979, Lye 2004, and chapter 7 of this dissertation). Endicot (1979: 16), who studied the Bateks, characterises the fact that they seldom hunt or trap large game as a "mystery"; indeed, it is remarkable that they do not use traps for any type of game. This mystery is deepened by the fact that wild pigs (*S. scrofa*) were "one of the major reasons the Bateks do not consider it worthwhile to plant crops".

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[8] In the Peninsula, tigers may occasionally attack young elephants (Hubback 1941).

Existing reasons put forward for not hunting pigs and large game relate to questions of praticality, the risk of injury, and personal preferences (Endicot 1979). One important practical consideration is the fact that the Menraq weapon of choice is the blowpipe, having abandoned the use of bows and arrows (Figure 3-9) in the 19th century (Schebesta 1929: 77, Rambo 1978).



Figure 3-9: **a.** (left) Menraq archer, ca. 1925; **b.** (right) young Senoi man with a blowpipe, and his father with a spear, Perak, ca. 1946; **c.** (below) arrow and quiver.

The size and ferocity of elephants and tigers are perhaps another reason that the Menraq do not set traps. In tropical forests without elephants and tigers, foragers regularly do set traps. For example, the Penan of Sarawak set snares and spear-springs to catch pigs (Puri 1999), and the Huaorani of South America use a variety of traps for deer, tapirs and peccaries (Rival 2003). However, setting traps for elephants and even setting traps for other animals in a landscape dominated by elephants risks antagonising the local elephant population.

There is evidence that elephants can associate traps with the humans who set them. Elephants use their excellent sense of smell (Plotnik et al. 2014) to connect artefacts with humans (Bates et al. 2007). Asian elephants are known even to destroy harmless camera-traps (Grassman et al. 2005). Since elephants teach their young,

(Haynes 1991, Hart et al. 2001), they can pass antagonism against humans on to their descendants.

At any rate, fatty meat is generally in short supply in the rainforest. As highlighted in Figure 3-1, large game is found at very low densities in primary rainforest. For example, the large bovids such as banteng occur at 10–15 animals per km² in semi-arid forests but in primary rainforest are usually no more than 1–2 per km² (Pfeffer 1974), and in the Peninsula were seldom found south of the Kangar-Pattani line (6 °26' N) (Wharton 1968). The seladang is found more widely in the Peninsula, but it's presence is thought to be largely dependent on the opening up of the forest by swidden farmers (Wharton 1968).

Despite the low density of large game in the primary rainforest, there is a significant volume of other forms of animal protein in this environment. Dentan (1968, 1991) points out that the Orang Asli opportunistically forage on "lots of little things", including insects, lizards, tiny fish, and snails. Similarly, Endicott (1979) also finds that blowpipe hunting of arboreal animals, and the hunting method that he describes as "getting animals out of holes" yields an adequate supply of mammal, reptile, and bird meat over the long run (147g of meat or 30g of protein per person per day) – supplemented by vegetable protein. Protein from fish can play a particularly important source of calories of forest foragers during periods of scarcity when the fat stores of other prey animals are depleted (Stearman 1991).

In summary, it is probable that one important reason why the Menraq seldom hunt elephants and set traps for other animals is that there is a significant risk associated with antagonising the local elephant population. On the other hand, both swiddener and settler farming communities do occasionally hunt elephants and trap other game species (the hunting of elephants by the different groups of Orang Asli is discussed in more detail in chapter 4).

3.3.4 Elephants killing people

The literature on intraguild killing focuses mainly on carnivores (Donadio and Buskirk 2006), however, as noted, territorial megaherbivores such as elephants can also engage in interference competition to lethal effect. I found no estimate of the actual rate of human mortality due to elephants in the past apart from noting that (i)

mortality due to elephants was possibly higher among the communities that hunted elephants than among those that avoided elephants; and (ii) the absolute levels of mortality probably rose along with population levels after the Neolithic transition, and again after the arrival of settled agriculture (with rates of mortality possibly rising as well). Regardless of the specific figures, elephant attacks were clearly a risk that rural people rated highly.[9] In the following section I review how mutual fear may have altered the diurnal activity patterns of both elephants and people.

3.3.5 Relative demographic characteristics

In addition to suffering attacks from elephants, people living in the forest probably suffered much higher general rates of mortality than elephants. As noted in chapter 2, unlike elephants, humans have several natural predators, and can also be killed by other people. Furthermore, in the rainforest, humans probably have a higher risk of mortality from falling trees and branches, as well as a higher risk of dying from snake bites. It is also possible that humans suffer from higher mortality (particularly infant mortality) due to communicable diseases (such as malaria) – although I did not find data to confirm this.

Offsetting these relatively high levels of mortality is the fact that humans also have a higher fecundity rate (i.e. they typically can have more offspring per female, and thus typically have higher levels of fertility). This difference is due to several ontogenic factors (Table 3-5), primarily the fact that elephants have a gestation rate about twice that of humans. While inter-birth intervals are highly variable in both humans and elephants, a longer interval for elephants, coupled with a slightly shorter child-bearing lifespan, gives elephants a fecundity rate less than half that of humans.

[9] Incidentally, human killings by elephants are presently very rare in the Peninsula. Only a fraction (0.1%) of complaints DWNP received about wild elephant involved actual human casualties, with nine people being killed by elephants between 2001 and 2011 (i.e. ~3.5 deaths per 100-million people per year).

Table 3-5: Fecundity rates of humans and elephants

Trait	Humans[1]	Elephants
Mean litter size	1.0	1.0
Gestation (months)	9	19–23[2]
Mean inter-birth interval (years)	2	4[3]
Childbearing age (years)	15–49 (34)	8–37 (29)[2], [4]
Fecundity rate	17	7

Note: Fecundity rate = (mean litter size × childbearing years) ÷ mean birth interval.
Sources: [1] Pennington R. (2001); [2] Hildebrandt et al. (2006); [3] McKay (1973);[4] Wiese (2000).

3.3.6 Temporal niche partitioning: diurnal & nocturnal activity patterns

Elephants and people have different requirements in terms of rest and activity. In order to sustain their large bodies on a plant-based diet, elephants need to consume a large volume of food, requiring them to be constantly seeking food and eating it. In Sri Lanka, in areas with people, elephants are probably active 18-20 hours a day (McKay 1973). In the Peninsula, Olivier (1978a) notes that elephants tend to travel around and feed in the open at night and feed in closed forest during the day. He suggests that this behaviour is possibly in response to human predation, noting that, even during the evening, groups of elephants alerted to danger might bunch initially, but in response to a severe threat would disperse into the forest. In Belum-Temengor, Hii (2017) placed camera traps next to a salt lick where human visits peaked from 10:00 to 12:00 and found that elephants were most active from 20:00 to 06:00. Similarly, I found that the activity of a crop-raiding elephant tracked using a satellite collar peaked between 21:00 and 23:00 when she was moving near human settlements (chapter 8).

As with elephants, the threat of predation by tigers and other humans and territorial aggression by elephants probably had an influence on the activity patterns of people living in the forest. The Orang Asli seldom leave their camps after dark, indeed, Robarchek and Robarchek (1992) note how the Semais could not imagine spending a night alone in the forest. Similarly, Dunn (1975) notes that the Temuan sub-group of the Aboriginal Malay Orang Asli are reluctant to sleep alone in the forest for fear of evil spirits. Rambo (1979) notes that this ideology is an example of adaptive behaviour as it actually protects them from dangerous wild animals. Dunn

(1975) mentions that elephants and tigers would have been the main threats the Orang Asli in the past, also mentioning leopards and pythons as supplementary causes for concern.

3.4 Discussion

The results of this review suggest that, in several key respects, elephants and people in the rainforests of the Peninsula have managed to partition their respective ecological niches to enable them to coexist. This finding has several implications for the conservation of elephants and of biodiversity more generally.

The strength of the narrative, interpretation, and commentary that I have provided in this chapter is speculative rather than experimental. Indeed, one reason the study of people and elephants has been largely ignored by ecologists is because the relationship does not lend itself well to experimentation. The large-scale and long term nature of human-elephant interactions makes it difficult to design an objective and empirical basis upon which to gather evidence to reject any null hypothesis – such as the idea that people and elephants actually have no significant influence on each other, and that differences observed between sympatric populations and isolated populations are due to chance, or due to factors unrelated to interaction between the two taxa.

Another issue is my reliance on ethnographic analogy to illuminate the prehistoric relationship between humans and elephants. I accept that such analogy is one of the most controversial areas of theoretical archaeology (Watson 1995, Gosselain 2016), and there are likely significant differences between the contexts and cultures of the Tampanian, the Hoabinhian, the historical Orang Asli, and the Orang Asli today. Furthermore, I trust that it is clear that the cultural practices that I describe in this chapter, such as not hunting pigs have not applied consistently throughout history, and by no means apply to all Orang Asli today. Indeed, the taboo against pig hunting does not apply to all Menraq, or even to all Bateks. As will be noted in chapter 7, such practices are even variable within a single community: for example, the Jahai village that I visited had only stopped hunting pigs a few years prior to my visit and while it appeared to me that the whole village respected the taboo, the reasons for this shift were far from clear. Such dynamic and varied beliefs

prevent broad generalisations about culture (Barth 1969) but they do not subtract from the value of the cases as illustrations of examples of the central point of this chapter: the flexibility of our fundamental niche which can, whether consciously or not, enable convivial coexistence with megafauna.

One important aspect of conserving elephants in the Peninsula is the nature of official programmes that encourage (and often coerce) the Orang Asli to adopt a modern lifestyle. These programmes (which will be discussed in more detail in chapters 5–8 of this dissertation), often overlook the adaptive aspects of the traditional lifestyles of the Orang Asli with respect to sharing a landscape with large mammals such as elephants and tigers. Many aspects of Menraq culture that are viewed by the authorities as "primitive", can actually be explained as being adaptations to life in the rainforest, to living in a landscape influenced if not dominated by elephants and tigers. For example, Roseman (1998) notes that some Malays take a culturalist position and negatively characterise the Orang Asli as "people who live in trees", failing to grasp the selective advantage of arboreal retreats when living in the rainforest. Such derogatory attitudes often extend to many other aspects of the Orang Asli's traditional rural culture.

From the perspective of elephant conservation, the key aspect of traditional cultures is their relatively low population density. The "development" brought by the fossil-fuel economy of the latter half of the 20th century resulted in a dramatic increase in the population of the Peninsula, including the population of the Orang Asli. This increase often results in a "landscape of fear" that effectively excludes elephants. Furthermore, permanent settlement, adoption of cash-based materialism, and a reliance on plantation agriculture, results in increased depredation. These trends can reduce tolerance of elephants via a process of "othering" whereby elephants are marked as "different" and unwelcome (Weis 1995, Singh 2018). This is an example of the more general tendency of modernity to break traditional attitudes of respect towards animals (as other-than-human-persons) and towards the natural world as a whole (Naveh and Bird-David 2014). I will examine all of these issues in more detail in the following chapters of this dissertation.

3.5 Conclusion

In summary, there is evidence that in the rainforests of the Malay Peninsula, elephants and humans succeeded in partitioning their spatial, trophic, and temporal niche. People managed to avoid elephants by climbing trees; they found sustenance via yams, arboreal animals, and honey; they avoided travelling in the forest at night. It is clear that the presence of large mammals such as elephants and tigers had a significant influence on the culture of forest communities, these cultural influences are discussed in more detail in the following chapter.

4 A Review of Traditional Human-Elephant Relations Among the Indigenous Communities of the Malay Peninsula

Sa-bĕsar-bĕsar gajah di rimba, dapat juga ka-tangan manusia.
"No matter how big the elephant, he too can end up being caught."
—Malay proverb (Brown 1959)

This chapter reviews the traditional cultural relationship between indigenous communities and elephants in the Malay Peninsula. I examine the groups' beliefs, attitudes, and behaviour towards elephants. I show how all communities traditionally treated elephants with respect, considering them to be non-human persons. I highlight several differences between the specific practices of the extant Orang Asli groups, including the Menraq foragers, the Senoi swiddeners, the Aboriginal Malay settlers and the Malays. Most groups had taboos against eating elephant meat but some would kill and eat persistent crop-raiders.

KEY WORDS: anthrozoology, community understanding, ethnoelephantology, human-elephant conflict, interspecies coexistence, knowledge of elephants, non-human persons.

4.1 Introduction

The traditions of a community plays an important role in determining the behaviour of an individual towards elephants. Whether a community traditionally sanctioned hunting elephants, eating their meat, or using ivory depended on its values, world view, belief system, higher-order attitudes and norms (Fulton et al. 1996, Manfredo and Dayer 2004). Each of these factors is, in turn, influenced by various other inter-related factors, including the complex question of whether or not the social-psychological needs of the individual is being met.

The functionalist approach to human values, views a community's collective values as "adaptive traits, which people adjust to maximise their effectiveness as the larger social system around them changes" (Morris 2015). Morris' theory suggests that the "ideal-type moral values" of a community depends on the population of the community and ultimately whether their main source of energy comes from foraging, from farming or from fossil fuels. Although there is considerable in-group variation,

and culture is always in flux, members of ethno-linguistic groups (Morris uses the terms "value systems" and "cultures") that were traditionally foragers would thus generally be expected to have quite different beliefs and behaviours towards animal raids compared with people who were traditionally farmers.

Foragers traditionally held beliefs characterised as animist, while settled farmers usually practised a form of theism. For many forager groups around the world, elephants (along with other animals, plants and even places) are considered to be other-than-human-persons (Naveh and Bird-David 2014). In these forager communities, it is often taboo to kill elephants or to eat elephant meat (Lev and Barkai 2016).

In Peninsular Malaysia, there is considerable variation in the world-views of the various socio-ethnic groups. Ponnusamy (2012) suggests that in terms of human-elephant relations in the Peninsula it is useful to consider these groups in three clusters: traditional indigenous communities, smallholders, and people associated with large plantation companies. These clusters map fairly well to the three modes of energy-capture identified by Morris (2015): foragers, farmers and fossil fuelers. Morris (2015: 25) uses the term "horticulturalist" for swidden farmers and considers them to be a type of forager, however, most Orang Asli communities have transitioned from foraging (including swiddening) to settled farming. Also, In the context of the Peninsula, it may be helpful to maintain a clearer distinction between the traditionally nomadic hunter-gatherer Menraq, and the Senoi swiddeners, as well as between these swiddeners and the Malayic settlers.

World views vary among the major communities (Storz 1999, Ibrahim 2004), as well as among the indigenous minorities (Dentan 1968, Endicott 1983, Howell 1984, Robarchek and Dentan 1987, Robarchek and Robarchek 1992, Robarchek and Robarchek 1998, van der Sluys 2000, Riboli 2013, Tacey and Riboli 2014). There have been several monographs that examine the relationship of groups of Orang Asli and the natural world (Dunn 1975, Rambo 1979, Lye 2004, Benjamin 2014). However, very little of this ethnographic information has been incorporated into the discourse of wildlife management generally, or of elephant management in particular.

Understanding such inter-group differences in attitudes is particularly important when it comes to identifying the most appropriate measures to take for the appeasement and mitigation of the impacts of elephant depredation. Therefore, with the aim of supporting elephant conservation in Peninsular Malaysia, this chapter reviews the literature related to indigenous communities' traditional beliefs about elephants, traditional attitudes towards them, and traditional behaviour towards elephants.

4.2 Methods

I reviewed a broad range of literature regarding the indigenous cultures of the Malay Peninsula, with a focus on Peninsular Malaysia. I group my findings according to the four main indigenous cultural/ethnic groups: the foragers, the Senoi swiddeners, the Aboriginal Malays, and the Malays. For each of these groups I reviewed their historical beliefs, attitudes and behaviour towards elephants. In particular, I review archaeological, ethnological and ethno-historical sources on the hunting and taming of elephants, as well as the consumption of elephant meat and the use of elephant parts, particularly ivory. I followed the approach adopted by Thekaekara and Thornton (2016) and compared the groups' relations with elephants from both ontological and practical points of view, considering how their worldview and values shaped their beliefs which in turn affected their attitudes and behaviour towards elephants.

The review relies heavily on ethno-historical sources from the colonial period; starting with a synthesis of primary sources identified in the review of aboriginal groups by Skeat and Blagden (1906a, 1906b); the review of economic products by Burkill (1935); and the review on trapping and trade of elephants by Andaya (1979: 401-3). I also reviewed archival material related to elephants in Malaysia's national archives, Arkib Negara, Kuala Lumpur. I have attempted to rationalise the wide variety of ethnonyms used in these sources by using the standard names listed in Table 2-4, with guidance from Lye (2001).

Where possible, the colonial sources were updated with reference to more recent popular accounts, unpublished academic dissertations as well as academic papers published in journals in both the social sciences (including anthropology,

archaeology, geography, and history), the natural sciences (including genetics, paleontology, ecology and zoology), and applied sciences (including agriculture, forestry and wildlife management). Most of the literature was in English but I also reviewed some articles in Bahasa Malaysia and Chinese. I aimed to review all relevant work published prior to 31 December 2017.

Due to my desire to include a broad range of references to human-elephant relations, several of the sources I include in this chapter are anecdotal, and not the result of professional anthropological research. As noted in the previous chapter, such ethno-historical and popular accounts can be exaggerated, biased, and unreliable, but, if treated with caution, they can still provide useful information. It is beyond the scope of this chapter to examine the reliability of each of these sources, however, I do supplement the review with original research on a select number of Orang Asli groups. I mention this research in passing in the present chapter, and describe it fully in the further chapters of this dissertation.

4.3 Results

4.3.1 Foragers and Elephants

Forager Beliefs & Attitudes

In the last 20 years, anthropologists have proposed a theory of animism that uses the term to refer to an ontology prevalent in most traditional societies, in which the world is a community of persons, not all of whom are human (Bird-David 1999, Harvey 2005). In the Peninsula, the traditions of all groups of Orang Asli and the Malays include an ontology where elephants, like other animals, can have human souls. Skeat and Blagden (1906b: 194) note this animist or totemic world-view for the Menraq (the sub-group he refers to as the "Eastern Semang", and who are referred to today as the Bateks), and, for them, the soul of a *B'lian* (shaman) entered after death into the body of a wild animal, such as an elephant, tiger, or rhinoceros: "In this embodiment it remained until the beast died, when it was admitted into the Upper Heaven (of Fruits)." Skeat and Blagden (1906b: 221-222) further note that for the Menraq of Perak (their "Semang" which probably refers to the Jahais), the souls of their shamans also migrate after death into elephants.

Table 4-1: Names for "elephant" used by indigenous groups of the Peninsula

Group (sub-group)	Regular names	Avoidance names	Source
Menraq (Batek)	*gajah*, *gawəy, gagoˀ*	*ay tə-Bəw* ('the big animal')	Lye (2004: 83, 202, 208)
Menraq (Jahai)	*gajah*	*ʔoʔ t-bəw* (the big one) orang kuat (stalwart)	Burnehult (2002: 123) pers. obs. (chapter 7)
Senoi (Temiar)	*talam*	*gajah*, *gadik* (*gading*) [tusks], tataak (grandfather), hand signal (see section 7.3.2)	Benjamin (2014: 77), Quinton (in prep.), pers. obs. (chapter 7)
Senoi (Semai)	*chiig*	*bah entoi* (Mr Big), bah entoi jug (Mr Big Foot)	Dentan (1967) "
Senoi (Besisi)		*jong lintar* (round foot)	Skeat and Blagden (1906a; 1906b)
Aboriginal Malay (Temuan)	*gajah*	*nenek* (grandmother), *babi rĕbong* (bamboo-shoot pig)	Antares (2007: 182), Skeat and Blagden (1906a; 1906b)
Aboriginal Malay (Jakun)	*gajah*	*sagantel*	Skeat and Blagden (1906a; 1906b)
Malay	*gajah, biram*	*datuk* (grandfather, Sir), *ber-olak tinggi* (tall loafer), *orang besar* (chief), orang kuat	Steven (2004: 285), Hale (1885), Skeat (1900), pers. obs. (chapter 7)
"all three groups"	*liman*		Skeat and Blagden (1906b: 436)

Superstitions about elephants lead the indigenous groups of the Peninsula to use avoidance language when talking about the animals (Table 4-1). In Belum-Temengor, I found that, when speaking in Malay, the Jahais refer to elephants as *Orang Kuat* (or "Comrade", literally, the strong person or stalwart); often with a hand-symbol (imitating a flapping ear) used to make it clear that it was an elephant that was being referred to (see section 7.3.2).

The use of avoidance names do not necessarily mean that the Menraq have a deep fear of elephants or of the forest. Chadwick (1992) travelled through several sites with elephant conflict in Perak, and notes that, compared with the Malays, the Menraq were the only people he encountered who were not afraid of elephants. In Temengor, he interviewed a headman who said, "We're used to them. We chase them out of the fruit trees and vegetable gardens with noise and firebrands."

Forager Food Taboos

For some Menraq, elephants and other animals are not to be eaten (Table 4-2). Schebesta (1929: 237) says that the "Kintak Bongs" (a sub-group of the Kintaq) eat little meat and do not eat elephants, tigers, or bears because these animals "were once human". Bolton (1972: 792) reports that the Bateks do not eat elephants or tigers. Loke (2016) found that the Jahais have a taboo against pregnant women eating

certain species including gibbons and tapirs. I found that the Jahais of Belum did not eat elephant meat and some entires villages had even stopped hunting wild boar (*Sus scrofa*) because they found that the meat caused illness (chapter 7).

Table 4-2: Taboos against eating elephant meat by groups of the Peninsula

Group (sub-group)	Taboo	Source	Notes
Menraq (Kintaq)	+	Schebesta (1929: 237)	
Menraq (Batek)	+	Bolton (1972: 792)	General taboo against large animals
Menraq (Jahai)	+	pers. obs. (chapter 7)	
Senoi (several*)	+	Bolton (1972), Howell (1984)	*Besisi, Chewong, Jahut, Semai, Semoc Beri
Senoi (Temiar)	-	Bolton (1972: 792), Benjamin (2014: 77), pers. obs. (cap. 7)	Partial taboo (old men are allowed to eat the meat)
Senoi (Jahut)	-	pers. obs. (chapter 7)	
Aboriginal Malay	-	Favre (1865: 60), Bolton (1972)	
Malay	+	Skeat (1900), pers. obs. (cap. 7)	Taboo related to Islam

On the other hand, Endicott (1979: 16) notes that apart from snake meat, the Bateks had no particular taboo against consuming the meat of any species, even that of those that they did not normally hunt. Similarly, Lye (2004: 113) notes that Bateks profess to not having any food taboos (compared to the Muslim Malays); for example, although they do not hunt pigs themselves, “they eat them with great gusto when they are given them by Malay farmers”.

Forager Shelters

Lye (2004: 16) reports that the role of the shaman among the Batek of Kechau, Pahang, includes the safety of the community from “threatening skies, ground subsidence and landslides, attacks from predators like tigers and elephants.” One practical safeguard is choosing a safe place to live and, as noted in the previous chapter, the Menraq make use of above-the-ground shelters.

Forager Hunting Practices

Hunting practices vary among the different groups of Orang Asli that traditionally engaged in hunter-gatherer foraging lifestyles. The hunting practices also appear to have changed significantly throughout history.

In the 19th and early 20th century, several ethno-historical and ethnographic accounts suggest that some groups of Menraq did hunt large game, including elephants. Begbie (1834: 8-9) found that the Malays would trade with the "Semang" (location not specified) to exchange modern goods for forest products including ivory. Logan (1850: 426, cited by Skeat and Blagden 1906a: 202-203) note that "Semang (locality unspecified) handle both the bow and the spear with wonderful dexterity, and destroy [using poison-tipped weapons] even the largest and most powerful animals (such as the elephant and rhinoceros)."

Skeat and Blagden (1906a) note that "the Semang of Kedah, in addition to bow, spear and blowpipe, make use of all sorts of ingenious traps, pitfalls and snares to secure their quarry". Skeat and Blagden (1906a: 271–279 quoting L. Wray, pers. com. to Skeat) make reference to the "Semang of Perak" hunting big game (including deer, seladang, elephant, rhinoceros, and tiger) with poisoned arrows with barbed heads and detachable fore-shafts. Evans (1937: 236) notes a "Semang" folk tale involving bow-hunting an elephant for ivory, the ivory being repeatedly stolen after it had been acquired.

Recent ethnographic studies suggest that the Menraq no longer hunt elephants. Immediately prior to the 1950s, most Bateks gained their protein from hunting birds and arboreal mammals using blowpipes; digging animals out of holes; fishing; and from plant sources. As noted in the previous chapter, most nomadic Bateks had no hunting dogs, and did not hunt or set traps for elephants, tigers, leopards, seladang, rhinoceroses, tapir, deer, pigs, or snakes (Endicott and Bellwood 1991, Lye 2004: 113). However, other groups of Batek, and some Jahais, do hunt pigs (Rambo 1979). Loke (2016) found that around 50% of 87 respondents from three Jahai villages claimed to hunt wild boar, although none of them claimed to hunt tigers or elephants (around 10% of respondents claimed to hunt seladang, tapir or sunbear). Similarly, Kuchikura (1988) found that primates made up 96% (N=130) of all Semaq Beri catches, while no catches were terrestrial. He claimed that the Semaq Beri found it too dangerous to hunt large game such as elephants. These findings are in-line with my findings that today the groups of Menraq that I studied (the Batek Tanum and the Jahais) do not hunt elephant (chapter 7).

It is remarkable that no group of Menraq hunts elephants. As noted in the previous chapter, elephants can be a significant source of calories and protein. R. Barkai (pers. comm. 14 Mar. 2019) notes that a review of the dietary significance of elephants in hunting societies would show that it would be particularly difficult for subsistence groups to accept taboos against the consumption of such a major potential food source. He adds that there is a possibility that the taboo against eating elephant flesh is a modern development, perhaps influenced by Islam (as is the case with other groups discussed in the section on Aboriginal Malays, below).

Forager Artwork

As noted in chapter 3, some groups of Menraq made charcoal drawings of elephants (Figure 3-4, section 3.3.2.4). Evans (1918: 228) found these sketches in four cave sites in Perak with charcoal sketches dating to the 18th- or 19th-century, suggesting that they were probably the work of the "Negritos" who still used the caves at that time. The art includes a charcoal drawing of an elephant pulling a four-wheeled wagon, and one with a rider holding a goad, these are only 2/288 (0.7%) of the drawing in two of the caves (Mokhtar and Tacon 2011). At the more ancient Gua Tambun rock art site in Perak, elephants do not appear to be among the 640 figures; 53 of these are zoomorphic, including depictions of pig, deer, and tapir, among other species (Matthews 1959, Tan and Chia 2010). In comparison, Latinis et al. (2016) found that, in the Kanam rock art site in Cambodia, elephants comprised 32 (14%) of 222 figures depicted.

Summary of Forager Relations With Elephants

The ancestors of the Menraq have probably been living with Asian elephants in the Peninsula for around 55,000 years (Olivier 1978, Sukumar 2011, O'Connell et al. 2018). Over this period, the Menraq culture adapted for life alongside elephants (chapter 3). For the Menraq, elephants may have human souls, and this is a reason to treat them with respect. They do not greatly fear these "Big Animals" but they do find ways to avoid encountering them. The risk of depredation from antagonised elephants probably stopped them from hunting or trapping them, whether for meat or for ivory. There is insufficient archaeological evidence to determine the extent of

elephant hunting in the past but it is does appear to be the rule among the Menraq today.

4.3.2 Swiddeners and Elephants

The Senoi Swiddening Culture

From the perspective of human-elephant relations, the key elements of the swiddening culture of the Senoi and other indigenous groups of the Peninsula (as introduced in chapter 2) are (i) it supports a greater human population density; and (ii) it opens up the forest canopy allowing for the growth of understory vegetation that elephants can consume (as mentioned in chapter 2).

Senoi Beliefs About Elephants

The Senoi share much of the same animist beliefs towards elephants as the Menraq. Skeat and Blagden (1906b: 305) note that, in the 19th century, the Besisi of Selangor "firmly believe that the souls of their deceased Batins find a resting-place in the bodies of elephants, tigers, rhinoceros, deer, pigs, and crocodiles." They believed that the spiritual attendants to a keramat (a shrine) near Sepang, Selangor, included an elephant and a tiger, both of whom had one of their feet formed like the foot of a man (for further discussion on keramats, see the section on Malay beliefs about elephants, below). The Besisis also made carvings of these elephant spirits (Werner 1974: 170, 237, 622, 625). One such carving (Figure 4-1a), is associated with a story of two Besisi brothers who were out on a blowpipe hunting trip when they were confronted by an elephant and climbed a tree; the supernatural elephant (that was part-elephant part-man) caused the tree to fall to the ground, killing the brothers (Shahrum 1980).

The elephant also has an important position in the creation mythology of several groups of Senoi. For the Chewongs, elephants were the first creatures created, have *ruwai* ('souls'), and are personages (Howell 1984: 163). Werner (1975) gives an account of the Jahut creation myth that involves a spirit named Ebrahil[10] attempting to make the first man out of a lump of crushed water lilies, but ending up

[10] My interviews with members of the Jahut community (see chapter 7) suggest that the name "Ebrahil" in their creation myth is cognate with the Malay 'Malaikat Jibrail', being the Angel Gabriel of the Abrahamic religions.

making an elephant instead: "On the third attempt, Ebrahil finally made a man, 'His name shall be Nabi Adam,' … 'He will, for the time being, live with the elephant.'" Later, Ebrahil decided that Adam and the elephant did not make suitable companions, and he built a new land to put the elephant on: "As the elephant travels, its droppings will fertilize the new soil and rejuvenate the earth so that it brings forth cereals, vegetables and fruit."



Figure 4-1: **a.** (left) "Moyang Gajah" (elephant spirit) (39 cm) carved in 1965 from nyireh batu *Xylocarpus moluccensis* wood by Tika bin Jeda, a Senoi (Besisi) man; **b.** (right) tin ingot of an elephant (*gambar gajah*) (17cm). Both artefacts belong to Muzium Negara, Kuala Lumpur.

On this new land, named Tanah Jehaya Pasa Negeri, the elephant becomes king and eventually marries a human and has hybrid offspring (Werner 1975). In the 19th century, the Malays of Labu, Negeri Sembilan, reportedly referred to the Elephant King (*Raja Gajah*) as the ancestor of all people in a charm used to protect against elephants (*pendinding gajah*): "Oh Great-grandfather Kaban, please don't destroy your own grandchildren" (*"O Dato' Moyang Kaban*, *janganlah binasakan anak-cucu*") (Skeat and Blagden 1906b).

The Elephant King also makes an appearance in a Chewong fable recounted by Howell (1984) as *Bongso in the Elephant Land*, where a Chewong farmer, Bongso, spears a crop-raiding elephant in the leg and chases it to Moödn, the land of the elephants. In that land, the elephant removes its *baju* ('cloak') to reveal itself as

human underneath. Bongso meets the Elephant King, who offers him a daughter as a bride.

Similar stories are told by the Jahuts (Holaday et al. 2003: 53–87), by the Temuan of Selangor (Antares 2007: 180), as well as by Malays in Negeri Sembilan (Skeat 1900: 152-154) and Pattani (Skeat 1901). These stories share several motifs that Thompson (1955) identifies in several other cultures in the Far East and around the world, including "marriage to animal in human form"; the "land of elephants"; and the "man-elephant".

As with the Menraq, the Senoi traditionally use an avoidance language when talking about elephants (Table 4-1). Senoi traditions have elephants as agents of doom that punish people for spiritual transgressions. Evans (1918: 199) notes that for the Senoi of Behrang, Perak, a spirit "Dana Sirlok" (lit. promise spirit) enters an elephant, a tiger or a snake and attacks persons *to whom* a promise has been made and broken. Similarly, Robarchek (1977: 770) notes that for the Semai, a broken promise to keep an appointment puts the person *to whom* the promise had been made into a state termed *srnglook* (and puts them in extreme danger from a powerful or malevolent demon that may kill the person directly or send an animal to attack the person).

Many groups of Senoi also have a related concept of "*pehunan*" or "*punen*" which is "a state of being unfulfilled, unsatisfied or frustrated in regard to some specific and strongly felt want" (Robarchek 1977: 767, Howel 1984: 184, Heelas 1989). Someone who makes a request which is denied then becomes placed in *pehunan* and is then believed to be at risk of being attacked by elephants and other wild animals.

Senoi and Elephant Meat

Most groups of Senoi have taboos regarding eating the meat of elephants and other animals (Table 4-2); these can be complex, varying according to the age and gender of the individual. Dentan (1965: 11) found that, among the Semais, only very old men are considered able to eat elephant meat. Similarly, Bolton (1972) found that, by the age of 25, Semai men will "sometimes eat snake, tiger, leopard and even elephant", while elderly men and postmenopausal women have the minimum or no

food taboos (1972: 792). Bolton found no respondents actually reported eating elephant meat in the 14 Semai villages he visited. Neither was any elephant meat reported from his visits to villages of Besisis, Chewongs, Jahuts, and Semoc Beris. Howell (1984: 163, 197, 182) notes that the Chewong use the tale of *Bongso* to explain why elephant meat is *talaiden* ('taboo') and eating it would lead to being attacked and killed by an elephant.

One group of Senoi that traditionally had significant levels of elephant consumption are the Temiars. Bolton (1972: 792) notes that elephants were eaten in six out of nine Temiar villages he visited in Perak and Kelantan; in all cases it was only elderly men who ate elephants.

In the 1960s, former Chief Game Warden, Mohd. Khan Momin Khan shot a crop-raiding elephant in Fort Kemar, Perak, following complaints by the Temiar villagers (Khan 2014). He recalled that following the shooting, the villagers came to collect its meat (pers. com. 31 March 2017).

Benjamin (2014: 77) notes that in his original 1967 research he found that his Temiar respondents in Kelantan regarded elephants as "too fearful to provide fit meat", and no Temiars regard elephants as food even though they are "aware that other peoples may eat them". He noted that Temiars do kill elephants if necessary to prevent harm to people or crops, but "they never eat the flesh". In a note, Benjamin (2014: 77 n.) adds that he was later told that some Temiars ate elephant meat in the past. Benjamin (pers. comm., 2018) notes that during his field work among Temiars in Kelantan, elephants were very rare, never actually visiting the village where he was staying – although he did see a herd once when he visited Perak.

Fatan (2015: 4) reports that, among the Temiars of Lenggong, elephant meat was prohibited to expectant mothers (other prohibited meat included that of tigers, deer, chicken and fish); however Fatan does not report whether the meat of elephants and tigers were actually eaten by other members of this particular community.

Senoi Avoidance of Elephants

The Senoi traditionally took several steps to protect their crops and homes from elephants and to avoid encountering elephants when walking in the jungle (as mentioned in section 3.3.1.2). Croix (1882) describes how the "Sakai [Temiars] of

Kg. Chabang, in Hulu Perak" scared elephants (and birds) away from their rice fields by using bamboo wind chimes which could be sounded by a watchman. As with the Menraq, the Senoi often built their houses high above the ground for protection from elephants (Figure 3-4). Dentan (1968: 28) notes that the Senoi Semai longhouses were built to be especially sturdy to protect against elephants and tigers. Some of my Temiar respondents from Perak reported that traditionally they would avoid elephants by building their houses on steep ground, away from open pathways (chapter 7). Nevertheless, the increased numbers of elephants in Senoi territory, combined with their own increased populations and sedentary lifestyle, meant that they would have had increasing encounters with elephants as their populations grew.

Senoi Hunting of Elephants

The Senoi have been described as a "non-violent" people (Dentan 1968; Robarcheck and Dentan 1987; Leary 1995; van der Sluys 1996; Robarchek and Robarchek 1998). At the same time, they are avid hunters and there are several accounts of them hunting and trapping elephants. The ethnographic literature (Barkai in press) shows that there is not necessarily a contradiction between having a respectful attitude towards an animal as an other-than-human-person, and at the same time hunting it. Most killing of elephants by the Senoi was probably to control crop raiding, although some was for ivory. Hubback (1905) said that the "Sakai" set traps for elephants, "only when the elephants caused them much trouble and damaged their crops". Noone (1936: 43-44) also suggests that elephant hunting was at levels low enough not to have an adverse impact on the elephant population.

There are several colonial accounts of Senoi hunting and trapping elephants using various methods. Bows with poisoned arrows appear to have been the main method for hunting elephants in the past, and they were also used in warfare. A 19th-century account mentions that Temiar archers killed the war elephant of Mengkong Jamal, the leader of an army invading Perak from Pattani (Noone 1936: 55; King 2006: 84-85). Agam and Barkai (2018) mention the use of poisoned arrows in elephant hunting among several other groups around the world.

Some early accounts also mention that Senoi groups used blowpipes to shoot poisoned darts at elephants, aiming for the elephant's eye (Leech 1879, Morgan

1885, Skeat and Blagden 1906a: 206-207, Wheatley 1961: 111-112). Probably not all of these accounts are reliable and, in particular, Evans (1937: 63) suggests that Morgan's (1885) account sounded like a Malay "fairy story". Poisoned darts are not one of the hunting methods included in the review of elephant hunting during the Paleolithic by Agam and Barkai (2018). However, a review by Osborn (2016) suggests that poison darts were quite probably one of the methods that were used by traditional societies in elephant hunting as they can successfully penetrate elephant hide and deliver a lethal dose.

Other accounts involve spears and elephant traps that are similar to the traditional methods that Agam and Barkai (2018) note were used in hunting elephants elsewhere in the world. Ridley (1895: 163) noted that "Sakai" stalk elephants and drive a large-bladed spear between the hind legs into the abdomen "when the whole party rush upon him with spears and sharp-pointed sticks and soon despatch him." Hubback (1905) notes that the "Sakais" trapped big game using several methods including pitfalls, by means of the *penurun* – a wooden drop-spear, suspended over a game-track – and by nooses. Skeat and Blagden (1906a: 207) note that the Perak "Sakai" would set *belantik* spring-spear traps for large game (see chapter 7 for illustrations of these traps). Dentan (1968: 45) noted that the Semai claimed to occasionally build deadfall traps to kill marauding elephants (although he did not actually see them do so).

Finally, with the advent of firearms, some Senoi would hunt elephants with guns (Hubback 1905). However, Campbell (1887) notes that although many of the "Sakais" of Ulu Langat had guns, they were not brave enough to hunt elephants or seladangs and were "not ashamed to tell you so". Kathirithamby-Wells (2005: 197) suggests that, in the 20th century, "The introduction of the gun, colonial game laws and restrictions on shifting cultivation eroded the symbiosis between swidden cultivators and wildlife. ... the wider adoption of paddy cultivation on the west coast reduced feed for scrub and grass-dependent mammals." Hunting elephants using guns by other groups was a feature of the colonial period and is mentioned in further sections of this chapter.

The Senoi and Ivory

Apart from crop protection, the Senoi also hunted elephants for their tusks. An early Chinese author, Zhou Rugua, notes in 1225 that elephants on the Peninsula were killed using poisoned arrows, their ivory being exported to China (Wheatley 1961: 111-112). Croix (1882) listed ivory and rhinoceros horns as some of the jungle produce that the "wild Sakai of the Perak Hills" traded with Malays. Ridley (1895: 163) also gave ivory as the main object of Senoi hunts.

Most of the ivory that the Senoi obtained was for trade, and there are very few references to Senoi ivory artefacts. One reference to ivory comes from Baharon (1964: 40) who notes that Jahut leader Mangku Dris of Kg. Balek Nyor, Pahang, told of a princess, Putri Beloh Betong, who put a lock of her hair in a *Chembol Gading* (a round ivory container), and floated it down the Sungai Pahang where it was eventually found by an Acehnese prince. An artefact possibly related to the Neolithic ancestors of the Senoi is an ivory tusk section (diameter: 66–74 mm) carved into the shape of a spindle or bee-hive was found among a selection of numerous other animal remains at a protohistoric coastal community site at Kuala Selinsing, Perak, dated to 1000-2200 years old (Davison 1991, Taha 1991, Lim 2013).

Senoi Taming of Elephants

In addition to hunting elephants, the Senoi were also involved in catching and taming elephants. It is possible that this involvement had its roots in the early historical kingdoms of the Peninsula such as the 12th-century "Po-se" where Chinese official Zhou Qufei noted the "dark-skinned and curly haired" king used an elephant for transport (Laufer 1919: 472). At any rate, by the 20th century, Noone (1936: 55) noted that the Temiars were more competent mahouts than the Malays of Pattani and they regularly served as elephant-drivers along the portage routes between Perak, Kelantan and Pahang (the location of these routes are shown in Figure 2-4). Temiar mahouts tended the elephants of the Malay chiefs of Perak, including those of the Sultan of Perak. Temiar mahouts were also used in tin mines in the 19th century (Kathirithamby-Wells 2005) and in conveying timber from the forests of Temengor (Kathirithamby-Wells 1997: 228). Temiars also manned a successful elephant-control

corps formed by the British to reduce the damage that wild elephants caused to rubber plantations in the Pelus valley of Perak (Noone 1936: 49).

One possible clue to the early involvement of the Senoi in elephant taming was thought to come from the command words used by mahouts in Perak and Kedah (Table 4-3). Skeat and Blagden (1906a: 14 n. 1) note that, in these states, even the Malay mahouts spoke to their elephants using some words that were not Malay or Thai and were probably "Mon-Khmer". Skeat and Blagden (1906b: 469 n. 2) suggest that this was a sign that it was "Mon-Khmer speaking individuals who had acquired the art of taming elephants and imparted it to the Malays."

Table 4-3: Command words used by mahouts in Malaysia and Thailand

Command	Perak[1, 2]	Kedah[1]	Perlis[4]	Thai[3]	Lao[3]	Kui[3]	Karen[3]
Come here	*chit, dee-dee, di*	*chee, cham*	–	*ma*	*ma*	*ma*	*i*
Go forward	*hee-hee, kut*	*kee*	*ho dit*	*bai*	*bai*	*bai*	*lili*
Stop	*haw, hoh-hoh,*	*hoh*	–	*hau*	*hau*	*hau*	*hoa*
Go backwards	*tul*	–	–	*sock*	*thoi*	*thoi*	*chokai*
Get down	*tĕrum*	*tĕrum*	*koi-koi*	*map lung, nan long, sôm*[5]	*moap, nan long*	*drun, drum*	*minoer*
Lower head	*lot, lulu*	*lût*	–	*tak lung*	*tam lung*	*maeb*	*chalong*
Lift leg to mount	*chang*	*song*	–	*sang soong, chœng*[5]	*soong*	*soong*	*sosow*
Stand up	*tah*	*puan*	–	*long khen, tan*[5]	*luk khun*	*luk*	*chitelo*
Go slowly, carefully	*chin, kohoi-kohoi*	*koy*	*saw*	*goy*	*goy*	*goy*	*kaekae*
Pick up (item)	–	*jûn*	*au*	*gap bon*	*gap*	*gap bon*	*buchitlong*

Sources: (1) Maxwell (1906); (2) Miller (1927); (3) Schliesinger (2010); (4) Mokhtar (2006) – seems unreliable; (5) Giles (1932).

The etymology of Malay elephant command words is not clear. Maxwell (1906: 7; 1907a: 71) failed to find any Mon-Khmer link for the non-Malay words used in the mantras used by Malay mahouts. Schliesinger (2010) notes several elephant command words for Kui (a Mon-Khmer language spoken in Indochina) (Table 4-3). Some of those commands are common throughout the region, and one of them ("drum") matches only with the Peninsular command *tĕrum* given by Maxwell (1906) and Miller (1927); Wilkinson (1952) gives it as *dĕrum* ("word of command to

make an elephant kneel"). Etymology of the traditional elephant command words used in the Peninsula certainly deserves deeper analysis as it may shed light on the history of elephant taming in the region (note also the observation in the section on Malay proverbs, below, that at least two local proverbs regarding elephants have identical counterparts in the Khmer language).

Summary of Senoi Relations With Elephants

In summary, the Senoi swiddeners traditionally had a superstitious fear of elephants. However, this did not stop them from occasionally hunting, killing, and eating elephants, especially crop-raiders. The strategic position of their forested highlands in the heart of the Peninsula meant that the Temiar Senoi were well positioned to take advantage of the demand for ivory and for live elephants by hunting and catching elephants. The extent of historical taming of elephants by the Temiar deserves further research.

4.3.3 Aboriginal Malay Settlers and Elephants

The Aboriginal Malay Settlement Culture

Aboriginal Malays are recorded as having a mixed relationship with elephants, fleeing from them on one hand and hunting them on the other. The Aboriginal Malays did engage in some swiddening but generally had more fixed settlements than the Senoi (chapter 2). As noted in chapter 3, some groups of Aboriginal Malays protected themselves from elephant attack by building off-the-ground shelters (Table 3-2). There is no record of Aboriginal Malays being involved in taming elephants, although the Aboriginal Malay folk hero, Hang Tuah, is said to have possessed several tame elephants (see section 4.3.4).

Aboriginal Malay Beliefs About Elephant Meat

Aboriginal Malays have mixed traditions and beliefs related to elephants. Most groups are traditionally animist but some adopted Islam several hundreds of years ago. These differing backgrounds affect the groups' relationship to elephants, specifically with regards to whether the group sanctions hunting elephants and eating elephant meat.

An early account of Aboriginal Malay hunting of elephant comes from 1642 when the Dutch colonial administrator, Jan Jansz Menie, visited a group of Jakuns in the headwaters of the Malacca river. Menie's account (translated by Bremner (1927)), notes that the group subsisted on wild yams and hunted various animals including primates, pigs, and large game including "buffaloes" (probably a reference to seladangs). Menie also mentioned that groups of Jakuns would hunt elephants using spears, giving a somewhat implausible account of how a hunter would grab an elephant by the tail.

Some Aboriginal Malays have no taboos against eating elephant meat. Favre (1865: 60) notes of the Jakuns that, "When an elephant is killed either by themselves or by the Malays, they call together their friends and relatives to partake of the large entertainment which is prepared; they then build houses in which to lodge their guests until the animal which furnishes the feast is entirely finished". Similarly, Bolton (1972: 792) reports that most of the Aboriginal Malay sub-groups that he surveyed (including the Jakun, Orang Seletar and Orang Kanak) had no food taboos.

Several 19th-century ethno-historical accounts do note taboos against the consumption of elephant meat by Aboriginal Malays. Logan (1847a and 1847b) writes on the "Binua" (Jakuns of Johore) and the "Mintirá" (Temuans living in Malacca) and notes that while "no kind of food comes amiss, if it does not intoxicate or poison them", he found that "the flesh of the elephant is not used". Similarly, the French missionary Pierre Favre (1865: 60) notes, "Some Jakuns refuse to eat the flesh of elephants, under the pretext that it would occasion sickness, but many others are not so scrupulous."

Early accounts in the 20th century were sceptical of the existence of these taboos. Skeat and Blagden (1906b: 260) found that food taboos were unusual for the Aboriginal Malays and:- "In the absence of further information it is simpler to suppose that some Jakun groups had, owing to contact with Malays or other tribes, given up one of their old tribal beliefs, or, possibly, that those which respected the elephant had acquired from outside a belief in its sacrosanctity." Burkill (1935: 922) expresses similar scepticism, suggesting that the pretext mentioned by Favre

probably just meant that all Jakuns would eat elephant meat if they could, but that they just do not get an opportunity.

However, more recent ethnographic accounts seem to confirm that some Aboriginal Malays do indeed have taboos when it comes to hunting elephants and consuming elephant meat. Bolton (1972: 792) found that the Semelai and Temuan do not eat the meat of elephants or tigers and elephants were only eaten in one out of five (20%) of the Aboriginal Malay villages for which he gives data. Similarly, an ethnographic work by Kruspe (2004) found that the Semelai have a "total taboo" on the hunting of tigers, elephants and crocodiles.

Some groups of Aboriginal Malays follow the food taboos of Islam. Since the 14th-century conversion of Sultan Iskandar Shah of Malacca, some of the Aboriginal Malays, such as the Orang Kuala also converted. Henceforth, some claimed that they "only eat the flesh allowed by their religion" (Bolton 1972). Muslims in the Peninsula generally do not eat elephant meat, as it is considered non-halal and *makruh* (disliked) under the Shafi'i school of Sunni Islam followed in the region (M. M. Khan 1994: 927). Indeed, Clarence-Smith (2016: 3, 8) suggests that enjoyment of elephant meat was one reason some indigenous groups in Sumatra were reluctant to adopt Islam. There are no reports that this was also the case in the Peninsula, although, as noted by Harris (1987), the proscription against pork is certainly one of the factors that has slowed the adoption of the religion by the Orang Asli.

Aboriginal Malay Traditions Regarding Elephants

Several Aboriginal Malay legends make reference to elephants. Davison (1988: 188) notes a "close link" between the Orang Hulu (Jakun) people of Endau Rompin and the natural world. He records the tale of the mythical giant, Datuk Sang Kelamai, "The Old Man of Endau", who goes hunting downstream, spears an elephant, butchers it, and places the meat in his rowboat to take back home (Davison, 1988: 188). Similarly, Antares (2007: 180) notes a legend of the Temuan of Selangor, where Mamak Bongsu was hunting a rogue *Gajah Keramat* or spirit elephant, which he wounded with an arrow but manages to escape with the weapon dangling from its side. Incidentally, Bongsu then named the area 'Selangor' after s*chlangor*, the Temuan word for "to dangle". Antares (2007: 182) also notes that the Temuan use the

avoidance name *nenek* (grandparent) as a "polite" way to refer to elephants. Some Aboriginal Malay groups, such as the Semelai, refer to the Milky Way galaxy as Denai Gajah (the elephant trail) (Nurul Fatini Jaafar pers. comm., July 2018).

Aboriginal Malay Hunting of Ivory

Whether or not they eat elephant meat, there is evidence that Aboriginal Malays have a long tradition of hunting elephants for ivory. In Negri Sembilan, Skeat and Blagden (1906b: 291) note that a pair of "ancient" ivory ear-studs, declared to be of Temuan origin, form part of the royal regalia of the state of Jelebu. That this ivory was hunted is suggested by an account by Favre (1865: 45; also see Skeat and Blagden 1906b: 276–278 for a related account) who notes that, in 1847, a group of "Beduanda" (Temuans) from Sungei Ujong (now Seremban, Negeri Sembilan), killed several elephants and sold their tusks. This upset the local Malay chief who "pretended" that his rights had been violated and "consequently sent armed Malays with orders to kill these poor people; as such a crime could only be atoned for by the death of the guilty parties; seven persons were killed and wounded, and many others fled to different places." Vaughan-Stevens (1892: 92) also noted the importance of the ivory trade between the Aboriginal Malays ("Ôrang Blandass", i.e. Temuan) and Malay middlemen who sold it on to Chinese and Thais.

Another account of Aboriginal Malay dealing in ivory comes from the Malacca-born writer of Indian and Arab origin, Abdullah Abdul Kadir (1796–1854), also known as Munshi Abdullah, who noted, following travels in the 1830s, that the Jakun of upriver Pahang, "dressed like Malays" and traded ivory, benzoin (resin of *Styrax* spp. trees), and rattan (Manickam 2015: 59).

Summary of Aboriginal Malay Relations With Elephants

The Aboriginal Malays' traditional relations with elephants are similar to those of the Senoi, however, there is no tradition of taming elephants. Apart from that, their traditions can be seen as being somewhat intermediary between the Senoi and the Malays in terms of their adoption of Islam, feudalism and settled agriculture. Compared with the other groups of Orang Asli, the Aboriginal Malays traditionally

had more assets such as fruit trees, permanent houses and paddy fields; and thus risk more financial losses from elephant raids.

4.3.4 Malay Settlers and Elephants

Overview of Malay Beliefs about Elephants

The Malays (introduced in chapter 2) have traditional relations with elephants shaped by animist beliefs as well as the Hindu, Buddhist and Muslim religions. Skeat (1900) notes that "all wild animals, more especially the larger and more dangerous species, are credited in Malay folklore with human or (occasionally) superhuman powers." For many Malays, elephants in particular were considered to be holy animals (*haiwan yang suci*) (Azharudin 2013: 536; Nurul Izzati et al. 2014: 1610). This tradition is consistent with the provisions of Islam where elephants are held in high esteem, although they are not usually considered to be divine (Clarence-Smith 2016).

Most Malay communities in the Peninsula have been Muslim for at least five hundred years, however "their beliefs and rituals do not preclude elements which are incompatible with the strict tenets of Islam" (Mohd Taib 1989). Tales and rituals often include elements of earlier religions modified to incorporate Abrahamic elements. For example, Skeat (1901) notes that Malays of Pattani recounted a version of the Senoi's story of the Elephant King, but began it with a reference to Adam and Eve (Nabi Adam and Baba Hawa). Numerous other syncretisms of animist, Hindu and Islamic elements are mentioned in the following sections.

These beliefs often shaped the way Malay communities responded to elephant depredation, the way they hunted elephants for ivory, the way they captured and tamed elephants, and some of these beliefs are still apparent in the performing and visual arts, and even in everyday discourse.

Keramats and Elephants

One traditional Malay belief that relates to elephants is the concept of keramat, which is a popular site for prayer, a holy object, a revered individual, or an animal considered to have supernatural powers (Tong 1998, Mandal 2012). The word

"keramat" comes from Arabic, meaning holy or sacred, and the concept was traditionally recognised by Malays, Orang Aslis, as well as other non-Malays.

Maxwell (1907: 11) notes that keramat animals were said to "treat humans with a benign consideration bordering on condescension; thus a keramat elephant will walk by the rice fields leaving the crops untouched." Skeat (1900) mentions a common Malay belief that holy elephants (*gajah keramat*) exhibited some sign of their sanctity, such as a stunted tusk or a shrunken foot, and were the protectors of certain places such as the Besisi keramat in Sepang, mentioned in the section on Senoi swiddeners, above.



Figure 4-2: **a.** (left) Keramat Panglima Hitam, Batu Ferringhi, Penang (2004), featuring a framed image of Lord Ganesha. **b.** (right) granite statue of Ganesha from the Bujang Valley, Kedah, ca. 5th century, Muzium Lembah Bujang (~80 cm).

Some keramat rituals are still practised in 21st-century Peninsular Malaysia, often combined with Chinese and Hindu traditions. In particular, ethnic Chinese Malaysians maintain many shrines to Malay *datuk keramat* (Muslim saints or wali) throughout the country. For example, Goh (2011: 151) notes how an image of Lord Ganesha had been placed in the keramat of Datuk Panglima Hitam, a legendary Malay warrior from Malacca (Figure 4-2a). Mandal (2012: 372) highlight that such keramats are both popular and historically grounded.

Some individual elephants are still attributed with keramat-like powers. In an example from the 1970s and 1980s, the people of Gerik, Hulu Perak, took a giant

bull elephant named "Aduka" (Figure 4-3) as their mascot. This elephant was possibly a tame elephant that had been released, and it roamed freely on the outskirts of the town. Members of the Malay community of Gerik credited the tusker with several exceptional feats, such as saving the lives of government soldiers who were fighting against communist guerrillas (Muhammad Shamsul 2017).





Figure 4-3: **T**he free-ranging tame bull elephant, Aduka, mascot of the town in the 1980s, Gerik, Perak

Attitudes to elephant depredation

Unlike the Orang Asli, Malays did not traditionally build tree houses, and, as settled farmers, they potentially suffered great losses from elephant raids. However, this did not usually provoke an aggressive response.

Maxwell (1907: 137) gives an account of how the Malays of Sungai Belat, Kuantan, Pahang, suffered great damage from a crop-raiding elephant but regarded it as they would regard "a flood, a harvest failure, or an outbreak of smallpox ... [with] a calm acceptance of the fate". The elephant was regarded "as a tool in the hand of some maleficent demon rather than as a voluntary harm-doer, or as a manifestation of evil rather than as the evil itself." While the Malays of Sungai Belat did not have any ill feeling against the elephant itself, they still wanted to have it killed and made solemn vows to sacrifice goats, and even buffaloes, when the elephant was killed (Maxwell 1907: 137).

While this account may be somewhat distorted by Maxwell's colonial lens, it does give some insights into the traditional Malay belief system which appears to

incorporate aspects of pre-Islamic attitudes, and, to a certain extent, a fatalistic submission to the will of the Almighty. It may support's Acevedo's (2008) observation that fatalism in the Muslim world does not involve complete detachment. My interviews (chapter 7) suggest that many Malay communities believe that it is inappropriate to express an aggressive or vindictive response towards elephant depredation.

Similar attitudes against crop-raiders were recorded in the 1932 report of the Wild Life Commission of Malaya (WLCM: I), where about 25% of Malay village headmen felt that problems from crop-raiding meant that the protection on shooting elephants should be lifted. For example, Wan Aim bin Wan Lambut, penghulu of Gerik, Perak, said: "I would like to see elephant and deer exterminated. Wild animals used to do some damage and my people were frightened of getting mixed up in a law suit if they shot [them]."

W. G. Maxwell (1907b: 42) notes that, for the Malays, animals are under the full protection of the *hantu hutan* (spirits of the forest) only while they live in the deep jungle, but those that venture close to humans, and feed on the crops of man, have done wrong by wandering too far from their proper home and thus forfeit part of the protection of the forest spirits.

Traditional Malay Beliefs Regarding Dead Elephants

Despite their respect of elephants, when a crop-raiding elephant got out of control, some Malays would take matters into their own hands and kill the culprit by setting a trap or by more direct means (Maxwell 1907: 140-41, 165). However, after killing an elephant, the corpse of the elephant was still considered to be protected by an influence known as *bahdi* (also spelled *badi* or *bahadi*). Wilkinson (1952) defines *bahdi* as the "evil influence (supernatural) haunting a place, animate being or corpse." Skeat (1900) refers to it as "the mischief", and notes that, after killing an elephant, on no account was a person "to let the naked skin rub against the skin of the slain animal." Maxwell (1907b: 37) notes that *bahdi* was believed to cause sickness, blindness, or madness.

It was possible to remove the *bahdi* from an elephant carcass by performing appropriate ceremonies. Skeat (1900) notes the following charm: "Mother of

Mischief … who originated from three drops of Adam's blood … Mischief of elephant, return to the elephant!" ("*Mak badi ... aku tahu asal kau jadi, darah Nabi Adam tiga titek asal kau jadi ... Badi gajah, pulang ke gajah*!"). The reference to "Adam's blood" refers to the Malay origin myth that elephants were created from the umbilical cord of Cain and Abel (Skeat 1900).

Fear of the *bahdi* and the fact that they considered it to be non-halal meant that Malaysia did not eat elephant meat. Hubback (1905) frequently mentions his Malay and "Sakai" companions eating meat of the seladang but he makes no reference to eating elephant meat apart one instance when he claims to have seen his guides eating an "elephant-liver"; however, the context suggests this meat was actually from a seladang. Elephant liver also features in a Malay version of being together through thick and thin, *hati gajah sama dilapah, hati kuman sama dicecap*, which Maxwell (1878) translates as "together we have sliced the heart of the elephant, together we have dipped the heart of the mite". Another isolated case comes from the 1970s, when a group of hungry Malay soldiers in the jungles of Kelantan helped themselves to some dried elephant meat that they found in a hut used by the guerrillas they had been battling against, although it is not clear whether they realised what it was that they were eating (Quinton in prep.).

Despite the fear of the *bahdi*, or perhaps because of its power, there are several traditional Malay beliefs that elephant parts have magical properties. Hubback (1905, 1941) notes that, for some Malays, a durian seed which has passed through an elephant's gut becomes a powerful medicine and an ingredient for a love-potion. He also notes that musth fluid (that bull elephants secrete during the rutting season) is similarly valued and Malays "always try to obtain some of it when an elephant is killed"; he describes that this can be achieved by putting cotton-wool into the temporal glands to absorb the oil. Burkill (1935: 924) notes that the Malays call the fluid *minyak tahun*, *minyak gajah menta*, and *minyak kelong* and use it for the removal of blotches on the skin. Similarly, Gimlette (1913: 17) notes that, for some Malays, the bristles from an elephant's tail cure toothache in children.

Some of these beliefs regarding elephant parts still persist among some Malay communities. The E. of Cranbrook (in lit., 21 Sep. 2012) notes how, for Malay

villagers in Perak in the 1960s, it was "fearfully bad luck to handle the remains of elephants." There is even a widespread taboo against touching elephant dung that is still common among Malaysian communities all the way from Johor to Sabah (V. Ponnusamy pers. comm., Feb. 2018)

Hunting Elephants for Ivory

Despite the beliefs regarding touching elephant remains, Malays did traditionally hunt elephants for their ivory. This ivory was mostly for trade, but there were some local uses. Burkilll (1935) notes that ivory was sometimes used for making the handle of a kris (Figure 4-4); Gimlette (1929: 16) notes that, for some Malays, "a stirring rod of ivory will become dusky if poison should have been put into the food"; and putting powdered ivory in a drink was said to counteract poisoning by potassium-cyanide (Gimlette 1913: 31).

The traditional uses for ivory were very limited, and the primary demand for ivory came from overseas. Kathirithamby-Wells (2005: 192) notes, "From early times, the exorbitant prices paid in China for elephant, rhinoceros and gaur parts had created within the indigenous populace, both aboriginal and Malay, a strong tradition of big game hunting." The trade was both an important source of revenue and sport for the Malay sultans (McNair 1878: 115-120). Maxwell (1887) mentions that ivory tusks of elephants were one of the three monopolies of the Malay sultans, the others being the eggs of river turtles (*Batagur affinis*), and the edible oil of the fruit of the ketiau tree (*Acronychia porteri*). Skeat (1900) notes that in Selangor there was a royal right to one of each pair of an elephant's tusks (Skeat 1900), and this right also extended to the Sultan being able to buy the other tusk at his own price (Gullick 1975: 46). Kathirithamby-Wells (2005: 192) noted that these laws were a disincentive to elephant shooting among ordinary Malays.



Figure 4-4: a. (left) A royal kris with ivory hilt and its sheath with ivory wrangka (40 cm), Muzium Negara, Kuala Lumpur. b. (right) a similar kris worn by the first king of Malaya, 1957.

In the late 19th century, the switch from traditional methods of hunting and trapping to the use of firearms increased the impact of elephant hunting. By the 1880s most bull elephants in Negri Sembilan, big and small, had been killed by Malay ivory hunters (Hubback 1905). At this time, elephant hunting was dominated by Europeans, but it was still pursued by the Malay aristocracy, including the Selangor leader, Tengku Kudin, who is known to have bagged a pair of tusks weighing 44 kg (Foenander 1939: 59).

Incidentally, at the start of the third millennium, killings of elephants in the Peninsula averaged around two individuals per year (i.e. ~0.2% of the elephant population per year) (Poh and Shahwahid 2008). Of these killings, around 60% were retaliatory killings (often using poison) in response to depredation. Between 1974 and 2016, a total of 19 elephants (about one elephant every two years) were reported to have been killed for ivory (Abdullah Zawawi Yazid pers. comm., 2018).

Capturing and Taming of Elephants

In addition to, and perhaps more important than hunting elephants for ivory was the capture of live elephants for taming and export. The art of elephant capturing and taming elephants probably arrived in the Peninsula via the ancient Indianised states of Funan (centered on the Mekong Delta), who had probably acquired the art from

India where elephants had been captured and tamed as early as the third millennium before the Christian era (Sukumar 2011). As noted in chapter 2, the demand for live elephants in India led to the trade in elephants from the Peninsula from around the 10th century, if not earlier; commercial relations having been established with the state of Kedah since at least the 2nd century (Braddell 1949). Indeed, the name "Kedah" possibly comes from the sanskritic word for an elephant corral (*khedda*) (Braddell 1949, Wilkinson 1952, Kamat 2003). The Indian influence on elephant handling is further witnessed by the sanskritic origin of the word for the elephant itself (*gajah*), the goad (*kosa*), elephant panniers (*rengkah*) and the cupola (*kop*) that covers the howdah (Figure 4-5) (Maxwell 1906: 4; Burkill 1935: 922).

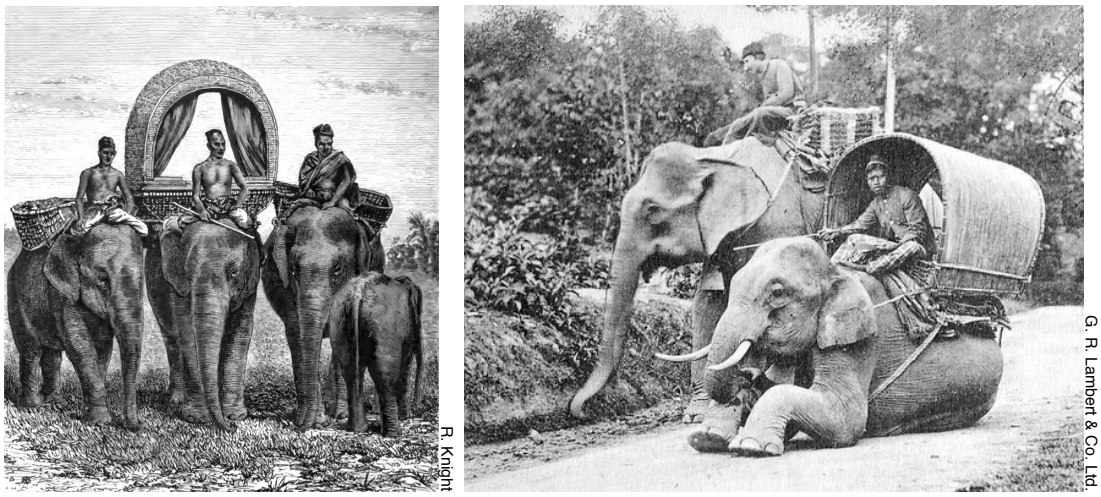


Figure 4-5: Elephants with rattan panniers (*rengkah*), and howdahs with covered cupolas (*kop*); some of the mahouts (*gembala gajah*) are carrying goads (*kosa*)
Notes: **a.** (left) this engraving, based on a photograph by Major Fred McNair from Perak (1878: 117), was later used as the vignette for a series of postage stamps (see chapter 5); **b.** (right) image from postcard published ca. 1900.

While the art is probably originally from India, there is considerable Thai influence on elephant handling in the northern states of the Peninsula. W. E. Maxwell (1881: 23) writes that the northern Malays "owe most of their ideas on the subject of taming and driving elephants to the Siamese". W. E. Maxwell's son, George, (Maxwell 1906) gives a detailed account of the mantras used by the Malays when catching elephants, noting terms of Thai origin in the vocabulary of Malay mahouts in Kedah, Perak and Perlis (Skeat and Blagden 1906b: 469 n. 2; Maxwell 1906: 8-9; Maxwell

1907: 71; Mokhtar 2006: 25). For example, *chang*, the Thai word for elephant, was used in Kedah to refer to the panniers on the sides of tame elephants, and, in more general use, *chang* meant 'to piggyback' (Wilkinson 1952). Furthermore, tame bull elephants in Perlis were traditionally given Thai names, while the cows were given Malay names (Mokhtar 2006: 25). Gullick (1986: 11) notes that the only states in Peninsular Malaysia to have recent traditions of elephant use were these northern states which had been under Thai control (i.e. Perlis, Kedah, Perak, Kelantan and Trengganu).

W. E. Maxwell (1881: 23) writes that, in Perak, the Malays "universally believed that the observance of particular ceremonies, and the repetition of prescribed formulas, are necessary before wild elephants can be entrapped and tamed." The purpose of the ceremonies was to propitiate the spirits of the forest (Wise 1895: 398). Maxwell (1907b: 37) notes that, for Malays, wild animals are protected by influences known as *bahdi* (discussed above), *jinggi*, and *genaling*. The *jinggi* can let quarry slip past the hunter in the form of a mouse, attack him in the form of a tiger, or even make the hunter appear to his friends to be an animal. The *genaling* can kill the hunter outright.

The mantras used for catching and controlling elephants in Perak supplement references to the Hindu gods, Lord Vishnu and Lord Shiva, with references to Abrahamic personages (Maxwell 1906: 3). For example, prior to noosing a big elephant to a tree, the Malays of Perak would recite a mantra to pay their respects to the patriarch Noah (Nabi Nuh), the lord of the plants; elephants themselves being considered to be of the flock of King Solomon (Nabi Sulaiman), the lord of the animals (Maxwell 1906: 19). And, prior to opening up virgin forest for an elephant enclosure, they would pray for protection from the angels Azazel and Samael – the headmen of the forest or *penghulu hutan* (Maxwell 1906: 2-3, 13).

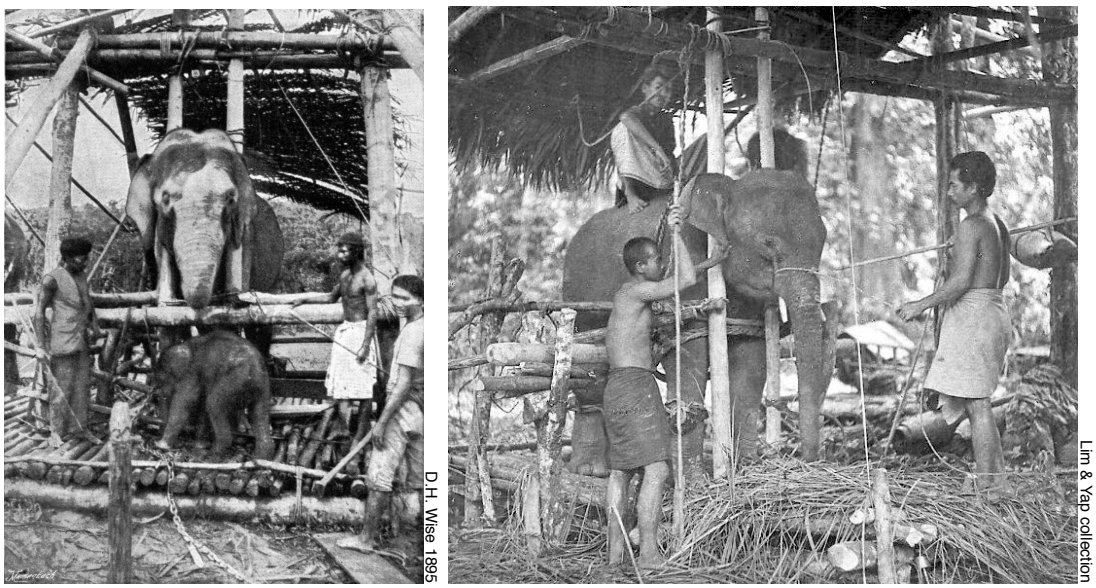


Figure 4-6: Elephants in stocks (*celong*): **a.** (left) in late 19th-century Perak (Wise 1895); **b.** (right) on a postcard published in the 1920s. Some of the men are holding what appear to be iron-headed pikes that Skeat (1901) refers to as "sā" (sau).

These mantras were usually uttered by a *pawang*[11] (shaman) specially hired for the task of capturing the elephants (Sevea 2013). Wise (1895: 398–404) notes how one of these *pawangs* was hired by the Malay chief of a district in Perak. The *pawang* worked with a group of some 50 Malay and Senoi men to catch and tame 12 crop-raiding elephants to be sold for work in the tin mines (Figure 4-6). Maxwell (1906: 40-47) notes how a solitary bull elephant would be lured using a group of cow elephants. Similar methods were also used in Perlis (Mokhtar 2006). Such traditional methods of capture of wild elephants continued until around the time of the Second World War. The American hunter Charles Mayer (1922: 57-90) gives a detailed account of how once in Trengganu he succeeded in capturing a group of 60 elephants.

In addition to their prominent role during the capture of elephants, spiritual beliefs were also important for traditional Malay mahouts during the handling of tame elephants. For example, mahouts of Kelantan, Kedah and Patani would often carry goads (*kosa*) engraved with a symbol (Figure 4-7), said to be that of Siti Fatimah (a daughter of the Prophet). Such goads were intended to protect war-

[11] Also known as a *bomoh* or *bomor*.

elephants, and to encourage them in their attacks. The goads were also to protect the mahout of work-elephants during musth (Shaw 1975: 32).

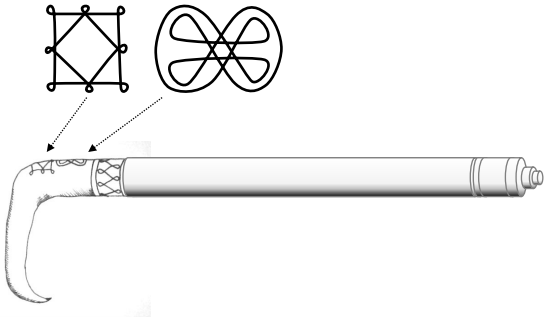


Figure 4-7: An iron-headed elephant goad (*kosa* or *cangkuk*) from Kelantan
Notes: (top left) the sign of the eight-headed *jin* (genie); and (top right) a 'Angka Sangga Siti Fatimah' symbol (redrawn after Shaw (1975)). The Malay proverb, "gajah lalu dibeli, kosa tidak terbeli," (bought an elephant, but neglected to buy the goad) highlights the importance of paying attention to detail (Maxwell 1878).

Trade in Live Elephants

The tale of the folk hero, Hang Tuah, of 16th-century Malacca, mentions importing tame elephants from Thailand. Hang Tuah, is said to have been an Aboriginal Malay (Winstedt 1962) vassal of the Sultan of Malacca. When the Sultan was interested in purchasing elephants, Hang Tuah sailed north and asked the King of Siam for six elephants. Hang Tuah impressed the Siamese with several heroic exploits, including killing a group of marauding Japanese pirates. The King of Siam then presented him, not only with six elephants for his sultan, but with an additional four elephants for Hang Tuah himself. Eventually he is said to have sailed all ten of these elephants back to Malacca (Muhammad and Robson 2014: 193, 432).

Control of the elephant trade was one of the reasons for the colonial conquest of the Peninsula. In 1641, forces of the Dutch East India Company, aided by the sultanates of Johore and Aceh seized control of Malacca from the Portuguese. At that time, hundreds of elephants were being exported from Perak and Kedah to India (Maxwell 1907a: 72-73), and also from Johore to Java (Burkill 1935). An elephant of 5½ cubits (about 2.5 m) bought in Kedah for $200 (i.e. 200 silver reals, known locally as *ringgit*, equivallent to about USD40,000 today) could be sold in India for $3000 (USD600,000 today) (Andaya 1979: 403). Hopeful to reap some of the profits

of this trade, the Dutch tried to emulate local methods, and to catch elephants in the forests around Malacca (Ito 1984: 420). But, after catching eight elephants, they failed to sell them, accusing the traders in India of scheming against them; and the animals eventually fell ill, refused to eat or "died of sorrow" (Andaya 1979: 403 n.).

By the 18th century, several sources report that elephants were no longer seen in Malacca (Ito 1984: 421, Reid 1995: 106). However, Munshi Abdullah notes some 62 elephants were caught between 1813 and 1818 (Sevea 2013: 213); and Dennys (1894) states that the species was still found in the state until the 1850s. Nevertheless, the north-eastern states of the Peninsula continued to export elephants to Java and India throughout the 18th century (Crawfurd 1820). Exports of live elephants from the Peninsula to the rest of the world continued into the early part of the 20th century, usually via Singapore (Mayer 1922).

Use of Elephants

The Malays of the Peninsula have traditionally had many uses for tame elephants, mostly for transporting nobility, and as draught animals, but also in warfare. In the 11th century, the Indianised kingdoms of the Peninsula (then part of Buddhist Srivijaya empire) were invaded by the Indian Chola Empire, and elephants were said to have been used in combat by both sides. The 15th-century *Sejarah Melayu* gives a dramatic account of the elephants' putative role in these battles (Brown 1952: 18-19). Malay rulers even claimed that their cities did not need walls for protection because of the strength of their elephant forces (Reid 1995: 104). The strategic importance of elephants is also reflected by the *gajah* holding the place on the Malay chessboard (*main catur*) that bishops hold in the western game (Elcum 1907: 88, 91); in some districts the game itself is known as *main gajah*, "the game of the elephant" (Dennys 1894).

Elephants were important symbols of royalty, with kings using them as a form of tribute. In 1103, the king of Po-se (the dark-skinned, curly-haired king mentioned above) is recorded as having presented a white elephant to the king of Yunnan (now a southwestern province of China) (Laufer 1919: 471). Locally, the Malay chiefs themselves came to consider the possession of elephants "incumbent upon their dignity" and used them as status symbols, for processions on important

occasions including circumcisions, weddings, coronations, the reception of foreign dignitaries, and funerals (Laufer 1919: 472; Burkill 1935: 922–24; Brown 1952: 143–44; Reid 1988: 173–79; Reid 1989: 25–29; Reid 1995: 104; Muhammad and Robson 2014: 151; Trautman 2015: 290–291) (Figure 4-8).

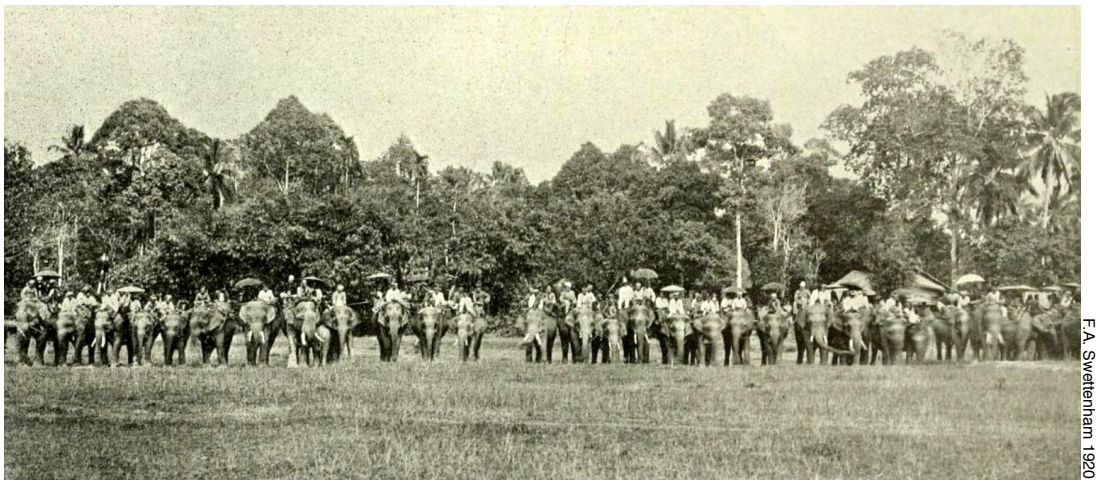


Figure 4-8: Tame elephants at a gathering in Perak, ca. 1900.

In the 14th century, the traveller, Ibn Battuta, mentions that elephants were used extensively on the east coast of the Peninsula, possibly Kelantan. His undoubtedly exaggerated account was that elephants were so numerous that "every person has his elephants picketed at his door, and every shop keeper his elephant picketed near him, for riding on to his house and for carrying loads" (Gibb 1929: 276). What is uncontested, however, is that, at this time, elephants were particularly important modes of transport in the interior of the Peninsula, particularly for the steep parts of some of the trans-peninsular portage routes (Figure 2-4) (Lubeigt 1999: 70-71).

In the 16th century, elephants were used in the defence of Malacca against the forces of the Portuguese general Afonso de Albuquerque, who attacked the city in 1511 (for the Portuguese account, see Birch 1880: 104, 178; for the Malay account, see Brown 1952: 167-169). The Sultan of Malacca is said to have joined in the defence of the city while riding atop one of his elephants. Nevertheless, the Portuguese managed to overwhelm the city and killed this elephant.

The Portuguese provide a vivid account of the death of the Sultan's elephant (Birch 1880: 141). The elephant, "mad with the mortal wound which it had received,

seized the black man who was guiding it with its trunk, and roaring loudly, dashed him in pieces, and the king being already wounded in the hand, sprang out of the castle [i.e. the wooden castle on the top of the elephant's back], but escaped because he was not recognised." Following the defeat, some of the sultan's other elephants were captured alive and subsequently used by the Portuguese (Birch 1880: 141). Incidentally, Hang Tuah, is said to have escaped to Perak where he became a chief of the Senoi (Muhammad and Robson 2014: XXII).

Following the fall of Malacca, elephants use in warfare dwindled, however, during the 19th century, there was an upsurge in demand for elephants for use in the tin mines being opened up in the west of Peninsula and capturing and training elephants became a critical part of the Perak economy (Skeat and Laidlaw 1953: 82-83, Khoo and Lubis 2005: 43, King 2006: 100-103). In 1894 there were 52 elephants in the tin mines near the town of Ipoh, Perak, alone (Gullick 1986: 120). The Malays made tin ingots in the shape of elephants and other animals (Figure 4-1b). The purpose of these ingots may have been a form of standard weight or currency, but it is also possible that they had talismanic properties connected with tin-mining (Shaw and Mohd. Kassim 1970).

By the end of the 19th century, the use of elephants had declined significantly as the expanded road network had made possible for heavy goods to be sent by carts drawn by buffaloes or bullocks (Wise 1895: 404, Gullick 1986: 120). Transport was also possible by train or by horse (Clarence-Smith 2004). In 1891, the native elephant owners in Perak tried to find work for their elephants in Selangor but met with no interest. The Capitan China of Selangor, Yap Kwan Seng, noted that elephants would damage the roads and were no cheaper than bullock carts (ANM 1957a: 5/5/1891). Falling demand had meant that prices of tame elephants had declined to $600 (USD3600 today) around 1900 (Wise 1895: 404).

One of the last strongholds of captive elephants were the stables of the royal families of the northern states of the Peninsula (Bird 1883: 210-211, Gullick 2010: 40-41, Nurul Izzati and Adnan 2015: 55-57). In 1886 the Raja of Raman (one of the Pattani states shown in Figure 2-4) came for a meeting with the British governor of Hulu Perak with a train of 100 elephants (Gullick 1986: 116). Around 1910, the

Sultan of Perak had some 63 elephants participate in a race, and he staged *Lenggang Gajah*, a form of rodeo, with elephants shaking people off their backs, into the river (Mahmud 1997: 59-60). In the 1920s, the Sultan of Trengganu asked the American, Mayer, to help him add to his stables because, "elephants, I perceive, are like ringgit. He who has many desires more." (Mayer 1922: 29). However, by the 1930s, Burkill (1935) noted that elephants were already obsolete, being only used during royal weddings, and Malay chiefs in Sumatra maintained *empty* elephant-stables for their heritage value alone.

Following the Second World War, a small number of elephants remained in use for transport in remote parts of the Peninsula. In the late 1940s, the historian John Gullick (1986: 120) saw an elephant moving timber at a sawmill in Seremban, Negeri Sembilan, but he notes that their general use "had long since ended". After the war, the federal game department had three tame elephants with mahouts from India. Acting Chief Game Warden, A. H. Fetherstonhaugh (ANM 2006: 18), reports that the Indian mahouts were repatriated and the department could only find substitutes in Hulu Perak and north Kedah. These hilly areas had a poor road network and elephant transport survived for some time after the war (ANM 1957b). However, in 1948, the guerrilla war with the communists made it dangerous to travel by elephant in the forest (see section 5.3.2, below).

By the 1970s, the remaining traditional mahouts and tame elephants in Malaysia were working in the logging industry in Kelantan (Whitmore and Ho 1968; M. K. M. Khan pers. comm., 2018). In 1974, the wildlife department decided to establish an Elephant Management Unit to capture and translocate elephants away from conflict locations. The shortage of local mahouts meant that the department had to hire four mahouts and import their tame elephants from Assam, India. Finally, by the start of the 21st century, a Kelantanese mahout, Ibrahim bin Yahya (then 70 years old), was said to be the only traditional mahout left in Malaysia (Shariff Daim 2002: 149).

Elephant Symbolism in Malay Culture

Although the tradition of taming elephants in Malaysia has died out, elephants remain an important part of Malay culture, particularly as symbols in the performing

and visual arts. Much of this elephant symbolism is inherited from the Hindu-Buddhist era. For example, the *wayang kulit* shadow-play of Kelantan features the character 'Pahlawan Gajah Sumor' (Figure 4-9a, below), an elephant-headed son of Rawana – the chief of the demons in the Ramayana. This character, along with several other half-animal creatures, is the progeny of Rawana's extensive affairs with creatures including dragons and tigers. These chimeras are said to be unique to the shadowplay of the Peninsula and are not found in the pantheon of India or Indonesia (Yousof 2015a).

While the Hindu elephant-headed god, Lord Ganesha, is depicted in the *wayang kulit* of Java, he is not found among the shadow puppets of the Peninsula (T. Chuo pers. comm. 28 Jan. 2018). Nevertheless, several granite statues of Ganesha (Figure 4-2b), dated to around the 5th century, have been found in the Bujang Valley, the site of the ancient civilisation of Kedah (Abu Talib 2014). And Ganesha is now revered by several non-Muslim communities in Malaysia (Figure 4-2a, above).



Figure 4-9: "Wayang Kulit" shadow puppets, Kelantan, 20th century: **a.** (left) the hybrid Pahlawan Gajah Sumor, **b.** (right) a tamed bull elephant. **c.** Traditional Mak Yong dancer of Kelantan.

Elephants are also a recurring image in the Mak Yong theatre, a tradition of the north of Peninsular Malaysia. The dance features several symbolic hand movements (Figure 4-9c), including some that imitate an elephant raising and rolling its trunk ("*tangan gajah lambung belalai*" and "*tangan gajah gulung belalai*") (Mohd.

Ghouse 1995). Yousof (2015b) suggests that in Mak Yong, elephants are important symbols of "abundance and richness in the natural world".

Elephants are also symbols of religion and state, both in Buddhist Thailand, and in Muslim Malaysia (Burr 1979, Salleh Yaapar 2011). The crest of the kingdom of Siam featured Erawan, the Hindu god Indra's three-headed elephant (also known as Airavata), alongside a white elephant on a red background (the national flag (see chapter 5), and a kris (symbol of the Malays) (Figure 4-10a). In Malaya, the district of Upper Perak had an elephant crest (Figure 4-10b); and the Pahang state crest has two tusks flanking a spear (Figure 4-10c).



Figure 4-10: Crests (from left) **a.** the Kingdom of Siam (1855–1916); **b.** the District of Upper Perak (early 20th century); and **c.** the State of Pahang (1947–).[12]

The crest of Upper Perak, is particularly interesting. It said to have been designed by Hubert Berkeley (see section 5.3.2), and it portrayed an elephant with a howdah, bearing the motto "Koh Dehulu". Butcher (1979) notes that "koh" was an elephant command, meaning "go slowly" and the motto could be translated to mean move forward carefully at first, or "look before you leap". A similar term 'kohoi-kohoi' is noted by Maxwell (1906) (see Table 4-5).

Elephants in Malay Proverbs

Today, the once prominent presence of tamed elephants, ivory, and elephant-based folk remedies have passed out of sight. However, there is a Malay saying that a body of a dead elephant cannot be entirely hidden, and, in addition to the visual symbols mentioned above, the Malay language itself continues to harbour proverbs and

[12] I am not certain why the tusks in the Pahang crest have a double cross-section.

idioms that make reference to these majestic animals. While these proverbs are purely figurative, they do highlight the past importance of elephants and contain some other insights into Malay culture and history.

The actual saying, *bangkai gajah takkan dapat ditudung dengan nyiru*, literally means that the corpse of an elephant cannot be covered by a winnowing basket, and the proverb signifies that a large mistake cannot be kept hidden by sweeping it under the carpet. Interestingly, Salleh Yaapar (2011) suggests that the saying comes from a Thai version, where it is a lotus leaf that the elephant cannot be hidden under. While the Thai version adds the potency of the lotus plant (a Hindu symbol of purity), there is also a Khmer version that is identical to the Malay one, using the winnowing basket imagery (Fisher-Nguyen 1994: 93).

Another saying that Salleh Yaapar (2011) identifies as having Thai roots is, *gajah berak besar, pelanduk pun nak berak besar*, literally, when the elephant has a large defecation, the mousedeer also wants a large defecation. The proverb is an exhortation to live within ones' means. It may also give some insight into a social system where certain things are considered to be out of the reach of the common folk. Of a very similar Khmer proverb, Fisher-Nguyen (1994: 94) suggested that, "Pride leads to behavior inappropriate to one's status, something to be avoided always."

Another proverb that highlights class divisions within Malay culture is related to the Swahili proverb, "when elephants fight, it is the grass that suffers", but for the Malays, when elephant fights against elephant, it is the mousedeer that dies in-between (*gajah sama gajah bĕrjuang pĕlanduk mati di tĕngah-tĕngah*) (Brown 1959). The meaning for both, of course, is that, in conflicts between the powerful, it is the weak that suffer. The pitfalls of living in the lower rungs of an hierarchical society are also reflected in the simile, *seperti gajah masuk kampung* ("as an elephant enters a village"), which refers to a powerful person being able to do what he likes among the weak (Stevens 2004: 287).

Finally, perhaps the most famous elephant saying in Malaysia is a version of "the elephant in the room". The local take is structured along the lines of failing to see the "wood for the trees" and is an admonition for failing to see the elephant right

before your eyes, while clearly noticing the ant on the other side of the ocean (*gajah di dĕpan mata tak nampak, sĕmut di sĕbĕrang lautan kĕlihatan*) (Brown 1959).

Summary of Traditional Malay Relations with Elephants

To summarise, the traditional Malay relations with elephants are characterised by a deep respect for the wild populations, not just for the danger that they represent, but also out of recognition of their connection with royalty, with the divine, and for the potentially evil influences that surround their being. As with the Senoi and the Aboriginal Malays, this respect did not prevent Malays from occasionally hunting elephants for ivory, or from killing crop-raiders. Traditional Malay mahouts adopted the art of elephant handling from the Thais and also worked together with Orang Asli groups such as the Temiars in catching and training elephants. While once very important, the place of elephants in Malay society declined sharply in the 20th century but aspects of the species still remain entrenched in the visual and performing arts, and in the Malay language itself.

4.3.5 Summary of Traditional Relations with Elephants in the Peninsula

In summary, the various traditional communities of the Peninsula can be distinguished primarily based on their mode of energy capture (Table 2-2) and resulting population densities (Table 2-3). Common threads include an underlying animistic world view which endows elephants with human souls and with a degree of supernatural powers. For all communities, these beliefs result in superstitious behaviour, including the use of avoidance names for elephants (Table 4-1), although the groups, sub-groups, and individuals differ in terms of the extent to which they exploit elephants (Table 4-4).

Differences between the traditional communities vary somewhat according to their mode of subsistence: foraging, swiddening, or settlement (chapter 2). The traditionally nomadic Menraq foragers stand out as the group with the world view most accepting of living alongside elephants but they are also the group that had the least likelihood to be in direct conflict with elephants due to their very low population density and the fact that they did not traditionally plant crops. To a certain extent, the other three groups (all farming communities) form a continuum, with the

Senoi swiddeners in the central highlands focused on the original animist traditions, the Malay settlers in the coastal lowlands professing Islam, and the Aboriginal Malay settlers being somewhere in between.

Table 4-4: Traditional human-elephant relations in the Malay Peninsula

Culture	Beliefs	Avoidance Names	Hunt	Eat	Tame	Ivory
Menraq	Animist	Yes	No	No	No	No
Senoi	Animist	Yes	Some	Some	Some	Some
Aboriginal Malay	Animist/ Muslim	Yes	Some	Some	Some	Some
Malay	Animist/ Hindu/ Muslim	Yes	Some	No	Some	Some

Note: this table presents general findings and does not account for significant in-group variation.

This summary is, of course, an over-simplification and there is actually much variation between the sub-groups, even among members of the same village; there is also continuous change in the beliefs, attitudes and behaviour of members of these communities. This subject will be examined in more detail in chapter 7.

4.4 Discussion

In the preface of his book on tigers and people in the Malay world, Boomgaard (2008: x) warns that similar research on the relationship between people and a particular species (he suggests that elephants and crocodiles would be excellent candidates) can only be done as a sideline. He points out that he read through hundreds of books that only had several lines on tigers in them, adding that targetted research was frustrated because “tiger” was seldom a keyword in the catalogues of libraries and archives.

While I agree with Boomgaard’s general sentiments, in carrying out the research for this chapter I did not find access to information to be an obstacle. This is partly due to my paper having a far more specific thematic and geographical focus. But, most importantly, the Internet makes it possible to search the content of millions

of references in libraries and archives around the world without the need to read the full texts or to navigate through a card catalogue system.

While incredibly efficient, the digital approach to research can produce an overwhelming volume of isolated snippets. It remains a challenge for the researcher to place the results in an appropriate context. An added challenge is the fact that, in the field of anthropology, the context itself is continuously shifting. Rapid advances in archaeo-genomics are leading to continuous reappraisals of the origins of the people and cultures around the world, with Asia being an area where there is likely to continue to be many new insights gleaned over the next few years. Geneticist David Reich claims that he has no doubt that analysis of ancient DNA from Southeast Asia will reveal "great surprises" over the next decade (Reich 2018: 277).

Despite the challenges in placing the findings of this study in an appropriate anthropological context, they do yield some insights. I find that, as with some groups in India (such as the Bettakurumba and Kattunayaka social groups), all traditional communities in the Peninsula have a conception of elephants as non-human persons (Thekaekara and Thornton 2016: 25). This is seemingly in conflict with the fact that some of the same groups also engage in hunting and eating of elephants. However, as with numerous other communities in Africa and in Asia (Lev and Barkai 2016), the hunting and eating of elephants takes place only with significant associated ceremony.

This finding regarding killing non-human persons can perhaps be best put into context by reference to the literature regarding violence by people against other people. Various anthropologists have pointed out that all people are capable of violence when in extreme circumstances, and such violence does not conflict with the cultural inclination towards peacefulness espoused by the world view and value systems of the Orang Asli (Robarcheck and Dentan 1987, van der Sluys 1996).

Another finding that is in line with Thekaekara and Thornton (2016) is the suggestion that our long presence in the Peninsula has allowed us to adapt to living with elephants. The Menraq are the group that seems to be the most tolerant of elephants, and, as noted in chapter 3, there are biological and cultural adaptations to living with elephants among some of these groups. As noted above, I explicitly reject

the suggestion that the foragers are in any way "backward" or "uncivilised" (in a derogatory sense). Although they do not possess or apply many of the technologies and cultural adaptations of the other groups, there is every reason to believe that the foraging culture has the most advanced knowledge of jungle and possess the most appropriate culture for their context: the forested lowlands of the north of the Peninsula. This is particularly the case in consideration of the presence of elephants in this landscape. This theme will be discussed further in the light of the findings of the later chapters of this dissertation.

The findings of this chapter could have positive implications for elephant conservation in Malaysia. The continued existence of elephants in the Peninsula seems due, at least in part, to the fact that none of the Peninsula's traditional communities regularly hunted elephants for meat. All communities had a deep respect for elephants and killing was usually only in response to persistent crop raiding. Neither hunting for ivory or for capturing elephants to tame was stimulated primarily by demand from traditional communities as none of the communities used ivory or any other elephant parts in significant quantities. As long as there is no demand for ivory from overseas, then elephant hunting should be under control.

However, in the interior of Malaysia today conflict with elephants has become a significant problem (Salman et al. 2011). The findings presented in this chapter are already being incorporated into several studies geared at contributing to the national plan to mitigate human-elephant conflict (DWNP 2013, Hii et al. 2016). In particular, the traditional views are being compared with present attitudes identified by surveys of Orang Asli presently living in elephant landscapes (chapter 7). In addition, several surveys have also been carried out to assess the attitudes of local communities to electric fences as a means to control elephant raiding (Ponnusamy et al. 2016; and chapter 8 of this dissertation).

4.5 Conclusion

Looking at the history of foragers, swiddeners and settlers in the Peninsula, I see in all three groups an underlying belief in the personhood of elephants which breeds an attitude of respect for elephants, and leads to generally low levels of attacks against elephants. In cases where groups did occasionally hunt elephants or eat elephant

meat, these activities were done with a great degree of ceremony and were generally constrained by taboos. In rural areas, many of the traditional beliefs of the aboriginal and rural Malay communities probably continue to shape their attitudes and behaviour towards crop-raiding elephants. Effective conservation strategies will therefore be those that show respect to elephants, acknowledge local customs and beliefs, and promote such traditional mindsets among the wider public in general, and among relevant government agencies in particular.

5 An Environmental History of Belum-Temengor

que de lejos parecen moscas
those that from afar appear as flies
—J. L. Borges (1942)

This chapter highlights the history of Belum-Temengor, in the north of Peninsular Malaysia, which is a priority site for elephant conservation and is also home to groups of indigenous people. In this site, the conservation of elephants comes into conflict with measures taken to develop the land for the benefit of the people such as the creation of a hydroelectric dam, building a highway, and clearing the forest to plant rubber trees. I examine the history of elephants, the history of the people, and the history of the relationship between humans and elephants in this site. I find commonalities between the ways in which the authorities have treated both elephants and people, with paternalistic attempts at translocation and resettlement resulting in unintended consequences on both elephant conservation and economic development. I highlight conflicting government policies that set the stage for unprecedented levels of conflict between Orang Asli and elephants.

KEY WORDS: Temiar, Jahai, Perak, Pattani, Asian elephant, Malaya, human population density.

5.1 Introduction

The NECAP identifies three priority sites for elephant conservation in the Peninsula (DWNP 2013). One of these sites is Belum-Temengor which consists of around 9000 km² of humid dipterocarp rainforest in the states of Perak and Kelantan, bordering around 1300 km² of forest in the south of Thailand (sites 4 and 5 in Figure 5-1, below). Apart from being rich in biodiversity, Belum-Temengor is also home to groups of indigenous people, known as Orang Asli in Malaysia.

As noted in the previous chapter of this dissertation, people and elephants have been living together in the Peninsula for millennia. However, in the 20th century, the government undertook several initiatives to bring "development" to the Orang Asli (Lim 1997, Subramaniam 2015). In places such as Belum-Temengor, such people-focused development sometimes came into conflict with elephant conservation by increasing forest clearance for industrial plantations, increasing human population density and thereby increasing the incidence of crop-raiding.

The problem of crop-raiding by elephants is a complex one and understanding the roots of the particular situation of the Orang Asli of Belum-Temengor requires examining both the history of elephants, as well as the history of the Orang Asli. This chapter aims to provide insights into the problem by (1) reviewing the history of Orang Asli in Belum-Temengor; (2) reviewing the history of human-elephant relations in Belum-Temengor; and (3) examining the effect of human population density on the distribution of elephants in Peninsular Malaysia, with a focus on Perak and Belum-Temengor.

5.2 Methods

5.2.1 Study site

Belum-Temengor is situated on the Peninsula's main Titiwangsa mountain range (Figure 5-1). This hilly landscape has an altitude generally ranging from 130-1500 m above sea level (the highest peak being Gunung Ulu Sepat, at 2160 m). The landscape has an average annual rainfall of about 2700 mm, and a mean temperature of 24°C. Belum-Temengor has long been recognised as being rich in biodiversity in general and in megafauna in particular (Ridley 1910), having the Peninsula's principal concentration of salt-licks (Stevens 1968: 62; Kromann-Clausen 2015), which are crucial supplements of minerals for large herbivores such as elephants.

5.2.2 Literature review

I reviewed a broad range of literature regarding the history Belum-Temengor, with a focus on the Perak side of the landscape. I also reviewed the history of the management of elephants in the state of Perak. The review started with a synthesis of the scattered references from colonial literature. I also reviewed primary sources in the Malaysian national archives (Arkib Negara Malaysia). These sources were updated with reference to more recent popular accounts, unpublished academic dissertations as well as academic papers published in journals in several fields of natural and social science in both English and Bahasa Malaysia.

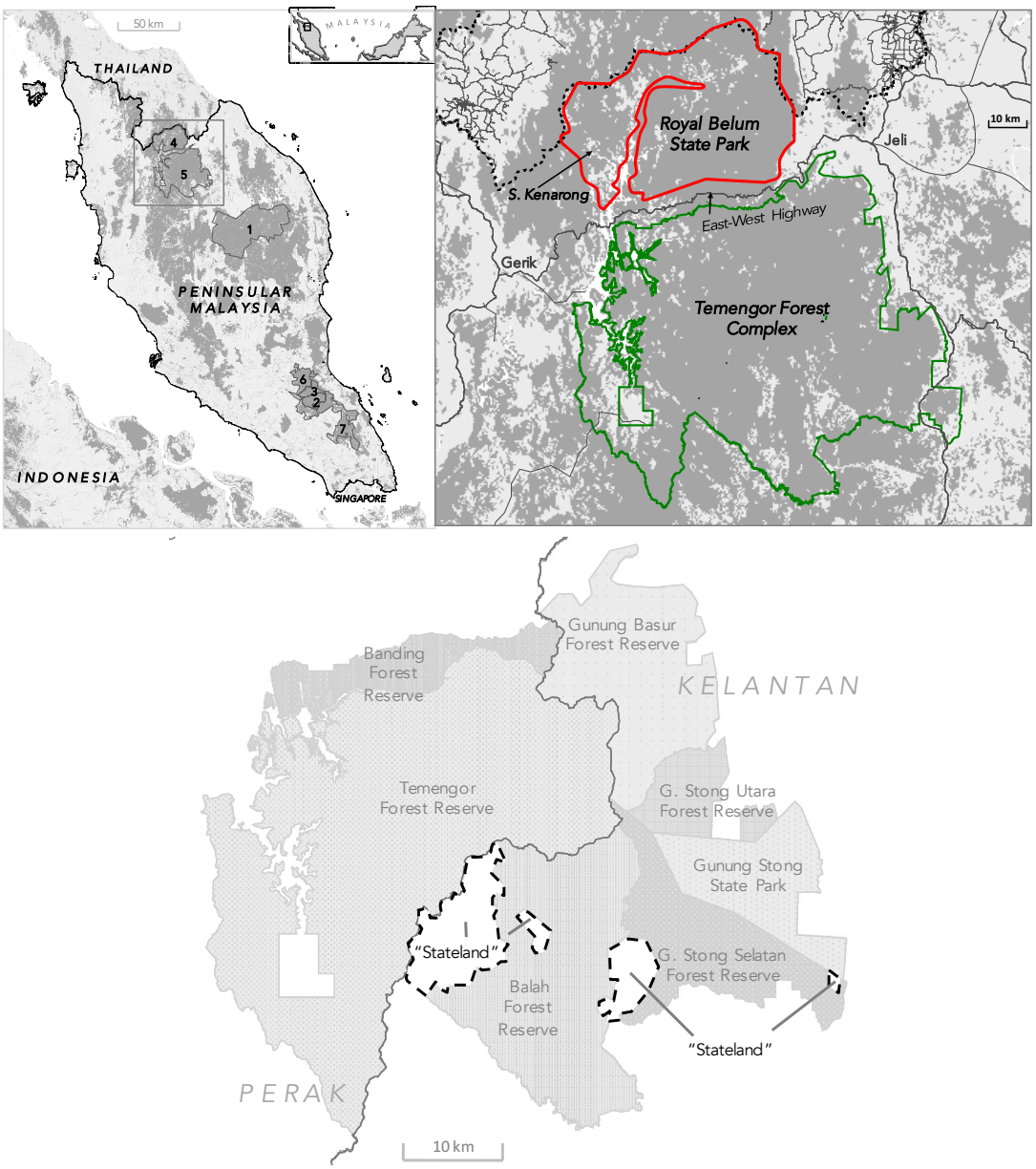


Figure 5-1: **a.** (top left) Priority Sites for Elephant Conservation in Peninsular Malaysia; **b.** (top right) detail showing the Royal Belum State Park (red outline); the Temengor Forest Complex (green outline); and the surrounding road network (black lines); **c.** (below) Landuse of Temengor Forest Complex in 2018.
Dark grey: forest cover based on "Closed to open (>15%) broadleaved evergreen or semi-deciduous forest (>5m)"; light grey: all other landcover; white: water bodies.
Priority sites: **1.** Taman Negara National Park, **2.** Endau Rompin Johore National Park (Endau-Rompin complex comprises sites 2, 3, 6 & 7), **3.** Rompin/Endau Wildlife Reserve (Pahang), **4.** Royal Belum State Park (Perak), **5.** Temengor Forest Complex (Perak & Kelantan), **6.** Endau-Rompin Forest Complex (permanent reserved forests in Pahang), and **7.** Endau-Rompin Forest Complex (permanent reserved forests in Johore).
Source: forest cover from ESA and UCLouvain (2009), excluding plantations from Potapov et al. (2017); priority site boundaries from NECAP (DWNP 2013).

5.2.3 Mapping

In order to visualise the progression of the loss of elephants in the state of Perak, I created a map of the location of elephant deaths and translocations based on data tabulated in the wildlife department's 1994 elephant conservation plan (M. K. M. Khan 1994). I geo-referenced the locations of the deaths of 15 juvenile elephants (from 1948–1968); the deaths of 73 adult elephant (from 1948–1969); and the locations of six translocations (from 1990). I overlaid these points with a map of land use as well and the distribution of elephants (based on the data presented in chapter 6).

5.2.4 Population data and analysis

To assess the effect of human population density on elephant distribution I gathered data for three different administrative levels: (i) states (in Peninsular Malaysia); (ii) districts (in the state of Perak); and (iii) sub-district ("mukims" in the state of Perak). I looked at changes over a 40-year period (looking at three particular years: 1970, 1990, and 2010). I used national census data (Department of Statistics, Malaysia: 1971, 2010) and data from the wildlife department (Khan 1994, Salman et al. 2011). For elephant distribution I used the maps from Tan (2016), as well as Lim et al. (2017a) (i.e. chapter 6 of this dissertation). I plotted the results using box-plots and log-log scatter plots.

5.3 Results

5.3.1 Overview of the People of Belum-Temengor

Belum-Temengor includes part of the territory of traditionally foraging (Menraq) and traditionally swiddening (Senoi) groups of Orang Asli (Figure 5-2). The main Menraq community in the landscape are the Jahais (Evans 1937; van der Sluys 1999; Gomes 2007). The total Jahai population in Malaysia was around 2326 in 2010 (Endicott 2016: 2). The swiddener Temiars, numbered around 30,118 (Benjamin 2014, Endicott 2016: 2). The population of Orang Asli in the Perak portion of Belum-Temengor is outlined in Table 5-1.

The traditional beliefs and attitudes of the Jahais and the Temiars towards elephants were outlined in the previous chapter (chapter 4) and their present attitudes

are studied in chapter 7. In summary, for many Orang Asli, elephants are sentient beings and should only be killed when absolutely necessary. Some Temiars do occasionally kill and eat crop-raiding elephants, but many communities have taboos related to hunting elephants and eating elephant meat.

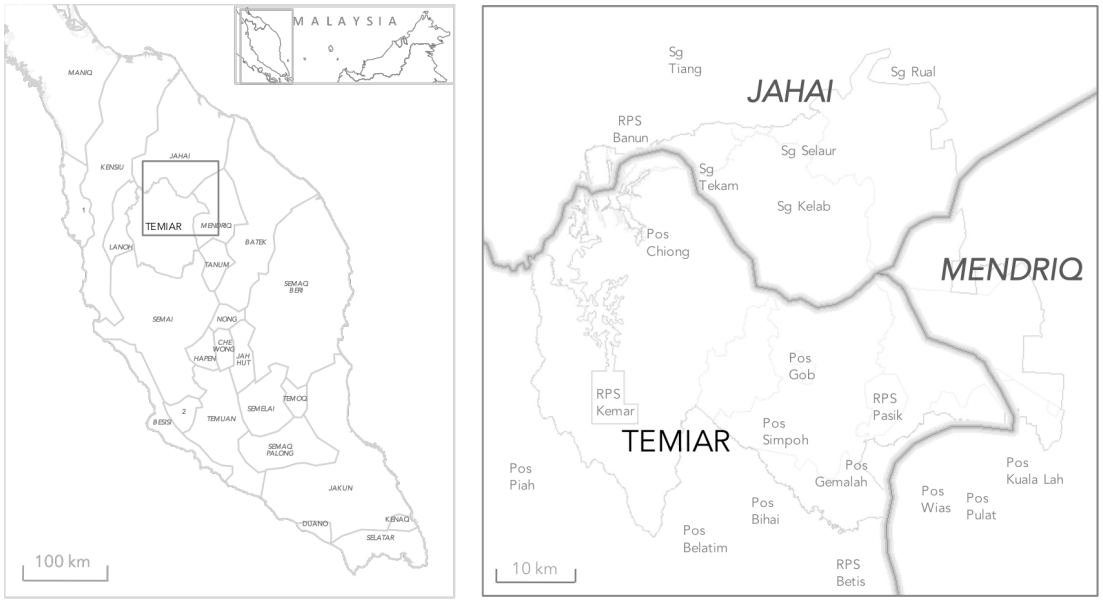


Figure 5-2: The approximate distribution of Orang Asli groups in Belum-Temengor prior to the arrival of the Malays, showing the location of Orang Asli regroupment schemes and government-supported outposts in and around the Temengor Forest Complex.

Table 5-1: Orang Asli population trends in Belum-Temengor (2009-2016)

Settlements	Ethnic Group	n	2009 Pop.	2016 Pop.	Growth Rate (%)
RPS Banun	Mostly Jahai	4	539	571	0.8 (±1.2)
Outlying Jahai	” ”	7	1119	1408	3.3 (±2.7)
RPS Kemar	Mostly Temiar	15	3477	4288	3.0 (±1.6)
Outlying Temiar	” ”	6	679	597	-1.8 (±7.9)
Total	–	32	5814	6864	2.4 (±3.0)

Notes: ‘*n*’ refers to the number of settlements in the settlement group.
Source: Department of Orang Asli Development, Malaysia (JAKOA)

5.3.2 The Settlement of Belum-Temengor

During the first and second millennia of the Christian era, Belum-Temengor has passed under the influence of numerous settler kingdoms and empires, including

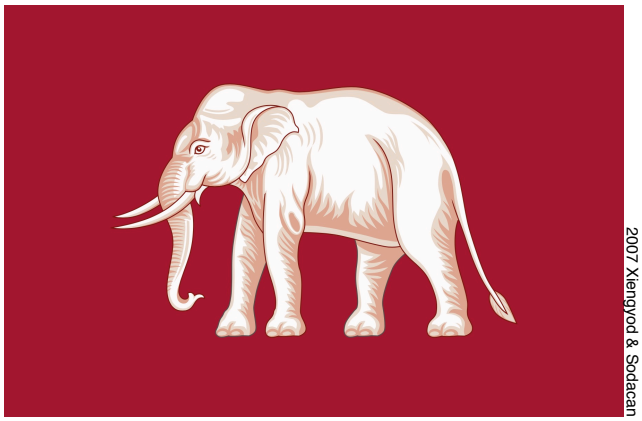
Funan, Langkasuka (thought to have covered the northern half of the Peninsula), the Mongol empire (whose influence stretched to Indonesia), Siam (Thailand), Pattani (presently part of Thailand), Raman (straddling the present border between Malaysia and Thailand), Great Britain (as part of British Malaya), and Japan (during the Second World War). Belum-Temengor presently forms part of the states of Perak and Kelantan, which since 1963 have been members of the federation of Malaysia.

The Orang Asli of Belum-Temengor have largely resisted governance as have other highland communities in Southeast Asia (Benjamin 2002, van Schendel 2002, Scott 2009). However, the Jahais and Temiars have adopted innovations from outsiders such as cultivating New World crops, cassava in particular, which came with the arrival of the Portuguese in the 16th century. The Temiars also probably learnt to tame elephants from outsiders many hundreds of years ago and were active mahouts until the 20th century (as noted in chapter 4).

In the late 18th century, Belum-Temengor came under the control of the Sultanate of Pattani, a Malay vassal state of the Kingdom of Siam. The precise circumstances of the events that took place are not clear (King 2006: 84-85), but one account describes how the Temiars tried to defend their territory by constructing earth forts at Kuala Banun, behind which their archers shot at the invaders. The Pattani army was led by Mengkong Jamal who rode atop an elephant and, while the Temiar archers managed to kill the elephant, in the end they failed to defend their territory (Noone 1936: 55). Whatever the true course of events, by 1810 the Pattanis had established villages along the banks of the Perak river, at Belum and at Kuala Temengor (Annandale and Robinson 1903).

Administratively, these areas now fell under the Pattani Kingdom of Raman (also spelled Reman or Rahman) and flew the Siamese flag bearing a white elephant on a red background for the next 100 years (Figure 5-3a). In 1818 Siam also invaded Lower Perak and required the Malay Sultan of Perak to send elephants laden with

tributes including decorative flowers made of gold and silver (known as *bunga emas*) up to Bangkok every three years.[13]



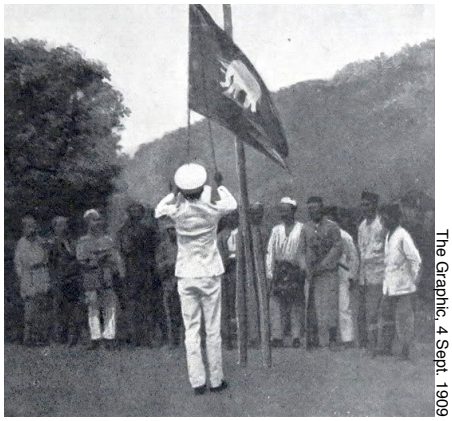


Figure 5-3: **a.** (left) Flag of the Kingdom of Siam (1855-1916); **b.** (right) ceremony for the final flag lowering, Upper Perak on 16 July 1909 – marking an end to Siamese rule and to the practice of slavery in Belum-Temengor.

5.3.3 Belum-Temengor as a Source of Slaves

The Malay settler communities traded with the Orang Asli but also carried out raids against them. From as early as the 14th century, Orang Asli slaves had been exported along with elephants to markets such as China (Lubeigt 1999:85). In 19th-century Perak, more than 6% of the population were slaves (Bird 1883: App. C II). However, the British and Dutch imposed restrictions on international slave trading, and slave-owners in Perak began to increasingly target the Orang Asli (Ileto 1971: 25, Warren 1977: 167).

Both the Jahais and the Temiars were targetted by slave raiders. After the invasion of Perak, the Thais and the Pattanis carried out numerous slave raids against the Jahais. Meanwhile, slave raiders from Sumatra (of Batak ethnicity) employed Temiars of the lowlands to hunt down the people of the highlands (Endicott 1983, Heikkilä 2016).

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[13] Incidentally, Nishii (2000: 198) notes that there are many places named after elephants along the tribute route used for travelling north to Thailand. For example, the town of Changlun, north of Kubang Pasu in Kedah, means 'elephant fell' (Thai ช้างลง), supposedly after the spot where an elephant conveying tribute had fallen into the river.

Orang Asli slaves were kept by Malays in Kuala Temengor until 1899 and in Belum until 1909, as Siam ceded these areas to Perak where slavery had already been abolished by the British in 1884 (Annandale and Robinson 1903: 28). Despite the official ban on slavery, Robarchek and Dentan (1987: 360) state that the Temiars of the lowlands continued helping slave raiders from Sumatra until the 1930s, as slavery in Indonesia continued until at least the 1940s (Boomgaard 2003).

5.3.3 History of Elephants in Belum-Temengor

In addition to being a source of slaves, for many centuries Belum-Temengor was also a source of live elephants (Maxwell 1907a: 72-73, Skeat and Laidlaw 1953: 82-83, Gullick 1986: 119-120, King 2006: 100-103). As noted in chapter 4, tame elephants were important for export, for use in mining, and for general transportation.

In the 19th century, members of the Malay elite often owned dozens elephants. For example, in 1886, the Raja of Raman attended a meeting with the British governor of Upper Perak to discuss handing back Belum-Temengor to Perak[14]; and the participants of the meeting came with a train of over 100 elephants (Gullick 1986: 116). Gullick (1986: 120) notes how elephant owners in Perak would rent them out to carry tin from mine to river, and in 1894 there were 52 elephants working in the tin mines near Ipoh alone.



Figure 5-4: Postage stamps issued in 1896 with a vignette inspired by an engraving from the book *Perak and the Malays: Sarong & Kris* (see Figure 4-5).

[14] Gullick (1986) describes a touching account of two elephants belonging to a Perak sayyid (Syed Mohd. Zin of Chegar Galah, Kuala Kangsar) being caught up in the Belum-Temengor handover, with the Governor of Malaya eventually contacting the King of Siam for their return.

Elephants were particularly important for transport in rural parts of Perak as, until the late 20th century, there were few roads and no vehicles in districts such as Belum-Temengor. The animals illustrated a series of postage stamps (Figure 5-4), adorned the crest of Upper Perak (Figure 4-10b), and graced a memorial erected in the town of Gerik, the administrative centre of the district (Figure 5-5). A similar elephant statue had also been erected in Keroh (Pengkalan Hulu) (Fodor and Fisher 1986). The sources do not state the purpose of these statues but they may have been war memorials.



Figure 5-5: During the 20th century a statue of an elephant was erected in Gerik town. Around the turn of the 21st century, following concerns that it encouraged idolatry, the statue was replaced by a giant concrete replica of the antlers of a sambar deer.

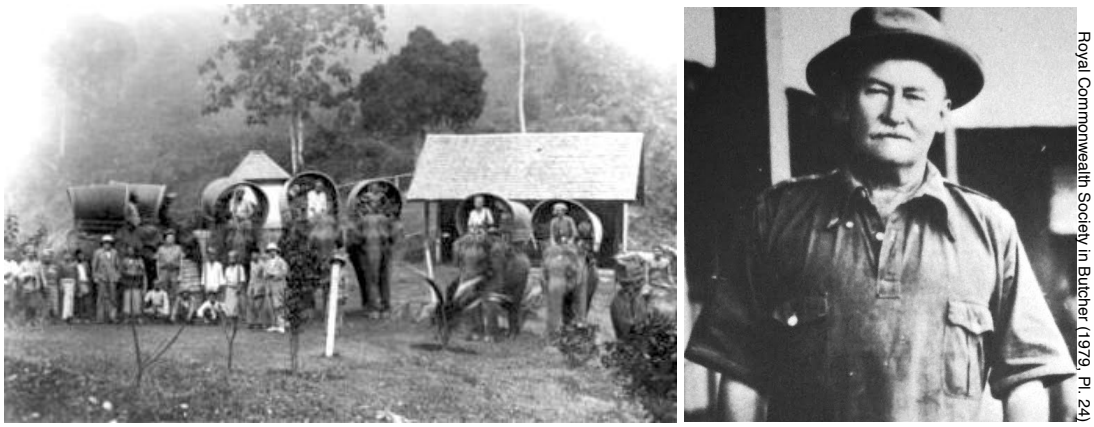


Figure 5-6: **a.** (left) the Gerik elephant corps, ca. 1900 **b.** (right) Capt. Hubert Berkeley, ca. 1922 (he is also standing in the preceding photo, eighth from left).

Given the poor roads, elephant transport continued to be used in Belum-Temengor until the mid-20th century. Captain Hubert Berkeley, the District Officer of Upper Perak from 1891-1925 (Figure 5-6b), set up a team of seven elephants (Figure 5-6a) for travel between Gerik and Belum-Temengor (Anon. 1989). Two of Berkely's elephants were still in service in Gerik after the Japanese Occupation (1941–1945) (ANM 1957/0308570).[15]

5.3.5 Moving People Out: 20th-Century Orang Asli Resettlement

As noted in chapter 4, when the proverbial elephants fight, it is the mousedeer that gets caught in-between. During the Cold War, the people of Malaya found themselves caught between the Western Bloc capitalists and the Eastern Bloc communists. In 1948, the Malayan Communist Party launched a guerrilla war against the British colonial government, which responded by declaring an "Emergency".

The guerillas were based in camps deep in the forest which made it dangerous for members of the administration to travel into the interior (Barkway 1990). For example, in October 1950, the guerrillas set up a machine gun along a trail in Temengor and managed to ambush a convoy of 36 policemen, four elephants, and seven mahouts – killing seven policemen and one elephant (Guest 2004). In 1952, another ambush in Temengor killed two policemen and one elephant; another elephant and her mahout were both injured (Swanbury 2014).[16]

To isolate the guerillas, the authorities decided to move rural communities into fenced 'new villages'. The Orang Asli suffered considerably during this resettlement (Short 1975, Leary 1995, Baer 2012). Perak had previously conceived a

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[15] Berkeley used the symbol of an elephant as the official crest of Upper Perak (see Figure 4-10b).

[16] The animal injured in the 1952 attack was a government-owned cow elephant named "Mek Yah", 37 years old at the time of the attack (and thus possibly one of Berkeley's elephants). She spent three years recuperating in Pahang before returning to Gerik to continue to carry passengers and goods (Figure 5-7b). One of her duties was to carry the ballot boxes to Belum-Temengor for the first general elections of Malaya (Anon. 1955). On "retirement", Mek Yah gave rides to children in Zoo Negara, Selangor (Swanbury 2014). This zoo opened in 1963, when Mek Ya would have been 48 years old; I remember interacting with four tame elephants when I first visited in the 1970s and a similar number when I worked there part-time in the '80s.

scheme of "controlled reservation and patterned settlements", with the passing of the Aboriginal Tribes Enactment 1939. However, following the Second World War, the colonial and post-colonial governments increased efforts to force the Orang Asli to give up their dispersed foraging and swiddening practices and to settle down. This policy of resettlement was further facilitated by the provisions of the Aboriginal Peoples Ordinance 1954 (Nicholas 2000: 82).

In 1953, the British bombed the jungle and used helicopters to spray their crops with the Agent Orange defoliant (Robarchek and Dentan 1987: 359, Stellman et al. 2003).[17] However, this resulted in Orang Asli deaths and illness and proved to be counterproductive, leading the British to switch to a 'hearts and minds' approach. In 1956 the British convinced ten Temiar men to form the 'Senoi Praaq' police unit under the command of a Malay officer (Figure 5-7). By 1959 the unit had grown to 369 men (Robarchek and Dentan 1987: 359). Between 1957 and 1967, this unit killed six guerrillas and captured 62 (Leary 1995). They also built a chain of 12 jungle forts and a number of smaller outposts throughout the Peninsula. These forts and outposts provided food, supplies, medical services and some primary schools and encouraged the Orang Asli to settle down at these sites.



Figure 5-7: **a.** (left) members of the Senoi Praaq police unit ca. 1960; **b.** (right) government elephant, Mek Yah, and her mahout en route to Gerik in 1955.

In building one of these forts, Fort Kemar, in the south of Temengor, the police had the assistance from a squadron of the Special Air Service (SAS) commando

[17] I found no evidence, however, that Agent Orange was used in Temengor.

regiment. The SAS, in addition to providing security, were in charge of making contact with scattered and isolated Temiar groups and to persuade them to visit the fort site to help with the fort construction for which they were paid (Wombell 2011).[18] These moves led to the isolation of the guerrillas who, by 1960, had either surrendered or retreated across the border to Thailand.

In 1968 the guerrillas launched a new offensive and the response of the government (now the independent federation of Malaysia) was a combination of military action and an enhanced programme of rural aid and "development" which included the construction of the East-West Highway (connecting the towns of Gerik in Perak and Jeli in Kelantan) and a hydroelectric dam on the Temengor river. In 1979, the government proposed to relocate the Orang Asli from their villages into 25 regroupment schemes known as Rancangan Pengumpulan Semula ('RPS'), some of which were located at the sites of the jungle forts. The RPS were to be sustained by clearing larges areas of forest areas and developing cash crop plantations (Nicholas 2000: 113-118, Gomes 2007).

In Belum-Temengor, the villages relocated included 13 Jahai villages who were moved from near the Thai border downstream to a site named Pulau Tujuh, which was jointly settled with people from several Temiar villages (point no. 2 on Fig. 2) (Nicholas 1995). In 1978, the Temengor Dam created a lake spanning 152 km² and inundated this site, Kuala Temengor, and several other villages. The Malay villagers were resettled to Kampung Belum Baru, south of Gerik town, and the Orang Asli had to move to a new site known as RPS Banun (Davison et al. 1995).

Once again, the twin strategy of military force and development was to be successful, and in 1989, the government and the guerrillas signed a peace agreement. The guerrillas no longer a threat, the Orang Asli began to leave the regroupment sites, some returned to their original territories and several established new villages in sites accessible from the East West Highway.

However, federal and state agencies did not recognise the right of the Orang Asli to return to their original territories, and tried to discourage the Orang Asli from

[18] Incidentally, Wombell's (2011: Ch. 6) team of policemen were repeatedly attacked by a bull elephant while they slept in a Temiar longhouse near Fort Kemar in 1953.

leaving the RPS areas. On 1 May 1984, the Perak state executive council decided that 15.84 km² at RPS Banun be gazetted as an aboriginal reserve under the provisions of the Aboriginal Peoples Act 1954 but that the wider forests be reserved for timber production under the provisions of the National Forestry Act 1984 (see chapter 6).

5.3.6 Like a Pigeon: Orang Asli's Current Status in Belum-Temengor

The government policy of excluding the Orang Asli from forest reserves and restricting them to the RPS areas had limited success. By 1993, the majority of the Jahais and Temiars had left RPS Banun (Lim et al. 2002) and settled in the surrounding forest reserves and areas outside forest reserves that the government considered to be "stateland" (see chapters 6 and 7 of this dissertation). The Orang Asli also spread out from the much larger 46-km² RPS in Kemar, in the south of Temengor, as well as from RPS Pasik, in the Kelantan portion of the Temengor Forest Complex. At present about 30% of Jahais still live in RPS Banun and more than 90% of the Temiars in the Perak portion of Belum-Temengor continue to live in RPS Kemar (Table 5-1).

In addition to the forest reserves, whose primary designation is timber production, the state governments also created totally protected areas in Belum-Temengor. In 2007, both the Perak and Kelantan governments constituted new parks in Belum-Temengor: the 1,175-km² Royal Belum State Park, in Perak (Pk. G.N. 519-2007); and the much smaller 219.5-km² Gunung Stong State Park in Kelantan (Kn. G.N. 1312-2007) (see Figure 5-1). As with the production forest reserves, the Orang Asli are not allowed to enter these areas without a permit, and the reserves have been declared to be no-hunting areas (Perintah Pemuliharaan Hidupan Liar (Kawasan Larangan Memburu) 2013 (P.U.(A)364)).

In practice the restrictions on access and hunting are seldom enforced, however the lack of formal rights causes numerous hardships for the Orang Asli (Lim 2011, Kamal Solhaimi et al. 2013, SUHAKAM 2013, Subramaniam 2013, SAM and JKOASM 2016). These studies, and that by Aziz et al. (2013), highlight the deficiencies in the natural resource legislation with regards to respecting indigenous peoples' rights. On top of legislation, the courts have held that the government has a

duty to uphold the rights of the Orang Asli (Subramaniam 2013). In one specific case of logging in RPS Banun, the courts have held that the Orang Asli have the right to the forest produce within their RPS areas (Abdul Malek 1991). However, despite the judgement of the courts and the many recommendations of the studies and reports mentioned above, the state governments have taken no action to amend the laws. Furthermore the gazette notifications for constituting the RPS areas in Belum-Temengor as Orang Asli reserves have yet to be issued, despite it being more than 30 years since the decision was made by the state executive council to proceed with the gazettement.

The state government's denial of the land rights of the Orang Asli led to a general feeling of disempowerment. Yee et al. (2016) highlight how the Jahais of Belum resent the fact that outsiders do not respect their ownership of the land, "People don't ask our permission to enter the park," said Kederi from Sungai Kejar, "they just look at me like I'm a pigeon." Outsiders intervened on numerous aspects of the Orang Asli's lives including their collection and trade in forest produce such as rattan and agarwood (Lim and Jimi 1995, van der Sluys 1996); the animals that the Orang Asli hunt (Azrina et al. 2011, Aziz et al. 2013), and those that they eat (Benjamin 2014); the education of Orang Asli children (Juli et al. 2013); and impacts on the environment of industries including tourism (Mohd Maseri 2013, Wan Suzita et al. 2015), and logging (SAM and JKOASM 2016, Lim and Lee 2017, Murad 2017).

One other issue was that different government agencies had different policies towards dealing with Orang Asli. While state land offices, and the forestry and parks departments did not recognise the legality of settlements inside forest reserves and state parks, federal agencies from the ministries of rural development, education and health provided extensive aid including building homes, schools, and clinics for the Orang Asli, even in settlements located inside the forest reserves (Lim et al. 2017a, i.e. chapter 6 of this dissertation).

The transition to a settled lifestyle resulted in an increase in the population of Orang Asli in Belum-Temengor. From 2009 to 2016, the population grew around

2.4% per annum (Table 5-1). This increase led to an increase in demand for land for cultivation.

Agriculture was one of the forms of aid provided by the federal government. The government encouraged the establishment of settled agriculture including tree plantations of rubber and oil pam. Schemes included providing each family with 400 seedlings (Walker 2013). These seedlings were sometimes planted on land cleared inside the areas disputed by the forestry and park authorities such as forest reserves and state parks.

5.3.7 Elephant Depredation in Perak

While the expansion of agriculture was aimed to benefit the local people, one unintended consequence is the increase in crop depredation by elephants. Conversion of high forest to swidden farming has been shown to result in an increase elephant population density (Olivier 1978a). The expansion of swiddens is believed to have enhanced the attractiveness of Belum-Temengor to elephants (Kathirithamby-Wells 2005: 190).

In addition to the expansion of swiddens, crops such as rubber and oil palm are particularly vulnerable to elephant depredation. Unlike seasonal crops such as rice and maize, the bark and leaves of rubber trees and the heart of palm trees remain an attractive source of food for elephants all year round (Blair et al. 1979). Rubber plantations in elephant landscapes inevitably become “supermarkets for elephants” (Santiapillai 1996) and plantations face extensive damage (Blair and Noor 1981). After a forest has been cleared, terraced, and planted, it is easy for an elephant to walk along planting lines and destroy the saplings (Figure 5-8).





Figure 5-9: **a.** (left) rubber seedling protected by bamboo slats; **b.** (right) elephant eating leaves of a rubber sapling along a plantation terrace in Pahang.

On the question of elephant conservation versus crop protection, the government generally took the position that the interests of agriculture were "paramount and must prevail" and thus elephants must not be allowed to interfere with agricultural areas (Kathirithamby-Wells 2005). In order to deal with elephants deemed to be a threat to agriculture, the DWNP initially took to culling problem animals. Between 1948 and 1969, at least 88 elephants were killed in Perak alone (Figure 5-9).

With the formation of the DWNP's Elephant Management Unit in 1974, the culling was replaced with efforts to translocate elephants away from conflict locations. This programme involved the capture by the DWNP of over 600 elephants between 1974 and 2010. Most of the elephants were relocated to protected areas throughout the Peninsula, including the Royal Belum in the north, Taman Negara, in the centre and Endau Rompin in the south (Salman et al. 2011).

At the start of the 21st century, despite the reduction in their range and number, elephants remained a significant source of complaints related to wildlife in Peninsular Malaysia. Between 1998 and 2010, the DWNP reported that it received 10,750 complaints related to wild elephants, second only to complaints related to long-tailed macaques (Salman et al. 2011). Most (72.8%) complaints about elephants involved damage to crops. From 2005 to 2010, economic losses due to elephants reported to the Peninsular Malaysia wildlife department were estimated at RM18.8 million (about USD0.04 per capita per year) (Salman et al. 2011).

In Perak, DWNP recorded around 4.5 complaints per month related to elephants between 2011 and 2016 (Table 5-2). The number of complaints, and associated costs, rose significantly in 2013 but declined thereafter.

Table 5-2: Cost of elephant raiding in Perak (2011-2016)

Year	*No. of Complaints*	*Cost of Damage (MYR)*	*Cost/Complaint (MYR)*
2011	67	126,600	1890
2012	76	482,450	6348
2013	111	171,800	1548
2014	50	40,500	810
2015	44	76,170	1731
2016	53	51,050	963
Total	401	948,570	13,290

Note: MYR4 ~ USD1. *Source*: DWNP (2017).

In recent years, the DWNP has taken a range of actions that included conducting monitoring visits, providing farmers with fire-crackers to use to scare off crop-raiders, actually firing warning shots at crop-raiders, building electric fences (examined in detail in chapter 8), and translocating elephants (Table 5-3, below).

Table 5-3: Elephant Control by Perak Wildlife Department (2011–2016)

Activity	*Typical Cost*		*Units (6 years)*	*Total Cost*
Monitoring	RM2500	/visit	450 visits	RM1,125,000
Warning shots	RM3500	/visit	375 visits	RM1,312,500
Fence construction	RM36,000	/km fence	135km	RM4,860,000
Fence maintenance	RM11,100	/km fence	135km	RM1,498,500
Removable fences	RM12,500	/km fence	8km	RM100,000
Translocation	RM45,000	/animal	52 animals	RM1,755,000

Note: RM1 = ~USD0.25. *Source*: DWNP (2017).

5.3.8 Moving Elephants into the Interior

The continued presence of Orang Asli in the forests of Belum-Temengor ran counter to the government plans to turn these areas into sources of timber and sanctuaries for wildlife. The problem caused by logging in the area has been well documented (SAM and JKOASM 2016). The problems caused by "wildlife conservation" (i.e.

translocating elephants to the landscape, and maintaining elephants in the landscape) are less straightforward.

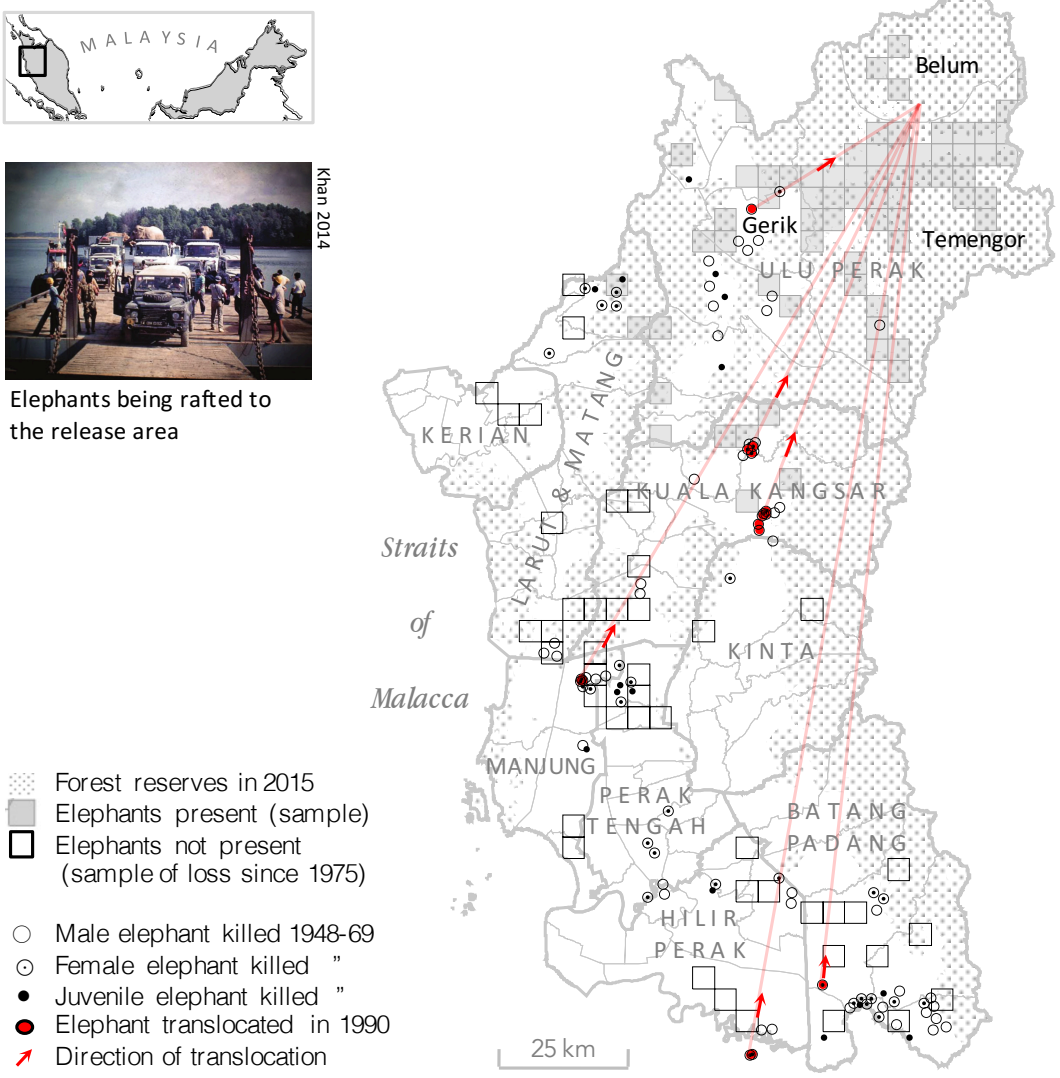


Figure 5-9: Elimination of elephants from the lowlands of Perak, Peninsular Malaysia, in the 20th century, showing translocations to Belum-Temengor
Sources: Mortality and translocation data from Khan (1994); elephant presence in 2015 from Tan (2016), and Lim et al. (2017a).

From its origins as the source of wild elephants for taming, during the 1970s Belum-Temengor began to be transformed to being the release site for wild elephants that had been translocated from agricultural areas in the lowlands (Salman et al. 2011). These agricultural areas were mostly in areas where forests were being cleared for rubber, oil palm and settlements (Blair 1979, Chadwick 1992, Shariff Daim 1995). In Perak, the translocation programme (highlighted in section 1.1.4, above) resulted in a

significant contraction in the range of elephants in the lowlands, and an increase in the population of elephants in Belum-Temengor (Figure 5-9).

Belum-Temengor was one of several conservation sites that the wildlife department deemed to be a suitable destination for the elephants due to the landscape's relatively low human populations, low levels of agriculture and extensive areas of natural forest. Between 1974 and 2010, the department carried out more than 600 wild-elephant translocations to these conservation sites (Salman et al. 2011). In the 1980s, these translocations involved taking a barge across the Temengor lake to the vicinity of Sungai Kenarong inside the Royal Belum State Park, and far from any village (PSPC 2017: 15) (Figure 5-1b). This eventually proved too costly and the elephants were instead released near the highway (see chapter 8). Between 2010 and 2016 the department made some 52 translocations to this locality (DWNP 2017). All of these translocations originated from areas with high human density – Sungai Siput, Gerik and Lenggong.

Moving elephants to areas with low human occupancy reduces the number of potential complainants, and was thus an attractive strategy for the authorities to take. Indeed, following the translocations in 2011-2013, the department reported a significant (>60%) drop in the cost of elephant damage in Perak and also a 20% reduction in the number of complaints related to elephants in the state (DWNP 2017).

5.3.9 Elephant Presence in Belum-Temengor

Prior to the advent of sophisticated monitoring methods, rough estimates by game wardens were based on direct observation (M. K. M. Khan, pers. com. 31 March 2017). These methods suggested that there were only nine elephants in the herd that visited the salt-licks in the Perak portion of Belum-Temengor (Khan 1967), and 25 over in the Kelantan portion (Khan 1985). However, Hii (2017), using camera-trap technology found that, over a one-year period (October 2012-October 2013), some 55 adult elephants (34 cows, 21 bulls) visited one of the largest salt-licks, "Sira Gajah", in the south of Temengor (see chapter 8). The elephants included seven family units with a mean group size of six individuals, four mother-calf units and 18 lone males. One bull, "Awang Banun" was spotted wearing a satellite collar and

identified as an individual that had ranged at least 30 km from the salt-lick to RPS Banun (see chapter 8).

5.3.10 Elephant Depredation in Belum-Temengor

While the overall levels of conflict in Perak were reduced by the translocations, elephant depredation in Belum-Temengor may have increased. Several decades after the first translocations, numerous studies report that elephant raids were widespread in Belum-Temengor. Azrina et al. (2010) interviewed 284 respondents from eight villages around RPS Banun and found that 87.7% reported elephant raiding as a problem. Similarly, Juli Edo found that crop-raiding by elephants and wild boar was one of the main reasons that the Jahais and some Temiars moved out of RPS Banun and created new villages at Semelor, Pulau Tujuh, Sungai Kejar and Sungai Tiang (Juli et al. 2013).

Non-governmental organisations SAM and JKOASM (2016: 65) also note that crop-raiding by wild elephants was a problem at RPS Banun and RPS Kemar. They report that between 2010-2015 there were three people from RPS Kemar killed by elephants and one person lost an arm while trying to scare elephants away. Chow and Yee (2016) highlight the case of a 15-year old boy who was killed by an elephant in RPS Kemar, with the headman of the village claiming that, “If outsiders die, it will surely appear on TV. But when it happens to orang asli, nobody knows about it.” They add that, in response to the depredation, from 2014-2016, five to six elephants had been killed in Belum-Temengor, mostly by fruits laced with rat poison and fertilisers, but also by spear traps (Chow and Yee 2016).

The Royal Belum park management plan states that HEC “is a serious issue for the indigenous communities living in the park. Crop raiding by elephants (and wild boars to a lesser extent) has now prevented them from being able to planting hill paddy or any other forms of crops around their settlements.” (PSPC 2017: 23). Similarly, my survey of Temengor Forest Reserve (detailed in chapter 5) also found that elephants were present throughout the reserve and some degree of crop-raiding by elephants was reported from all settlements in the landscape.

Azrina et al. (2010) state that the problem of crop-raiding might have been due to relocation of elephants causing the local “carrying capacity” of the forest to be

overwhelmed. Similarly, Kamal Solhaimi et al. (2013: 86 n. 2) report a belief among a Temiar community in Temengor that "local elephants" are easy to handle and would leave their settlements if told to do so, but "outside elephants" often trespass into their village or fields, refusing to leave. A news article by the BBC interviewed Jahai Headman Andak, from RPS Banun, claimed that there had been an increase in elephant raiding: "They used to come in ones and twos, and they weren't much of a problem. Now they come in herds of between ten and 12 and they eat anything they can find." (Walker 2013). Studies from Sri Lanka support support this idea that translocated elephants become habituated to humans and are thus more prone to depredation (Fernando et al. 2012). Similarly, Naveh and Bird-David (2014), report that among the Nayaka hunter-gatherers of the Nilgiris of South India, a specific long-term convivial relationship can develop between an individual human and an individual wild elephant.

More recently, Yee et al. (2016) produced a video documentary regarding a Jahai village in Belum that blamed translocations for repeated elephant raids on the village. The Royal Belum park management plan states that the translocations had "potentially elevated local levels of human-elephant conflict, especially at the Orang Asli settlements in the park" (PSPC 2017: 15), adding that, "Although HEC is a fairly recent occurrence in the park, which has escalated over the past two decades, it is unclear whether the elephants involved are from the original or translocated populations." (PSPC 2017: 23). The recent increase in conflict had meant that "cultivation of hill rice has not been practiced in the last five years due to crop raiding by elephants."

The Orang Asli have raised the issue of elephant depredation in Belum-Temengor with the authorities. Between 2011 and 2016, Banun and Kemar were two of five sites in Hulu Perak that DWNP considered the severity of crop-raiding to be "serious" and warranting action as they generated more than three complaints a year (DWNP 2017). In comparison, Yee et al. (2016) found that the wildlife department had received a relatively low number of direct complaints from the small settlements in Belum. Reasons given for this included the facts that the Jahais lacked adequate

telephone facilities, and that their village was too remote for them to conveniently make complaints to the DWNP office in person.

5.3.11 Human Population Density and Elephant Distribution in the Peninsula

In the Peninsula as a whole, and in the state of Perak, human population was negatively correlated with the distribution of elephants (Figure 5-10, Table 5-4). In 2010, the human population of the mukims (sub-districts) in Perak where elephants were detected (23 people per km²) was 13% of those mukims where elephants were not detected (178 people per km²). Put another way, there were 7.7 times as many people in the mukims where elephants were not detected as there were in the mukims where elephants were still present. This finding was statistically significant ($p < 0.05$) for the state-level and mukim-level analysis, but not for the district-level analysis (probably due to the low n in the latter).

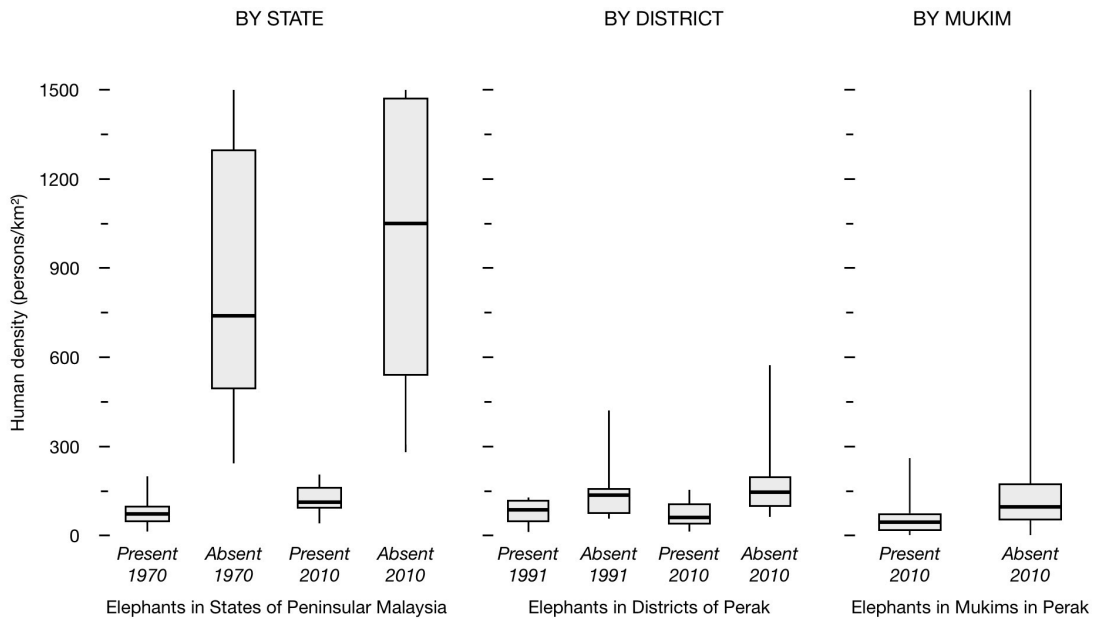


Figure 5-10: Human population density in administrative divisions of Peninsular Malaysia and Perak with elephants known to be present and those where elephants have no longer been detected: **a.** states, **b.** districts of Perak, and **c.** mukims of Perak. *Source*: Elephant data from Khan (1994), Salman et al. (2011), Tan (2016), Lim et al. (2017a); human population from Department of Statistics, Malaysia (1971, 2010).

Table 5-4: Correlation between human population density and elephant presence

Aggregation units and year	*Unit size (km²)*	*n*	τ	*p*
States of Peninsular Malaysia 1970	11,048 (±8212)	12	-0.54	0.015
States of Peninsular Malaysia 2010	10,202 (±8231)	13	-0.67	0.002
Districts of Perak 1991	2096 (±1117)	10	-0.44	0.104
Districts of Perak 2010	”	”	-0.49	0.075
Mukims of Perak 2010	262 (±200)	80	-0.44	2×10^{-6}

Note: τ – Kendall rank correlation co-efficient (tau); *p* – probability value.

In terms of individual states, no elephants were detected in states with mean population densities above around 200 people per km² (Figure 5-11). Between 1970 and 2010, three states (Perlis, Negeri Sembilan, and Selangor) lost all their elephants as they crossed this human population threshold. A similar cut-off point also applied at the level of districts within the state of Perak, where three districts lost all their remaining elephants as their human population densities increased between 1991 and 2010.

At the finest resolution of data available, the level of mukim, the cut-off point was lower, with no mukim in Perak with more than 100 people per km² having elephants detected. The mukim with the highest human population density and still having elephants present was Grik, with 73 people per km², followed by Pengkalan Hulut, with 72 people per km². The mukims with the most elephants (Belum and Temengor) have human populations below 10 persons per km².

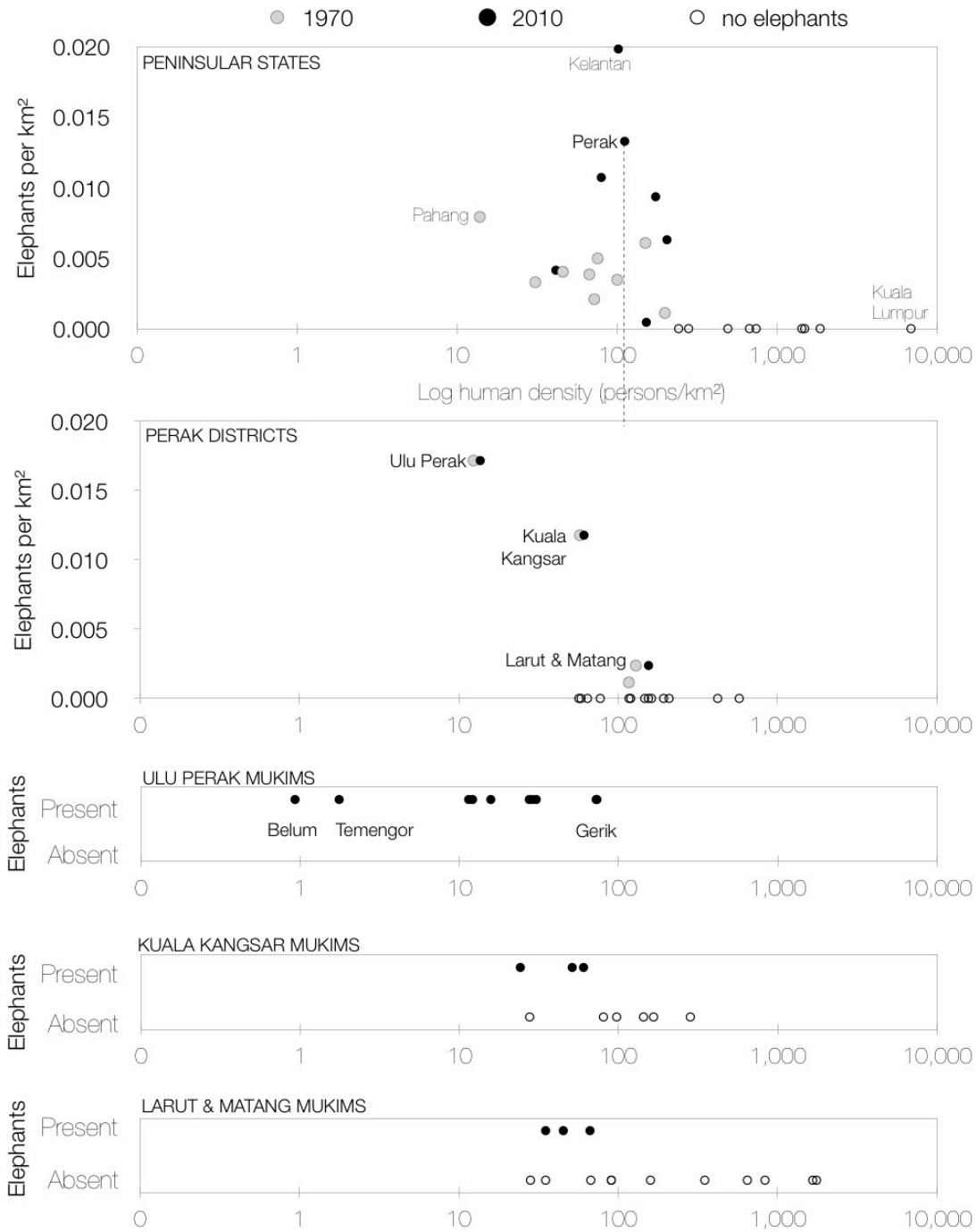


Figure 5-11: Relationship between elephant presence and absence and human population density.

5.4 Discussion

5.4.1 History of Human-Elephant Relations in Belum Temengor

The history of Belum-Temengor can be seen from the perspective of human-elephant relations as having three phases, (i) co-existence between elephants and forager and swidden communities; (ii) exploitation of both elephants and Orang Asli by the

settler cultures; and (iii) twin paternalistic attempts by the state at both "conserving" elephants and "developing" the Orang Asli. Examining this latter stage reveals tensions in reconciling the two goals of the state. As a result of the tensions, both elephant conservation and human development have met with mixed success. Here, I explore this tension in more detail and highlight areas where the history of the landscape suggests areas for a future where convivial human-elephant co-existence may once again become a reality.

The development of Belum-Temengor bears two of the classic hallmarks of state-initiated social engineering: bureaucratic planning and high-modernist ideology. James C. Scott (1995) notes the dangers of such social engineering and identified four elements that, when taken together, often result in tragedy. The resettlement of the Orang Asli out of the interior and the translocation of elephants into the interior are a clear example of Scott's first element: the administrative ordering of nature and society.

Scott's second element, "a high-modernist ideology" is also reflected by the numerous aspects of "development" that the British and later Malayan/Malaysian governments have put in place in the region. These include the government's self-confidence about the benefits of the RPS settlement schemes (particularly the provision of houses); the promotion of settled agriculture; the creation of forest reserves managed using "scientific forestry" (especially the promotion of timber plantations in these reserves (Aziz et al. 2010)); and the construction of the Temengor dam.

In addition to underpinning development projects, the high-modernist ideology is also evident in the state-led initiatives for wildlife conservation. The wildlife laws, the reservation of the state park and, indeed, the formulation of NECAP itself all are characterised by a very top-down orientation. This gives rise to the impression among local communities living in the designated elephant conservation priority sites that the state prioritises the welfare of elephants over the communities' own development. Norwegian anthropologist, Signe Howell, points out that the National Elephant Conservation Centre was itself established on the land of

the Chewong, asking "elephants or people – who counts more in present-day Malaysia" (Howell 2018).

Fortunately a tragedy in Belum-Temengor was averted due to the relative weakness of the state and the relative strength of civil society. Scott's third element – an authoritarian state willing and able to use coercive power to bring its high-modernist ideals into being – did not characterise the Perak or Kelantan state governments. While the federal government did make use of coercion during the Emergency, it fortunately did not use the full weight of its powers to force the Orang Asli to remain in the resettlement schemes, or to exclude them from the forest. And similarly, Scott's fourth element – a prostrate civil society that lacks the capacity to resist the state –may have existed at some points in Malaysian history but does not characterise the formal and informal networks that the Orang Asli have used to assert their rights over the last few decades.

While the human development situation in Belum-Temengor cannot be characterised as a human-rights tragedy of the proportions described by Scott (1995), the situation is far from ideal, particularly in regards to elephant depredation and the apparent conflict between development and conservation. In this regard, it is worth highlighting how bureaucratic planning failed to identify the second-order effects of several "development" initiatives: (i) translocation; (ii) logging; (iii) plantation development; and (iv) the increase in human population density as a result of improved health care.

It is indeed possible that the translocation programme could have increased the prevalence of crop-raiding by elephants in Belum-Temengor. Upon release, translocated elephants can range over a considerable distance (Stüwe et al. 1998, Wadey et al. 2018). This has meant that, following the translocations, there can be an increase in crop-raiding in the villages nearest to the release site, even if these villages are many kilometres from the actual release point (Fernando et al. 2012).

Nevertheless, it is important not to isolate translocation as the cause for increased elephant depredation since it is likely that local elephants are the ones primarily responsible for crop-raiding. For example, Campos-Arceiz (2013: 5) found no crop-raiding behaviour among three translocated elephants that had been collared

over a 225-day period. Furthermore, the wildlife department recognises that translocating elephants into protected areas is not a suitable option in all situations, also due to factors such as the high cost and stress caused to the animals (Salman et al. 2011).

Extensive areas of forest in Belum-Temengor have been opened up for industrial logging. This has probably increased the food available for elephants and has, at least temporarily, increased the population of elephants in the landscape (the extent and effects of forest clearance in Belum-Temengor will be examined in more detail in chapter 8).

Similarly, the extensive promotion and adoption of permanent agriculture (particularly rubber plantations) is a clear source of conflict that would not traditionally have affected the Orang Asli community of Belum-Temengor. The effects of such plantation activities on the attitudes of local communities in the region are examined in chapter 7 of this dissertation.

Finally, the government policy of resettlement and development has caused a significant increase in the Orang Asli population. For example, the Temiar population increased from less than 9000 in 1964 to around 28,000 in 2014 (Benjamin 2014). This increase is best seen in the context of the general increase in population of Malaysia (discussed in the following section).

5.4.2 Human Population Density and Elephant Distribution

The results of my analysis of human population density and elephant distribution in Perak suggest that a key to controlling the deterioration of human-elephant relations appears to be keeping human populations below a certain threshold. This can be achieved by land-use planning (restricting the size and number of settlement in the key conservation landscapes).

In this regard, it is worth reiterating that the various indigenous groups of the Peninsula traditionally lived at population densities compatible with elephant conservation. The traditional Menraq culture had a very low population density of less than one person per km² (Evans 1937). At those levels, chance encounters between the species would be rare and the absence of farming means minimal attraction for elephants, the depredation-habituation cycle would not occur.

Similarly, traditional Senoi swiddener villages remained small because they were limited by the amount of food that could be produced by traditional agricultural systems. Swidden agriculture can support around seven persons per km² and still people remain in productive equilibrium (Whitmore 1975: 279). Throughout the range of the Asian elephant, these low population densities seem to be the key factor affecting communities' relationships with elephants, with the dispersed communities of swiddeners having a less confrontational relationship with elephants than the densely populated settlers (Olivier 1978a: 400, Wen et al. 1995: 196, Fernando et al. 2005). Sun et al. (1998: 50) use historical data from China to suggest a crude threshold value for human population density of around 20 persons per km², above which elephant populations do not persist.

In the Peninsula, a significant expansion of settled agriculture occured in the 20th century. In the present area of Peninsular Malaysia as a whole, the 20-person per km² threshold was crossed sometime between 1901 (when there were around 15 people per km²) and 1930, when the population reached 22 people per km². In terms of elephant conservation this increase in population has been somewhat mitigated by the increasing concentration of the population in urban areas, shifting from 20% urban in 1930 to 75% urban in 2017 (Guérin et al. 2017). During the 20th-century, elephants were extirpated from all the urban areas along the west coast of the Peninsula (Tan 2016).

The occupancy model for elephants in Peninsular Malaysia developed by Tan (2016) indicates that human population density was the factor with the strongest negative influence on an elephant's ranging behaviour, a finding consistent with studies elsewhere in Asia and also in Africa. For example, in Zimbabwe, Hoare and du Toit (1999) found a non-linear relationship where human density does not affect elephant numbers until passing a threshold of about 15.6 people per km², after which elephants are extirpated.

Hoare and du Toit (1999) note that their study was focused on the savanna elephant (*Loxdonta africana*) and state that they are cautious about extrapolating it to the forest elephant (*L. cyclotis*) as the species' ecological requirements and patterns of human land use are different. Similarly, the ecology of the Asian elephant and the

patterns of land use in the Peninsula are also different. The following chapters examine the particulars of the elephant ranging behaviour and the patterns of land use among the Orang Asli of Belum-Temengor in more detail. Once these issues have been examined, the issue of human population density will be discussed in more detail in the general discussion.

5.5 Conclusion

The future of Asian elephants depends very much on the success of conservation measures in sites such as Belum-Temengor. This chapter has shown how both indigenous people and elephants have experienced a history persecution which has now shifted to paternalistic protection. Fortunately, the authorities recognise that the fate of elephants is linked to the wellbeing of the people and schemes such as community fences represent a promising trend towards empowering local communities to play a role in the conservation of their local resources.

With the buy-in of these communities, crop-raiding will be less likely to lead to retaliatory killings and there is a good chance that the species can be conserved. In order to be effective, the initiatives of the federal government need to be combined with more far-reaching state-level reforms in the legislation regarding Orang Asli rights as highlighted by the court judgements, the recommendations of the National Human Rights Commission (SUHAKAM), and the numerous studies that have been referenced in this chapter. It is crucial that conservation agencies (both governmental and non-governmental) play a role in these reforms to ensure that the recognition of Orang Asli rights does not result in over-development of conservation areas.

It is also important that land-use controls are respected and the human population increases are increasingly confined to urban areas. However, it is important that these controls are not imposed via an imperial or hegemonic planning mentality that excludes the input of local communities. Instead it is key to recognise the traditional land use patterns of the Orang Asli and to work with them to identify land-use plans that will meet the needs of both national conservation initiatives (such as NECAP) and local aspirations. Specific challenges associated with mapping these potentially competing interests are the subject of the following chapter.

6 Mapping the Distribution of People, Elephants, and Human-Elephant Conflict in Belum-Temengor

This chapter examines the location of Orang Asli habitation in Temengor Forest Complex. The specific objectives are to (i) determine the original extent of indigenous lands; (ii) map the location of existing human settlements; and (ii) to determine the extent of current human-elephant conflict. I reviewed the history of settlement in the site; geo-referenced settlements in existing maps; and ground-truthed a sample of these locations. I found that the whole of the site is located in part of the original indigenous lands; I mapped a total of 16 occupied settlements inside the Temengor forest reserve, including three settlements in the interior of the forest reserve and 13 on the periphery; I found that 97.5% of sites visited has elephants and 43% experienced human-elephant conflict. I discuss several ethical implications of community mapping but recommend carrying out further mapping of villages throughout all sites designated for elephant conservation and propose that land claims be identified via a participatory approach.

KEY WORDS: human-elephant conflict, community mapping, Google Earth, Jahai, Temiar.

6.1 Introduction

6.1.1 Remote forest settlements

As of 2017, there are still human communities in remote parts of the forested tropics that remain uncontacted by the outside word (Nath 2017). The government of Brazil has successfully used aerial surveys to identify dozens of uncontacted groups in the vast Amazonian forests (Reel 2007). While the forests of Malaysia are much smaller and more accessible, there is some speculation that there could still be some isolated groups living in these forests as well (Holmes 2013). There is no evidence of any uncontacted group in Malaysia but several forest settlements have very little interaction with the outside world and are only accessible by footpath (Sluys 1999, Lye 2004, Lai 2015). The government seldom gives official recognition to these remote forest settlements (Lim 2011).

The Orang Asli claim customary rights over much of the forests of Peninsular Malaysia. The lack of recognition of these land rights by the government has caused the Orang Asli to suffer numerous problems. Most of these issues have been

documented by a national enquiry convened by Malaysia's national human rights commission which found that "a high level of frustration, anger and desperation among indigenous communities because of the non-recognition of their rights to land" (SUHAKAM 2013, Subramaniam 2013). Those communities living in forested settlements are particularly vulnerable if the authorities permit the forest to be logged without taking community interests into account (Watson 1996, Rist et al. 2012).

Furthermore, government agencies lack clear strategies for dealing with remote forest settlements. In particular, the existence of these settlements poses a challenge for the state agencies that control logging and mining (Subramaniam 2013). In addition, conservation of forests and wildlife can be undermined without due consideration of the presence of people in protected areas (Schwartzman et al. 2000, Aziz et al. 2013). Indeed, in some cases, the negation of the role of local people in safeguarding forest resources has been identified as the most important driver of deforestation (Waiswa et al. 2015).

The uncertain status of forest communities poses significant challenges in the Malaysian government's attempts at planning and implementing programmes to conserve the nation's rich biodiversity. These challenges are particularly acute in the conservation of large mammals such as elephants that can come into conflict with local communities (Bruner et al. 2001). Thus the success of plans such as NECAP depend on a clear understanding of forest communities.

6.1.2 Orang Asli Settlement Patterns in Belum-Temengor

As noted in chapter 5, several problems can arise when Orang Asli land is declared to be a protected area, and crop raiding by elephants has become a significant issue for some of the communities living in the Belum-Temengor elephant conservation site. NECAP recognises the need to resolve issues related to people living within such sites (DWNP 2013: 57).

As noted in chapter 5, Temengor includes part of the territory of the Jahais and the Temiars (Figure 5-2). Over the years the state governments have approved projects on this land, including industrial logging, oil palm and rubber plantations. The Orang Asli managed to take legal action against some of these projects and several court rulings have upheld their traditional land rights (Lim 2011).

Recently there have been several high-profile cases of Temiar communities challenging logging in both the Perak and Kelantan parts of the Temengor priority site. News resports highlight the Temiars building blockades on logging roads and the subsequent dismantling of these blockades by the authorities (Lim and Lee 2017, Murad 2017). However, apart from a few brief mentions in NGO reports (SAM and JKOASM 2016), few details of the extent of Orang Asli settlement in Belum-Temengor have been published and thus the extent of the conflict with NECAP is not clear.

6.1.3 Mapping Elephant Distribution in Peninsular Malaysia

There is a similar lack of data on the distribution of elephants, and the extent of elephant depredation in the villages of the interior of Belum-Temengor. Between 2013 and 2015 the MEME project has surveyed members of the public throughout Peninsular Malaysia to determine where elephants are still found and to examine the degree of conflict that they cause (Tan 2016). This survey used an interview method developed by the Elephant Conservation Group ('ECG'), a network of 11 teams involved in Asian elephant conservation in range countries (Campos-Arceiz and Fernando 2016). The ECG method was developed for the study of human-elephant conflict in nine Asian elephant range countries. For the Malaysian component, it involved partitioning Peninsular Malaysia into 5-km by 5-km grid cells and interviewing people within each grid on whether elephants were found there and the extent of human-elephant conflict (see Figure 6-1).

Tan's (2016) survey included respondents from about 16 grids in the Temengor Forest Complex as well as numerous respondents from the non-forest areas on the periphery of the complex (Figure 6-1, inset). The interviewees from the grids in Temengor Forest Complex included members of Orang Asli communities in RPS Banun in Perak, as well as RPS Pasik in Kelantan. Tan also visited several other villages outside RPS Pasik, these included Pos Simpoh and Pos Gob. For this study Tan only visited settlements that were accessible by motorcar and not grids that were dominated by plantations, water-bodies, and forests. She marked these areas as "no interviewees" and did not include them in the study.

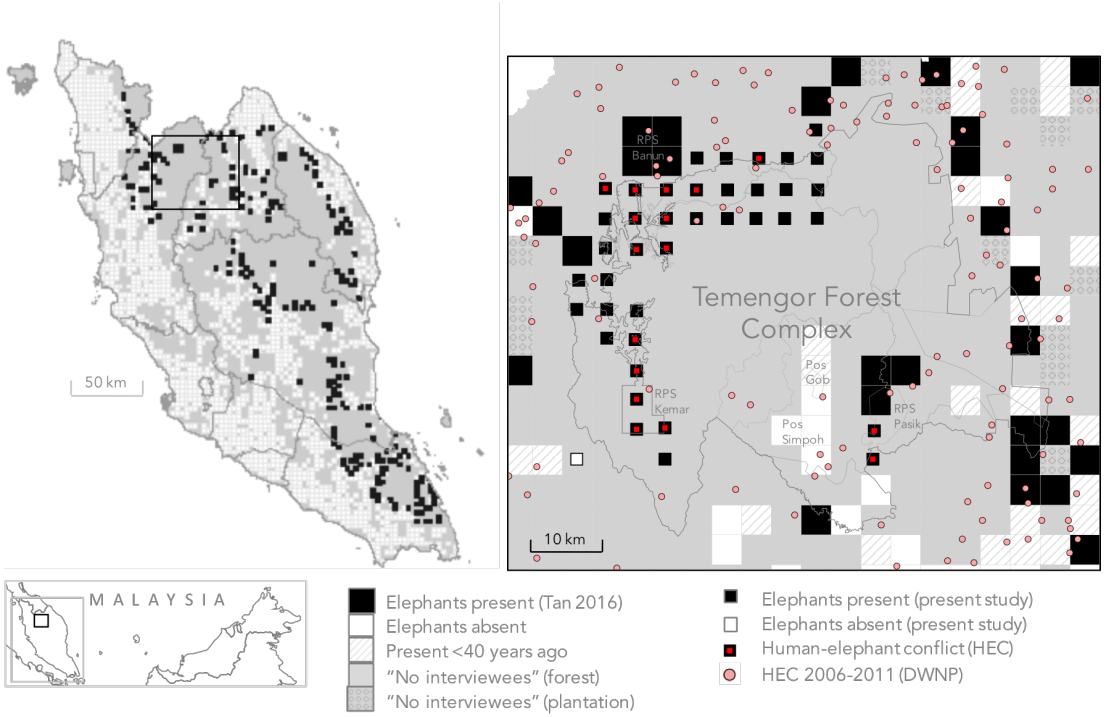


Figure 6-1: Elephant presence in Peninsular Malaysia (from Tan 2016) with inset showing human-elephant conflict in the Temengor Forest Complex (present study).

In order to contribute to the implementation of NECAP in Belum-Temengor in a manner that recognises the rights of local communities, the present paper supplements the work of Tan (2016) by examining human-elephant relations in the less accessible parts of the Temengor Forest Complex. My objectives include (i) to map the current extent of indigenous settlements; and (ii) to determine the extent of human-elephant conflict.

6.2 Methods

6.2.1 Study area

The study area for this chapter is the southern portion of the Belum-Temengor complex, known as the Temengor Forest Complex (Figure 5-1, above, and Figure 6-2, below). I give particular attention on the Temengor Forest Reserve, the main reserve in the Perak portion of the forest complex.

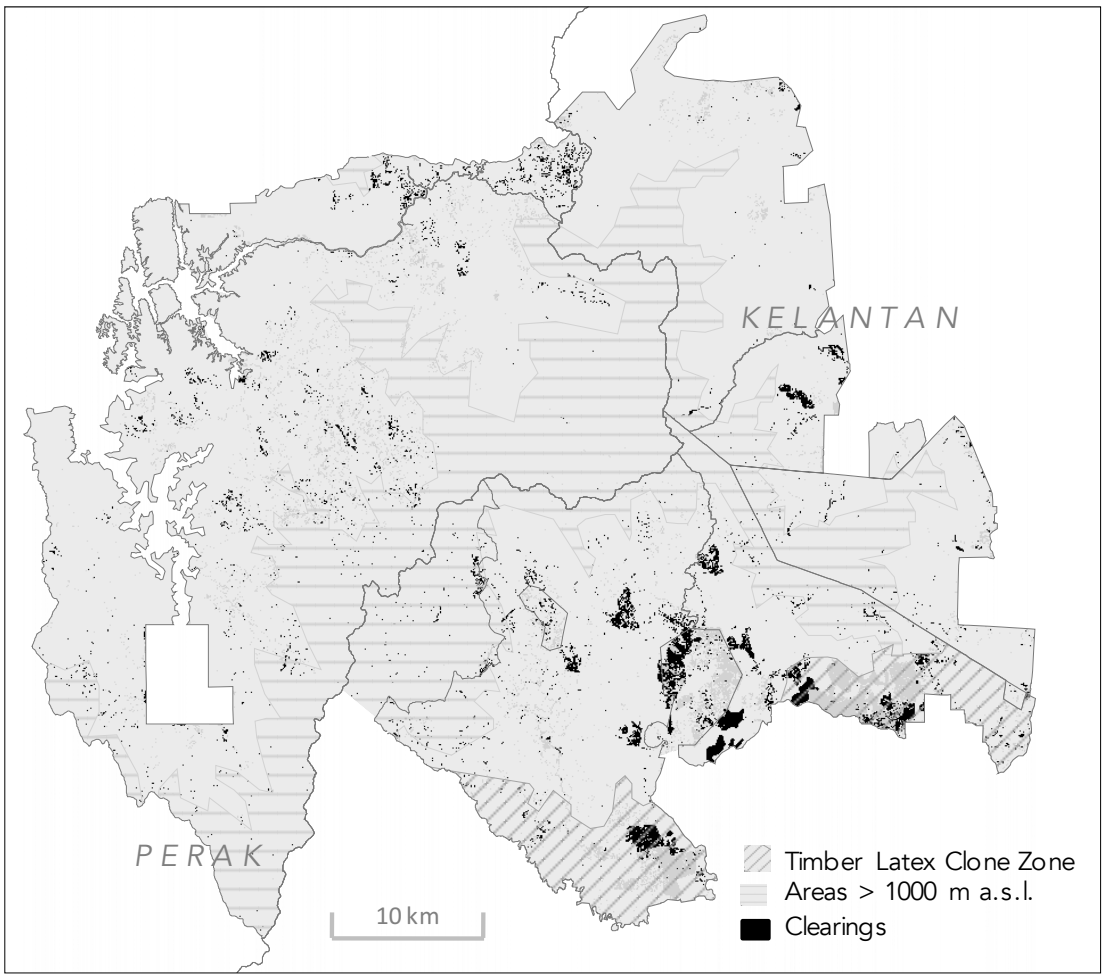


Figure 6-2: Temengor Forest Complex: land-cover changes, showing "forest loss": 2013–2016 (black); 2001-2012 (dark grey); and land-use zonation.
Sources: JUPEM Perak, JUPEM Kelantan; Kelantan State Forestry Department; Global Forest Watch (2017).

6.2.1 Mapping

I reviewed the literature on Orang Asli distribution in Peninsular Malaysia, focusing on existing maps showing the location of settlements in Temengor (Davison 1995, Azrina et al. 2011, Aziz et al. 2013, Kamal et al. 2013, Siti et al. 2015). I also identified settlements in Temengor Forest Reserve from topographical maps (JUPEM 2012).

I used the Google Earth Pro (Version 7.1) software to geo-reference copies of these maps and marked the coordinates of each putative settlement. I took a single point coordinate for each settlement and did not attempt to assess the extent of the boundaries of the village. To take into some account of the fact that settlements cover

more than just a single point, I included all settlements centred within one kilometre of the forest reserve.

I checked the coordinates of putative settlements from the published maps using satellite imagery provided via Google Earth. Specifically, I used the following images: CNES/Airbus 8/22/2013; DigitalGlobe 5/13/2014; and CNES/Airbus 5/26/2016 (these are mostly panchromatic images with very high resolution). I noted whether I could see any settlement within a 1-km radius of each point. When I could not see any obvious buildings I used the historical imagery option to identify any forest clearings indicative of swidden farming.

6.2.3 Village locations from memory

P.P. and R.A. worked with T.L. to identify settlement locations on Google Earth based on memory. P.P. and R.A. are familiar with the area as they belong to the Temiar ethnic group and originate from and reside in Kampung Semelor, situated just north of Temengor Forest Reserve (Figure 6-5). P.P. and R.A. also used their personal smartphones to identify settlements using the maps and imagery on the Google Maps app – also available on the website <https://www.google.com/maps/>.

6.2.4 Site visits

For field verification I focused on the south of Temengor Forest Reserve because most of the existing literature had focused on the north. I carried out site visits from 5-19 October 2016 and 16-20 December 2016, visiting a total of 11 points in Sg. Singor and Sg. Temengor (point Nos. 1-4, 6, 19-21, 23-25 in Table 6-1).

At each location I attempted to carry out interviews following the method used by Tan (2016) and aimed to interview at least two respondents for each 5-km by 5-km grid cell. I found that the ECG survey methodology employed by Tan (2016) required several modifications when applied to forested landscapes with low human populations. Instead of using a haphazard selection method, I deliberately selected senior male respondents. While the ECG methodology required respondents to be at least 30 years old, I targeted senior respondents over 50 years old, including those designated as village leaders and village elders who were the most confident in

answering questions. I targeted male respondents as they are more likely to agree to be interviewed (A. Tan pers. comm., 2016).

Permission was obtained from the Department of Orang Asli Development (JAKOA), the Department of Wildlife and National Parks, Peninsular Malaysia (Jabatan Perhilitan), the Forestry Department Peninsular Malaysia and the Perak Integrated Timber Complex Sdn. Bhd. logging company. Verbal informed consent was sought from the village elders and from each respondent prior to commencing the interviews. The study protocol was approved by the Research Ethics Committee of University of Nottingham Malaysia Campus.

I wrote down the Orang Asli place names following the phonemic orthography recommended by Benjamin (1986). The glyphs mostly follow the International Phonetic Alphabet (IPA), with the following exceptions: I use *j* instead of IPA *ɟ* or *dʒ*, *y* instead of *j*, and *ʔ* instead of *ʔ*. I write phonemically long vowels geminate (VV) instead of with a colon (V:).

6.3 Results

6.3.1 Settlements in Temengor Forest Reserve

I identified 26 points of putative camps and settlements in and within 1-km of Temengor Forest Reserve (Figure 6-5). Of these points, 17 (65%) were presently occupied by Orang Asli settlements. I was able to match 14 of these 17 sites with 10 entries from the JAKOA (2016) database, totalling 1248 people (Table 6-1).



Figure 6-3: Satellite image of Kg. Kelap (point no. 7 in my study), showing six buildings in a clearing next to a river bend. Screenshot from Google Earth.

In addition to the site in the JAKOA database, P.P. and R.A. identified five more points using the satellite imagery (e.g. Figure 6-3). Site visits and interviews with residents indicated that eight of the published points and all of the five points identified by P.P. and R.A. – a total of 13 points – were still occupied (e.g. Figure 6-4). Table 6-2 identifies the sources that refer to each point.



Figure 6-4: Kg. Changkat Tenel (point no. 25 in my study), showing a traditional Temiar dwelling place in a forest clearing.

6.3.2 Human-Elephant Conflict

Out of 161 grids overlapping with the Temengor Forest Complex, 31 (19%) had reports of previous conflict. I found that elephants were reported present in 39 out of 40 cells with respondents (Figure 6-1, inset). Of these 17 grid locations (43%) reported presence of human-elephant conflict (mainly crop-raiding) including nine locations where conflict had not been previously reported.

6.4 Discussion

6.4.1 Mapping indigenous territories & settlements

The fact that the whole of Temengor is part of the traditional territories of the Orang Asli poses a challenge for NECAP. Native land claims affect all of the NECAP priority sites and dealing with these claims are one of the key challenges for wildlife conservation generally. Clarifying the location of villages is a first step to mapping the extent of the claims together with the villagers. However, before embarking on this exercise it will be important to consider the implications.

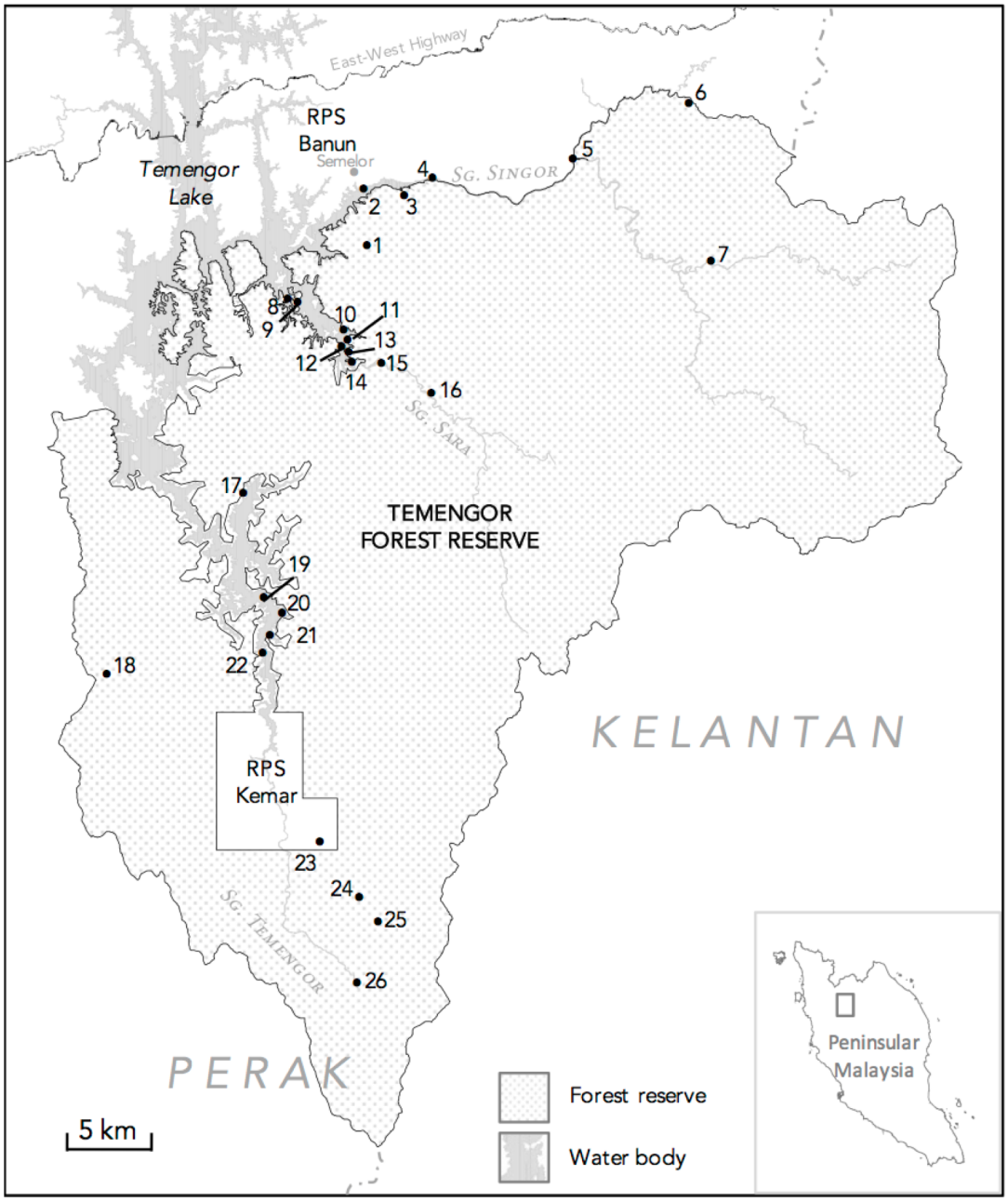


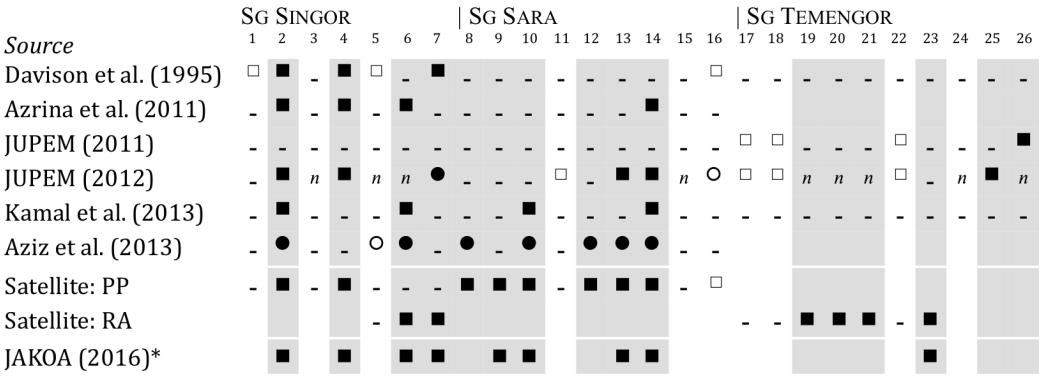
Figure 6-5: Putative settlements in Temengor Forest Reserve
Notes: the numbered points along the rivers refer to the following localities:- *Sg. Singor:* 1–Halong, 2–Pulau Tujuh, 3–Enam, 4–Tekam, 5–Mangga, 6–Selaor, 7–Kelap; *Sg. Sara*: 8–Chuweh Lama, 9–Chuweh Baru, 10–Charok Bus Baru, 11–Charok Bus Lama, 12–Tebang Baru, 13–Tebang Lama, 14–Chiong, 15–n/a, 16–Terhong; *Sg. Temengor*: 17–Panggas, 18–Jeh, 19–Chabang Tiga, 20–Tersau, 21–Kenyer, 22–Pulau Hitam, 23–Lerlar, 24–Lengweng, 25–Changkat Tenel and 26–Agik. The authors map have placed this map under a Creative Commons Attribution 4.0 International license (https://creativecommons.org/licenses/by/4.0/).

Table 6-1: Settlements in Temengor Forest Reserve

No.	*Name*[1]	*Pop.*[2]	*Ethnicity*	*Notes*[3]
1	Sg. Halong	-	n/a	Expedition camp 1995
2	Kg. Pulau Tujuh	98	Temiar/Jahai	Within RPS Air Banun
3	Sg. Enam	-	n/a	Expedition camp 2012
4	Kg. Sg. Tekam	86	Jahai/Temiar	[tə'kaᵇm] (Burenhult 2002)
5	Kg. Kuala Mangga	-	n/a	Former army camp
6	Kg. Selaor	149	Jahai	*Səlaʔo* – Salaor/Salo/Selaur
7	Kg. Sungai Kelap	110	”	[kə'lap̄ə'lBurenhult 2002)
8	Kg. Sg. Chuweh Lama	*	Jahai/Temiar	*Pop. included in no. 9
9	Kg. Sg. Chuweh Baru	97	” ”	Includes no. 8
10	Kg. Charok Bus[4]	93	” ”	*Carəʔ Bus* (Baru)
11	Kg. Charok Bus Lama	-	n/a	Six buildings on topo
12	Kg. Sg. Tebang Baru	131	Temiar/Jahai	Includes no. 13
13	Kg. Sg. Tebang Lama	*	” ”	*Population w. no. 12
14	Pos Chiong	229	” ”	[ci'jɨᵍŋ] (Burenhult 2002)
15	n/a	-	n/a	Bridge on Sg. Sara
16	Kg. Sg. Terhong	-	”	Farmed by residents of no. 14
17	Kg. Panggas[5]	-	”	
18	Kg. Jeh[6][5]	-	”	
19	Kg. Chabang Tiga	*	Temiar	*Nine huts. “P. Chabang Tiga”
20	Kg. Sg. Tersau (*Təsau*)	*	”	*Eleven huts. “Tesau” (topo)
21	Kg. Sg. Kenyer (*Kɛɲɛr*)	*	”	*Seven huts
22	Kg. Pulau Hitam[5]	-	n/a	
23	Kg. Lerlar (*Lɛrlar*)	255	Temiar	Within RPS Kemar
24	Pos Lengweng[7]	-	n/a	*ʔəŋ Lɛ̃ŋwɛ̃ʔ* (topo: “Lanweng”)
25	Kg. Changkat Tenel[8]	*	Temiar	“Kg. Lelah” on topo
26	Kg. Agik[9] (*ʔagiʔ*)	*	”	“Kg. Sumba” (JUPEM 2011)

Notes: (1)(2) Name & population from JAKOA (2016); administratively 1–16 are under RPS Banun and 17–26 are under RPS Kemar; “Kg.” = *kampung* (kampong); “Sg.” = *sungai* (river); “Charok” = *caruk* (stream); “Chabang” = *cabang* (fork); *pulau* = island); “Changkat” = *cangkat* (hillock); *lama* = old; *baru* = new; *pos* = post; *kuala* = river mouth. (3) “topo” refers to JUPEM (2012). (4) A small traditional settlement by the same name is around 400-m north of here (5°26.812’N, 101°25.603’E); Chen (2010) refers to this settlement as “Bush” and gives an alternate name, “Kerbah”. (5) place name given by topo map and probably now abandoned. (6) this site is outside the Temengor river basin. (7) *Ləgəb Burʉʔ*. (8) *Taŋkɔl Tɛnʔɛl*, population under no. 23; three huts with only three individuals present when I visited. (9) Population (of about three families) is included in 219 people of Kg. Lediau (a village that is part of RPS Kemar but I do not consider to be in Temengor Forest Reserve).

Table 6-2: Sources for points in Temengor Forest Reserve



Notes: *Demographic data only (no spatial data).
Key: Shaded columns indicate extant settlements, unshaded columns indicate that there is no extant settlement at that point.
Symbols for settlements: (■): named extant; (●): unnamed extant; (□): named not extant; (○): unnamed not extant; *Other symbols*: (*n*): named river or island; (-): not labeled or identified as a settlement; ( ): outside boundaries of map.
Settlement Names: 1–Halong, 2–Pulau Tujuh, 3–Enam, 4–Tekam, 5–Mangga, 6–Selaor, 7–Kelap, 8–Chuweh Lama, 9–Chuweh Baru, 10–Charok Bus Baru, 11–Charok Bus Lama, 12–Tebang Baru, 13–Tebang Lama, 14–Chiong, 15–n/a, 16–Terhong, 17–Panggas, 18–Jeh, 19–Chabang Tiga, 20–Tesau, 21–Kenyer, 22–Pulau Hitam, 23–Lerlar, 24–Lengweng, 25–Changkat Tenel, 26–Agik.

So far, no state nor federal government agency has published any maps of the Orang Asli land claims. Instead, the federal and several state governments have agreed to a policy whereby each Orang Asli household would be granted individual title to between two and six acres (0.008 to 0.024 km²) of plantation land, an amount of land largely insufficient for swidden cultivation (Subramaniam 2015). The exercise of mapping is often seen as an act of confronting the state's control in what Nicholas (2000) describes as a "contest for resources". In the light of this contest, Peluso (1995) describes mapping as an "intrinsically political act", she labels maps produced by NGOs and communities as "counter" maps that challenge the "hegemony" of the state (Peluso 1995). Bryan and Wood (2015) characterise maps as a weapon in the "war" for native land rights. Nietschman (1994) characterises indigenous people as "Fourth World nations" fighting against the "internal colonialism" of state governments: "More indigenous territory has been claimed by maps than by guns. This assertion has its corollary: more indigenous territory can be reclaimed and defended by maps than by guns".

Even if the government were to agree to community mapping, it can be hard for maps to capture the complexities and dynamics of indigenous rights. Peluso (1995: 401) highlights how mapping of land uses can have the effect of "freezing" them, taking away their natural flexibility, variability and fuzziness. There are also

problems that can arise from overly territorialising rights that in reality are overlapping or vary according to individual trees (Ibid.: 402). Gemmell (2014) also cautions that Google's digital maps lack the depth of expression of traditional indigenous cartographic conventions that are often based on narratives that incorporate gesture, song and dance.

Community mapping also raises several ethical issues. Taking an "externalist" approach, the use of satellites to monitor activities of rural communities bears the hallmarks of a "surveillance society" and risks encroaching on the right of these people to privacy (Crampton 1995). Bujang (2005) also notes the danger of community maps revealing too much information regarding exploitable resources. Indeed, in some instances the actual location of a settlement can be something that the community may not wish to reveal. Identifying settlements makes them "legible" to the state (Scott 1995) and thus exposes them to administrative intervention which can include forced resettlement. Maps can also be exploited by commercial interests including people involved in hunting, tourism, forest products, and cultural artefacts. Maps of settlements also make it easier for proponents of various mainstream religions to proselytise the Orang Asli. Despite these challenges associated with community mapping, Peluso (1995) concludes that few communities would choose the alternative: not being on the map and having local claims obscured.

6.4.2 Map of Settlements in Temengor Forest Reserve

Despite the National Forestry Act 1984 not recognising Orang Asli rights inside forest reserves, including the right to reside, there are still a significant number of Orang Asli villages in and around Temengor Forest Reserve. Many of these settlements are just on the reserve's border and might be regarded as being outside the forest. However, at least three settlements with a total population of at least 110 are more than 5-km inside the reserve and are not accessible neither by motorbike nor by motorboat.

In addition to the settlements in my study, I note that there are around 10 additional settlements in RPS Kemar that I did not map because they are outside the 1-km buffer that defines my study area and they are not presently included within the NECAP priority site. However, these settlements are almost enclaved by the forest

reserve and the residents probably also consider their territory to extend into the forest reserve (SAM and JKOASM 2016).

Furthermore, there are probably several additional settlements that I did not capture in my survey. Meyer (2004) mentions a "Kg. Bidayus" which may refer to "Kg. Kelap" or it may be a separate location. My respondent from Kg. Lerlar mentioned that there was a settlement of four or five families in a location known as *Barlɛs* to the southwest of my point no. 24. There are also several locations on the lake that look like they have been cleared recently and might contain settlements. I recommend that future studies look at these locations as well as all the minor settlements in the RPS Kemar area.

6.4.3 Accuracy of Published Data

None of the existing maps provided adequate detail in terms of settlements inside Temengor forest reserve. The JAKOA (2016) database was a good source of data but its usefulness was compromised by the fact that it often lumped several settlements into one entry and did not note the proportion of the population living in the main village compared with the proportion living in the minor settlements.

The topographical maps (JUPEM 2012) were constrained by the fact that they were relying on old sources dating back to 1986. Temiar swiddening means that the precise location of a settlement moves every few years as part of a rotation that can take more than 100 years (Cole 1959). By the time a map goes to print, the data can already be out of date. For example, I assume that a recent move is the source of the error that led JUPEM (2012) to place Kg. Charok Bus at point no. 11 (Figure 6-5) as there is no longer any settlement at that point. This is an issue that will probably arise again in future but it can be somewhat overcome if community maps focus on the location of rivers and watersheds (which are fixed) rather than on the location of particular settlements (that are dynamic).

Another issue with the topographical maps is with regards to labels. Several of the place names on the maps are not recognised or accepted by the local people. One reason for this is the inadequacy of the national spelling system. The Jahai and Temiar languages are Austroasiatic languages that have a very wide range of vowels

and *Aslian* words are not adequately captured by the spelling system used for the national language, Malay, which is an Austronesian language (Benjamin 1986).

One example of spelling difficulties is the word "Temengor" itself. The region, forest reserve, lake, and dam are all named after the river which in turn comes from the Temiar word for a species of fruit tree, *tumŋɔɔˀ* (Benjamin 2014, SAM and JKOASM 2016). The topographic maps render this both as "Temengor" and as "Temenggor"; other published spellings include "Temengoh" (Ridley 1910), "Temangor" (Durai 1939), and "Temanggor" (FAO 2013). However, a more accurate spelling would actually be "*Temengok"* (SAM and JKOASM 2016).

Another issue related to spelling is the fact that many of the village names pre-date the national spelling rules adopted in 1972. For example, villages such as Chiong and Chuweh are usually spelled using the letters <ch> rather than <c> for the voiceless palatal plosive. The use of the old spelling is common with most place names in Malaysia as changing the spelling of toponyms can lead to confusion. Nevertheless, the governments of some Malaysian states have directed that spelling of place names follows the 1972 rules (e.g. "Melaka" instead of "Malacca"; Koh 2017). Thus authors such as Chen (2010) spells Chuweh as "Cuweh", although he retains the original spelling for Chiong.

In Table 6-1 I did not change any of the spellings of the names of the villages. For point no. 25 my respondent gave the Temiar name as *Taŋkɔl Tɛnˀɛl* and I transcribe this as "Changkat Tenel" – opting for spelling that is consistent with that of the other village names.

Moreover, despite the advent of computer-based GIS, there is still scope for human error and some published maps have limited value due to mislabelled points and errors in plotting. These errors meant that I was unable to use some of these maps in my analysis (I did not use the map found in Zainon and Daniel 2014, nor the one in Siti et al. 2015).

6.4.4 Community Mapping

Peluso (1995) states that "investment in specialized computers and software and knowledge will make the costs of mapping prohibitive for most local people". I find that now, the widespread ownership of smartphones and mobile broadband internet

means this is no longer the case. People throughout Peninsular Malaysia are beginning to use this technology to map their homes as well as to assert their claims to land and resources.

Mapping is very important for staking a legal claim to land. Indeed, Malaysian courts have already recognised the legitimacy of community maps (Majid Cook 2003, Lasimbang 2004, Bujang 2005). On their own initiative, the Orang Asli communities in Temengor are now in the process of preparing detailed maps of their land claims. In the meantime, partners of MYGAJAH should consider mapping the location of all settlements within the NECAP priority sites. These maps will form the basis for discussions on which areas should be allocated for elephant conservation and which areas require assistance on conflict mitigation (such as building electric fences to protect crops).

The map produced by the present study does expose the settlements to the risk of increased attention by the state and other external interests. I acknowledge and accept that this risk is not really addressed by my efforts at ensuring my respondents consented to being interviewed and did not express any reservations to my revealing the location of their settlements. Nevertheless I feel that I have demonstrated that the accessibility of high-resolution satellite imagery means that the locations of the settlements that I map here are already in the public domain. I also feel that the benefits of highlighting the location of the settlements – via appropriate zonation of and prescriptions for elephant management areas – outweigh any potential negative effects.

I made no attempt at mapping any claims to resources, boundaries or property rights. This is something for future studies to examine via a participatory mapping exercise that has the free, prior and informed consent of the residents of these settlements.

6.4.5 Human-Elephant Conflict

I was not surprised that elephants were reported from throughout the Temengor forest complex. However, my findings do demonstrate that the ECG survey methodology can be applied in remote and inaccessible parts of the Peninsula, this suggests that there is much scope to build on Tan's (2016) survey of human-dominated landscapes.

I was surprised that the respondents from Piah reported that there were no elephants there. The locality is just over the ridge from Kemar where there are a lot of elephants. It is probable that some elephants do occasionally pass through Piah, and the negative finding is simply due to the respondents not being aware of the elephants. It is also possible that Piah is too far from salt licks or simply not as attractive as Kemar for some other reason.

I found it encouraging that conflict was not reported in every location. The pattern of conflict distribution requires more analysis but my preliminary observation is that the smaller, traditional settlements had lower levels of conflict than the larger villages, possibly due to the plantation agriculture being particularly susceptible to elephant damage. This is an issue I examine in more detail in the following chapter.

6.5 Conclusion

This chapter demonstrates that (1) there are several Orang Asli settlements inside Temengor Forest Reserve, (2) conflict with elephants takes place in a significant proportion of these settlements and elsewhere in the Temengor Forest Complex. The following two chapters examine the relationship between the inhabitants of these settlements and elephants and attempts to control the conflict.

7 Attitudes of Indigenous Communities to Wild Elephants in Peninsular Malaysia

This chapter presents the results of a series of interviews on the influence of ethnicity on the beliefs, attitudes, and behaviour of rural indigenous communities with respect to elephants. I find that all the groups have an attitude of respect towards elephants, although some groups, such as the Temiar, occasionally kill crop-raiding elephants, and eat their meat. I find that settled lifestyles and planting cash crops, particularly rubber, lead to an increase in the levels of depredation, with younger respondents showing less tolerance towards elephants. There is also the belief among some indigenous communities that the increase in crop-raiding by elephants was due to the action of the government to translocate elephants away from other communities (which they perceive as discriminatory). The findings of this study suggest several strategies to reduce elephant depredation, including learning from the traditional cultures, and keeping human population density low in conservation sites.

KEY WORDS: Perak, Kelantan, ethnoelephantology, Orang Asli, Jahai, Temiar, Belum-Temengor, human-elephant conflict, crop protection, human population density.

7.1 Introduction

The literature on the indigenous communities of Peninsular Malaysia (reviewed in chapter 4, above) suggests a variety of traditional beliefs related to elephants, with some groups having taboos against killing elephants, and other groups hunting elephants for ivory and for their meat. It is therefore probable that the different communities continue to have varying beliefs, attitudes and behaviour towards elephants. However, existing studies on attitudes towards wildlife in the Peninsula do address the question of the effect of ethnicity: whether a community's traditional beliefs has any impact on their attitudes and behaviour.

The failure to address the effect of ethnicity on attitudes towards wildlife is probably limiting the effectiveness of the wildlife department's elephant management programmes. Manfredo and Dayer (2004) suggest that in countries with multiple ethnicities, "cross-cultural investigations are one of the most important priorities for the future success of HWC mitigation." They add that "strategies with a sound biological basis are simply not adequate unless they account for the differences among people involved". Kansky and Knight (2014) reviewed 45 studies on HWC

and found that ethnicity was only mentioned in 13% of publications, but when evaluated it was one of the top predictors of attitudes (ranking alongside intangible costs, land tenure, and the legal status of the animal in question).

Attempts at examining the effect of ethnicity and developing culturally appropriate wildlife management strategies have recently been implemented in other parts of the Asian elephant range. In a seven-year study of 861 households in Madagascar, Golden and Comaroff (2015) found that ethnic affiliation was a significant indicator of the number of food taboos that an individual held to. Studies in South India (Thekaekara and Thornton 2016) and Sri Lanka (Fernando et al. 2005, Lorimer 2010) suggest that cultures with longer histories of interaction with elephants are the ones that are most able to cope with depredation.

Existing studies looking at attitudes towards wildlife in Peninsular Malaysia tend to ignore the effects of the traditional indigenous knowlege and beliefs of the Orang Asli. As early as the 1930s, the Wild Life Commission of Malaya carried out a survey of public opinion (WLCM 1932) but it made no effort to survey minority groups and the experiences and attitudes of the Orang Asli were not included (Guérin et al. 2017). Even recent studies on attitudes towards wildlife in the Peninsula make no mention of the ethnicity of respondents (Baharuddin 2013, Jafarpour and Manohar 2014, Shahriman et al. 2017).

Those studies that do focus on the attiudes of the Orang Asli often treat them as a generic group and do not include analysis on the variation of attitudes between members of sub-groups that hold different beliefs (as highlighted in chapter 4). For example, Azrina et al. (2011) and Aziz et al. (2013) examine the attitudes of the Orang Asli of Belum-Temengor, but they do not break down their results by ethnicity – lumping the foragers (the Menraq Jahais) with the swiddeners (the Senoi Temiars).

This deficiency is also found in recent studies that focus on the attitudes towards elephant conservation in the Peninsula. The majority of recent studies do not mention ethnicity as a variable (Ahmad and Magintan 2016, Asimopoulos 2016, Ponnusamy et al. 2016, Tan 2016). Two studies on attitudes towards elephant conservation in the Peninsula do mention ethnicity (“race”) as a variable, but they

fail to discuss whether it was of any significance on the results (Poh and Mohd. Shahwahid 2008, Kaffashi et al. 2015).

Other related cultural factors that have been insufficiently examined in terms of wildlife management generally include the effects of social change on cultural disolution and erosion. In particular, very little empirical research has been carried out on the effects of social change on adherence to food taboos (Golden and Comaroff 2015). Of key interest in terms of the management of wild elephants in Peninsular Malaysia are the effects of a community's population density and agricultural practices (particularly the type of crops they plant). Based on the findings of chapter 5, it is likely that communities with higher human population densities and permanent cash crops (plantations) will show lower tolerance towards elephant depredation.

With the aim of looking explicitly at the influence of ethnicity on the beliefs, attitudes, and behaviour of indigenous communities related to elephant conservation (i.e. supporting the implementation of the NECAP), I carried out a series of interviews. My objectives included, (1) to determine current *beliefs* regarding elephants among the different ethnic groups; (2) to examine the factors affecting current *attitudes* towards elephants; (3) to examine the role of ethnicity and other factors in influencing *behaviour* towards elephants among the different groups (specifically in terms of hunting, trapping, and eating elephants).

7.2 Methods

7.2.1 Study Sites

I conducted my survey between 2015 and 2018 in 37 villages in Peninsular Malaysia, including villages both inside and outside the current elephant range (Figure 7-1). The villages varied in size from large kampongs (Malay *kampung*, abbreviated as 'Kg') to small settlements (Malay *perkampungan*). For my second objective, on patterns of depredation, and my third objective, on human behaviour, I focused on 10 villages in the Belum-Temengor landscape (Figure 7-1-A). These included two Jahai villages, six Temiar villages, and two mixed Jahai/Temiar villages.

7.2.2 Procedure

I employed a mixed-methods approach to both the data collection and analysis (Table 7-1). This included a combination of participant observation, in-depth individual-level interviews, focus group discussion, and open-ended and semi-structured survey interviews which included both quantitative and qualitative questions (as described by Bryman (2004), and Bernard (2006)).

Table 7-1: Number of respondents by interview method and ethnic group

Ethnic Group	*Villages*	*Respondents by Interview Method*		
		KII	*SSI*	*FGD*
Menraq "Foragers"	7	8	17	20
Senoi "Swiddeners"	19	12	14	22
Malayic "Settlers"	7	5	-	-
Mixed/Others	7	5	3	16
Total	40	30	34	58

Note: KII - number of respondents participating in Key Informant Interviews; FGD - Focus Group Discussion (number of residents present during the discussion); SSI - Semi Structured Interviews using a Questionnaire.

I selected villages based on several criteria. For Objective 1, on beliefs about elephants, I aimed to interview a broad range of ethnic groups, including those living in areas where elephants are no longer present. I also made an effort to include in my sample some of the smaller, less accessible settlements, away from roads. For Objectives 2 and 3, on attitudes and behaviour towards elephants, I focused on Belum-Temengor, which still has a population of wild elephants, and aimed to include a mix of Temiar and Jahai participants, and include villages that had not been surveyed by previous studies.

I categorised the 10 villages into the following three clusters: (i) resettlement scheme villages (4 villages), (ii) other government villages (3 villages), (iii) independent small villages (3 villages). The basis for this clustering is as follows: (i) *resettlement scheme villages* are villages within the government-designated resettlement area ("RPS Kemar") this includes both officially designated villages within the resettlement area (with government-built houses) and also unofficial

villages within the resettlement area (with houses built by the villagers themselves); (ii) *other government villages* are villages outside the resettlement areas but having facilities provided by the government (i.e. the majority of the houses in the village are built by the goverment); (iii) *independent small villages* are small villages outside resettlement areas not having facilities provided by the government (the houses are built by the villagers themselves).

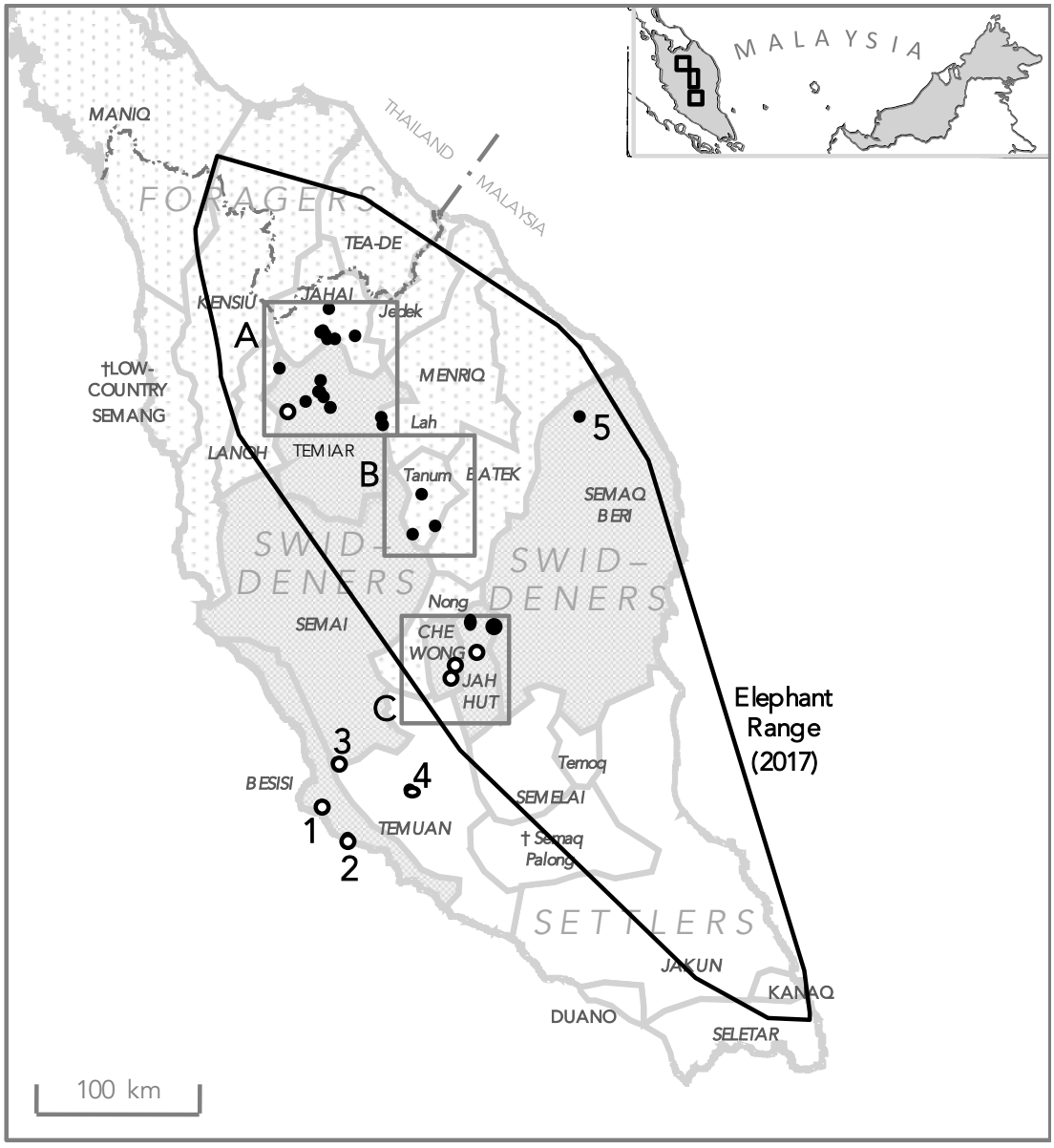


Figure 7-1: Villages visited in relation to the original extent of Orang Asli language groups and elephant range. Black dots indicate villages where elephants were present; white dots villages with no elephants.
Note: group boundaries often fluid and occasionally overlap. †Extinct languages.

Villages visited:- 1. Kg Sg Bumbun, Selangor; 2. Kg Koi, Selangor; 3. Kg Sg Kuning, Selangor; 4. Kg Beroga, Negeri Sembilan; 5. Kg Sg Berua, Trengganu (Batek/Semaq Beri). *Inset maps*:- A. Temengor Forest Complex, B. Tanum Valley, C. Krau Wildlife Reserve (Figures 6-1-A to 6-1-C.).
Sources: language boundaries as per Figure 2-7; elephant range shows the extent of occurrence (EOO) of elephants in Peninsular Malaysia (Salman et al. 2011) and contiguous populations in peninsular Thailand (DNP 2015).

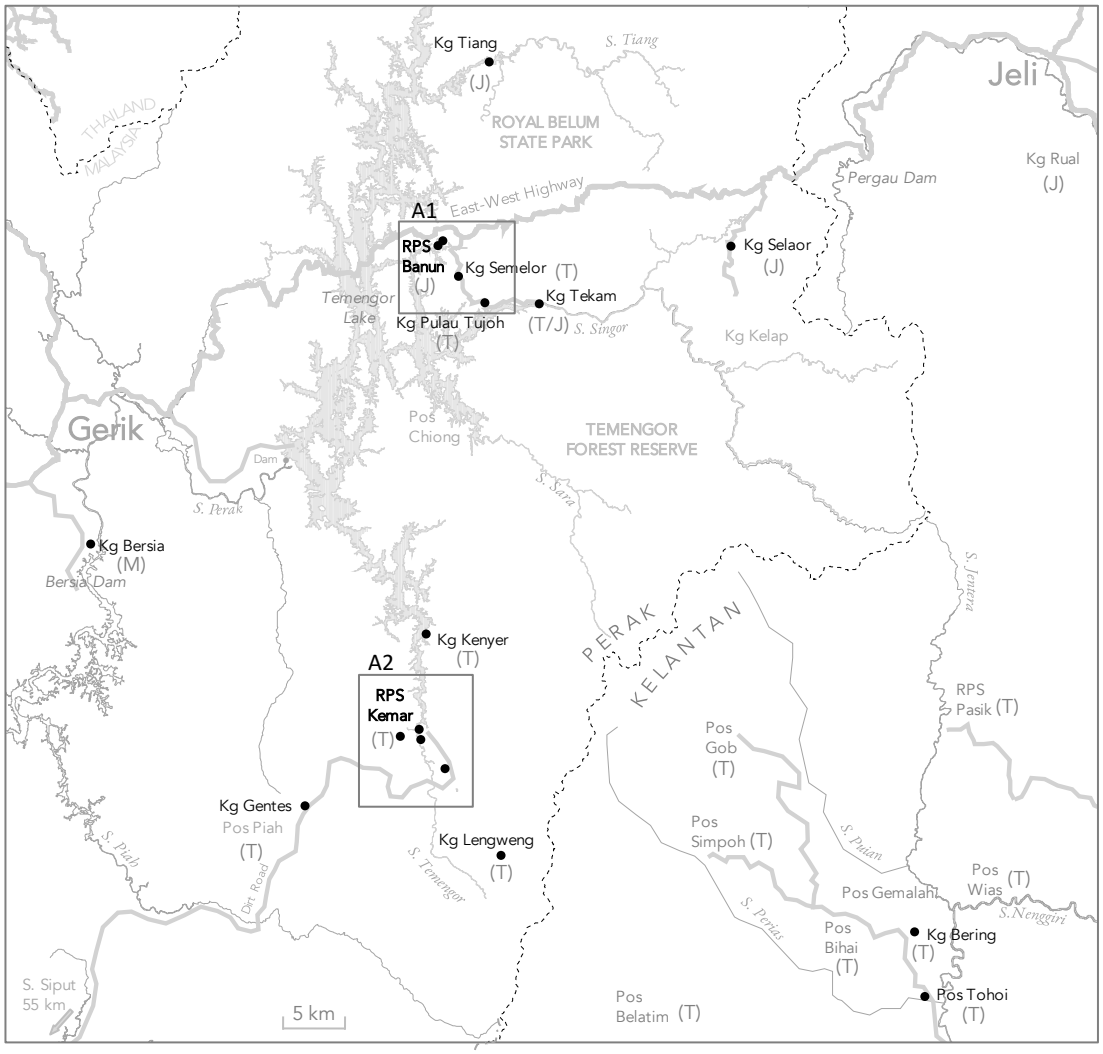


Figure 7-1-A: Villages visited in and around the Belum-Temengor landscape. Predominant ethnicity of village:– (J) – Jahai, (M) – Malay, (T) – Temiar. Other abbreviations: Kg = Kampung (village); S. = Sungai (river); RPS = Rancangan Pengumpulan Semula (regroupment scheme).

For each village I supplemented village-level data with official population statistics from JAKOA. For each village I also calculated the human population density of the

landscape surrounding the village, based on the total population of all villages whose centre-points were within a 5.641-km radius of the centre-point of the particular village (i.e. within the 100 km² surrounding the village).

At each village I requested to interview residents and obtained respondents in 30 of the villages (83%). For Objectives 2 and 3, I identified additional key informants, candidates for in-depth semi-structured interviews, and focus-group participants through snowball sampling and "door-to-door" techniques. I also interviewed additional individuals opportunistically if I happened to meet them in the course of the survey period. In particular, in Kg Bering, Kelantan, I interviewed people from Pos Balar, Pos Simpor and Kg Gawin.

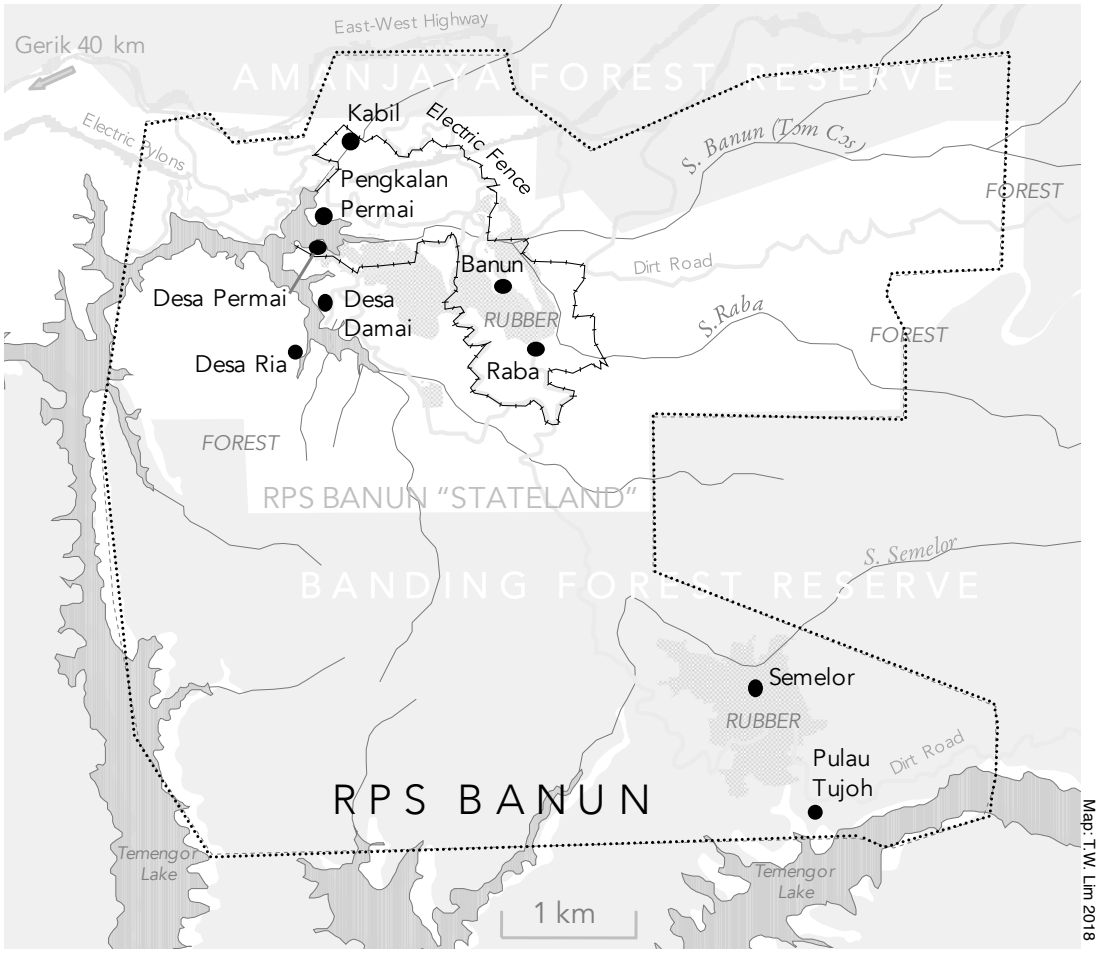


Figure 7-1-A1: Villages in and around RPS Banun (dotted line), showing the original configuration of the electric fence.
Source: RPS boundary: MDHP (2008); Landcover: JPBD (2016).

For the semi-structured interviews I used a questionnaire (Appendix I) which included 65 open-ended, multiple-choice and yes/no questions related to: (i.)

background and demographic descriptors; (ii.) agricultural practices, (iii.) knowledge of elephants and other wildlife (in terms of their raiding patterns), (iv.) experience of living with elephants (how often elephants visited the villages; whether elephants had ever been killed in the village); (v.) attitudes towards elephants; and (vi.) behaviour towards elephants as indicated by stated response to hypothetical depredation scenarios (crop-raiding, actual harm to humans, and human fatalities).

Open-ended questions ensured respondents were not limited in their range of responses (Newing 2010). The maximum interview duration was 15 minutes, following a similar approach to Aziz et al. (2017), where each question was read aloud by the interviewer to the respondent, and the respondent's answer was then recorded by the interviewer directly in the questionnaire. Where a question required 'yes,' 'no,' or 'don't know/not sure' answers, it was asked without providing answer options. In order to maintain privacy, respondents' identities and house locations were not recorded. The questionnaire was drafted in English and then translated into formal Bahasa Malaysia (the standardised version of the Malay dialect officially used in Malaysia).

A first draft of the questionnaire was pilot-tested with the villagers in Kampung Tiang, and based on results and feedback it was amended and refined. The questionnaire was administered by one male (TL) and one female (VLPW) enumerator in pencil-and-paper format via face-to-face interviews conducted in a mix of colloquial Malay, occasionally using some words in the indigenous languages. Occasionally Temiar and Jahai translation was assisted by a Temiar field assistant.

To supplement the questionnaires, I carried out in-depth interviews with key-informants (usually a village elder) and occasionally a wider focus-group. These discussions included extended questioning along the lines covered in the questionnaire but giving the respondents the opportunity to give more lengthy replies on a broader range of topics.

If a respondent did not wish to respond to certain questions, they were not pressured. Respondents did not receive gifts for participation; however, I did usually provide some basic supplies (worth around MYR100) to a village leader prior to the

commencement of the interviews. At the time of this study, the exchange rate was about MYR4 to USD1.

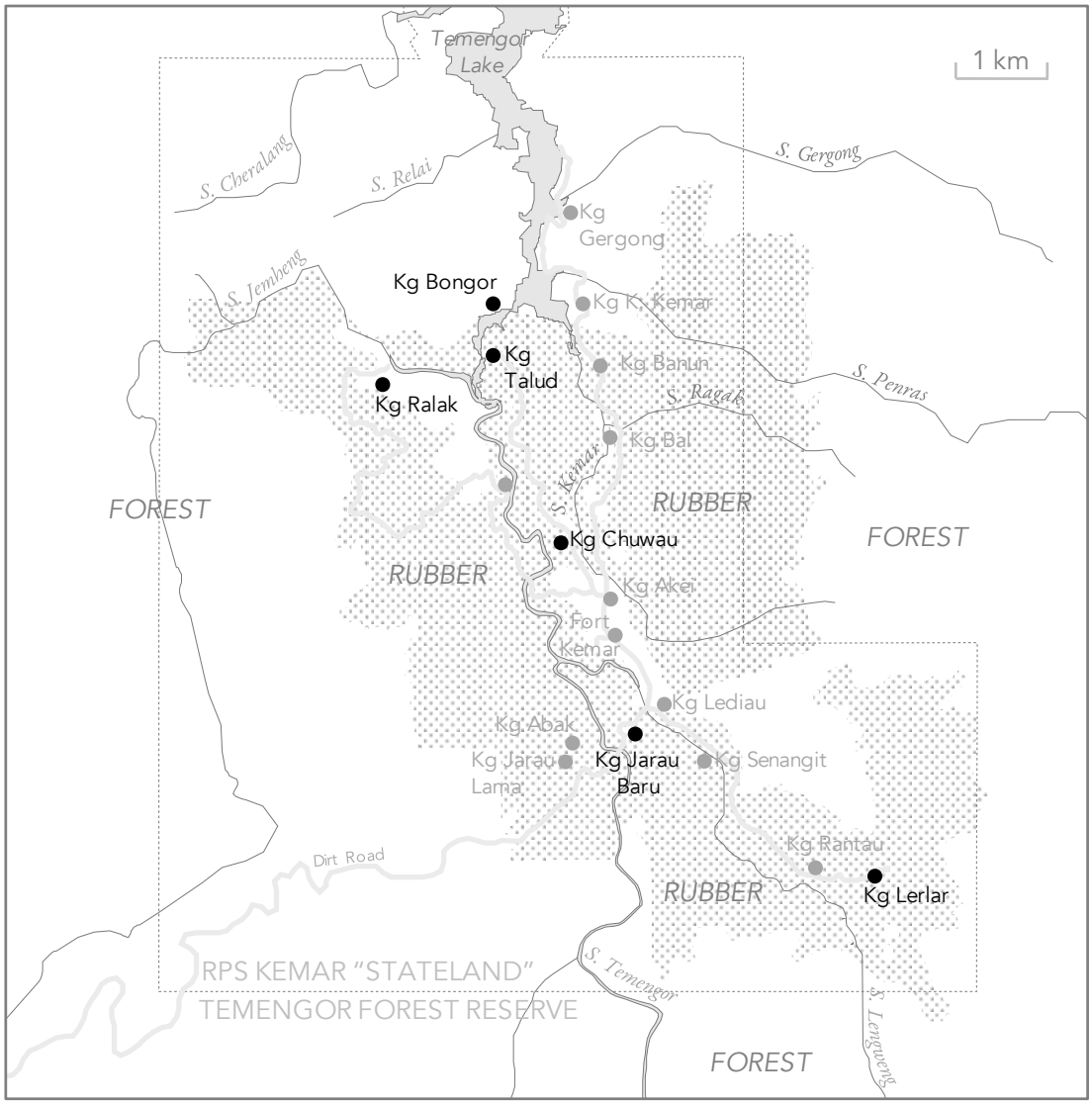


Figure 7-1-A2: Temiar villages visited in RPS Kemar, Perak (shown in black). *Source*: Map drawn by T.L. using field survey data for locations of village and road; land use and landcover data from JPBD (2016).

7.2.3 Data treatment and analysis

I compiled the data from the key-informant interviews and the focus-group discussions and arranged it according to the ethnicity of the respondents. I summarised the key beliefs, attitudes, and behaviours related to killing and eating elephants. To assess the influence of actual experience of elephant depredation, I created an index of depredation by adding together all the forms of depredation

reported by each respondent (whether elephants raided crops, property, and/or people) as well as whether the respondent had reported an elephant being killed in the village. I then examined the extent to which depredation was correlated with the population density of the village using Kendall's rank correlation test; I did not adjust the values to account for population density.

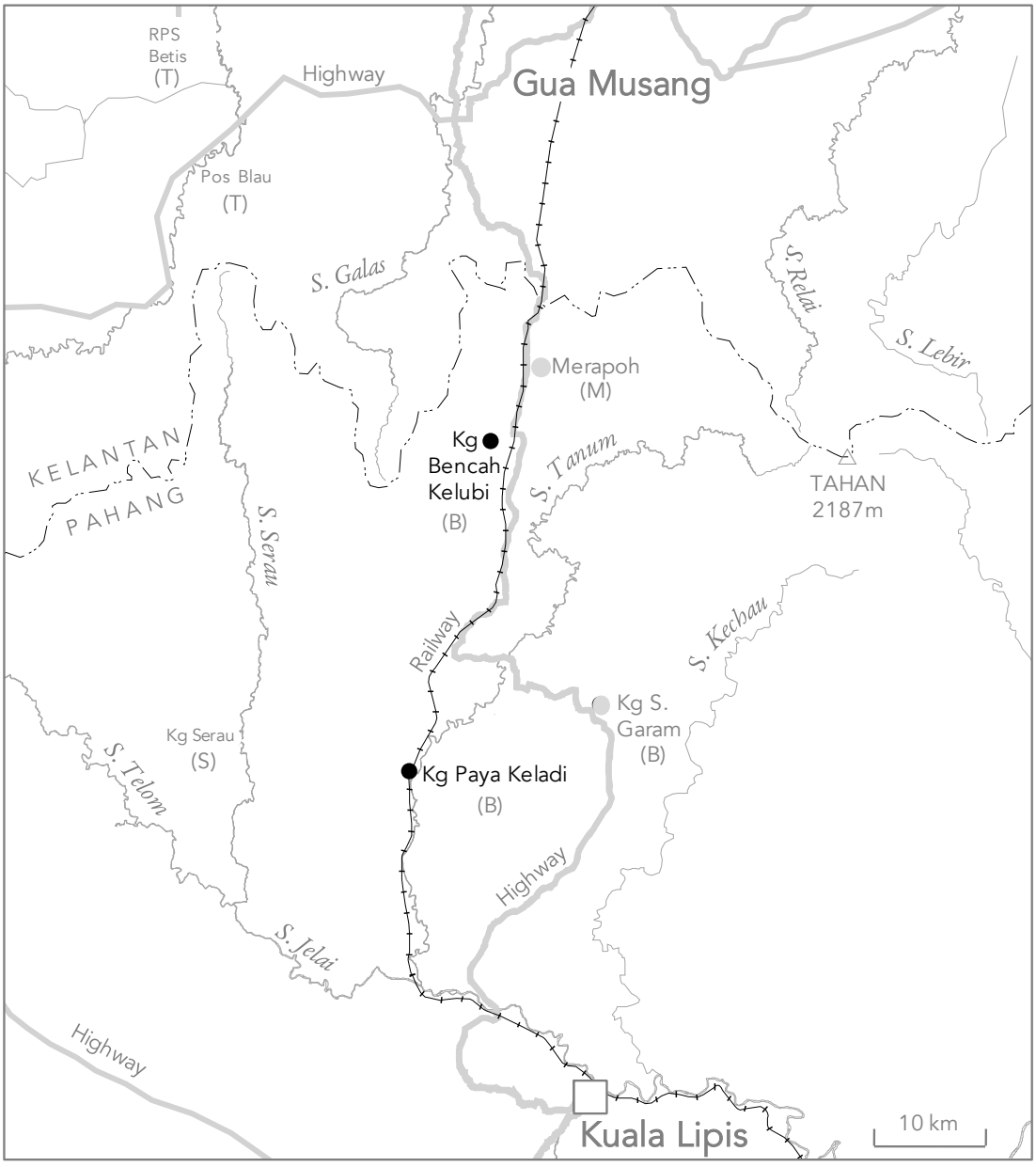


Figure 7-1-B: Batek Tanum villages visited in Pahang (shown in black).
Main ethnicities: (B) – Batek Tanum, (M) – Malay, (S) – Semai, (T) – Temiar.

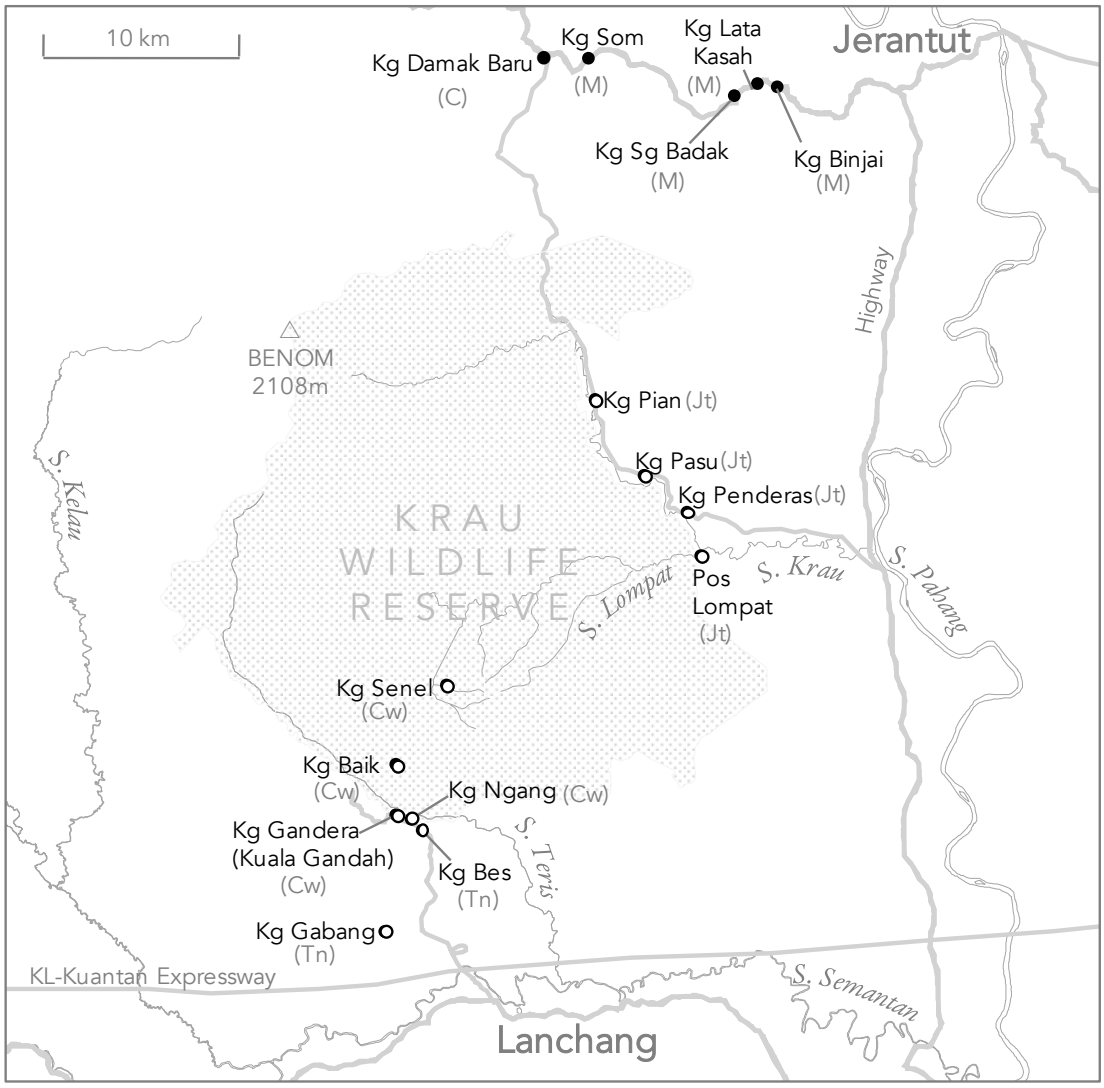


Figure 7-1-C: Villages visited in and around Krau Wildlife Reserve, Pahang.
Main ethnicities: Malay (M), Jahut (Jt), Chinese (C), Chewong (Cw), Temuan (Tn).

For examining the factors influencing respondents' attitudes towards elephants, I analysed the data from the semi-structured interviews by using unbiased recursive partitioning – this is the conditional inference framework developed by Hothorn et al. (2006), and implemented using the R programming language (Hothorn et al. 2015). Specifically, I assessed whether respondents' attitudes towards elephants (as expressed by their willingness to have elephants present) varied according to the following variables: (i) gender of respondent, (ii) age of respondent, (iii) ethnicity of respondent, (iv) quantity of rubber trees owned by respondent, (v) age of rubber trees of respondents, (vi) frequency of elephant presence in the past year, and (vii) whether

elephants had damaged rubber trees of respondent. I also compared how responses varied according to villages clustered according to status (resettlement scheme villages, other government villages, and independent small villages).

7.2.4 Ethics statement

Verbal agreement to participate in the survey was considered as consent. Participants were informed before commencement that they could withdraw at any stage, and that data collection was anonymous. I obtained approval from the Research Ethics Committee of the Faculty of Science, University of Nottingham Malaysia Campus.

7.3 Results

7.3.1 Overview of respondents and villages

A total of 34 respondents from 10 villages agreed to participate in the semi-structured interviews (Table 7-2). The sample was predominantly male (88%).

Table 7-2: Demographics of semi-structured interview respondents

Ethnic Group	Median age	Age range	*n*	Male:female ratio
Temiar	40 (±13.5)	[19–80]	14	12:2
Jahai	28 (±12.1)	[17–70]	15	14:1
Mixed/Other	41 (±6.6)	[21–47]	5	4:1
Total	36.5 (±12.9)	[17–80]	34	30:4

Occupation	Percentage of respondents (*n*=34)
Farming	47% (including rubber tapping, 15%; and bee keeping, 9%)
Fishing	24%
Foraging	21% (including agarwood collecting, 9%; and rattan collecting, 3%)
Other	8% (including headman, retired civil servant; and NGO employee)

The 10 focal villages in Belum-Temengor varied in terms of population, landscape population density, and number of rubber trees (Table 7-3). The villages ranged from a small cluster of houses with a total of five residents at the time of my visit (0.2 people per km²), to 450 residents (4.5 people per km²), the largest village having a

library and a school. In the five smallest villages the semi-structured interviews were restricted to the key informants; 52 respondents participated in focus group discussions. About 130 other individuals declined to be interviewed and did not contribute during the discussions but were present during the interviews and sat-in on the discussions.

Most of the respondents, from both the Jahai and Temiar villages, reported multiple occupations including agriculture, fishing, and collecting forest produce; when asked to name their primary source of income, respondents named several specific activities (Table 7-4). All respondents had some cassava as a subsistence crop and almost all planted some rubber as a cash crop. Fruit trees planted included rambutan (*Nephelium nappaceum*), durian (*Durio zibethinus*), jackfruit (*Artocarpus heterophyllus*), mangosteen (*Garcinia mangostana*), tamarind (*Tamarindus indica*), langsat (*Lansium parasiticum*), mango (*Mangifera indica*), and cempedak (*Artocarpus integer*). 60% of villagers planted bananas and about 10% planted sugarcane (*Saccharum* spp.). Villagers also reported harvesting wild fruit from the forest. Two villages (20%) had coconut trees, and two villages (20%) had oil palm; however, in all cases these palm trees were planted either singly or on a very small scale (at most a clump of trees).

Almost all respondents had also planted vegetables (including legumes (32.4%), chilli (23.5%), aubergine (20.6%), sweet potato (11.8%), amaranth (5.9%), as well as cucumber, luffa, and okra (all 2.9%). Most of these vegetables were planted in small plots behind the respondents' houses. Four villages were engaged in swidden farming (Selao, Lengweg, Kenyer (Figure 7-1-A) and Bungo (Figure 7-1-A2)). Maize (*Zea mays*) was planted by one respondent, in one village. None of the villages planted rice or millet (with elephant depredation being one of the reasons), and almost all respondents (97%, n=29) said that they supplemented cassava with rice bought from outside the village.

Table 7-3: Elephant raids and dead elephants in focal villages

Village	Homes	Pop.	SSI *n*	Trees count	Trees age range	Freq. /month	Kill
Resettlement scheme villages							
Ralak (T)	Own	240	1	100	16	0.5	1
Jarau (T)	JAKOA	110	4	1450	[3–10]	1 (±0.5)	1
Bungo (T)	Own	10	1	100	10	4	0
Talud (T)	JAKOA	10	1	20	6	1	0
Other government villages							
Tiang (J)	JAKOA	450	11	595	[0.5–13]	1.2 (±0.7)	1
P. Tujuh (T/J)	JAKOA	98	6	410	[2–5]	2 (±1.5)	0
Tekam (T/J)	JAKOA	86	6	860	[1–6]	1.6 (±0.9)	1
Independent small villages							
Selao (J)	Own	120	1	1000	0.5	2	0
Kenyer (T)	Own	25	2	2000	7	2	0
Lengweg (T)	Own	5	1	10	45	0.1	0

Notes: for the predominant ethnicity of the village, (J) refers to Jahai, (T) to Temiar; villages are clustered based on location and size; 'Homes' indicate whether the houses in the village had been constructed by the villagers on their own or by JAKOA; 'Pop.' refers to the population of the village in 2016; 'SSI *n*' refers to the number of participants in the semi-structured interviews; 'Trees count' refers to the number of rubber seedlings, saplings and trees growing in the village; 'Trees age range' refers to the age of rubber trees; 'Freq. /month' refers to the average frequency of elephant visits per month over the last 12 months; 'Kill' refers to whether the respondent remembered a time that there had been a dead elephant in the village.

Almost all (80%) of the 10 villages were clearing patches of forest to plant rubber. Most (55%, n=34) of the respondents to the semi-structured interviews reported that they had received rubber seedlings from the government (Department of Orang Asli Development). In these villages, the mean age of respondents' current rubber holdings was 7 (±5.5) years (with the oldest being 45 years). The median number of rubber trees per respondent was 100 (two respondents reported having around 1000 trees).[19] Most of the respondents living in the RPS schemes already had mature rubber trees (rubber had been planted in RPS Kemar since 1985) and most of the respondents living outside the RPS were in the process of planting and growing rubber. One exception was Kg Lengweg where the villagers were only growing subsistence crops.

[19] One villager interviewed at Pulau Tujuh had arrived from the adjacent settlement of Pos Chiong (which I did not visit), he reported that elephants had destroyed half of some 20,000 rubber seedlings that he had been in the process of planting.

7.3.2 Experience of Wildlife Depredation

All villages in Belum-Temengor reported elephant presence, ranging from once a week to once a year, averaging 1.5 (±0.8) times a month (Table 7-3). Respondents from the semi-structured interviews most frequently named elephants as the source of depredation on rubber trees, bananas, buildings, fruit trees and sugar cane (Figure 7-3). Elephants also disrupted foraging activity, for example, the fear of elephant attacks prevented some respondents from going out at night to catch frogs.

Focus-group discussions in all villages reported that the presence of elephants influenced their choice of crops, stopping them from planting subsistence crops including rice, maize, sugarcane, sweet potato, coconut or banana. The villagers of Kemar reported that in the 1970s, prior to the clearance of the forest for rubber, they had planted rice, maize and sweet potatoes. None of focal villages planted rice any longer, although 97% of respondents reported buying it from shops outside their villages. In areas of high levels of depredation, such as Kg Tiang, respondents reported deriving an income from fishing and collecting forest produce (primarily agarwood) and then using the cash to buy rice from shops.

Threat of elephant depredation had also caused some respondents to stop planting cash crops including rubber – which is vulnerable to elephants within five years of planting (Olivier 1978a). For example, En. Cherang from Kg Semelor reported that elephants had destroyed all three of his plots of rubber totalling around around 600 seedlings, as well as bananas and chili plants. Respondents from RPS Banun and RPS Kemar reported that elephants also damaged mature rubber trees by stripping the bark and pushing over the trees and eating the roots. The plantations were vulnerable to depredation as they were usually planted on the edge of villages rather than in protective enclosures in the heart of villages (which is where subsistence crops were more often located).

Most of the villages had built fences of some kind. In RPS Banun, the federal government (through the wildlife department) has constructed an electric fence to protect the village from elephants. The effectiveness of this fence will be discussed in detail in the following chapter (chapter 8).

In Kg Senel (Krau), elephants were no longer a threat, but Tok Kueh reported that in the past they used to build special 'living' fences to keep elephants out of their fields. This involved planting tall saplings next to each other in a tight ring around the crops.

In Kg Tiang (Belum) almost every home had a small plot of vegetables surrounded by a make-shift fence of bamboo poles, chain-linked wire fencing and corrugated iron sheets. Even so, there was little success with planting, for example I only found one small banana tree growing in the entire village. The villagers reported that two individual wild boars had succeeded in jumping over and digging under the fences.

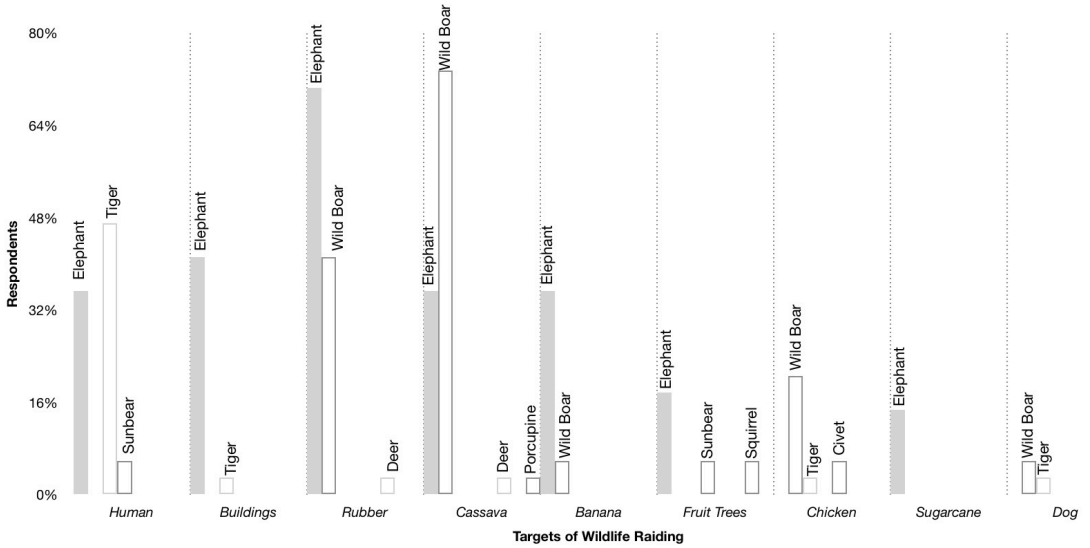


Figure 7-3: Targets and species responsible for wildlife depredation in the opinion of respondents in Belum-Temengor (*n*=34; multiple answers allowed for each target)

When the villages were examined by status cluster (Table 7-5), there was no significant difference between the clusters in terms of the frequency of elephant visits. However, increased human population density was associated with increased raiding of crops, property, and people; and also with increased reprisal killing of elephants.

Table 7-5: Influence of village cluster status on elephant raiding and killing

Village Cluster	HPD	Freq. of raids	Elephant raid targets			Kill
	/km²	raids/month	Crops	Property	People	Ele.(%)
Resettlement	35	1.2 (±0.4)	100%	75%	25%	44 (±44)
Other government	4	1.9 (±0.2)	100%	40%	0%	26 (±17)
Independent small	1	1.7 (±0.5)	67%	17%	0%	0

Notes: 'HPD' refers to human population density of the landscape surrounding the village; 'Kill' refers to the proportion of respondents confirming that there had been a dead elephant in the village.

7.3.3 Beliefs regarding elephants

Respondents in focus group discussions from both the Jahai and Temiar groups said that elephants "were people" or "had human souls". Tok Kueh from Kg Senel (Krau) and En. Shafie from Kg Penderas (Krau) reported how, for both the Chewong and Jahut, elephants were the first creatures created by Malaikat Jibrail (the Angel Gabriel), following the command of God (see note in chapter 4). Respondents in focus group discussions from both the Batek Tanum and Jahai groups said elephants were important because they were "part of nature" and kept forest pathways open and accessible.

Both Orang Asli and Malay respondents reported taboos against speaking in an arrogant manner about elephants. Orang Asli respondents from all groups said that elephants should be referred to by respectful terms such as *Datuk* (Sir), *Orang Besar* (Chief – lit. 'big person', important person), and *Orang Kuat* (Comrade – lit. 'Strong Person', stalwart) (Table 4-1). The actual name of the animal (such as *gajah*) was to be avoided and the Temiars and Jahais used a hand-signal (imitating a flapping ear) to refer to elephants without using its name (Figure 7-4). Malay respondents in Jerantut (Pahang) warned that people who were boastful ("cakap besar"), or belittled elephants, risked being targetted by elephant raids.



Figure 7-4: Jahai Batin Kederi, Sg. Kejar, Perak, using the hand-sign for elephant (a flapping ear) that is common in several groups in the north of Peninsular Malaysia.

7.3.4 Attitudes towards elephants

Results from the semi-structured interviews found elephants the least tolerated of five species of wild mammals mentioned, with 79% of respondents considering that there were "too many" elephants in the vicinity of their village (Figure 7-5). Respondents' stated willingness to kill elephants varied according to the severity of hypothetical depredation scenarios (Figure 7-6), increasing from 4% (in response to crop raiding), to 19% (in response to harm to humans), and then finally to 27% (in response to killing humans).

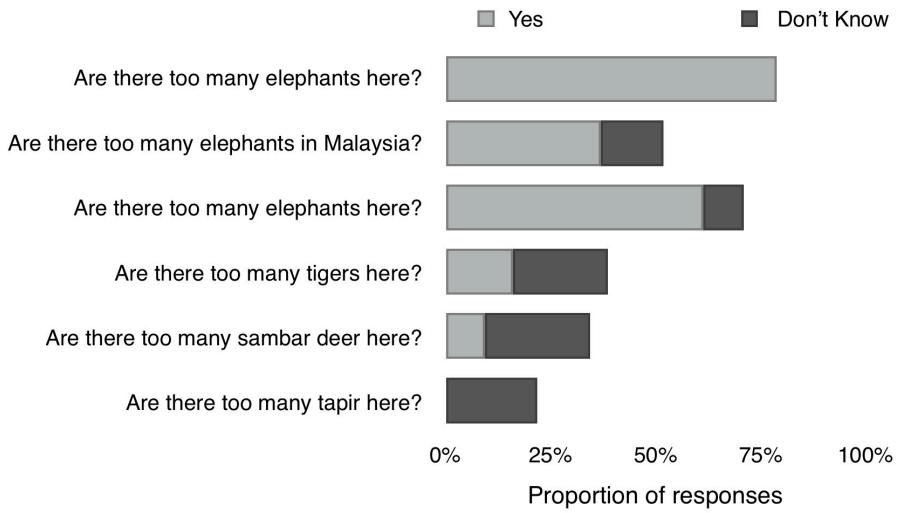


Figure 7-5: Attitudes towards the presence of wildlife expressed by respondents from the focal villages in Belum-Temengor ("here" in the context of the interview referred to the proximity of the respondents' village).

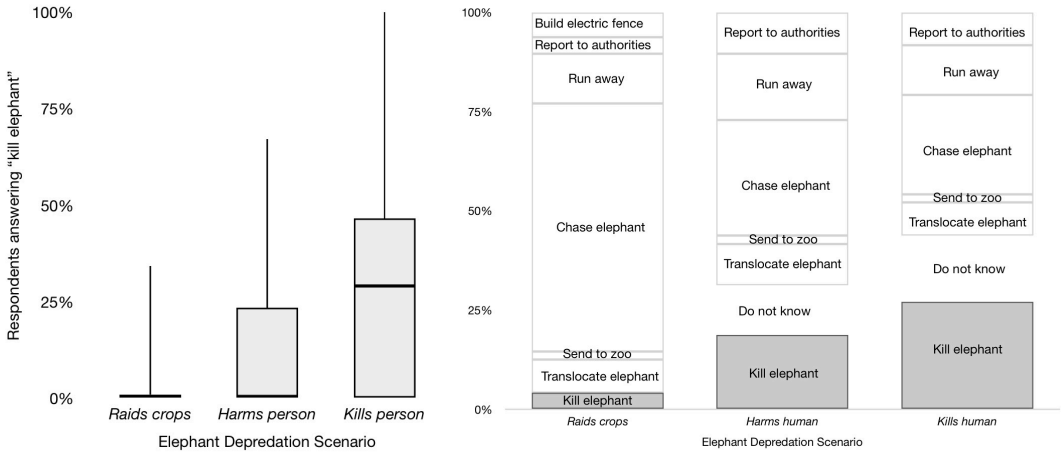


Figure 7-6: Villagers stated response to hypothetical depredation scenarios
Notes: **a.** (left) box-and-whisker plot showing the maximum, quartiles, mean (horizontal bar), and minimum for each village (n=34; variation based on village averages); **b.** (right) cumulative bar chart showing response frequencies ordered from violent intolerance to non-violent evasion; (the response "Do not know" is deliberately not included in the column of boxes of responses.

Ethnicity of the respondent (ie. Temiar or Jahai) did not appear to exert a significant role in their attitudes towards depredation. Instead, village status did appear to influence attitudes towards depredation, with attitudes towards elephants being the most favourable in the "Other Small" villages and the least favourable in RPS Kemar (Figure 7-7a).

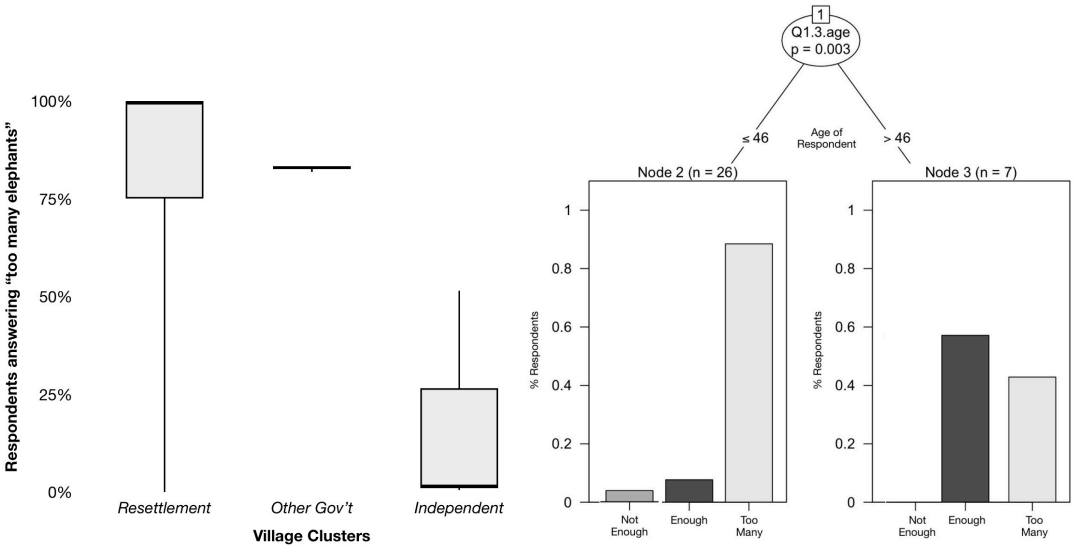


Figure 7-7: **a.** (left) Attitudes towards the presence of elephants "here" according to village status cluster (*n*=34); **b.** (right) Conditional inference tree showing attitudes towards the presence of elephants for respondents aged 46 and below (left), and those older than 46 (right).

Age of respondents also appeared to influence attitudes. Unbiased recursive partitioning found that there was significantly less (p=0.003) tolerance among younger respondents (less than 46 years old; n=26), where >80% felt there were "too many" elephants (Figure 7-7b). None of the respondents above the age of 54 (from all ethnicities and village status clusters) felt that there were "too many" elephants (Figure 7-8).

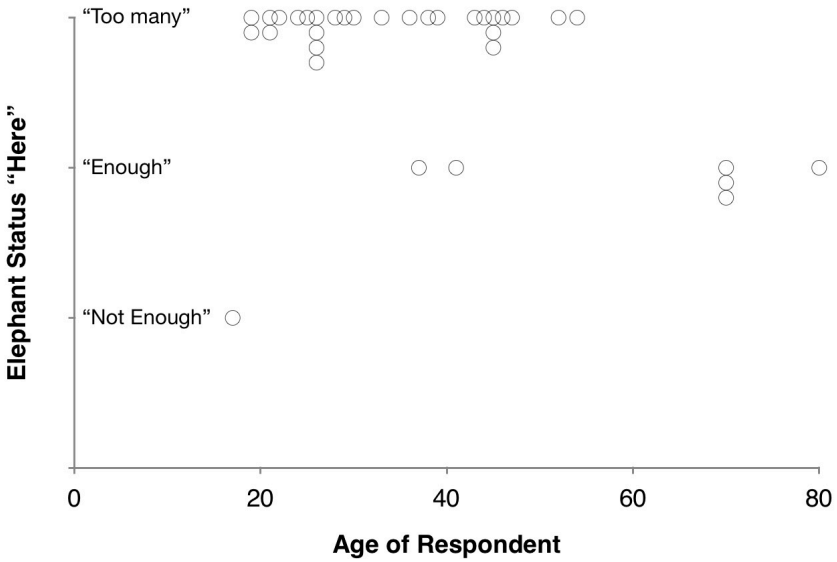


Figure 7-8: Attitudes towards elephants according to age of respondent.

7.3.5 Behaviour towards elephants

Of the 37 villages visited, 22 (63%) still had elephants present in the vicinity (solid dots in Figure 7-1). All respondents reported supplementing their diets with protein from hunting and fishing but none of them reported hunting elephants for meat or for ivory. Four of the 10 villages (40%) reported that there had been cases where villagers had killed elephants in response to depredation. The elephants were killed using pitfall trap lined with caltrops (*ranjau*), or by setting up a spring-spear trap (Figure 7-9a). The wildlife department (Joil Bombon 2018) notes that drop-spear traps (Figure 7-9b) are also used. Some respondents from three ethnic groups (Jahais, Jahuts and Temiars) reported that they would eat the meat of a crop-raiding elephant (Table 7-6).

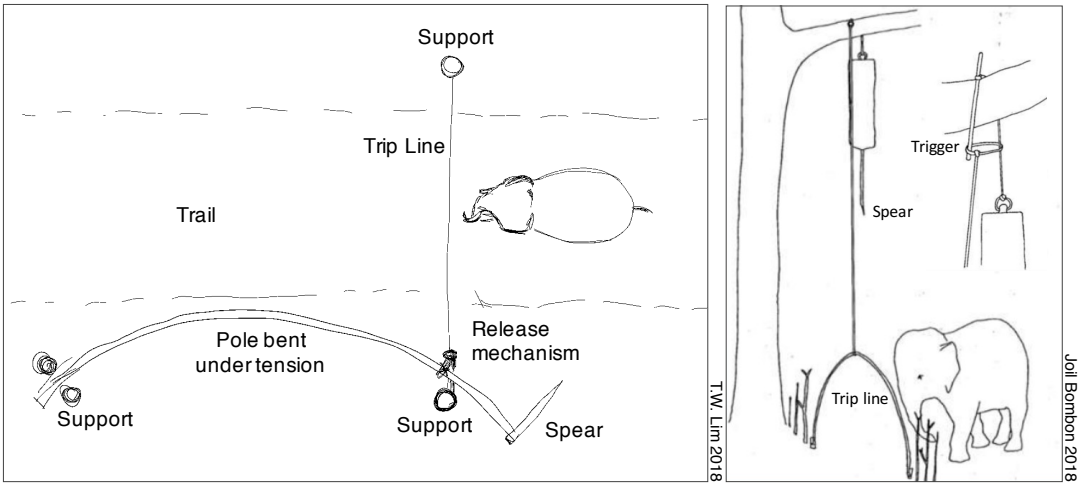


Figure 7-9: **a.** (left) *belantik* spring-spear traps used to kill large animals (incidentally, the constellation Orion is known as *Buruj Belantik* in Malay); **b.** (right) *penurun* drop-spear trap (with inset showing detail of trigger mechanism).

Table 7-6: Hunting and Eating Elephants in Peninsular Malaysia

Traditional culture	Ethnicity	Indigenous	Eat Elephant Meat
Forager	Batek Tanum	Yes	0/3
	Jahai	Yes	1/7 (14%)
			1/10 (10%)
Swiddener	Chewong	Yes	0/3
	Temiar	Yes	3/19(16%)
	Jahut	Yes	2/4 (50%)
			5/26 (19%)
Settler	Malay	No	0/3
	Chinese	No	0/1
			0%
All cultures			6/40 (15%)

My interviews suggest that, between 2007–2017, there were at least six elephants killed in the villages visited: three crop-raiding elephants had been killed and eaten in the Temiar villages in Perak; one was killed but not eaten in a Jahai regroupment scheme in Perak; one was killed but not eaten in a Jahai village in Belum; and one killed but not eaten in a Temiar village in Kelantan.

The villagers used several means to warn them of elephant raids. Some had strung tin cans to perimeter fences and could hear if animals were entering. When raids were common, the villagers set up watch-posts such as platforms in trees next to the fields - with villagers taking turns to stand watch each night, using spotlights powered by motorcycle batteries. The villagers reported that they could hear when the elephants had entered their fields by the sound of their fences being knocked over, vegetation being crushed and the movement of the elephants. The villagers also pointed out that elephants were often accompanied by clouds of sandflies.

The most common immediate response when an elephant entered a village or a planted field was to chase the elephant away by making loud noises (shouting, beating drums), lighting fires, shining spot-lights and ganging together to drive the elephant away. Some villagers had been supplied with firecrackers by the wildlife department[20] (Figure 7-10), but most villagers just used empty containers to beat as drums and shouted towards the elephant. The villagers reported that the use of fire

[20] In Kg Pulau Tujuh the wildlife department had supplied the Penghulu with 30 firecrackers after an elephant attack.

such as burning old tyres was effective in scaring off elephants. In September 2016 a villager had thrown a petrol-filled 'Molotov cocktail' at an elephant but had instead ended up badly burned himself. If scaring the elephants away failed, the villagers reported that they would have to run away. In Kg Bungo (RPS Kemar), respondents occasionally had to spend the night in their boat in the middle of the river.

In Kg Bungo (Kemar) some respondents said that they really hoped that the government could help them build an electric fence to protect their crops. However, in Kg Ralak (Kemar) the headman expressed a high degree of suspicion towards fences, suggesting that they could injure people and would only succeed in enraging elephants which could result in increased levels of depredation.

7.4 Discussion

7.4.1 Beliefs regarding elephants

My findings support the literature that suggests that, while members of Orang Asli groups and Malay communities share animist beliefs regarding elephants, they have different beliefs regarding hunting and eating elephants. Members of some groups (such as the Bateks) have beliefs that usually prevent them from hunting, trapping or eating elephants. Members of other communities, such as the Malays, have beliefs that mean that, while elephants must be treated with respect, and are not eaten, there is no outright proscription against killing them. Members of other groups, such as the Temiars, did not report any taboos against killing a persistent crop-raiding elephant, and eating its meat.

These findings should not be taken as a suggestion that all members of an ethnic groups share the same beliefs – a misunderstanding that Golden and Comaroff (2015) claim is prevailing within the environmental and development community. While Bolton (1972: 792) found that, among the Temiars, only elderly men ate elephants, none of my Temiar respondents mentioned taboos on eating elephant meat based on gender or age. When asked whether there were any particular restrictions on eating elephant meat, one Temiar respondent from RPS Kemar replied, "If we kill an elephant we will eat it – everyone in the village, even children can eat it because it has sinned and eaten our crops." Another respondent replied, "I hear it tastes good

but I have not tried it myself; I'm afraid it would make me fat!" In Kelantan, one Temiar respondent replied, "No, not all of us eat elephants here – some people do not like the taste."

While these findings support the contention that food taboos are often distinctively personal in nature, we did find many respondents that connected their taboos with their ethnicity and religion. For example, several Temiar respondents reported taboos against hunting birds that made calls that resembled that of a crying baby. They referred to these birds as *cɛp wɛdwaad* (these included several species such as *Hypothymis azurea, Oriolus chinensis, Rhipidura albicollis*) (Chu 2018). These beliefs were common to most Temiar respondents, although one village had a substantial number of residents who had converted to Christianity, and here a Temiar respondent noted, "We are Christian, we can eat anything." A Jahai respondent from the same village similarly claimed not to being restrained by Temiar taboos, "We Jahai hunt everything, we even hunt the birds that the Temiar call *cɛp wɛdwaad.*"

7.4.2 Attitudes towards elephants

Contrary to my initial expectations, the results of my semi-structured interviews in Belum-Temengor do not suggest any significant difference between the ethnicities studied (Jahais and Temiars) in terms of their attitudes towards elephant depredation. The factors that did affect attitudes to elephant depredation included (i) the severity of depredation experienced; (ii) age of respondent; and (iii) relationship with authorities.

Not surprisingly, the people with the least tolerant attitudes towards elephants were those that had experienced the most problems with elephants. Respondents most willing to kill elephants were those from the villages experiencing high levels of depredation (in terms of the level of threat, and the frequency of raids). Only 4% of respondents reported that they would kill elephants in response to crop raiding but 27% reporting that they would kill an elephant if human lives were at stake. Similarly, there was a consistent response that, while there might not be enough elephants in Malaysia as a whole, there were still too many elephants in the landscape of the respondent's own village – the not-in-my-back-yard attitude.

The age of the respondent also appeared to influence the attitudes of respondents towards elephant depredation. None of the respondents born before the formation of Malaysia (1963) reported feeling that there were "too many" elephants in their landscape (Figure 7-8). This finding is not robust due to the small *n* but it is consistent with the idea that the traditional foraging cultures were more compatible with elephant conservation than the present fossil-fuel culture. In this respect, the negative attitudes towards elephants of most of the respondents born after 1963 seem to be a sign that the world-view of indigenous communities may be shifting to accommodate values more in tune with a culture based on farming and fossil fuels rather than one based on foraging and swiddening. These findings are also consistent with those of Malaysian sociologist Vanitha Ponnusamy (2012) who found that Orang Asli smallholders had recently become more like Malay smallholders, with less tolerance and empathy towards elephants – increasingly demanding the authorities deal with the elephants and provide the villages with electric fences.

I found that the Jahai and Temiar respondents showed a high level of distrust towards the wildlife authorities. Only a small minority (8-10%) of respondents mentioned reporting incidents to the authorities as their response to an elephant attack. Villagers expressed dismay that reports seldom resulted in any action being taken. In response to repeated complaints, some villagers said that the wildlife department would send an officer to visit the village, but usually no action was taken apart from issuing the villagers with firecrackers (Figure 7-10). Some villagers (e.g. those of Kg. Bungor, Kemar) hoped that the authorities would build a fence to protect the village, and others (10-12%) said that they wanted the authorities to catch and translocate the elephants to another area or to a zoo.

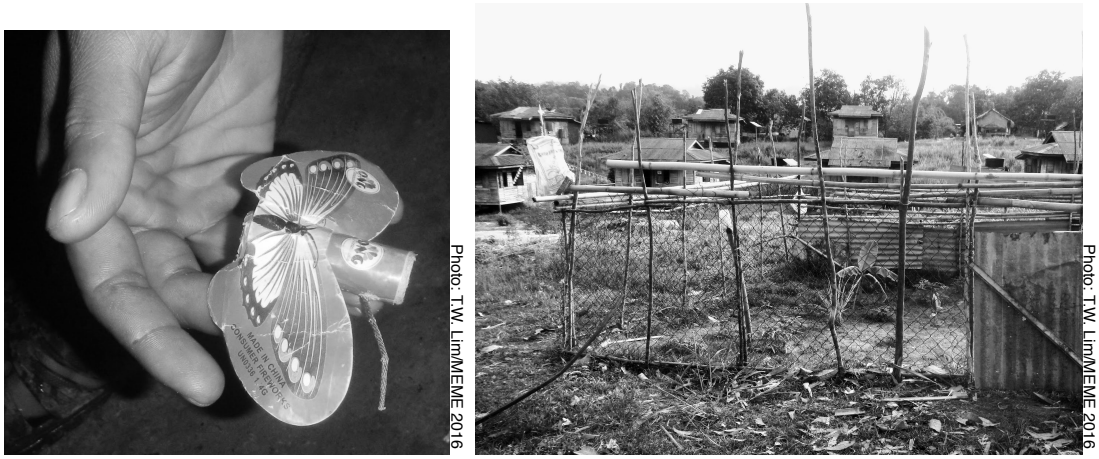


Figure 7-10: a. (left) a firecracker supplied to the villagers by the wildlife department to scare away elephants; **b.** (right) a makeshift fence in Kg Tiang protects the sole banana plant in the village.

Several respondents blamed the recent translocations for the increased conflict, saying that the native 'forest' elephants gave them no problems, and that crop raiding was only carried out by the translocated elephants (as had been reported previously in chapter 4). Around 93% (n=15) of respondents reported that they felt that problems with elephants were less during their grandparents' generation.

This idea that it was the elephants themselves that had changed their behaviour is similar to that found by Thekaekara and Thornton (2016: 13/33). They found that the traditionally animist forest communities of the Nilgiris had originally had a "trusting relation" with the native forest elephants but recently reported statements such as, "There is no Aanedevaru [totem elephants] here anymore. They have all gone to other forests. These are all other elephants and we don't know them."

7.4.3 Behaviour towards elephants

My findings regarding hunting, trapping and eating elephants support earlier studies finding that rural communities rarely actively hunt elephants, and killing usually takes place in response to depredation (as outlined in chapter 4). I did not find any evidence that any group of Orang Asli was involved in hunting or trapping elephants for ivory or for meat. My findings support the literature that some Senoi groups, including the Temiars (both in Perak and in Kelantan) and the Jahut, do occasionally

kill crop-raiding elephants, and some members of these communities do eat the meat of such animals.

I recorded examples of elephant killing and eating from Pahang and Perak. In Kg Penderas (Krau), Shafie Dris reported that, prior to 1993, the Jahut people had set pitfall traps for crop-raiding elephants and some had eaten elephant meat, although they did not particularly enjoy it due to its toughness. However, after that date, the authorities had translocated the last elephants away from the vicinity of Krau wildlife reserve. This account was confirmed by Yusri Ahon (President of JOAS, the Malaysian indigenous peoples' network), who hailed from another Jahut village in the vicinity of Krau, Kg Sungai Mai.

7.4.4 Factors Affecting Depredation

There are many and complex factors affecting the actual levels of elephant depredation faced by a community. Previous chapters suggested that the type of crops planted were likely an important influence on depredation. My interviews in Belum-Temengor suggest a clear increase in elephant depredation in response to (i) the planting of rubber; and (ii) increases in the population of people in the landscape.

My fieldwork identified a striking contrast between areas with plantations and high human population density and areas with no plantations and with low human populations. The best example of this is the convivial human-elephant co-existence in the settlement of Lengweg, in Temengor Forest Reserve, and some 10 km from RPS Kemar (Figure 7-1-A). The landscape surrounding Lengweg was mostly forested and population density was around 0.2 people per km². Here, my respondents reported that elephants visited the village about once a year but were easy to chase away and there was no significant depredation of crops, property, or people. This contrasted with RPS Kemar itself, where population density was 35 people per km², and elephants posed a constant threat, with several attacks homes, human fatalities, and reprisal killing of elephants. In RPS Kemar there were two human fatalities in 2014: one old man killed in his home and one young man killed after attempting to chase elephants away from his crops.

Since the mid-20th century, the government has had a policy of concentrating Orang Asli communities (see chapter 5). For example, RPS Kemar had a population

of 3459 people in 2013, and with its designated area of 46 km², its population density would around 75 people per km². In reality the actual landscape population density of the villages in RPS Kemar (calculated using my methodology) is around 35 people per km² since the RPS is largely surrounded by uninhabited forest. The crops of a concentrated population are more vulnerable than the crops of a dispersed population.

The situation in RPS Kemar seems to be one in which the local human population density is beyond the level that would allow the survival of elephants in the lowlands, but the fact that the settlements are in an enclave, surrounded by an extensive area of forested hills, means that the local sink is replenished from neighbouring sources. Further discussion of the nature of the factors affecting depredation and the strategies for controlling them will be presented in the general discussion (chapter 9).

7.4.5 Challenges in Conducting the Survey

There were several aspects of the methodology of my survey that are worth noting. The first aspect is the fact that the effect of agricultural factors, such as planting patterns was not examined spatially (i.e. the location and density of the rubber plantations in each village were not mapped out). The second aspect relates to the ability of the study to make statistically significant inferences, given the number of respondents interviewed. Future studies could minimise these limitations by collecting spatially explicit agricultural data and collaborating with anthropologists with experience in social research methods. This section considers the extent to which the current limitations affect the findings of the present study.

The small *n* affects the capacity to make strong interences regarding factors affecting attitudes towards elephants. My initial plan to obtain around 10 respondents for each village was made without realising that some of the villages were too small to achieve this. The number of female respondents is particularly low as, despite having female enumerators, most of the female villagers that the team approached were reluctant to be interviewed – we only managed to complete questionnaires for four women (12%). The overall response rate and that from women in particular might have been improved if I had employed female Orang Asli enumerators and

spent more time in each village building the trust of the villagers prior to conducting the interviews.

In addition, the results are naturally biased towards the individuals who were willing to participate in the survey, excluding individuals who may have had strongly negative attitudes towards elephants but did not wish to have these views recorded in order to avoid being seen as confronting the interviewers (who were known to be promoting elephant conservation).

I note that the question of killing elephants was something that respondents could be reluctant to admit to due to several factors including (i) shame due to their belief in the non-human personhood of the elephant; (ii) their desire to please the interviewer, with the knowledge that the interview team was interested in elephant conservation; (iii) their desire to avoid prosecution for killing elephants – since the elephant is a protected species.

I suspect that some respondents avoided making an admission to sanctioning the killing of elephants by answering "do not know" to questions such as, "What would you do if an elephant killed a person?" (Figure 7-6b). Despite this problem, there were enough respondents admitting their willingness to reprisal killing that the overall tendencies and trends could still be observed.

7.5 Conclusion

The findings of the present study could have several implications for the management of elephants in Peninsular Malaysia. The survey confirms the findings of previous chapters that highlight several aspects of the indigenous cultures of the Peninsula that have enabled them to co-exist with elephants for millennia: (i) an attitude of respect towards elephants; (ii) low human population densities; (iii) subsistence based on foraging or low-intensity swidden farming; and (iv) occasional killing of crop-raiding elephants. These aspects are discussed in-turn, below.

The traditional attitude of respect towards elephants can be encouraged by several measures. In the specific case of the elephants of Belum-Temengor, for example, an empathetic response is needed to address the current widespread belief that depredation is largely caused by elephants translocated by the wildlife department. The government should review the policy of translocating crop-raiding

elephants, paying particular attention to the impacts on local communities in the vicinity of release sites, consider granting compensation if warranted, and continue to explore appropriate methods of crop protection (see chapter 8). Education programmes can then highlight the influence of factors other than translocation on depredation, such as the increased human population and the shift to planting rubber.

Despite a long-standing national policy to increase the population of Malaysia to 70 million (Dwyer 1987), the rural population of Peninsular Malaysia has actually been in decline and the government plans further urbanisation (JPBD 2016). However, the population of the Orang Asli in general, and the population of communities living in priority conservation landscapes is increasing. Therefore, there needs to be increased cooperation between JAKOA and agencies such as the wildlife department and the state forestry departments to resolve the issue of increased settlement inside protected areas such Temengor forest reserve and adjacent forested areas. In light of the increased risk of elephant depredation in such areas, JAKOA itself should reconsider encouraging the settled agriculture, in particular its policy of promoting the clearance of natural forest for rubber plantations.

My findings support studies such as that of Aziz et al. (2013) that highlight the need to provide greater recognition of indigenous rights within natural resource laws (including the forestry and wildlife statutes). In terms of the management of protected areas, the laws should be amended to allow communities to continue to practice traditional low-intensity foraging and swidden. In consultation with civil society and the communities themselves, the law should be amended to ensure that it acknowledges traditional wildlife management measures. For example, at present if an elephant is killed by a person in self-defence, the law states that body of the elephant "shall be the property of the State and shall without delay be handed to any officer" (Conservation of Wildlife Act 2010: s54(5), s55(5)). This provision requires careful reconsideration, including examining the perspective of rural communities.

Finally, it is critical that measures that the authorities put in place to protect communities from elephant depredation garner the consent of the affected people prior to implementation. Poorly considered, half-hearted measures that do not have local support risk making the situation worse by antagonising elephants, increasing

habituation and even causing hyper-aggression in already dangerous animals. The issue of implementation of measures to protect communities from elephants is examined in more detail in the following chapter which looks at electric fences.

Almost all the individuals that I interviewed still hold beliefs and attitudes that are respectful towards elephants. While some members of groups such as the Temiars do occasionally kill crop-raiding elephants and eat their meat, they usually did so as a last resort, after tolerating extensive depredation. Nevertheless, there are signs that the traditional attitude of respect is being eroded by the shift away from foraging lifestyles to the cash economy, and by increased levels of depredation caused by factors associated with "development", including increased human population density, planting of cash crops, and inadequate protection measures. The widespread belief that the increased depredation is due to elephant translocations by the government is a key source of the erosion of respect for elephants. Overcoming this distrust will require increased empathy, engagement, and a coordinated strategy involving multiple agencies and civil society (this will be discussed in more detail in the following chapter).

8 Effectiveness of Electric Fences in Reducing Crop-raiding by Wild Elephants in Belum-Temengor

He only says, "Good fences make good neighbours."
Spring is the mischief in me, and I wonder
If I could put a notion in his head:
"*Why* do they make good neighbours? …"
—from "Mending Wall" by Robert Frost (1914)

This chapter examines a particular case study where the wildlife department assisted a village in setting up an electric fence to protect them from elephants. The effectiveness of the fence is assessed in terms of its design and also its maintenance. The attitudes of local villagers were surveyed and their responses are compared with the responses of those from other fence projects in the Peninsula. The effectiveness of the fence is also examined in terms of the land cover inside and outside the fence. By monitoring the movement of satellite-collared elephants, we find that the fence has only been marginally effective in protecting the village. We identify the design and maintenance of spring gates as a particularly weak aspect of the fence. We highlight extensive land cover change outside the fence as one factor exacerbating the crop-raiding.

KEY WORDS: Orang Asli, Jahai, Temiar, crop protection, wildlife management, Asian elephant.

8.1 Introduction

8.1.1 Controlling Human-Elephant Conflict

As noted in the previous chapters, the raiding of crops by elephants has a long history and is a fact of life throughout much of the world. However, changes in agricultural practices and increases in elephant populations can lead to persistent crop-raiding that reduces the tolerance of local people, results in reprisal killings, and can lead to the loss of local populations, ultimately threatening the survival of the species.

Many strategies exist to control depredation by wild elephants in ways that still conserves the population (Fernando et al. 2008, Hoare 2012). One of the oldest of these strategies is to place barriers (such as fences, walls, and ditches) around

humans and their property (including buildings, crops, and livestock) in order to protect them from wildlife raids (e.g. Hedges and Gunaryadi 2010).

In tandem with barriers, conservation strategies also aim to improve the attitudes of people towards wildlife, and thereby increase their acceptance of losses (see chapter 9 for an overview of these influences). The focus on improving the attitudes of local people is the focus of the Conservation Conflict Transformation (CCT) approach (Madden and McQuinn 2014). This approach uses the Levels of Conflict model (CICR 2000) to move beyond obvious immediate disputes related to wildlife depredation to focus on the systemic root causes of conflict.

8.1.2 History of Protective Barriers in Peninsular Malaysia

Barriers are probably the oldest of these interventions, with farmers in the Malay Peninsula having used them to prevent elephant incursions for hundreds of years. In the 19th-century, villagers in Perak reported that simple fences were usually effective in protecting their crops from elephant damage: "a slight fence of reeds usually keeps them out of padi, cane, and maize plantations" (Bird 1883: 211). In the first half of the 20th century, the expansion of large scale plantations of rubber and oil palm increased raids from elephants, seladang, and deer. This led to experiments to protect crops by digging trenches, erecting barricades and even using electrified fences.

Electric fences do not offer physical protection for crops so much as they demarcate 'no-go' areas that elephants can be taught to avoid (Thouless and Sakwa 1995). Initial application of electric fences in the Peninsula had mixed successes against elephants, with crop-raiding animals often ending up being shot (Hubback 1941, Hislop 1956).

By the 1970s, electric fencing technology was increasingly used by Malaysian plantation companies (Monroe and England 1978, Blair and Noor 1981, Zaaba et al. 1991, Chong and Dayang 2005). Experience from throughout Asia and Africa now suggests that, when appropriately designed and regularly maintened, electric fences can be effective and allow people to live in the same landscape as elephants (Seidensticker 1984, Andau and Payne 1992, Naughton et al. 2000, O'Connell-Rodwell et al. 2000, Hoare 2012).

By the turn of the millennium, growing recognition of the potential problems with translocation of elephants meant that the wildlife department was increasingly focusing its efforts on allowing elephants to co-exist in the same landscape and to protect crops by erecting electric fences (Salman et al. 2011: 71). In 2009, the department commenced an electric fence scheme to protect vulnerable rural communities. By 2016, a total of 214.8 km of fences in 16 sites had been constructed under this scheme, known as SPEG (Sistem Pagar Elektrik Gajah – the elephant electric fence system) (Ahmad Zafir and Magintan 2016, Nasharuddin 2016).

A survey of 566 famers living near 12 of the fence sites indicated that a significant majority in all sites felt that the fences were well maintained and effective at reducing depredation (Ponnusamy et al. 2014, Ponnusamy et al. 2016). Between 2011 and 2016 the wildlife department reported a significant (>60%) drop in the cost of elephant damage and also a 20% reduction in the number of complaints related to elephants (DWNP 2017).

Given this success, the wildlife department decided to expand the scheme, and to improve fence maintenance by involving the farmers directly. Most farmers were keen to have greater control over the management and maintenance of the fences (Ponnusamy et al. 2016). So, under the 11th Malaysia Plan (2016-2020), the government announced plans to spend an additional RM12,000,000 (~USD3 million) on managing, monitoring and maintaining the 16 fence sites, under a scheme, known as SPEGKOM, that would see local communities increasingly taking over the appointment and payment of their own contractors (Feisal Norawi 2015). Despite this allocation, in 2016 the wildlife department cited budget constraints for delaying plans to set up fences to control elephant fences in locations such as RPS Kemar, in Belum-Temengor (Loh 2016).

8.1.3 Problems with Elephant Fences in Peninsular Malaysia

Despite the overall success of the fences, the level of effectiveness was not uniform and elephant raids continued in some sites (Ponnusamy et al. 2016). The fences in such sites may have been less appropriately designed or not as diligently maintained.

One example of a less effective site was RPS Banun, in Belum-Temengor. Here, an electric fence had been constructed around the village of Semelor in 2005.

Not long after that, elephants had broken through the fence and attacked the village, damaging several buildings and raiding the honey of the stingless bees (*Trigona* sp.) kept by the villagers. The fence was soon abandoned.

Villagers continued to make consistent complaints to the wildlife department regarding elephant depredation and, in 2011, the department constructed another fence in the north of RPS Banun. This 12-km fence enclosed a 2.2-km² area which included four villages, totalling 571 people (260 people per km²).

In 2012, MEME fitted one of the elephants that raided crops around Banun with a GPS collar and was recorded spending several days inside the perimeter of the electric fence. MEME noted that the elephant "seemed to be entering and coming out of the fence perimeter seamlessly, suggesting a breach of the fence at some points" (Campos-Arceiz 2013: 5). In January 2015, an elephant died as a result of the conflict in Banun (DWNP 2017).

The reasons for the relatively poor effectiveness of the Banun fence were not clear. Some villagers criticised the fence at Banun for being poorly maintained, and not encompassing the cropland of all of the villages in the regroupment scheme (pers. obs., 2015). Other villagers blamed the raids on the high number of elephants in the vicinity of the village, which they claimed was due to the government programme of translocating elephants to the area (as discussed in chapters 6 and 7). The high level of elephant raiding in Banun has also been blamed on "development". The forests surrounding Banun have been the subject of extensive logging and land clearance. An unpublished report by the Malaysian Nature Society (Anon. 2009) suggests that this activity disrupted elephants' ranging patterns and destroyed salt licks. A clearer understanding of the reason for the continued elephant depredation in Banun is critical in order to safeguard the people of Banun and to determine whether or not the government should continue spending millions of ringgit in supporting electric fences in this and other locations.

8.1.4 Aim and objectives

In order to improve the effectiveness of electric fence projects generally, and to support the SPEG scheme under NECAP in particular, it is necessary to examine the reason for the poor performance of the Banun fence in more detail. This will provide

a case study that can also be referred to by elephant management programmes elsewhere in the world.

This chapter examines the case of the Banun electric fence project with the aim of identifying lessons for improving the effectiveness of human-wildlife management generally, and for ensuring the success of the SPEG scheme in particular. The specific objectives are to examine factors affecting the effectiveness of the fence in restricting the movement of elephants into the village: (1) the design and maintenance of the fence; (2) villagers' attitudes towards the fence; and (3) trends in land cover inside and outside the fence.

8.2 Methods

8.2.1 Study site

The Banun resettlement scheme (RPS Banun) comprises nine settlements with a total population of around 936 people in 2016 (Table 8-1) spread out over 38 km² in the middle of the Belum-Temengor landscape, the priority elephant conservation site (Figure 7-1-1A) (24.6 persons per km²). As noted in section 5.3.5, above, this includes 15.84 km² that the government considers "state land" and intends to turn into an aboriginal reserve, as well as other areas of state land that have not been allocated. Around 20 km² overlaps with the Banding and Amanjaya forest reserves. The population in the state land is 680 persons (42.9 persons per km²) and the population in the forest reserves (the villages of Semelor and Pulau Tujoh) is 256 (12.8 persons per km²).

Table 8-1: Population of villages in RPS Banun by ethnicity (2016)

Settlement	Jahai	Temiar	Total	Location
Kg Sg Raba	163	0	163	Inside Fence B
Kg Semelor	0	158	158	Outside fence
Kg Desa Damai	0	130	130	Outside fence
Kg Banun	113	0	113	Inside Fence B
Kg Pulau Tujuh	42	56	98	Outside fence
Kg Desa Ria	0	92	92	Outside fence
Kg Kabel	84	0	84	Inside Fence A
Kg Pengkalan Permai	67	8	75	Inside Fence A
Kg Desa Permai	0	23	23	Inside Fence A
Total	469	467	936	

Source: Department of Orang Asli Development (JAKOA) 2016 Database
Note: 'Kg' – Kampung (village), 'Sg' – Sungai (river).

The residents of the north of the site were mostly Jahais (of the traditionally foraging Menraq sub-group of Orang Asli) and the residents of the southern villages were mostly Temiars (of the traditionally swiddening Senoi sub-group of Orang Asli). The history of the resettlement scheme was discussed in chapter 5. The villagers made a living from rubber tapping, fishing and collecting forest produce (van der Sluys 1999, Lim et al. 2002, Burenhult 2002, see chapters 6 & 7).

8.2.2 Fence design and maintenance survey

We carried out a series of surveys of the fence at Banun, examining the design and maintenance of the fence. We surveyed the Banun fence over three periods: 22–25 April 2014, 11 January 2016, and 25-26 March 2018. The fence survey used a framework (Appendix V) that, as with the occupancy methodology mentioned in chapter 6, had been developed by experts from the ECG (see section 6.1.3). We used a Garmin GPS receiver to map each fence post, noting the condition of the fence, any elephant signs, and the adjacent land cover. At every 50th post, we recorded the voltage and current of all wires using a handheld digital electric-fence tester (Gallagher SmartFix).

8.2.3 Elephant tracking

We used GPS tracking collars (Rogers and Anson 1994) to monitor the movements of four elephants in the vicinity of the Banun fence. The elephants were located between 22 March 2012 and 5 May 2014, and the staff of the wildlife department immobilised them using the protocol described by Shariff Daim (1995). We attached the collars using the methodology described by Wadey et al. (2018).



Figure 8-1: **a.** (left) adult female elephant *Elephas maximus* "Mek Banun" with GPS collar (No. SAT247) attached; the wound in the shoulder is from the dart used to tranquillise her; **b.** (right) collar prior to attachment.

The collars (Figure 8-1) were designed and manufactured by Africa Wildlife Tracking, Pretoria, South Africa (collar numbers SAT247, SAT608, SAT609, and SAT612), and used the GPS network to transmit location coordinates via a geostationary satellite (Inmarsat) to a ground station every two hours. The project was undertaken with a permit from the wildlife department (Ref. "JPHL/TN(IP): 80 (4/2)"), and complied with the ethics requirements of the Smithsonian National Zoological Park Institutional Animal Care and Use Committee (NZP-IACUC #10–32).

For each elephant, we mapped its movement paths (by connecting the points locations transmitted at two-hour intervals). We also mapped the centroid and extent of the animal's range (Jenness 2006, Jenness 2008). We used high-resolution imagery from Google Earth to map the location of each building in the settlements in and

around RPS Banun, and calculated the closest distance that each elephant came to the buildings in each village.

Understanding of patterns of site-specific elephant depredation requires examining the behaviour of individual animals (Mumby and Plotnik 2018). On this basis, we undertook a case study that involved a detailed analysis of the movements of one of the collared elephants. This elephant, an adult female elephant from a herd of five known crop-raiders was given the nickname 'Mek Banun' (Figure 8-1). The elephant was caught in the vicinity of RPS Banun on 22 March 2012, fitted with a collar, and then released the following day.

Box 8-1: A novel animal-movement extrapolation algorithm for a barrier encounter

i. Estimate the direction the animal took as it approached the barrier from the path segment defined by the two points observed immediately prior to and approaching the barrier (the "approach path");
ii. Extrapolate the approach path until the barrier (and designate the point of intersection of the extrapolated approach path and the barrier as "point A");
iii. Estimate the direction the animal took as it moved away from the barrier based on the path segment defined by the two points observed immediately after it left the vicinity of the barrier (the "retreat path");
iv. Extrapolate the retreat path backwards to meet barrier (and designate the intersection of the extrapolated retreat path and the barrier as "point B");
v. Connect change points A and B by creating an extrapolated movement path following the perimeter of the barrier between the two change points.

Note: see section 8.4.2 for an example of how I applied this method.

To estimate the actual route that Mek Banun took in relation to certain sections of the fence, we plotted an extrapolated route using several novel algorithms. This was necessary in the immediate vicinity of the fence when the generalised two-hourly movement path did not give a sufficiently clear picture of her likely movement in relation to the fence and gaps in the fence. In particular, we found several instances when her observed movement path suggested that she had approached the fence and then, being unable to pass through, had walked back away from the fence. In such instances we used an animal-movement extrapolation algorithm to plot an interpreted path (Box 8-1, and see the discussion section for an example).

8.2.4 Attitude survey

We carried out a series of interviews to gauge the attitudes of the residents of the nine villages in RPS Banun regarding the fence. In March 2014 we carried out a seriessemi-structured interviews involving 30 residents from six of the villages (Appendix VI). The survey focused on villages located within the fenced area and included one respondent from each household visited. An effort was made to visit each of the households in the study area and respondents were selected based on whether willing respondents could be obtained. The interviews used a quesionnaire consisting of 25 quantitative and qualitative questions (as described by Bryman (2004), and Bernard (2006)). As with the fence design survey, the attitudes questionnaire had also been developed by the ECG, and focused on determining the attitudes of the residents regarding the effectiveness and maintenance of the fence. In 2016 and 2018 we carried out follow-up interviews with key informants in two villages.

For each village, we calculated an approval rating for both the effectiveness and maintenance of the fence, based on the number of positive responses received as a percentage of total possible responses. We compared the responses with those from responses from surveys we had previously carried out in 11 other elephant fences in Peninsular Malaysia (Ponnusamy et al. 2014, and Ponnusamy et al. 2016). We analysed the results using the Conservation Conflict Transformation (CCT) approach (Madden and McQuinn 2014) to examine the levels of conflict that were present in the case of the elephants of Banun: looking at (i) immediate disputes; (ii) underlying conflict; and (iii) deep-rooted conflict.

8.2.4 Land-cover mapping

We identified land-cover change (‘tree cover loss’) within RPS Banun using Landsat images prior to the construction of the fence in 2011 and between 2011 and 2017. We downloaded freely accessible images from the Global Forest Watch website[21], which uses median observations from a set of quality assessment-passed growing season

[21] globalforestwatch.org

observations (Hansen et al. 2013). We used these images to map tree cover loss prior to and after the construction of the fence.

We combined these images with high-resolution satellite images from Google Earth[22] to identify areas of terracing and planting indicative of rubber plantation. We confirmed these locations by visiting villages in the field on 11 January 2016, 17–20 December 2016, and 25–26 March 2018. This included driving along the main roads, walking into several of the plantations, and taking note of the land cover at key locations. Based on this information, and the information from the earlier fence survey, we mapped the locations of rubber plantations in and around the Banun fence and compared them with the elephant paths.

8.3 Results

8.3.1 Fence design

The results of the fence survey questionnaire (Appendix V (A)) indicate that the 12-km Banun fence was constructed from March to October 2011, encircling most of the villages in the north of RPS Banun. This fence cost the department RM432,402 (~RM36,000/km; ~RM200/ha; ~USD50/ha). The fence used three lines of 2.5-mm high-tensile wire with 1.6-mm wire loops to protect the posts (Figure 8-2). The wires were attached to cement posts using PVC insulators at heights of 0.6 m, 1.1 m and 1.6 m above ground. The posts were placed at 10-m intervals, with primary posts every 100 m. The primary posts had concrete bases and were supported with two angled support posts (Figure 8-3). The cement posts measured 10 cm x 10 cm x 240 cm, and consisted of concrete (Grade 20, with cement, sand, and aggregate mixed to a ratio of 1:2:4), reinforced with steel bars (4T8, R6 150 p/p, following the American Iron and Steel Institute standard); replacement posts were made of galvanised angle irons.

The fence was electrified by four power energisers (22 J PEL model 412i) that sent short pulses (3×10^{-4} s) along the wire at a rate of around one per second. The energisers used lead-acid batteries (Yokohama N150 12V 120AH) that were charged by solar panels (80-Watt 2'x4') using solar charge controllers (Steca Solsum

[22] earth.google.com

8.8F 27/24V, 8A). Each energiser was placed in a control box that was connected to the fence using insulated wire leads and a plastic switch mounted to the fence post. Each energiser was protected by two lightning diverters.

The original configuration of the fence ran in a 12-km semi-circle bounded to the west by the Temengor lake, starting near Pengkalan Permai and ending near Desa Permai (Figure 6-1-1A, above). In 2013 the fence was reconfigured into two sections (each around 6 km in length and enclosing around 1.3 km² of land), a semi-circular western section ("Fence A", below) and an enclosed eastern section that encircled Banun and Raba ("Fence B", below). People were able to move through the fence via spring gates (Figure 8-4) that were set up at 16 points along roads and paths that crossed the fence (Figure 8-3).

8.3.2 Fence maintenance

The fence was being maintained by a company contracted by the wildlife department. Between 2011 and 2016 the maintenance cost was RM133,200 (~USD450/km/year and ~USD2.5/ha/year) (DWNP 2017). The contractor employed two villagers to maintain the fence, paying a monthly salary of RM600 each, to work 4-6 hours a day, five days a week (RM14,400/year; ~USD1.5/ha/year). Material costs made up the balance of the maintenance cost.

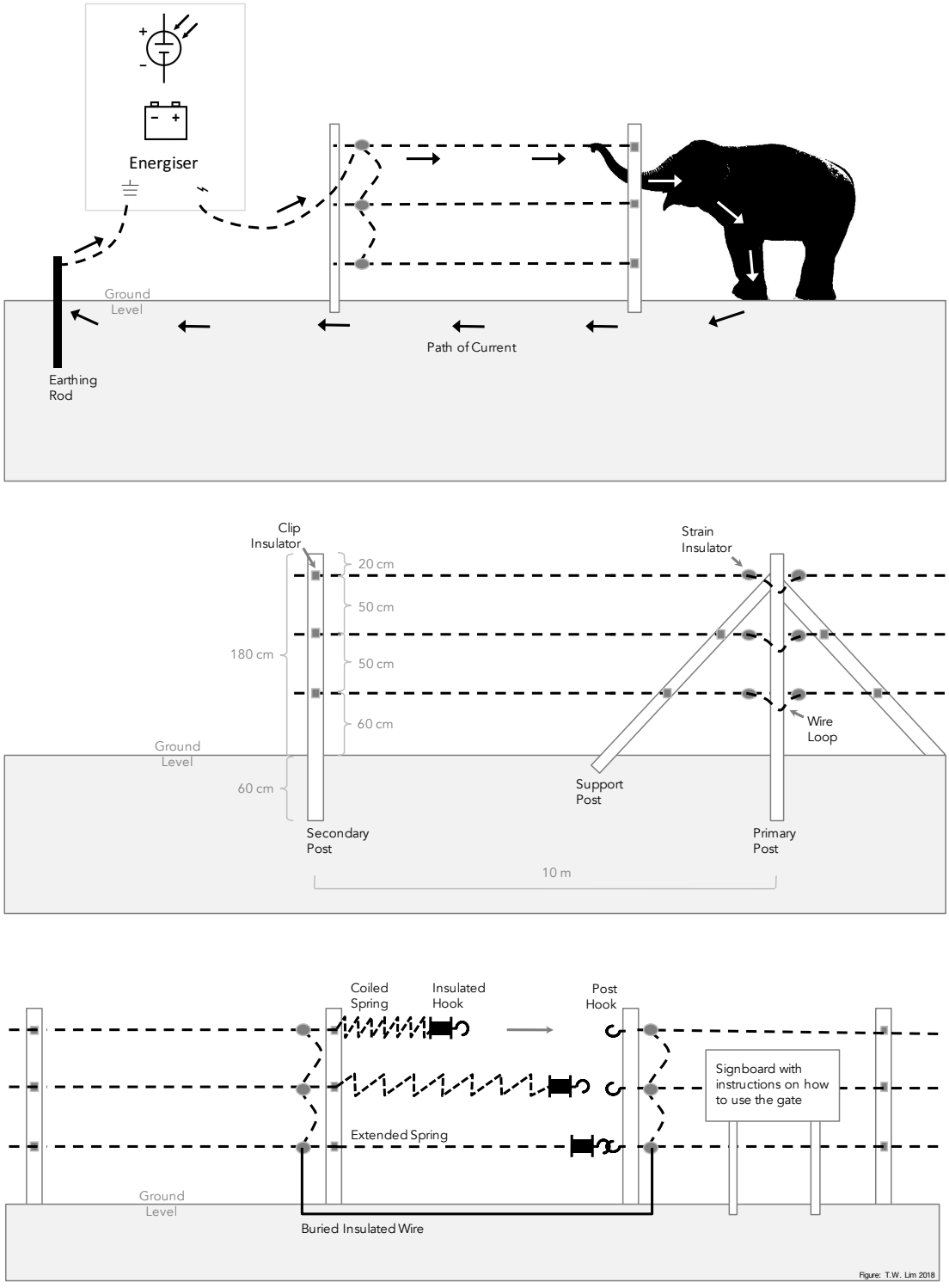


Figure 8-2: Profile diagrams of electric fence
a. (top) Configuration of the power energiser, live wires, and ground return path – an animal touching the fence completes the circuit and receives a shock. **b.** (centre) Arrangement of wires and posts on the electric fence: primary posts are cemented into the ground < 100-m apart, secondary posts are not cemented and are placed < 10 m apart. **c.** (bottom) Spring gate mechanism on the electric fence.

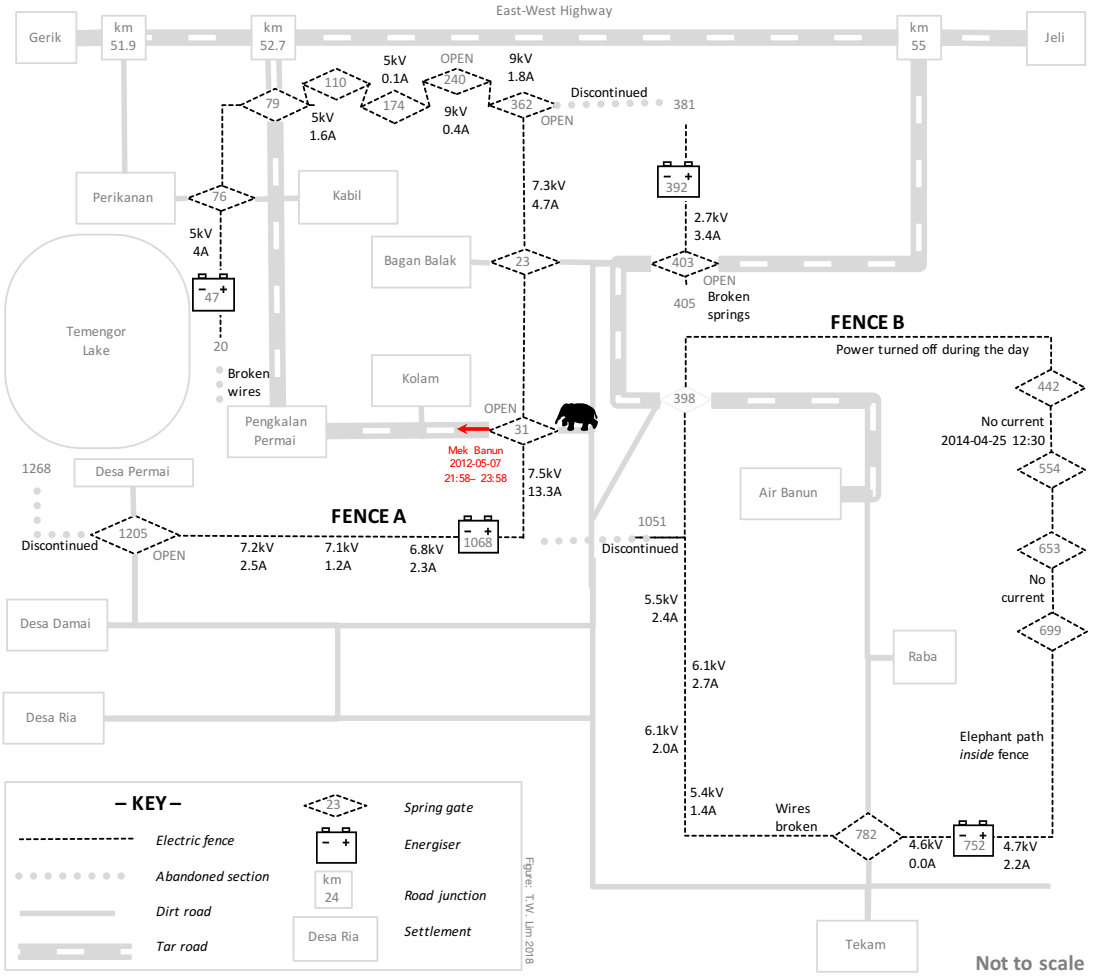


Figure 8-3: Schematic map of the electric fence and road network at RPS Banun
Notes: numbers in black inidicate daytime voltage and current along the top wire on 22-24 April 2014; numbers in gray in spring gates and power energisers refer to the serial numbers of adjacent fence posts. Arrow indicates the probable entrance of collared elephant "Mek Banun".

During the 2014 survey (carried out using the structure in Appendix V (B)), there were 17 locations where there was a physical gap in the fence. Of the 16 spring gates, five were found to be open (see photograph: Figure 8-4). Four (25%) of the spring gates had mechanisms that were no longer operable; and one spring gate was found to be operable, but had been left open during the day. During the 2018 survey, there had been no repairs to the main spring gates along the road, and they were still kept open.

At 12 points all the wires in the fence were found broken – often as a result of bamboo falling on top of the fence (Figure 8-5). At 23 points the top wire had been broken but other wires were intact. Nine posts had fallen down and 89 were leaning,

seven of these leaning more than 25 degrees. At 121 points there were live plants touching the fence, at 128 points vegetation had fallen on the fence, ranging from dry leaves (37 points) to entire bamboo poles (28 points - see Figure 8-7). At 13 points bamboo was leaning above the fence but had not yet fallen and was not touching it.

In 2014 we recorded elephant dung present at 69 points along the external perimeter of the fence, and we saw elephant footprints at 28 points (usually around 1-2 meters from the fence). At 10 points, elephant dung and prints were found along the *interior* perimeter of the fence. In 2018 we recorded elephant dung present along the road inside Fence A.

During the 2014 survey, two of the power energisers were malfunctioning, producing an unstable current, and one energiser was deliberately switched off during the day in order to ensure the battery charged for operation at night. Out of the 24 points sampled, eight (33%) had no current. The median non-zero reading for the voltage was 6.1 kV (range 0.3-9.4 kV, from 62 readings), and the median for the current was 2.1 A (range 0.0-16.0 A, from 51 readings). During the 2018 survey, none of the power energisers were operating during the day.[23]

8.3.3 Elephant movement around the fence

The four GPS-collared elephants had ranges that all centred around the Banun fence (Figure 8-8). Mek Banun's range was centred on a point 1.7 km east of the electric fence; Mek Fish's range was centred on a point actually inside the fence; Awang Banun's range was centred just south of the fence; and Awang Mendelum's range was centred 7 km south of the fence. Each of these elephants breached Fence A, and all but Mek Banun also managed to breach Fence B at least once, although they spent less time inside Fence B than they did in the surrounding landscape.

The elephants avoided the buildings in the villages, on average not coming closer than 24±15 m to a building (Table 8-2). There was no significant correlation between the village particulars and the distance that the elephants kept to the village. Only one elephant (Awang Banun) actually entered the interior of the villages.

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[23] Thouless and Sakwa (1995) found that in Kenya, elephant fences with voltages of 6–7 kV tended to be the most effective, althouh some successful fences had voltages between 3 and 4 kV.



Figure 8-4: Former spring gate at post no. 79 (see Figure 8-3), the spring connection wires were missing and the notices to close the gate (e.g. the signboard to the right of the fence) were illegible or overgrown with vegetation (see Figure 8-6c).



Figure 8-5: Bamboo growing above the fence, only bottom wire remaining.



Figure 8-6: **a.** (left) fence tester **b.** (centre) power energiser control box and charging station; **c.** (right) fallen spring-gate sign.

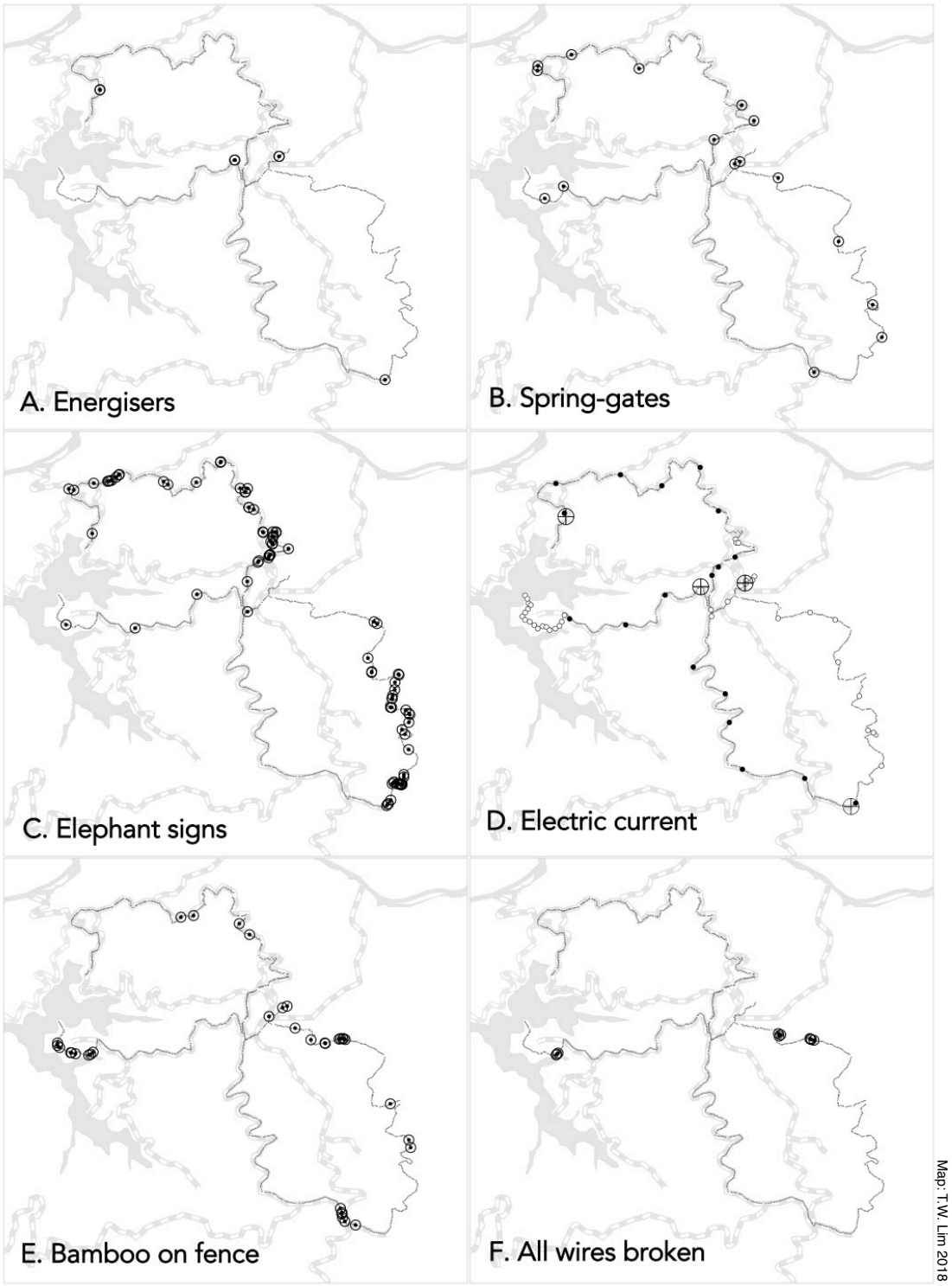


Figure 8-7: Points of interest along the Banun electric fence (22-24 April 2014)
Notes: **A**. Location of power energisers; **B**. Location of spring-gates; **C**. Elephant signs (dung or footprints) visible from the fence; **D**. Electric current (black dots show live wires; white dots show no current; earth symbol show location of energisers); **E**. Bamboo poles fallen on fence; **F**. All wires of fence were broken.

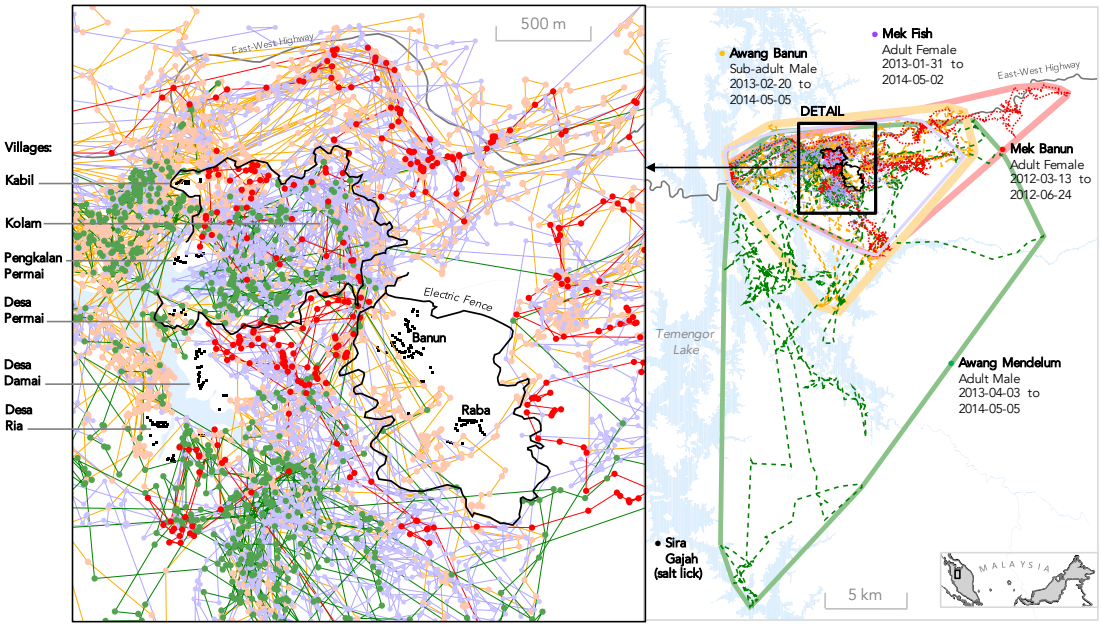
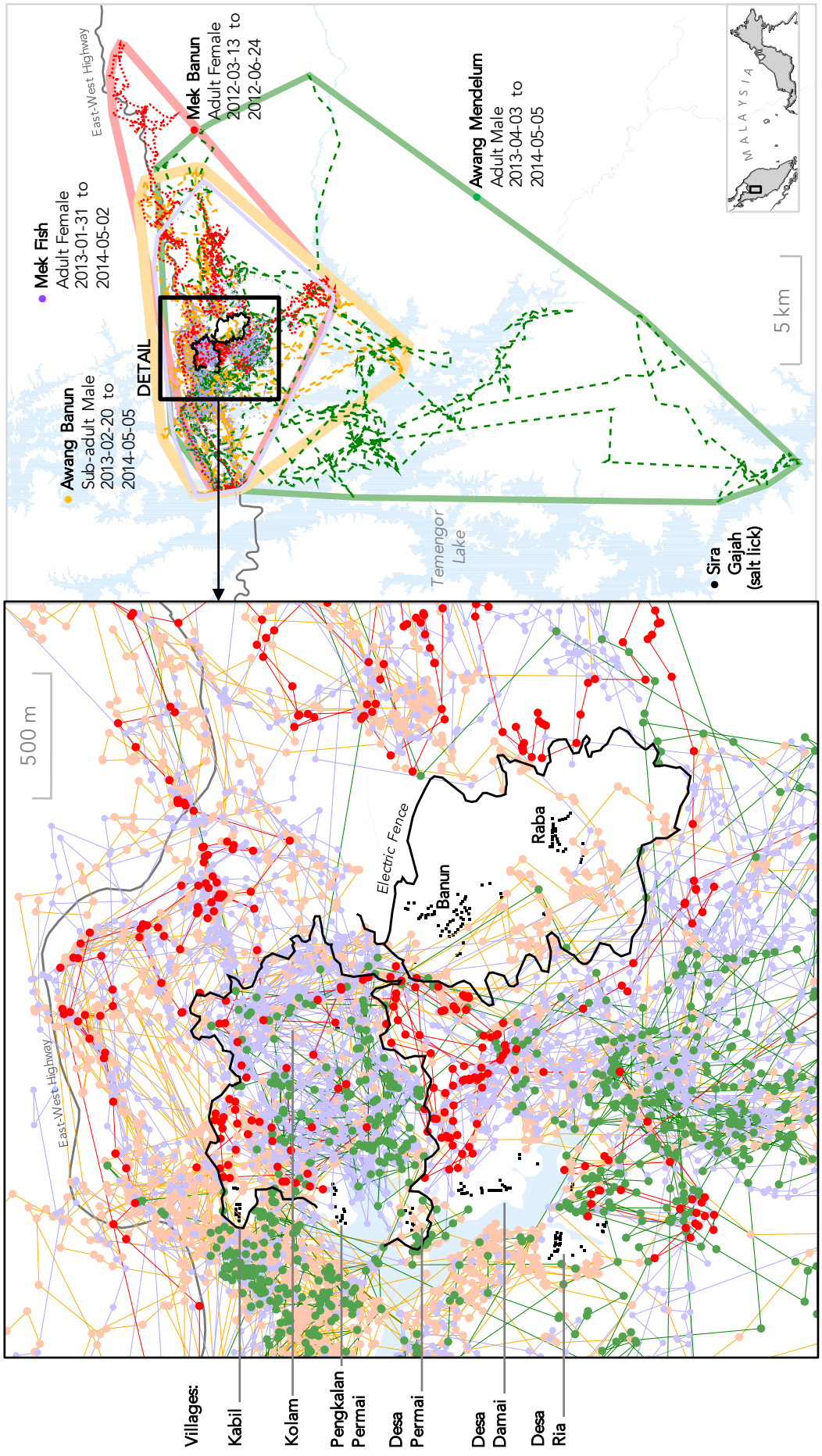


Figure 8-8: Paths of four GPS-collared elephants around the Orang Asli villages of the Banun resettlement scheme, Hulu Perak (2012-2014)
a. (left) detailed map indicating location of the elephants as transmitted every two hours; **b.** (right) general map of the total range of locations transmitted by each of the four elephants.
[A full-size version of this figure is included on the following page].

Table 8-2: Collared elephant proximity to villages (residential buildings)

	Village particulars					Elephant minimum proximity (m)*			
Village	Ppl	ha	HPD /km²	Build	Fence	Mek Banun	Mek Fish	Awang Banun	Awang Mendelum
Kabil	84	0.37	22,703	12	A	**53**	**60**	**16**	53
Kolam	5	0.01	50,000	3	A	**25**	**16**	**18**	**72**
P. Permai	75	0.62	12,097	13	A	**54**	**18**	**18**	**115**
D. Permai	23	0.33	6,970	8	A	164	**41**	**12**	**24**
Banun	113	12.48	905	53	B	85	**156**	**32**	**184**
Raba	163	2.85	5,719	29	B	304	**63**	**3**	**218**
D. Damai	130	4.88	2,664	26	-	31	27	9	75
Desa Ria	92	5.61	1,640	30	-	57	73	60	65
Semelor	158	2.72	5,809	34	-	116	253	256	342
P. Tujuh	96	0.76	12,632	15	-	130	[870]	261	263
Tekam	86	1.50	5,733	19	-	[4491]	[4533]	[4441]	746
Minimum	5	0.0	905	3	-	25	16	3	53
Median	92	1.5	5,809	19	n/a	71	60	18	95

Note: 'ha' – extent of village, using convex hull around all the buildings in the village. Distances to villages outside the elephant's range are given in square brackets and are not included in the averaging. Distances in **bold** indicate elephant *inside* the fence.


East-West Highway
Mek Banun
Adult Female
2012-03-13 to
2012-06-24
Awang Mendelum
Adult Male
2013-04-03 to
2014-05-05
Mek Fish
Adult Female
2013-01-31 to
2014-05-02
Awang Banun
Sub-adult Male
2013-02-20 to
2014-05-05
DETAIL
MALAYSIA
5 km
Temengor Lake
Sira Gajah (salt lick)
500 m
Electric Fence
Raba
Banun
East-West Highway
Villages:
Kabil
Kolam
Pengkalan Permai
Desa Permai
Desa Damai
Desa Ria

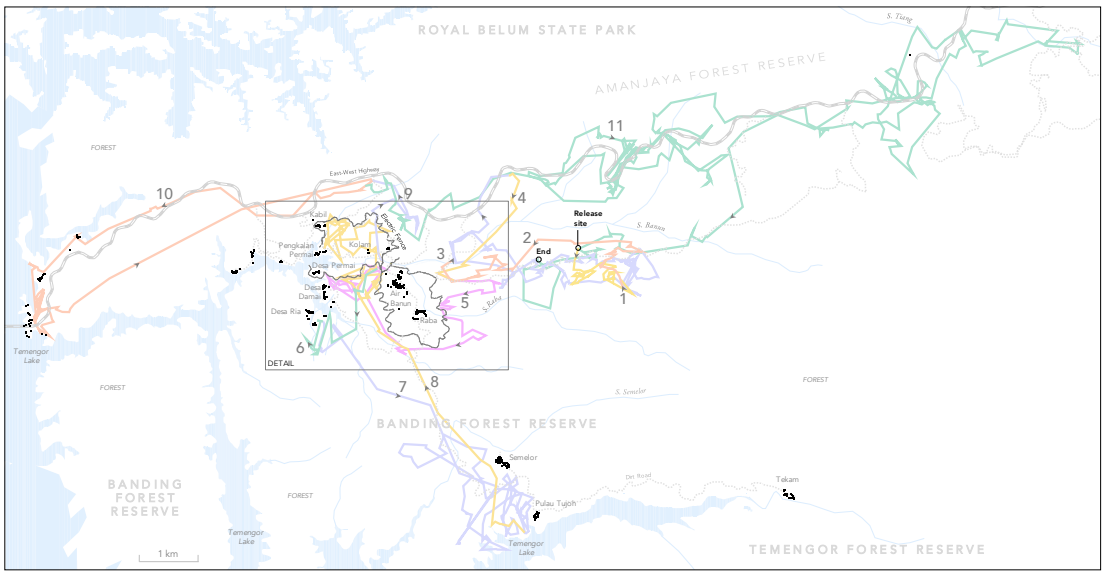


Figure 8-9: Path of GPS-collared elephant, "Mek Banun", who walked 141 km in a period of 94 days, from 23 March 2012 until 24 June 2012.
Note: Numbered and coloured sections refer to Table 8-3, below. The area of detail refers to Figure 8-10, below.
[A full-size version of this figure is included on the following page].

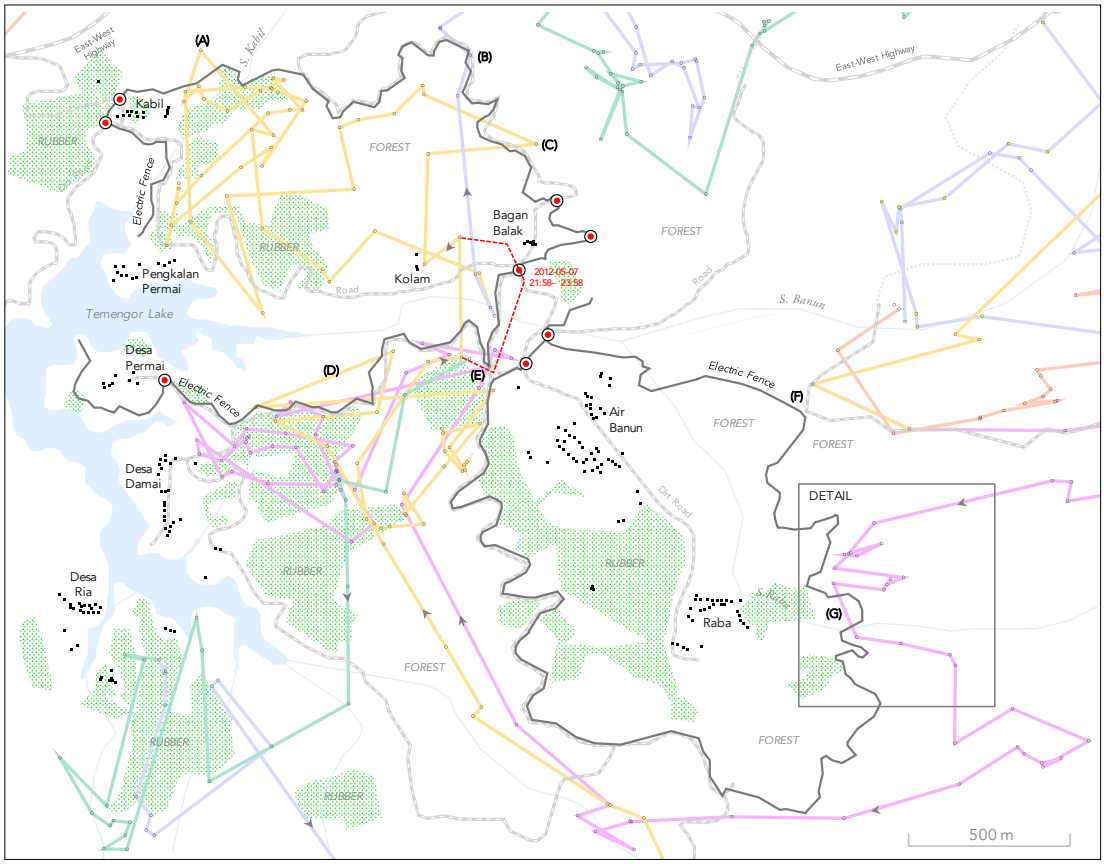
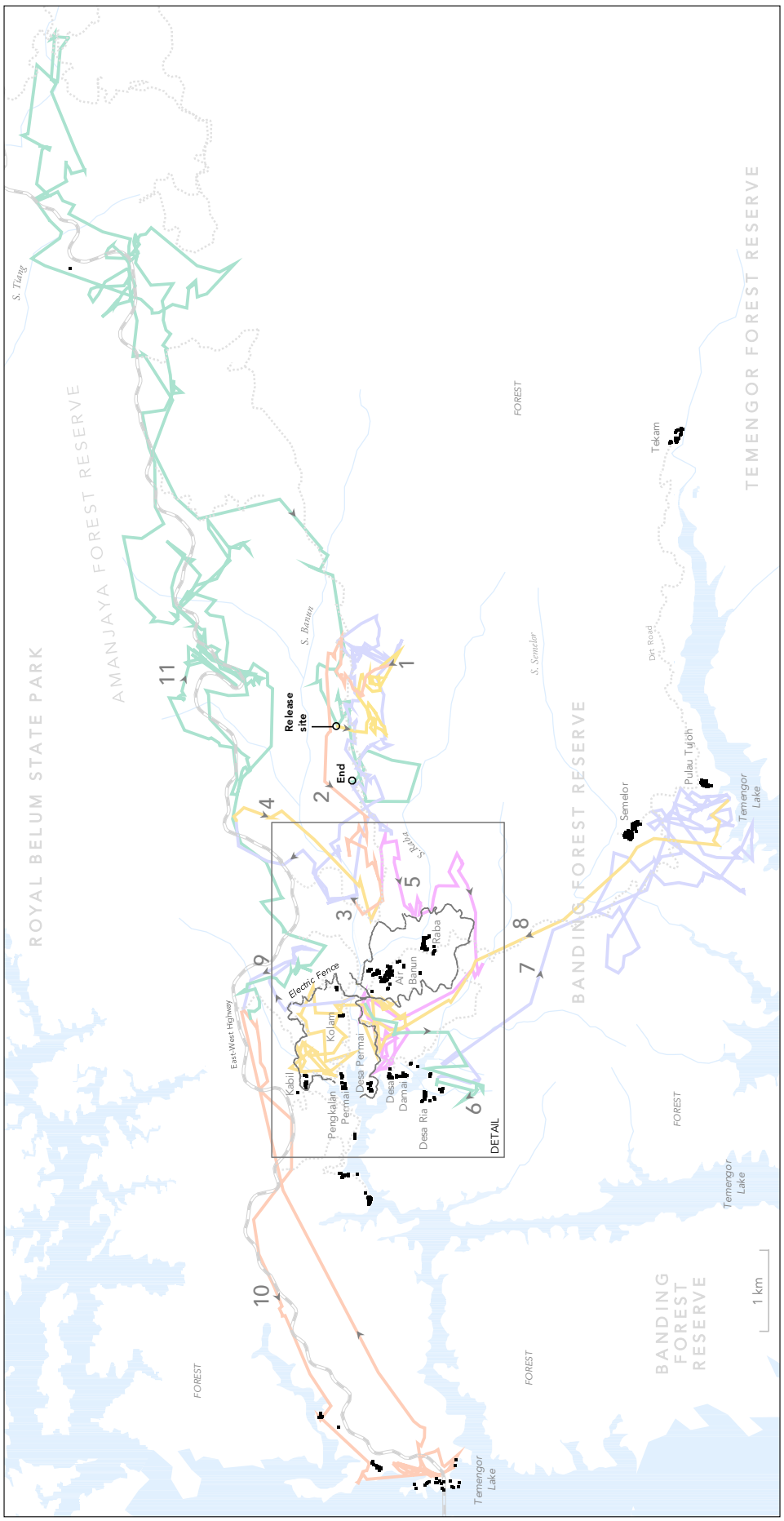


Figure 8-10: Detail showing rubber plantations and Mek Banun's path.
Circled red dots indicate open/broken spring gates and other gaps in the fence. Black squares indicate buildings. Dashed red line at point (E) indicates a likely path of entry into the fenced area. The area of detail around point (G) refers to Figure 8-11.



Full-size version of Figure 8-9 (from previous page).

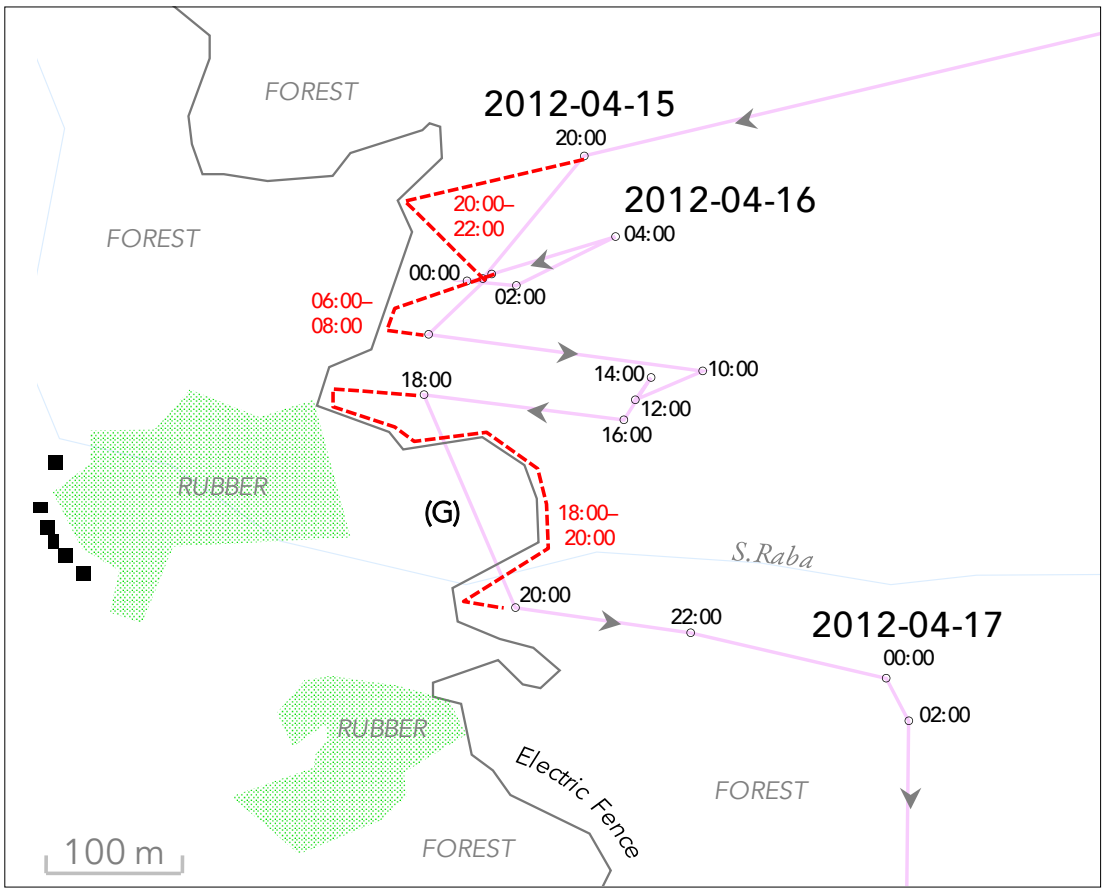


Figure 8-11: Detail of path of GPS-collared elephant, "Mek Banun", from 8 pm, 15 April 2012, to 2 am, 17 April 2012; showing several apparent deflections by the electric fence at Kampung Sungai Raba, RPS Banun.
Notes: Time are given at at two-hour intervals (24-hour clock); dashed lines show extrapolated paths; the path segment (G) shows an apparent breach of the fence between 18:00 and 20:00 on 2012-04-16 but is probably an artefact of generalisation. Apart from the rubber plantations and the village (shown by the black squares), the entire landscape here is covered with logged-over and regenerating natural forest.

The elephant used in the case study, Mek Banun, provided movement data every two hours for 94 days, from 23 March 2012 until 24 June 2012. Over this period she travelled over a total of 141 km, spread out over an area of 100 km² (Table 8-3, Figure 8-9). Her average speed (over two-hour intervals) was 0.09 (± 0.07) km per hour and her maximum speed was 1.39 km per hour. Her period of greatest activity was from 9pm–11pm. Mek Banun made 15 approaches to the fence (16% of her days included at least one movement segment approaching to within 1-km of the fence). On day 45 she breached Fence A and spent five days inside the fence (Figure 8-10).

Table 8-3: Observations on the movement of Mek Banun

§	Day	Date	km	kph	Observation (lettered points refer to Figure 8-10)
1	0–7	23/3–29/3	7	0.04	Wanders around release site
2	8–10	30/3–1/4	3	0.05	Follows track west until fence (point (F)) and then goes north, following track across river
3	11–22	2/4–13/4	15	0.06	Returns to release site and wanders around again and then goes north to highway
4	23	14/4	3.3	0.13	Goes down dirt track and goes to fence
5	24–30	15/4–21/4	10.2	0.07	Makes at least three approaches west, apparently deflected by fence. Follows ~3-km of fence between fence and Kg Desa Damai (Figure 8-11)
6	31–32	22–23/4	3.6	0.06	Passing six times between a patch near Kg Desa Ria and right to edge of lake
7	33–42	24/4–3/5	16.4	0.07	Travels past Semelor along Tekam road to Pulau Tujuh, spending three days right next to lake
8	43–50	4–11/5	10	0.10	Returns to fence, and enters fenced area around point (F) and appears trapped inside, visiting Kabil, Kolam and Pengkalan Permai; however, appears outside at points (A) and (C) – it is not clear how.
9	51–52	12–13/5	2.2	0.05	Exits fenced area around point (B) and goes to highway, keeping to the south of highway
10	53–58	14–19/5	10.6	0.08	Follows highway west to lake, spends four days on edge of lake and then returns along pylons
11	59-92	20/5-22/6	60.2	0.07	Follows highway east, crossing multiple times and then returns to release site

Notes: colours and numbered sections refer to the movement path in Figure 8-9.

8.3.4 Attitudes of villagers towards the fence

The survey in 2014 indicated that the fence had an average approval rating of 26%, with the range of responses varying from 8% in Kampung Kabil to 50% in Kampung Kolam (Table 8-4, below). While 60% (±28%) of the 30 respondents felt that there had been less crop-raiding after the fence, only 39% (±20%) felt that the fence was effective, with three respondents pointing out that there were elephants on both sides of the fence. The response rate for these questions was high, with 100% answering the former and 93% answering the latter.

Regarding the maintenance of the fence, the response rate was only 40%, and, of those, only 17% (±14%) felt that the fence was well maintained. Two respondents said that the power supply to the fence was faulty and five respondents said that there

was insufficient monitoring and maintenance; one person said that the problems were due to the fact that the maintenance contractor was not local.

Table 8-4: Approval rating of fence among villagers within the Banun fence

Village	*n*	Mean Age	Age Range	Males:Females	Fence Rating*
Kabil	4	28.3	[23–34]	4:0	8%
Kolam	1	42	42	1:0	50%
Pengkalan Permai	3	48.3	[46–52]	3:0	28%
Desa Permai	2	42	[31–53]	2:0	17%
Banun	13	30.5	[19–55]	12:1	29%
Raba	7	31.6	[22–40]	2:5	26%
Total	30	32	[19–55]	12:3	26%

*Over-all approval rating based on number of positive responses as a percentage of total possible responses to questions regarding the design, maintenance, and effectiveness of the fence.

Regarding acceptance of elephants in the landscape, 17% said they were willing to bear some losses. One respondent (3%) said that he could accept elephants living "here", and would be willing to pay up to RM200 a year (~USD50 a year) in insurance premiums. 12 (40%) said that they would contribute time or money to constructing or maintaining the fence (27% offering labour (2–10 hours a month), and 17% offering money (RM10–RM60 a month; ~USD2.5–USD15 a month). Three respondents suggested building a ditch and one suggested clearing a 5-m path alongside the fence.

In 2016, villagers in Kabil and Pengkalan Permai responded that the fence was not effective. The respondent in Kabil noted that the fence only covered half his rubber plantation land and elephant depredation still occurred several times a month. In both 2016 and 2018, villagers reported that rubber in RPS Banun had suffered elephant damage. Young seedlings were pulled up and eaten and older plants were pushed over and had their bark stripped off (Figure 8-12). In 2018, villagers reported that the federal government had plans to establish further rubber plantations outside the fence.



Figure 8-12: Damage caused by two elephants that visited RPS Banun in 2016: **a.** (top left) around 50 stems of cassava in Kg Pulau Tujoh; **b.** (top centre) destroyed electric fence in Kg Semelor; **c.** (top right) remains of around rubber saplings; **d.** (bottom) destroyed wooden fence – in one night, the farmer had lost ten stems of sugarcane, six banana trees, five rubber saplings, and 20 stems of cassava.

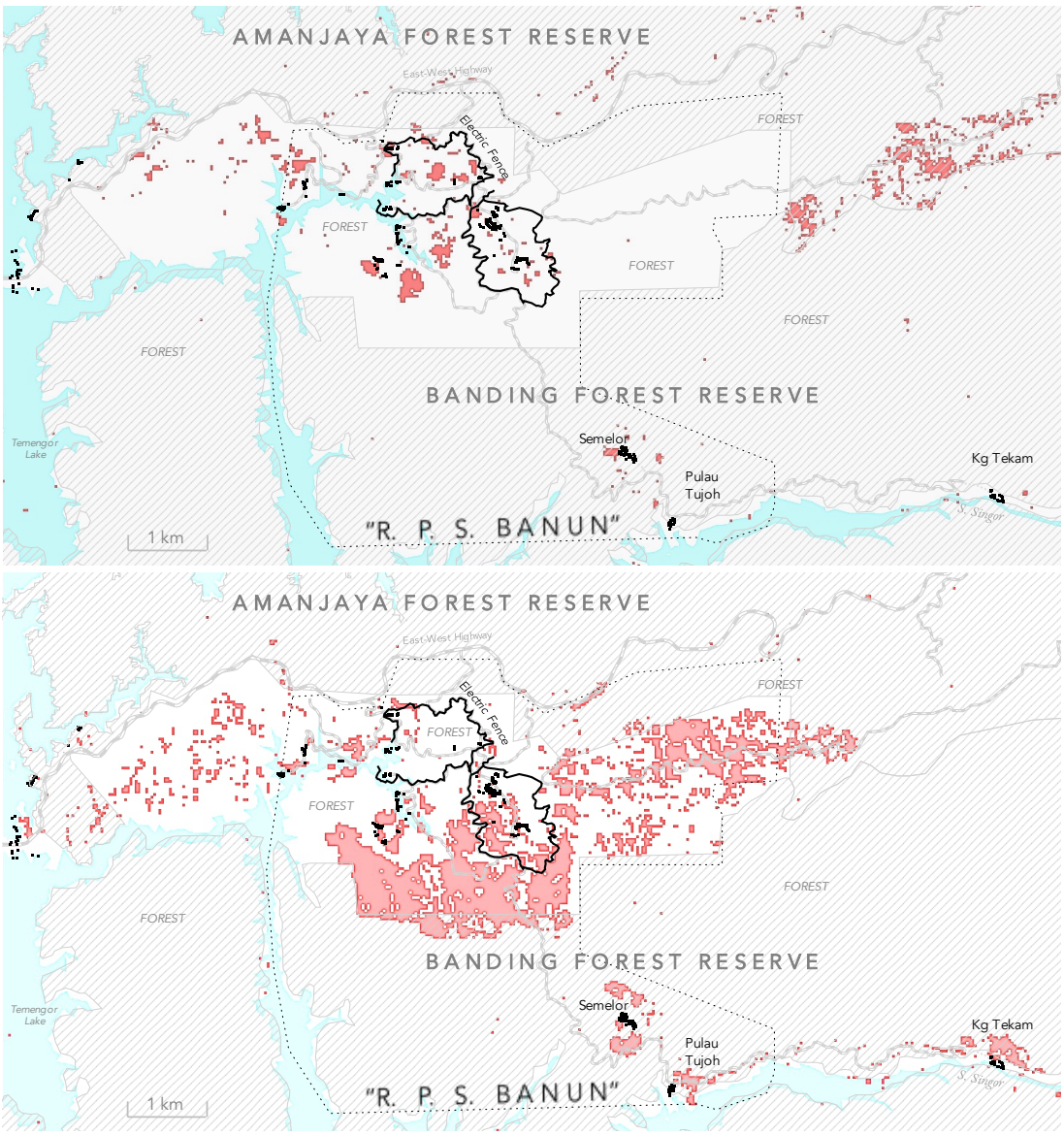


Figure 8-13: **a.** (top) Tree cover loss (in red) around Banun before fence construction (2001–2011); and **b.** (bottom) after construction (2011–2017)
Source: Landsat >30% in canopy density loss (Hansen et al. 2013).

Table 8-5: Land cover change in RPS Banun 2000–2017 (in hectares)

Land use	Total	Δ ('01-'11)	%	Δ ('11-'17)	%	Rubber	%
State land	1667	464	28%	47	3%	100	6%
Fenced	224	38	17%	12	5%	37	17%
Area A	96	3	3%	10	10%	10	10%
Area B	128	35	27%	2	2%	27	21%
Unfenced	1443	426	30%	35	2%	63	4%
Forest Reserves	1978	63	3%	4	0%	43	2%
Banding F.R.	1637	52	3%	3	0%	0	0%
Amanjaya F.R.	341	11	3%	1	0%	43	13%
Temengor Lake	221	0	0%	0	0%	0	0%
Total	3866	527	14%	51	1%	143	4%

8.3.5 Land cover inside and outside the fence

In the RPS Banun study site there had been approximately 578 ha (5.78 km²) of tree cover lost between 2000 and 2017 (Figure 8-13 & Table 8-5). Most of this area had been left to regenerate naturally, while about 143 ha had been planted as rubber. After the construction of the fence, around 5% of the area within the fence had been cleared and 17% planted with rubber (Figure 8-10). Of the 143 ha planted with rubber, 106 ha (74%) was planted outside the fence, with 43 ha (30%) being planted inside the forest reserves.

8.4 Discussion

8.4.1 Overview

This study shows that electric fences, such as the one in Banun can be effective in excluding elephants in some instances (e.g. Mek Banun was unable to enter Fence B during the period of observation). However, poor maintenance (particularly in regards to the spring gates) can give elephants access and then trap them inside the fence. Not surprisingly, the local community gave a very low rate of approval for both the effectiveness and maintenance of the fence.

The elephants in our study generally avoided travelling through the built-up portion of villages, regardless of whether the village had been fenced. The land cover assessment revealed that there was still forest cover both inside and outside the fence; however, forest continued to be cleared outside the fence, and rubber plantations were being planted both inside and outside the fence.

8.4.2 Effectiveness of the fence in restricting elephant movement

The case study of the movements of Mek Banun highlight the dangers of taking path segments based on connecting observed data points to be the actual path taken. It is most likely that Mek Banun was actually unable to enter Fence B, despite several apparent attempts (Figure 8-10 and Figure 8-11). The straight-line segment connecting locations 18:00 and 20:00 on April 16th (point (G) in Figure 8-11) suggests a breach of the fence, but the extrapolated path, taking account of the position of the fence (using our algorithm), suggests that this probably did not occur.

A similar extrapolation would also explain the apparent breach of Fence A at point (D). However, Mek Banun probably did eventually enter Fence A on 7 May. Her most likely entrance point was via the spring gate at post no. 31 (Figure 8-3, and Figure 8-10). She then appeared to become trapped inside Fence A for several days. The other three elephants also spent a lot of time inside Fence A and managed to enter Fence B, although they did not spend much time inside it. Some of the elephants crossed the lake into Fence A in the vicinity of Desa Permai.

The pattern of Mek Banun's breach of the fence suggests that she knew that there was food plants available inside the fence. A female elephant is conservative and shows fidelity to its home range, keeping a detailed "cognitive map" of this area (Sukumar 2003). Thus Mek Banun probably had memory of foraging sites in the area which had since been enclosed by the fence and she could also possibly smell food plants inside the area (Plotnik et al. 2014).

Mek Banun's movement in relation to the fence followed three stages. Firstly, she looks like she was moving around the fence at night until she found an opening in the fence (most probably the gap formed by the open spring gate location). Secondly, after she entered the fence, she remained there for five days. Thirdly, after she left the fence she travelled some distance away and stayed away for several weeks, but eventually she appeared to be heading back towards the fence.

Asian elephants display foraging site recursion with bimodal frequencies, returning to the feeding same spot for several nights in a row (and presumably retreating to safety during the day) and then returning to the same site again several months later. English et al. (2014), studying elephants in Borneo, found that the most common recursion frequencies were 48 hours and 151-250 days. Mek Banun's movement was consistent with this pattern, spending several days in one location before moving on to the next location.

The elephants appeared to be attracted to the vegetation growing around the villages, although they did seem to have been wary of the people. Even when they were *inside* the fence, the elephants seldom ventured within about 100 m of the built-up part of the villages (Table 8-2, Figure 8-8). This was most apparent with the built-

up parts of the Banun and Raba villages in Fence B, and could also be seen in villages of Desa Damai and Desa Ria – villages that were outside the fence.

Mek Banun's attempts at approaching the fence highlighted in Figure 8-10 and Figure 8-11 occurred at night. This is consistent with the behaviour of elephants crossing the highway, where 81% of crossings occurred at night (Wadey et al. 2018). It also supports the finding by Blair and Noor (1981) that "elephants rarely approach [plantation] scheme areas in daylight". Blair and Noor (1981) use this finding as the basis for only turning the fence on between 6 p.m. and 7 a.m., and only closing spring gates at night – thereby saving battery power. However, they add that, "In some areas, it has proved necessary to switch the fence on rather earlier in the afternoon, especially on wet days when the lower temperatures in the field encourage the animals to emerge from the shade of the jungle." This suggests that leaving the fence switched off and leaving the gates open is always risky. It not only risks elephant depredation in that instance, fails to give elephants a consistent message that will allow them to learn that they should never attempt to enter the fence, and also risks habituating the elephant to enter the fenced area (Fernando et al. 2012).

8.4.3 Design of the fence structure

The material specification and physical construction of the fence structure were of a high standard, compared to the wooden stakes recommended by Blair and Noor (1981). However, there were significant problems with gaps in the fence due to the spring gates (see the following section).

Several design options could be considered that would be easier to maintain than a three-wire fence. For example, single-wire fence, with only the top wire present, would mean that vegetation would need to be trimmed less frequently before it risked touching the wire. In addition, such a fence would reduce the need for pedestrian spring gates, as humans can pass beneath. Furthermore, spring gates with only a top high wire would not need to be opened for low vehicles to pass. Initial tests in Bardiya National Park, Nepal, suggest that single-wire elephant fences allow people and smaller animals to pass underneath, but still form a barrier for adult elephants (Meijaard 2017). However, no definitive findings have been produced and it is likely that elephants could learn to crawl under such fences.

8.4.4 Design and maintenance of spring gates

Spring gates were broken and left open, creating easy access points for elephants. The spring gates were undoubtedly the weakest link in the fence for several reasons. Signs were placed next to the spring gates, informing motorists and pedestrians on how to operate the gates. However there were inadequate warning signs along the roads approaching the gates. Some of these spring gates were on the main logging roads and the low visibility of the wires meant that several motorists that were unaware of the gates had crashed into them and broken the wires and insulators. There was also the issue of irresponsible motorists failing to close the gates after them. Many of the spring gates were regularly left open and the broken spring gates had not been repaired. Several of the other spring gates were left open during the day and only closed at night.

Respondents singled out logging trucks as being the main culprits responsible for both breaking the spring gates and for failing to close them. There was a significant volume of logs being removed from the forest reserves to the highway via roads going through the fence and the logging truck drivers had little incentive to respect the gates as there were no penalties for breaking the gate or for failing to close the gate.

It is critical to solve the problem of breakage of and non-compliance with the spring gates along the main roads. Potential solutions include design approaches (discussed here) and social-engagement approaches (discussed in the following section). One design approach mentioned above is the idea of a single-wire fence. Another design approach would be doing away with the spring gates and constructing an irregular surface on the floor of the road at the gap in the fence. This approach involves cementing three strips of cobblestones on top of the road (Figure 8-14).

The use of such “sharp stones” was initially recommended by Andau and Payne (1992) as an alternative to electric fencing but was found to be too expensive for widespread adoption (J. Payne pers. comm., 5 Jul. 2018). The stones do not necessarily need to be sharp to discourage elephants from walking on them, and smooth stones can also be effective as long as they are angled to create a highly

irregular surface in the manner of the more extreme reflexology footpaths. This approach has been adopted in the electric fence in Kahang, Johore, however its effectiveness merits further investigation (Salman Saaban pers. comm., 20 Aug. 2015; A. Tan pers. comm. 11 Jul. 2018).

8.4.5 Layout of the fence

In addition to obstructing the logging road, there were several other problems with the layout of the fence at both a landscape level and at a local level. From a landscape perspective, the layout of the fence blocked elephants from travelling along the edge of the lake. This problem, as well as the problem of the logging trucks, was reduced somewhat when the fence was divided into two parts, allowing movement in between (note the discontinued section from post no. 1051 onward in Figure 8-3). However, the path between the fences is very narrow (<100 m) and created a bottleneck. Rather than travelling through this stretch, it seems that the elephants more often entered through an open gate and then became trapped inside Fence A.

At a local level, the layout of the fence meant that several sections of the fence were routed through the forest had thus had dense jungle vegetation (particularly bamboo groves) growing on both sides, often with branches hanging above the fence as well (Figure 8-5, above). Even when the vegetation within two metres of the fence was cleared, the fence still gave the impression of just separating one part of the forest from another. This reduced the effectiveness of the fence as a visible psychological barrier demarcating the area where elephants were encouraged to remain from areas where they were discouraged to enter. The fence did not represent a clear boundary that could be communicated to the elephants as something that they were not to cross.

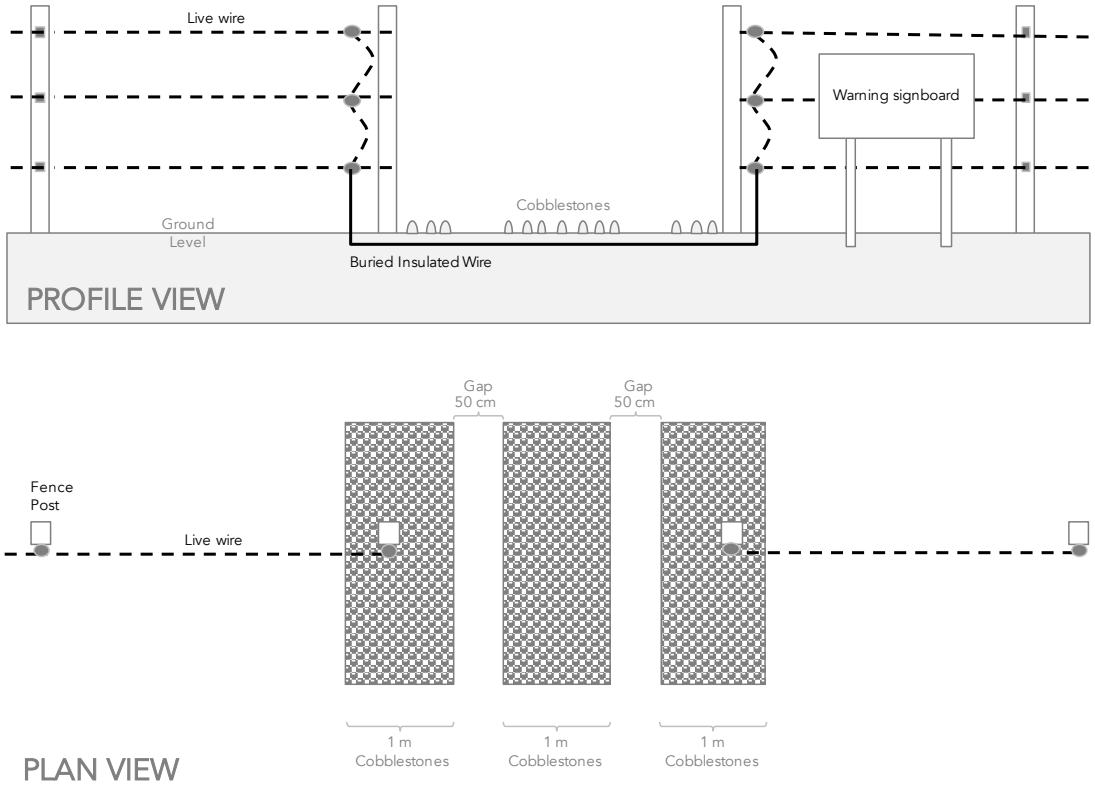




Figure 8-14: Design of cobblestone elephant-exclusion gateway: **a.** (top) profile view, **b.** (centre) plan view, **c.** (bottom) photograph from Kahang, Johore.

The lack of a clear distinction between the land cover inside and outside the fence was further blurred by the fact that there were also villages and agriculture outside the fence (see section 7.4.5, below). This scenario meant that elephants were not

being given a clear lesson as to where humans wanted them to go. It is quite plausible that elephants chased away from a village outside the fence would end up inside the fence. Indeed, Mek Banun appears to have been chased away from the villages of Desa Ria, Desa Damai, Semelor and Pulau Tujuh (all outside the fence) before ending up inside the fence.

Routing the fence through the forest also posed a lot of problems for maintenance. In particular, both Fence A and Fence B had sections that passed through dense groves of bamboo, this, combined with the extensive length of the fence and the steep terrain made maintenance a very difficult activity. Respondents reported that the contractors in charge of fence maintenance were outsiders and were thus not well motivated to carry out the work. The fence layout led to a lot of large bamboo stems falling on top of the fence (Figure 8-7 E), and to the wires of the fence breaking (Figure 8-7 F). Vegetation touching the fence increases the load on the fence and increases the work the power energiser has to do to maintain a high voltage; at night the battery drains quickly and the fence will not be effective.

Overall, the fence was probably too long, even after dividing it into two sections. Maintenance is known to be a particular challenge for long fences that attempt to surround an entire settlement and its associated cropland. Studies in Africa (AfESG 2000) suggest that poor maintenance leads to the eventual failure of these fences, even though they may be intuitively the most desirable in rural situations. Maintenance is easier if fences are shorter, encircling a small target area of households with crops, or crops only (Hoare 2012). The fence at Banun attempted at encircling several villages; some of their associated cropland; as well as some of the surrounding forest.

8.4.4 Villagers' attitudes towards the fence

Regardless of the design and layout of a fence, the successful maintenance of a fence depends on users having a "sense of ownership" that would motivate them to contribute to the maintenance of the fence (Meijaard 2017). However, the attitude survey reveals exceptionally low ratings of both maintenance and effectiveness of the fence compared with ratings for other SPEG fences in Peninsular Malaysia (Figure 8-15, below). These fences ranged from 2–35 km in length (averaging 17 km). The

lack of commitment to proper use of and care for the fence was probably the key reason for the failure of the spring gates in Banun.

In terms of maintenance itself, Hoare (2012) notes that deficiencies are "almost always caused by weak institutional arrangements". In the case of Banun, there appeared to be several deficiencies in this regard, with awareness of the institution responsible for the fence maintenance being low, with only 10% of respondents saying that they knew that the wildlife department was responsible for funding and maintaining the fence.

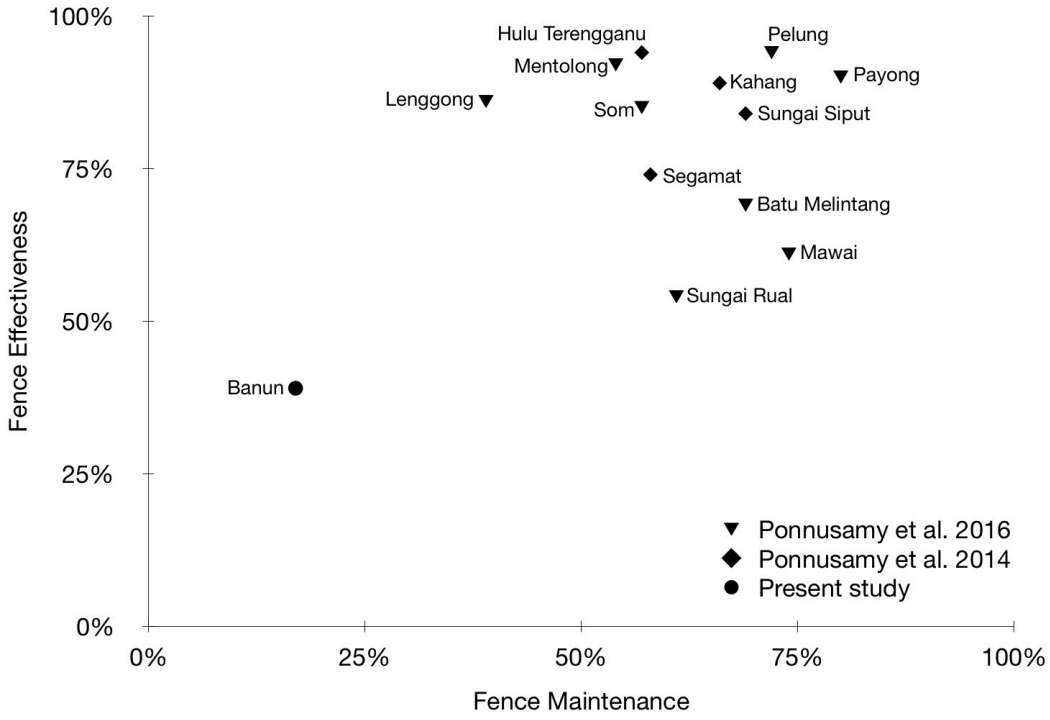


Figure 8-15: Community approval rating of maintenance and effectiveness of electric fences at Banun compared with other fences in Peninsular Malaysia

It is worth noting that Banun was the only fence site built to protect communities that were traditionally foragers and swiddeners. All of the other fences sites were protecting settler communities (Malays and Aboriginal Malays). Settler communities such as these tend to have a more collectivist culture that emphasizes attributes of authoritarianism far more that those of forager-swiddeners such as the Jahais and the Temiars. Malay communities would thus be more likely to agree to the enforcement of government protocols such as those related to fence maintenance. As noted by

Manfredo and Dayer (2004), it is critical to realize that the viability of strategies depends on societal conditions: "What may be effective with one social group may be totally ineffective with another due to cultural differences."

This is not to say that electric fences cannot work with traditionally forager communities, but rather it is that, to be effective in the long term, government agencies and NGOs need to consider that such communities may have different values, beliefs, and attitudes (as illustrated in the previous chapters of this dissertation). This is something that will be particularly important should the wildlife department continue with its plans to transfer responsibility for maintaining electric fences to local communities (see also section 8.4.6, below).

8.4.5 Land use inside and outside the fence

Over the study period there were two significant land use changes in RPS Banun: (i) industrial logging, involving "clear-felling" the native vegetation in preparation for planting rubber; and (ii) the actual planting of the rubber trees. Most of the state-land forest to the south of the Banun fence had been cleared before the fence was constructed (Figure 8-13a). The villagers reported that JAKOA plans to work with the Rubber Industry Smallholders Development Authority (RISDA) to develop a large rubber plantation in this area, right up to the edge of the forest reserve. RISDA would dig a ditch and build an electric fence to protect the rubber plantation.

During the survey, planting for this large rubber plantation had not begun and most of the land was covered with rapidly regrowing secondary forest. The vegetation included bamboo, wild bananas and other forms of pioneer vegetation. These plant species are favoured by elephants (Olivier 1978b, Yamamoto-Ebina et al. 2016, Terborgh et al. 2018) and all the collared elephants (apart from Mek Banun) spent a considerable amount of time here. This can be seen by the fact that all four collared elephants ranged primarily around the cleared area (compare Figure 8-8b with Figure 8-13a), and only one elephant ventured east of RPS Banun in the direction of the village Tekam, that was surrounded by relatively intact forest (Table 8-2, Figure 8-13a).

The rubber that had already been planted seems to be one of the main reasons for the elephants repeated visits to the villages. The villagers do not seem to

appreciate that it is the planting of crops such as rubber that attracts the elephants. As noted in chapter 5 (above), they are more likely to blame the presence of elephants on the wildlife department for translocating the elephants from elsewhere. This is in line with the findings of chapter 4 that traditional communities are reluctant to assign blame on the elephants themselves. As noted previously, the federal government has several conflicting policies in this landscape: with JAKOA providing free rubber seedlings (Figure 2-5) and promoting forest clearance without carrying out an environmental impact assessment or consulting the wildlife department.

In addition, neither the promotion of rubber or the provision of the fence have taken adequate account of the state laws regarding land ownership. As noted in chapter 6, none of the villagers have documented land titles and the villages inside forest reserves (such as Semelor and Pulau Tujuh) risk action by the Perak State Forestry Department to evict them, deny them access to the rubber trees, or even to destroy the trees. Even the villagers outside the forest reserves do not have any security of tenure as the promised Orang Asli reserve has yet to be gazetted by state government.

In a scenario where land rights have not been clearly defined, erecting a fence is a powerful political statement (Evans and Adams 2016). In determining the boundaries of the fence there would have been a risk that political considerations overshadow technical requirements. In terms of seeing the fence as a marker of the extent of their rights, villagers would have faced the temptation to make the fence larger than was practical to maintain. Similarly, some villagers would be inclined to reject a small fence altogether as it risked becoming a symbol of restricted land rights – on the contrary, villagers actually have an incentive to request a large fence to encompass the boundary of the land that they plan to clear for plantations in future.

8.4.6 Conservation conflict transformation

Human-elephant relations in Banun can be improved by considering the Conservation Conflict Transformation (CCT) approach (Madden and McQuinn 2014). This approach uses the Levels of Conflict model (CICR 2000) to move beyond obvious immediate disputes to focus on the systemic root causes of conflict. Using this model, it is apparent that three levels of conflict were present in the case

of the elephants of Banun: (i) dispute; (ii) underlying conflict; and (iii) deep-rooted conflict.

One superficial *dispute* was between the village of Semelor and the wildlife department regarding the destruction of an acre of newly-planted rubber in 2017. The villagers blamed the department for translocating the elephants into Belum-Temengor. While, the department officer blamed the villagers for planting the rubber seedlings inside a forest that NECAP had designated as part of a priority elephant conservation site.

Beyond this immediate dispute, the *underlying conflict* was a history of similar disputes between the villagers and the department. The villagers could recall many instances of elephant depredation over the years; as well as failed mitigation measures such as the Semelor fence. Similarly, the wildlife department officers could point to the times when the villagers had opened up land inside the forest reserves without official approval; occasions when villagers had been found to be hunting protected species; and even instances when the villagers had staged reprisal attacks that had resulted in dead elephants.

Then, ultimately, there was the *deep-rooted conflict* regarding the values that were central to the identity of the Orang Asli, specifically the question of the extent to which their native rights were respected. The Orang Asli had historically seen outsiders involved in logging their forest, forcing them to resettle, flooding their land for the dam, and even slave raiding (as discussed in chapter 5). The lack of recognition of their land rights was also illustrated by the failure of the state to gazette the Banun Orang Asli reserve and acknowledge the Orang Asli villages during the constitution of forest reserves.

From the perspective of the wildlife department officers – the majority of whom were Malay Muslims – the deep-rooted conflict present was mainly associated with their duty to uphold Islam as the religion of the state in relation to the Orang Asli – who were mostly non-Muslim. Furthermore, as civil servants, their loyalty to the sultans (symbolising both the religion and the state), and their duty to serve the government of the day.

For each of these three levels of conflict, CCT identifies three aspects of conflict intervention to address them: substance, process and relationships. Parties involved (in this case, both the villagers and the government officers) are encouraged to look beyond settling the immediate disputes, and instead to give equal attention to the process and relationships, with the aim of *resolving* the underlying conflict and *reaching reconciliation* with the parties involved (Madden and McQuinn 2014). We give some specific recommendations on incorporating these concepts in the implementation of electric fence schemes in the concluding section of this chapter, below.

8.5 Conclusion

In conclusion, we found the electric fence at Banun to be partially successful at excluding elephants, but this effectiveness was compromised due to poor layout, which, in combination with poor buy-in from users, led to problems with maintenance. Poor land-use planning meant that the logging of the forest and the fresh planting of rubber attracted elephants to the vicinity of villages. Engagement with the community by the wildlife department was hampered by a lack of trust related to the superficial dispute over the translocation of elephants. Underlying conflict included the failure of the state to recognise the land rights of the local community; with deep-rooted conflict regarding the position of native rights in relation to the statutory law of the state and the position of Islam as the religion of the federation.

This study suggests several recommendations for the various parties. For the wildlife department, our general recommendation is that electric fences can be effective, and should continue to be supported. However, some modifications in the design of the fences should be considered:

- Efforts to encourage the involvement of local communities in the design and maintenance of the fences should be continued (this should be carried out in coordination with JAKOA). Fences should be built with the free, prior and informed consent of local communities, giving particular attention to the process of consultation, and the long-term relationship between wildlife department staff and local communities.

- Expand the community elephant electric fence (SPEGKOM), whereby local communities are empowered to coordinate the maintenance of the fence by themselves, bearing in mind that some communities will have different values, beliefs, and attitudes towards the wildlife department, towards fences, and towards wildlife such as elephants.
- Fences should be built to protect settlements and crops; keeping the fence as short as possible, and focusing on vulnerable areas (such as young plantations) with a clear distinction between fenced areas and unfenced areas; fences should not be built through areas of dense vegetation or areas reverting to dense vegetation.
- Fences should be built in an encircling layout, ensuring that they do not block elephants' passage through the landscape or lead to entrapped elephants.
- Spring-gates should not be built on roads with heavy traffic, and on other roads precautions should be made to ensure that spring-gates are clearly visible to road users, with adequate warning signs and humps to slow traffic on both sides of the gate. Alternatives to spring-gates, such as single-wire fences and cobblestone gateways should also be explored.
- The wildlife department should liaise with other relevant government agencies, including JAKOA, and the state forestry departments to ensure that fencing plans do not conflict with other activities such as plantation establishment and logging roads.

For JAKOA, we recommend that promotion of settlement and establishment of plantations should be suspended until land tenure issues have been resolved. Establishment of plantations on forested land in priority elephant conservation sites should be avoided and only done after close consultation with the wildlife department.

For state governments, resolving Orang Asli land tenure issues needs to be given priority. All development plans should be in-line with the Central Forest Spine (CFS) Master Plan and the National Elephant Conservation Action Plan (NECAP).

For local communities themselves, we recommend that they engage with the wildlife department prior to the establishment of new plantations.

9 General Discussion

9.1 Synthesis

As mentioned in the introduction to this dissertation, human-elephant relations are complex and should be examined from both social and ecological perspectives. The previous chapters have attempted this, reviewing the relationship's prehistoric and ecological context, historical interactions, and sociological aspects of the present-day relationship.

In chapter 2, I presented the geographical background to human-elephant relations in the Peninsula, highlighting the sub-ethnic groups along the lines of their traditional modes of energy capture (foraging, swiddening, and settled farming). I also presented a schematic diagram that illustrated the differences in the spatial patterns of the cultures of the respective groups. I noted in particular how the shift from foraging to farming lifestyles represented a turning point in our relationship with elephants.

In chapter 3, I highlighted the key aspects of the ecological relationship between humans and elephants. I noted how the opening of the forest canopy by humans increased the amount of wild food available for elephants. I reviewed the literature and suggest several ways that elephants traditionally influenced human culture in the region. I also noted the theory of Ian Morris that a community's mode of energy capture can influence it's values, beliefs, and attitudes.

In chapter 4, I examined the human-elephant culture of the Peninsula in more detail, noting that indigenous communities' traditional beliefs about elephants, attitudes towards elephants, and behaviour in response to elephant depredation. I noted that there was generally an attitude of respect towards elephants, although some communities have a tradition of occasionally hunting and killing elephants for meat and for ivory.

In chapter 5, I examined the intertwined histories of humans and elephants in Belum-Temengor. I documented how both the Orang Asli and the elephants had suffered historically from persecution, and how both continued to suffer from the paternalist intervention of the state. I note, however, that various factors meant that a

full-fleged tragedy along the lines highlighted by James C. Scott had not materialised.

In chapter 6, I showed how people from traditionally forager and swidden communities continued to interact with elephants in Belum-Temengor. I noted that sustainable development in the region (including the conservation of elephants) requires resolving the land rights of these communities. However, I highlighted the many complexities related to the mapping of the extent of the traditional territories of these people.

In chapter 7, I presented the results of a broader survey of human-elephant relations among indigenous communities in Peninsular Malaysia. My findings provide support for the idea that a society's mode of energy capture influences its values, beliefs, attitudes, and behaviour — with younger respondents in rural communities showing less tolerance towards elephant depredation.

In chapter 8, I highlight the challenges to convivial coexistence with elephant by examining a government scheme to protect villages from elephants using electric fences. I conclude that such fences can be effective, but require increased local consultation regarding design and maintenance – particularly with regard to the points of access (in this case, "spring gates"). I note how this results supports the theory of conservation conflict transformation (CCT) whereby local consultation is particularly important when local communities have held attitudes of distrust towards the government.

In this chapter present chapter (chapter 9), I synthesise three key themes that emerged from these diverse perspectives, building on existing models that attempt convergence and integration of human and natural ecology via a socio-ecological systems approach (Cioffi-Revilla 2014, Lischka et al. 2018). The three emergent themes are: (i) modes of energy capture; (ii) the factors affecting the survival of wild elephant; and (iii) the five-phase strategic interventions. Convivial human-elephant relations in the Anthropocene depend largely on understanding these themes and implementing the prescriptions arising from them.

9.2 Modes of energy capture

The case of human-elephant relations in Peninsular Malaysia illustrates how shifts in the modes of energy capture by human societies (from foraging, to swiddening, to settled farming) can influence our relationship with nature generally and with elephants in particular. This influence was presented in chapter 2 (Table 2-3) and, using the findings of chapters 3, 4 and 7, can be supplemented with reference to the more recent shift towards a reliance on fossil fuels (Table 9-1).

Table 9-1: Influence of Culture on Relationship with Elephants

Culture[1]	Age[2]	HPD[3]	Group[4]	Tolerance[5]	Relationship with elephants[6]
Foragers	55 ka	~1	~10	High	Seldom experience direct contact with elephants, use tree houses as retreats
Swiddeners	4.5 ka	~7	~50	Moderate	Depredation, capture & reprisal killings in equilibrium, can use elevated shelters
Settlers	2.5 ka	~15	~200	Low	Vicious cycle: ↑deforestation, ↑depredation ↓tolerance, ↑killing, ↑habituation: eco trap
Fossil fuelers	0.1 ka	>20	>2000	Ambivalent	Rural intolerance; urban romanticisation

Notes: [1] Cultural group, which denotes the mode of energy capture employed (chapter 2); [2] Age of culture in the Malay Peninsula (thousands of years) (chapter 2); [3] Human population density (people per km²); [4] Typical size of group (settlement, village, town); [5] Tolerance of elephant depredation; [6] See chapters 3 & 4.

The influence of the mode of energy capture on our culture can be broken down into several intermediary elements: values, beliefs, attitudes, and behaviour (chapters 4 & 7). These elements interact with each other and with other social and natural elements in a number of complex ways (Fulton et al. (1996), Jadhav and Barua (2012), Madden and McQuinn (2014), Morris (2015), and Campos-Arceiz et al. (2017)).

In order to visualise the influence of the mode of energy capture I modelled human-wildlife interactions using a systems-thinking approach that illustrates the relative influence of each element on the relationship between humans and wildlife (Figure 9-1, below).

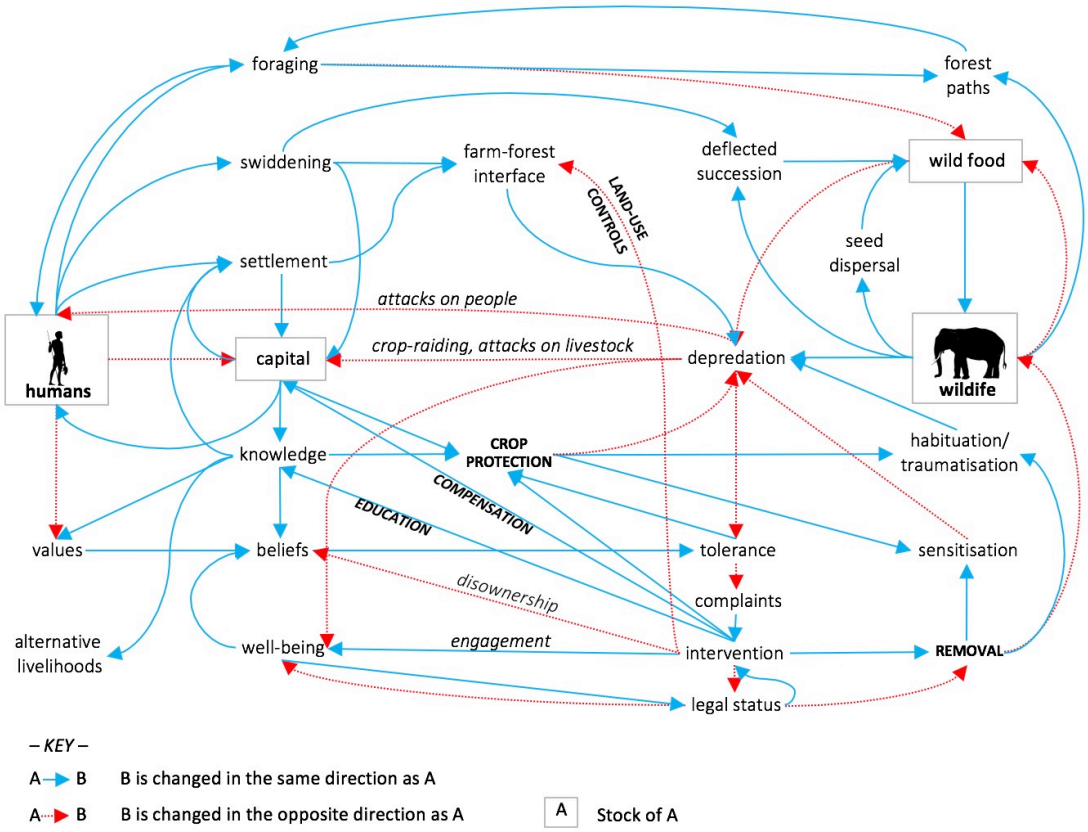


Figure 9-1: A systems-thinking model of human-wildlife interactions
Notes: "**beliefs**": community's beliefs in the value of conserving wildlife; "**capital**": livestock, standing crops, food stores, buildings, as well as financial stores of value; "**complaints**": complaints made regarding wildlife depredation; "**depredation**": wildlife raids on capital and attacks on people; "**disownership**": decline in sense of ownership related to depredation as well as the sense of disempowerment that can result from external intervention; "**farm-forest interface**": spatial overlap between distribution of "capital" and wildlife range; "**habituation/traumatisation**" & "**sensitisation**": changed behaviour of wildlife (conditioned fearlessness/fear); "**humans**": population of local community; **"LAND-USE CONTROLS"**: legal restrictions on agriculture, settlement, etc.; "**legal status**": regional or national protection status of wildlife; "**CROP PROTECTION**": safeguards and non-lethal measures to reduce depredation including active and passive frightening methods, barrier methods, and integrated pest management; "**REMOVAL**": capture or killing of wildlife; "**settlement**": permanent agriculture, industrial plantations; "**tolerance**": levels of goodwill and positive attitudes towards wildlife; "**values**": the core values, world-view and religion of the local community; "**intervention**": the five-phase strategic interventions (in capital letters) to address depredation by local, regional, national or international agencies; "**well-being**": psycho-social wellbeing of individual people; "**wild food**": potential food sources, excluding "capital"; "**wildlife**": local population of the specific species of interest (typically megafauna).

This approach displays two components: elements (indicated by nodes), and influences (indicated by arrows) (Galanakis 2006). Each influence has a single direction, indicated by the arrow head, and a format (colour and line type) that shows whether the influenced element is changed in the same direction as the influencing element (solid blue lines) or in the opposite direction as the influencing element (dotted red lines). Feedback (influences forming loops) can be either balancing (negative feedback resulting in an equilibrium) or reinforcing (positive feedback resulting in either an explosion or a collapse).

This systems-thinking model is structured around the population of humans – indicated by the word [**humans**] (in a box to indicate that the element represents the "stock" (population) of humans in the system), and the population of a particular species of [**wildlife]**. The model is generic and can be applied to most cases of human-wildlife competition, although I developed it primarily to address human-elephant relations in Peninsular Malaysia. The model illustrates the effect of modes of energy capture by connecting "humans" with "wildlife" via this route:

[**humans**] ⇢ values→ beliefs → tolerance ⇢ removal ⇢ [**wildlife**]

This means that the population of a human community (characterised by "HPD" and "Group Size" in Table 9-1) influences the core values of that community,[24] which in-turn influences their beliefs about wildlife, which influences their attitudes towards wildlife (represented here by the element "tolerance"), which ultimately influences their behaviour towards wildlife (expressed by here by the element "removal" which signifies humans killing or capturing wildlife).

In terms of human-elephant relations, this model illustrates how a nanoscale hunter-gatherer society, such as the Bateks, can hold a value system based around the centrality of nature, beliefs in the personhood of elephants, high levels of tolerance, and thus live in equilibrium with elephants (chapters 3, 4, and 7). However, should that same community of Bateks settle down and start growing crops, elephant raids

[24] The model shows this influence as a opposite-direction one, while in reality the influence has variable effects, as discussed in chapter 4 of this dissertation.

may reduce their population and thus start a chain of events that ultimately result in reprisal killings (chapters 4 and 7). The various taboos related to elephants may have been adaptive for foraging and swiddening communities, but they may not be so for farmers or fossil fuelers (chapter 4).

In addition to illustrating the causes and nature of human-elephant competition, this model includes five interventions that authorities can take to improve human-elephants relations: (i.) land-use controls; (ii.) protection; (iii.) compensation; (iv.) education; and (v.) removal. These interventions are discussed in more detail in section 9.4, below. However, in order to understand the rationale behind the interventions it is necessary to consider the nature of the relationship between the representation of the elements [**humans**] and [**wildlife**] in a little more detail, and to highlight several inadequacies in the model.

The systems-thinking model is a conceptual model and does not fully succeed in capturing several aspects of the human-wildlife relationship that are dependent on spatial variables. In particular, [**humans**] represents the population ('stock') of humans in the theoretical system being examined. However, the model does not say anything about where these humans live in relation to the wildlife. If the system is defined as a large area (such as a state or a nation) then some aspects of depredation (such as attacks on humans) would not occur if the humans and animals were spatially isolated (chapter 5). Furthermore, population taken in isolation is meaningless as it is the population per unit area (i.e. the population *density*) which is the key variable. Human population density is the subject of the following section.

9.3 Factors Affecting Survival of Wild Elephants

9.3.1 Human Population Density

Based on the historical data I presented in chapter 5, and the current data I presented in chapters 6–8, human population density seems to be the key factor affecting the survival of wild populations of elephants in the Peninsula. In Belum-Temengor, my respondents' experience of elephant depredation was strongly correlated with human population density in the landscape. For the three village clusters studied, the relative levels of depredation were consistent for all key aspects: rates of crop raiding,

property damage, and attacks on people were all higher in the clusters of villages with higher landscape population densities (chapter 7).

In terms of crop raiding, low human population density would present several alternative scenarios: (i) the crops would be quickly destroyed by the elephants, and the elephants move away from the settlement before escalation can occur; (ii) the crops would be in an area small enough to be protected; (iii) the crops would be in an area small enough not to be detected by or to be attractive to elephants.

Similarly, in terms of escalation, low landscape population density would mean: (i) effective reprisals from a village, with the elephants not managing to attain any food rewards, could result in elephants moving away from the settlement to an uninhabited area where they can get adequate food and not need to face the stress of humans, thus being sensitised to humans rather than habituated or enraged; and (ii) when low-level responses (such as making noise) leads to elephants leaving the area for a period of months or years, residents feel satisfied that elephants have learnt their lesson and when elephants return they would give the same low-level response rather than feeling that they need to escalate their response.

For these reasons, I suggest that elephant conservation requires implementing land-use controls. This includes the enforcement of planning restrictions prohibiting the expansion of settlements and agriculture in priority conservation sites. In these areas (particularly inside forest reserves), the government should reconsider the provision of urban amenities such as free housing, free tarred access roads, and similar infrastructure. By such measures human population densities should be targetted to remain below 100 people per km² and, prudently, below 20 people per km² (these densities should be calculated on the level of the mukim (administrative sub-district) (chapter 5). It is worth using the systems-thinking model (Figure 9-1) to examine the theoretical basis for this prescription. In addition, it is useful to consider spatial aspects that are not explicitly captured by the conceptual model such as the configuration of the forest-farm interface.

9.3.2 The mechanism behind elephant extirpation

Despite the many elements (nodes) and influences (arrows) in the model, only two influences actually point at [**wildlife**]: these are [wild food] and REMOVAL (i.e.

capture or killing). In the absence of humans, food would (by definition) have been the ecological factor limiting the numbers of megaherbivores such as Asian elephants (chapter 2). However, in the Malaysian context, wild elephants seldom face a shortage of food. I have never seen a thin wild elephant in Malaysia, although there are occasional observations of malnourished old or sick lone females (A. Campos-Arceiz pers. comm., 2018). Thus the model illustrates that removal of individual elephants by humans is the immediate factor affecting elephant populations.

9.3.3 Is habitat a red herring?

Forests provide elephants with a shaded refuge where they can rest during the day. Several studies suggest that this means that elephants have a threshold for the level of intact natural habitat in a landscape, and without this forest, they resort to depredation. Chartier et al. (2011) propose that this level may exist at 30–40% intact forest cover. I have examined the findings of Chartier et al. (2011) and, in my opinion, they do not support the existence of a *habitat* threshold in this respect. Instead, my reading of their data suggests that there is instead a threshold level of human population density that contributes to the expansion in depredation.

For Asian elephants, the issue of habitat loss is not straight-forward. In many instances, the preceding chapters of this dissertation (chapters 6, 7, and 8) have highlighted the generally agreed observation that elephants can thrive in degraded forest (Olivier 1978b, Evans et al. 2018, Wadey et al. 2018, chapter 3). Indeed, were it not for the presence of humans, elephants would probably thrive in landscapes dominated by agricultural plantations of rubber and oil palm – given sufficient shade, access to water, and perhaps occasional access to mineral licks. While intact forest might provide levels of shade and refuge that are not comparable to disturbed habitat, as noted by Campos-Arceiz (2013), the key driver of conflict is often "not the amount of forest available for the elephant but the amount of interface between forest and crops" (this is referred to as the "farm-forest interface" in the model).

9.3.4 The depredation-elimination cycle

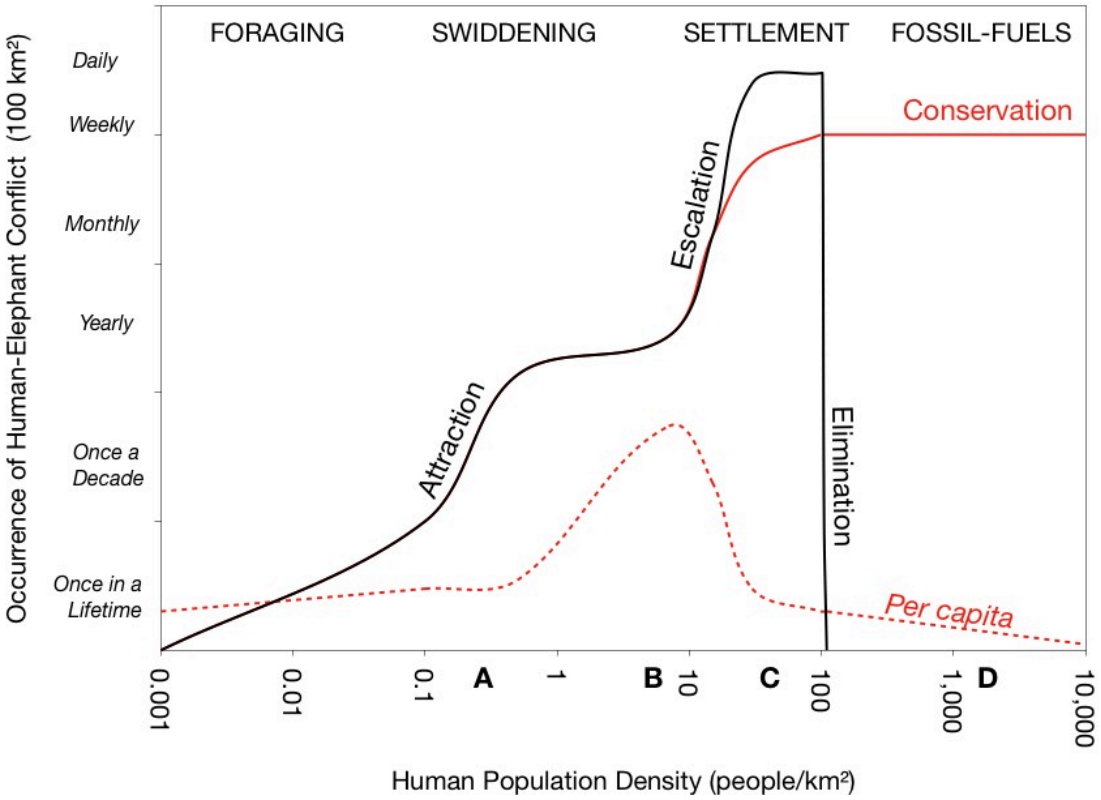
When human population densities increase, human-elephant conflict tends to increase as well and human-elephant relations risk entering a vicious cycle that

culminates in the loss of the elephant population. This cycle involves three phases: attraction, escalation, and elimination, which I illustrate using hypothetical scenarios based loosely on the situation in the Malay Peninsula (Figure 9-2).

In the attraction phase, elephants are drawn to an area by people opening up the forest, planting attractive food crops, and (in arid parts of Asia) irrigating dry land. During this phase both human and elephant populations are low and depredation remains infrequent. This would have been the predominant scenario throughout most of the history of the Peninsula (chapter 2).

In the escalation phase, typically during the transition from swidden farming to settled agriculture, depredation increases in frequency and intensity, leading to reprisals by people. Reprisal killings, in turn, cause the elephants to become increasingly habituated and aggressive, which leads to yet more depredation. Escalating depredation further reduces human tolerance and increases the severity of reprisals, leading to still more killing of elephants. In the Peninsula, there are indications that this phase began hundreds of years ago with the establishment of settled agriculture in the lowlands (chapter 4).

As noted in the introduction (chapter 1), settled farming of Asia was traditionally concentrated in the lowlands and did not extend to the hills, where elephants and swidden farmers continued to co-exist. However, the Anthropocene has witnessed the expansion of human domination into the steep uplands – and thus the third phase of the depredation-elimination cycle risks causing the extirpation of elephants throughout entire regions. When human population density passes a critical threshold, elephant raids occur very frequently and the cycle of violence continues into a third phase. In this elimination phase, individual elephants are progressively killed, resulting in hyper-aggression among the remaining individuals (Bradshaw et al. 2005), rampant depredation, and reprisal killings, until the entire population of elephants is extirpated. Much of the Peninsula (including the states of Malacca, Perlis, and Selangor; and the coastal lowlands of the other states) passed through this phase in the second half of the 20th century (chapters 4 and 5).



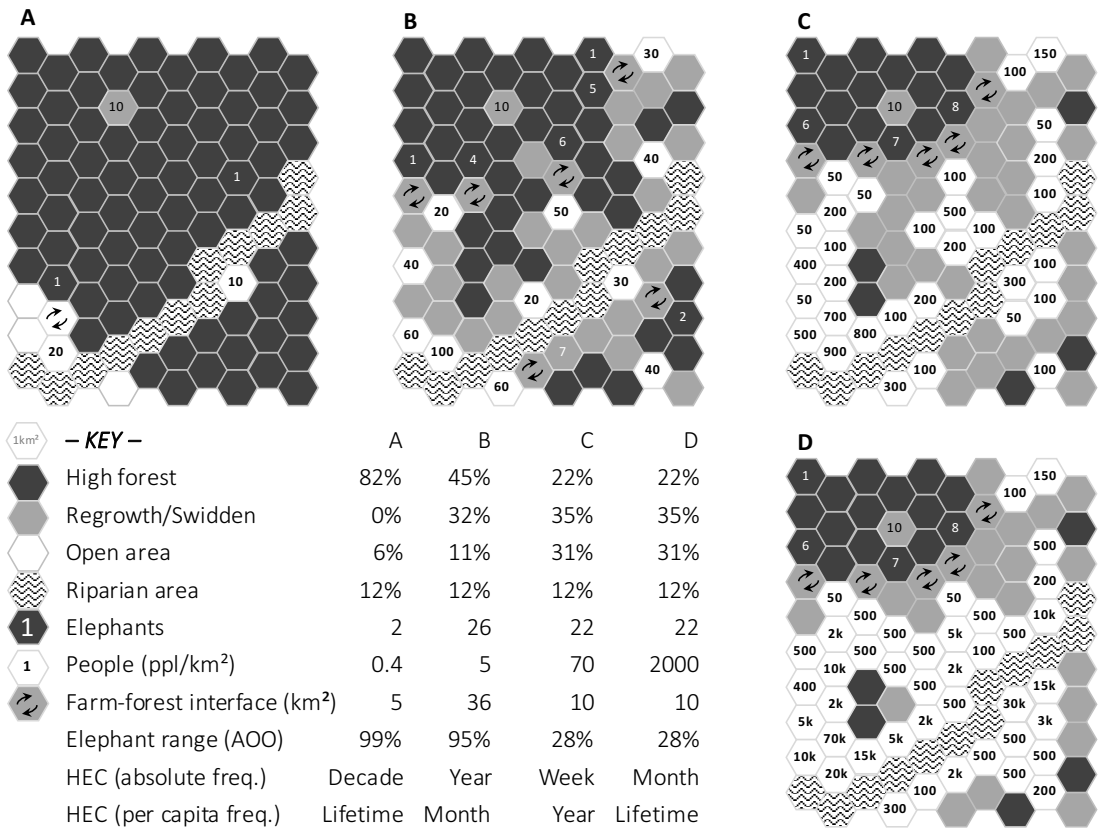


Figure 9-2: Scenarios in human-elephant relations: elimination or conservation
Notes: See Box 9-1 for detailed legend to this figure.

Box 9-1: Scenarios in human-elephant relations: elimination or conservation

Figure 9-2 presents a model of human-elephant conflict in a hypothetical 100-km² landscape. The model illustrates how the occurence of conflict (i.e. the number of incidents of depredation and reprisals) could vary in relation to human population density. This is illustrated using a log–log graph with logarithmic scales on both the horizontal and vertical axes.

The graph is supplemented by maps of four scenarios showing the land use and human population density in a 10-km x 10-km hexagonal grid. From very low levels (Scenario A), the introduction of agriculture causes a spike in per-capita conflict (Scenario B), and continued human expansion leads to very high levels of conflict (Scenario C). Without conservation intervention, the continued human expansion would result in the rapid elimination of the local elephant population (and thus end the conflict).

Conservation intervention lowers the absolute level of conflict slightly (solid red line). With conservation interventions (particularly land use controls) the elephant population is maintained while the relative (per capita) level of conflict decreases as the human population is restricted to urban areas (Scenario D).

Fortunately, the systems-thinking model provides several ways to avoid the depredation-elimination cycle and arrive at an alternative scenario where elephants can be conserved (scenario D in Figure 9-2). In particular, the model highlights five strategic interventions that make it possible to decouple increases in human population from increases in depredation. These interventions are outlined in the following section.

9.4 Five-phase strategic interventions

The systems-thinking model presents five interventions to conserve elephants. These interventions, developed by Salman et al. (2011) and Campos-Arceiz et al. (2017), will be appropriate at different times, depending on whether development projects have already been implemented, and whether depredation has already occurred. The interventions are ordered to give priority to measures that do not result in the elimination of wild populations (Table 9-2).

Table 9-2: Five-phase strategic interventions for wildlife management

Intervention	Appropriate timing
1. Land-use controls	Before a development
2. Barriers to protect people	During wildlife raiding
3. Compensation of losses	After wildlife raids
4. Education and engagement	At any time
5. Removal of wildlife	As a last resort

Source: Salman et al. (2011), Campos-Arceiz et al. (2017).

The foremost intervention is the application of appropriate land-use planning controls before a development occurs, this aims to ensure that human population density in conservation areas is kept at appropriate levels, that developments do not fragment wildlife populations (Othman et al. 2013), and that the forest-farm interface is minimised (Campos-Arceiz 2013). The challenges of implementing land-use controls in Malaysia are highlighted in chapter 6.

When land-use changes are already underway, and depredation is already occurring, steps can still be made to intervene by protecting humans and "capital" using barriers (such as fences, walls, and ditches). As examined in chapter 8, these barriers are most effective when appropriate land-use controls are already in place.

After raids have already occurred, and losses have been suffered, an appropriate intervention can be providing compensation to affected individuals (Chen et al. 2013).At any time, it is also possible to increase the tolerance of the local population towards depredation by addressing social conflicts (Madden and McQuinn 2014) and by providing education on the importance of elephants via communication outreach and public awareness campaigns (Jayewardene 2011). The need for compensation, education and engagement were discussed in chapter 7.

In this context, removal of wildlife (i.e. elimination of "problem animals" via capture or killing) should be seen only as a last resort. Translocation of elephants is seldom an effective long-term solution (Fernando et al. 2012, chapters 6-8 of this dissertation). By minimising the removal of wildlife, the elimination phase of human-elephant relations can be averted.

There are several challenges to implementing this strategic approach to intervention. In Peninsular Malaysia, the first strategic intervention (land-use controls) is something that is largely beyond the control of agencies of the federal government, with the final decision of land-use coming under the jurisdiction of the state and local governments (Nagulendran 2017). Taking the rights of local communities into account poses additional challenges – as illustrated in chapter 6. Nevertheless, the wildlife department has various initiatives designed to influence land-use controls, provide electric fences, education, and engagement. These initiatives include the support that the department gives to national-level policies such as the National Policy on Biodiversity, spatial planning initiatives such as the Central Forest Spine, as well as the many prescriptions detailed in species conservation plans, such as NECAP.

9.5 Can humans and elephants co-exist in the Anthropocene?

There remains the question of whether humans and elephants will be able to co-exist in the Anthropocene. As noted earlier in this chapter, co-existence will require breaking the depredation-elimination cycle and decoupling population growth from rural expansion. This will involve reconsidering policies that that promote human population growth in rural areas where the risk of depredation is high (especially the policies that subsidise the expansion of small-holder agriculture such as rubber).

At the same time, there is also a need to increase tolerance of elephant depredation. This is a complex issue with no immediate solutions and there is a need for more research on the factors that promote tolerance. Nevertheless there is a clear need to reconsider policies that reduce the traditional tolerance that people in rural areas had towards moderate levels of depredation. There are indications that tolerance can be increased by creating mechanisms to compensate for losses and by increasing awareness of the value of wildlife (Tan et al., in prep.).

There are several reasons to be optimistic about the potential for continued human-elephant coexistence in Peninsular Malaysia. Industrialisation has meant that population growth becomes increasingly concentrated in urban areas. While the overall population continues to increase, rural populations in the Peninsula have generally stabilised and, in some districts, rural populations are declining. This has

meant that, while the level of elephant depredation remains high (with complaints being made every week – Table 5-2), the *per-capita* incidence of depredation has not only dropped, but has dropped exponentially. The attitudes towards wildlife of Malaysian generally has thus improved (Guérin et al. 2017). This means that there is potentially the popular support necessary for elephant conservation, and in a functioning democracy this should translate into political will to support NECAP and future such initiatives.

There is, however, a low level of awareness about elephants among urban Malaysians a need to raise the profile of elephants among the Malaysian public. There is indeed a danger of failing to see the elephant that is right before our eyes (the Malay proverb "gajah di depan mata", mentioned in chapter 4). The fact that over 75% of the population lives in towns and cities means that, while there may be over a thousand elephants still inhabiting local forests, few Malaysians even realise that wild elephants continue to exist (Guérin et al. 2017). Even when driving through the jungles of the interior they would be lucky to see an elephant. It is indeed the case that the dense vegetation of the humid tropics means that "even so huge an animal as an elephant is sometimes invisible at fifteen yards, and almost always invisible at thirty yards." (Maxwell 1906: 7). As a result, modern Malaysians' conceptions of 'the big animals' are shaped by photographs and documentaries, often featuring African elephants. Indeed, it would be no exaggeration to claim that locals are more likely to be familiar with images of ants from overseas than they are with wild elephants from Malaysia. The challenge for conservationists will be to open the eyes of the public to these magnificent creatures, remind them of our long history of convivial coexistence, and thus to ensure their continued survival in the wild.

9.6 Recommendations

The findings of my research can be applied by conservation practitioners generally. In the particular case of Peninsular Malaysia, I highlight below several recommendations for government agencies, at state and federal levels; for the private sector, in particular for the plantation industry; for community-based organisations; and I highlight areas of future research for academics.

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For the Department of Wildlife and National Parks, Peninsular Malaysia, I recommend the following:

- Widen the group of stakeholders consulted on wildlife management, such as during the revision of NECAP, including increased representation from:- state government agencies, particularly the respective state planning units and state forestry departments; and representatives of Orang Asli communities;.
- Continue to support communities through the elephant electric fence scheme (SPEG), and expand the community elephant electric fence (SPEGKOM), whereby local communities are empowered to coordinate the maintenance of the fence by themselves.
- Continue to monitor the effectiveness of fences, and modify the location, layout and design of fences where appropriate. In particular, improve existing guidelines for the design and maintenance of electric fences, considering alternatives to spring-gates for controlling electric fence openings (as highlighted in chapter 8).

For the Department of Orang Asli Development (JAKOA), I recommend the following:

- Increase consultations with other government agencies (including the wildlife department, the forestry department, and state agencies such as the Perak State Parks Corporation) prior to providing development assistance, such as building houses and providing rubber seedlings, to the Orang Asli in conservation sites.
- Increase consultation with the state governments (particularly the state departments of survey and mapping and the state forestry department) on mapping the extent and boundaries of the traditional territories of the Orang Asli, and share this information with other departments, including the wildlife and forestry departments.
- Participate in the development and revision of national wildlife and forest conservation initiatives including NECAP and CFS.

For the Forestry Department of Peninsular Malaysia (JPSM), I recommend the following:

- Revise the guidelines for the development of state forest management plans (FMPs) to ensure full consultation with relevant government agencies such as the DWNP and JAKOA so that logging and plantation activities take into account the location of local people and elephants.
- Revise the guidelines for the approval of logging licences to ensure free, prior and informed consent of affected communities and relevant government agencies (particularly JAKOA).

For the individual state governments, I recommend the following:

- Engage the federal government in the development and revision of national-level species conservation plans NECAP and, once approved, support their implementation.
- Implement the revised guidelines for FMPs and logging licences mentioned above as taking into account the location of local people and elephants.
- Identify the location of salt licks and give them full protection from logging and land clearing; consider the restoration of degraded salt licks.

For the private sector, in particular for the plantation industry:

- Engage the wildlife department in the preparation and revision of species conservation plans such as NECAP, and adopt best management practices with relation to elephant conflict mitigation.
- Ensure that plantations cause minimal obstruction to movement patterns of elephants, allowing them to move through mature plantations where appropriate.
- Explore new approaches to wildlife management based on the principle of minor compromises in short-term profit in exchange for enhanced sustainability.

For academic institutions, I recommend that further research related to:

- The extent to which the Orang Asli (particularly the Temiars) were historically involved in capturing and taming elephants.

- Attitudes towards elephant depredation among suburban communities to determine the potential for elephants to live in closer proximity to towns and cities
- The effectiveness of electric fences on controlling elephant movement to identify optimal design of electric fences.
- Practical alternatives for electric fence openings rather than spring-gates.
- Demographics of elephant populations to determine the maximum level of removals that can be sustained in the long term.

9.7 Final remarks

In closing, this dissertation suggests that there is some hope for future human-elephant relations in Peninsular Malaysia. The prehistoric and ecological context shows that our two species can live together. Indeed, the indigenous cultures of the Peninsula have had a rich history of respectful interactions with elephants. If future increases in the human population are confined to existing urban areas, and rural communities receive appropriate support, then we can look forward to continued convivial co-existence with these magnificent megaherbivores.

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APPENDICES

Appendix I

Questionnaire on Assessment of Attitudes Towards
Elephants Among Forest Communities.

Interviewer: _____ Recorder: _____

Date: _____ Time: _____

Introduction

"Selamat pagi, nama saya _____ dari Universiti Nottingham di Kuala Lumpur. Saya tengah buat kajian tentang haiwan liar dan jenis-jenis tanaman yang ada di kampung ini. Saya minta kerjasama anda dengan soal-selidik yang mengambil masa lebih kurang 15 minit. Saya tidak akan catat nama anda. Kalau ada apa-apa soalan yang anda tidak mahu jawab, tidak apa. Anda boleh berhenti pada bila-bila masa. Bolehkah anda tolong saya dengan ini? Terima kasih."

Good morning, my name is _____ from the University of Nottingham in Kuala Lumpur. I am carrying out a study regarding wildlife and the types of crops planted in this village. I request your cooperation with a questionnaire of around 15 minutes. I will not note your name. If there is any question which you do not wish to answer, nevermind. You may stop at any given time. Would you help me with this? Thank you."

Demographics

1. Serial number:
2. Gender: M F
3. Age (15-24/>25):_____ years
4. Ethnic group (Sub-ethnic group):
5. Apakah nama kampung ini?

5. What is the name of this village?

6. a) Anda lahir di sini kah?

6. a)Were you born here?

b) Kalau tidak: berapa lama telah anda tinggal di sini?_____ years

b) If not: how long have you lived here?

7. Anda kerja apa?

7. What work do you do?

Agricultural Practices

1. Biasanya anda makan nasi atau tidak? (Y / T)

Do you usually eat rice?

2. Beras itu biasanya dapat dari mana? (ladang/kedai)

Where do you usually get the rice from? (grown/bought)

3. Biasa makan sayur-sayuran? (Y / T)

Do you usually eat vegetables?

4. Sayur-sayuran itu biasanya dapat dari mana? (hutan/ kebun/ kedai)

Where do you usually get those vegetables from? (forest/ garden/ store)

5. Adakah anda menanam apa-apa? (Y/T)? Jika Ya, pergi Q8

Do you plant anything? If yes, go to Q8.

6. Jika tidak, pernahkah anda menanam apa-apa sebelum ini? (Y/T) Jika tidak, pergi ke "knowledge"

If not, did you ever plant anything? If no, go to knowledge.

7. Jika ya, mengapakah anda berhenti?

If yes, why did you stop?

8. a.) Jika ya, apa jenis tanaman ada? b.) Berapa batang/luas? c.) Sumber benih: kerajaan/ kawan&keluarga? d.) ada haiwan yang biasa mengacau tanaman itu? e) apakah haiwan yang biasa mengacau tanaman itu?

a.) If yes, what did you plant? b.) how much/extent? c.) source of seedlings: government/ friends? d.) are there any animals that usually disturb these plants? e) what animals usually disturb these plants[Following table gives examples of rubber, oil palm, vegetables, bananas, fruit trees]

9. Jika getah/sawit:

a. Sudah berapa tahun tanaman itu?

b. Adakah anda menguruskan tanaman getah/sawit itu sendiri (atau diuruskan oleh pihak lain)?

If rubber/oil palm: a. for how long have you been planting this crop? b. Do you manage it yourself (or by others)?

Knowledge

1. Apakah haiwan yang paling biasa merosakan rumah?

1. What animals most often damage homes?

2. Apakah haiwan yang paling biasa mengancam manusia?

2. What animals most often threaten people?

3. Siapa yang boleh hidup lebih lama, manusia atau gajah?

3. Who lives the longest, people or elephants?

Attitudes

1. Ada [haiwan] di kawasan ini? Adakah anda rasa bilangan [haiwan] cukup dalam kawasan kampung ini?

Is there [animal] here? For [tapir/elephant/tiger/wild boar/sambar deer], please rate their status in the vicinity of this village: not enough, enough, too many

2. Jika jawapan adalah *terlalu banyak*: a. Apakah yang akan anda lakukan?

Tidak buat apa-apa; menghalau mereka; tangkap & pindah; tangkap & letak di zoo; lapor; racun; tembak; jerat.

b. "Adakah anda akan bunuh dia? (Y/T)

2. [For answers of "too many"] a. What can you do? [nothing; catch and relocate; catch and put in a zoo; report; poison; shoot; snare] b. "Would you kill them?"

3. Adakah anda rasa bilangan gajah di Malaysia (cukup/ tidak cukup/ terlalu banyak)?

3. What do think of the status of elephants in Malaysia? (not enough, enough, too many)

4. Apakah yang patut dilakukan jika [a/.../f] Siapakah yang patut bertanggungjawab?

4. What do you think should be done if [a. elephants destroy crops; b. elephants threaten people; c. elephants kill people; d. tigers kill livestock; e. tigers threaten people; f. tigers kill people]; g. who should be responsible? (do not do anything; chase them away; catch and relocate; catch and place in zoo; kill; n/a)

Elephant Presence & Conflict

['this area' refers to *the immediate surroundings of this village]*

1. Pernahkah gajah liar datang ke kampung ini dalam 12 bulan yang lalu? Y/T Jika Ya, pergi ke Q3 *Have wild elephants come to this village in the last twelve months? If yes, go to Q3.*
2. Jika 'Tidak', adakah anda ingat kali terakhir yang gajah berada di kampung ini? Y/T Jika 'Tidak', pergi Q.7 *If 'no', do you remember when was the last time that elephants were in this village? If 'no', go to Q7.*
3. Berapa kali gajah datang ke sini dalam 12 bulan yang lalu?

How often have elephants come here in the last 12 months?

4. Pernahkah gajah buat masalah di sini dulu? Y/T/Tidak tahu

Have elephants ever caused problems here? (yes/no/don't know)

5. Jika ya, adakah anda ingat apa masalah yang dibuat gajah di sini dulu?

Kerosakan tanaman Kerosakan rumah Kerosakan harta benda lain Isu keselamatan Kehilangan haiwan ternakan Kematian/kecederaan: berapa ramai orang: Lain-lain

If yes, do you remember what problems elephants caused

(Multiple options are possible; Answers not to be read)

6. a. Pernahkah ada kematian gajah di sini? Y / T b. Berapa lama dahulu (tahun)?

6. a. Did elephants ever die here in the past? b. How long ago (years)?

7. Apakah yang anda lakukan semasa gajah datang?

[Melaporkan kepada pihak berkuasa; menghalau; menyalakan api; buat bunyi; tukar cara menanam; membina pagar; membina rumah atas tiang/pokok

7. What did you do when the elephants came?

(*Multiple options are possible; Answers not to be read)*

8. a. Adakah anda ingat jika ibubapa atau datuk/nenek pernah ada masalah gajah?

b. Kira macam mana masalah pada masa itu berbanding dengan sekarang: lebih teruk / sama/ kurang teruk/ tidak tahu?

c. Jika ada masalah, apakah yang mereka buat pada masa itu?

[Melaporkan kepada pihak berkuasa; menghalau; menyalakan api; buat bunyi; tukar cara menanam; membina pagar; membina rumah atas tiang/pokok

a. *Do you remember whether your parents or grandparents ever experienced elephant problems?*

b. Were the problems then, worse than now/ about the same/ less than now/ don't know?

c. If there were problems, what steps did they take?

(*Multiple options are possible; Answers not to be read)*

Itu adalah penghujung soalan kami. Terima kasih atas kerjasama anda. Maklumbalas anda amatlah berhargai.

That is the end of the questions. We thank you for taking part. Your responses are valuable to us.

Appendix II

Short Note – Temiar Bird Names.

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Short Notes – Temiar Bird Names

TECKWYN LIM[1,*], DAVID P. QUINTON, ALICIA SOLANA-MENA[1],
YEN YI LOO[2], VIVIENNE P.W. LOKE[1], RIZUAN ANGAH[1,3], HUSIN SUDIN[1,3],
MUHD TAUHID @ CHERANG [1,3], PARAM PURA [1,3]

Peninsular Malaysia is home to at least 25 groups of indigenous people, collectively known as the Orang Asli (Lye 2001). Most of the Orang Asli still live in forested landscapes and have a close connection with nature. Thus, they often have complete sets of names for the plants and animals that they encounter (Skeat and Blagden 1906, Harrison et al. 1955, Rambo 1979, Nicholas 2012). These vocabularies open the door to traditional knowledge that can be of interest to various fields of research including biologists and social-scientists. These lists of plant and animal names illustrate indigenous taxonomic systems and can help biologists to work with Orang Asli guides in identifying species. For this reason, Dentan (1970) appeals to biologists to collect the vernacular names of species they are studying.

The Temiar are a large and well-known group of the Orang Asli. They number around 24,900 (Benjamin 2012), and are found in forested landscapes in the states of Perak, Kelantan, and in part of northern Pahang (Fig. 1). The Temiar practise swidden farming supplemented by fishing, trapping and collecting of forest products such as rattan and agarwood.

With the aim of preserving the traditional knowledge of the Orang Asli, we compiled a selection of local names of birds found in the territory of the Temiar (Table 1). This included 61 names from existing sources (including Roseman (1991), Means (1998) and Benjamin (2014)), as well as 111 new names from interviews with around 15 respondents from seven villages in Kelantan and Perak, making reference to Davison and Yeap (2010), Robson (2005) and Jeyarajasingam (2012). Our orthography follows Benjamin (2014).

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[2] Manchester Metropolitan University, United Kingdom;
[3]Koperasi Orang Asli Kampung Semelor Gerik Berhad, RPS Air Banun, Hulu Perak, Malaysia.
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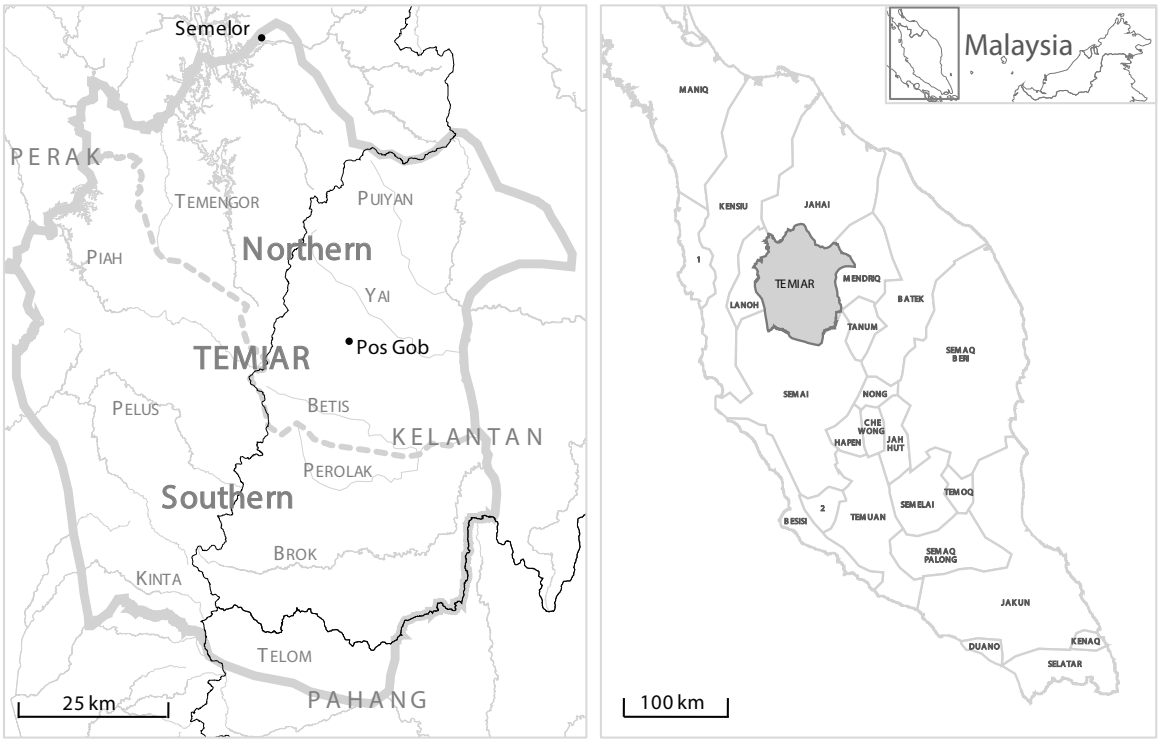


Figure 1. The approximate distribution of Northern Temiar and Southern Temiar dialects in relation to other language groups of the Peninsula prior to the arrival of the Malays (adapted from Benjamin 1983). 1-'Low-Country Semang'; and 2-'Sakai of Ulu Langat' are both now extinct.

Table 1. Temiar bird names[1]

ʔakul	*Harpactes duvaucelii*
ʔambood	*Ketupa ketupu*
ʔambʉj	*Argusianus argus*
ʔatan	*Gallus gallus* (also ***ʔayam, manɔʔ***) (cf. ***denak***)
ʔɛgʔag	*Corvus* spp., *Aplonis panayensis*
ʔɛŋʔiŋ	*Centropus sinensis*
ʔɛsʔɛɛs	*Alophoixus ochraceus* (B: ***ʔɛsʔããs***)
ʔubaʔ	*Acridotheres tristis* (also ***kuba***)
baliyɛk	*Anorrhinus galeritus* (also ***malik***)
baŋau	Order: Ciconiiformes
barpɔl	Family: Phasianidae
bayan	*Loriculus vernalis*
bəənəg	*Phaenicophaeus tristis*
bəətɔl	*Phaenicophaeus curvirostris*
bəkooh	Family: Columbidae (B: ***bɛrkɔg, bakɔh;*** M: behko)
bəlatɔɔk	Family: Picidae (M: bêr-wal, "a woodpecker")
bəliŋkɛŋ	*Gallinago stenura* (M: be-lîng-kêng, "snipe")
bəraglag	see: ***jəraglag***
bərɛlkuul	*Harpactes* spp.
bəroduk	Family: Turdidae
bərwɛl	*Treron* spp. (B: ***bɛrwɛl***)
bɛrlɛɛŋ	*Loriculus galgulus*
bərobɔh	*Pycnonotus brunneus*
bɛtɔg	*Phaenicophaeus sumatranus*
biirig	*Merops philippinus*
biray	*Copsychus saularis* (B: ***beraay***;M: payeh; R: ***bəraay***; also ***ɲuk ʔaluy biray***)
biyɔy	*Eurylaimus ochromalus*
cagu	*Alcedo* spp. (also ***cagɔʔ***)
caŋwɔɔj	Family: Tytonidae (also ***caŋwɔɔy***)
cekum	*Lophura ignita*
cəmog	*Phaenicophaeus tristis*
cəriyɛj	*Orthotomus atrogularis* (also ***cɛp rɛp***)
cɛhcad	*Arachnothera* spp. (B: ***cehcɛh, cɛhcah***)
cɛp	Class: Aves
cɛp rɛp	see: ***cəriyɛj***
cɛrwar	Family: Eurylaimidae
cɛw	*Pteruthius flaviscapis*
cicar	*Pteruthius melanotis*
cicor	*Luscinia ruficeps*
cintap	*Copsychus malabaricus*
ciyok	*Passer* spp.
ciyɔŋ	*Gracula religiosa* (S: niong)
cooŋ	*Harpactes duvaucelii*
coris	*Ceyx rufidorsa*
cucɔŋ	*Phaenicophaeus javanicus*
curɔɔw	*Eurylaimus ochromalus*
denak	Family: Phasianidae
dəkuug	*Buceros vigil* (M: dekub, dekuy, dekuyu)
dɛduh	*Centropus sinesis*
dɛŋdoŋ	*Ducula badia*
dɛŋpadɛŋ	*Luscinia ruficeps*
duwag	*Phaenicophaeus sumatranus*
gagoob	*Serilophus lunatus*
gerɛɛs pəŋkul	*Myophonus caeruleus*
gəralog	*Pycnonotus finlaysoni*
gəroyoj	*P. melanicterus*
həlaaŋ	*Buceros rhinoceros* (S: ngáng)
hənwããŋ	*B. bicornis*
hɛʔhɔ	*Cissa* spp.
hɛ̃j	Family: Passeridae/ Fringillidae,(cf. ***laŋkɛj***)
hɛr	*Pycnonotus squamatus*
hohɛ̃ɛ̃w	*Rollulus rouloul*
hohuy	*Bubo* spp.
holdɔk	*Oriolus chinensis* (R: ***huldɔk***)
hɔɔŋ	*Eupetes macrocerus* (R: ***hooŋ***)
jawiyɛr	Family: Apodidae/ Hirundinidae (M: jauyer, jaweer, yayer, yiyer, yoyer; also ***layaŋ***)
jəkoŋ	*Ninox scutulata*
jɛŋwɛr	*Yuhina zantholeuca*
jəraglag	*Prinia flaviventris* (also ***bəraglag***)
kaampik	*Caloenas nicobarica, Lophura erythophthalma* (B: ***pəgər***)
kahããr	*Anthracoceros albirostris*
kahkuu	*Aceros comatus* (B: ***kakeh***)
keruduk	*Pomatorhinus montanus* (B: ***huldɔk***)
kədor	*Sitta* spp.
k. ʔəŋkuk	*S. azurea*
kəlaŋ ʔala	*Dinopium javanense*
kəmɛlwak	*Dicrurus paradiseus*
kərkɔr	*Pycnonotus plumosus*
kəwɔɔk	*Argusianus argus* (S: kuok)
kɛkog	*Nyctyornis amictus* (also ***sɛŋog***)
kikud	*Cuculus saturatus*
klaak	Generic term for birds of prey

k. bajaw *Spizaetus alboniger*
k. cɛpiyɛw *S. nanus*
k. kəlɛ̃ɛ̃ŋ *Falco peregrinus*
k. kərəhuy *Spizaetus cirrhatus*
k. kurukuu *Spilornis cheela*
k. səwaˀ *Microhierax fringillarius*
k. sɛmpəl *Butastur indicus*
kuaˀ *Amaurornis phoenicurus*
kuba *Acridotheres tristis* (also ***ˀubaˀ***)
kucɔ̃ɔ̃ŋ *Phaenicophaeus javanicus*
kuhkor *Rhipidura albicollis*
laŋkɛj *Ficedula westermanni* (also ***hɛj***)
lawar *Peterochelidon* spp.
layaŋ see: ***jawiyɛr***
malik see: ***baliyɛk***
manɔˀ see: ***ˀatan***
maŋkeek *Alophoixus* spp.
məwaaˀ *Pavo muticus*
mɛɲut *Chalcophaps indica*
ɲuk ˀaluy biray see: ***biray***
pahɔɔŋ *Melanoperdix niger*
payɛh *Trichastoma bicolor*
pədlaj *Irena puella* (also ***pətlayj, pɛtlaj***)
pəlɛɛw *Minla cyanouroptera*
pənɛcad *Arachnothera* spp.
pərakak *Halcyon* spp. (M: *bè-ra-kah*)
pəroko *Garrulax* spp. (also ***rukɔw***)
poˀajɛl *Coracina javensis* (also ***puyeel***)
pohwɛh *Tricholestes criniger*
popooy *Lophura ignita*
puyuh Sub-family: Perdicinae
raab *Aegithina viridissima*
rahrɛh *Celeus brachyurus*
rempual *Ploceus philippinus*
rəs *Seicercus montis*
rukɔw *Garrulax* spp. (also ***pəroko***)
sããy bayas *Sitta frontalis*
sakoo *Oriolus xanthonotus*
saŋˀɛ̃d *Philentoma pyrhoptera*
səmɛlwak *Dicrurus* spp.
səmɛrluŋ *Platysmurus leucopterus*
sɛɲwɛ̃ɛ̃ɲ Super-family: Dicaeoidea (also ***sɛnvɛn***)
sərawel *Heterophasia picaoides*
sərid *Loriculus vernalis*
sərtɛɛŋ *Rhizothera longirostris*
sərawiyɛg *Heterophasia picaoides*
səwariyɛk *Pericrocotus* spp.
sɛlsɛɛl *Enicurus ruficapillus*
sɛmpoŋ *Chloropsis* spp. (also ***sɛŋhɔ̃ŋ*** and ***sɛŋlok***)
sɛŋog *Nyctyornis amictus* (also ***kɛkog***)
siyɛy *Aegithina tiphia*
sohsɛ̃ɛ̃w *Lonchura punctulata*
sorah *Gampsorhynchus rufulus*
taˀɛ̃j *Anthracoceros albirostris (also **taˀəəy**)*
tabaar *Lanius tigrinus*
tagut *Megalaima lineata*
tahud *Aceros undulatus*
tahwah *Picus* spp.
t. rahrɛh *P. mentalis*
t. tahtoh *P. miniaceus*
tajar *Pycnonotus atriceps*
tambɔj *Eurylaimidae* spp.
tantas *Oriolus cruentus*
taŋkəwɔɔj *Phodilus badius* (M: tangkoi wôjh)
taŋkiig *Pericrocotus* spp.
taptibaw Family: Caprimulgidae (M: tibau; also ***tɔgtɛbaw***)
tayɛt *Motacilla cinerea*
təkrɔɔ *Calyptomena viridis*
təkukur *Streptopelia chinensis* (M: kaku)
təntadeh *Motacilla spp.*
təraad *Psilopogon pyrolophus* (also ***təraah***)
təray *Ploceus philippinus*
tərək *Buceros rhinoceros*
təwal *Megalaima franklinii*
tɛgtɛg *Prionochilus maculatus*
tɛŋtaaŋ *Dicrurus* spp. (also ***teŋtɔɔk***)
tɛŋtoŋ *Cymbirhynchus macrorhynchus*
tɛraaj *Anthracoceros albirostris*
tɛrhɛr *Lonchura punctulata* (also ***tɛrhir)***
tɛruud *Megalaima faiostricta*
tiŋtaˀ *Myiomela leucura*
tɔgtɛbaw see: ***taptibaw***
togrɔh *Megalaima henricii*
wɛdwaad *Hypothymis azurea, Oriolus chinensis, Rhipidura albicollis*
w. saŋˀɛ̃d *Terpsiphone paradisi*
wɛgwoog *Macropygia ruficeps*
wɔɔy *Halcyon pileata*
yaktəbaˀ *Malacocincla malaccensis*
yɛgˀiiŋ *Centropus sinesis*
yɛhˀyud *Calyptomena viridis*

[1]'B'–Benjamin (2014); 'M'–Means (1998); 'R'–Roseman (1991); 'S'–Skeat and Blagden (1906).

Appendix III

Elephants: Humans in Disguise?

MEME Update 11 (December 2015): 3-4.



Elephants: Humans in Disguise?

By *Teckwyn Lim*

While investigating the history of human-elephant conflict in Peninsular Malaysia I wondered whether attitudes towards elephants vary between different ethnic communities and income groups. I found that while all communities view elephants with respect, some communities have a history of hunting and eating elephants while others have taboos against this. These taboos are reflected by several folk tales suggesting that elephants are sometimes human beings in disguise.

I came across a tale of a man named Bongso of the Chewong tribe in Pahang who had elephants come and eat his banana trees. Bongso speared the elephant in the leg and then chased it into the forest. The elephant led him to Moödn, a faraway land where the elephant removed his *baju* (cloak) and revealed a human form underneath. Bongso went and removed his spear from the leg of the man who forgave him and invited him to stay in the land of the elephants where he was given an elephant *baju* of his own and two wives. From then onwards the Chewong believe that to eat elephant meat is *talaiden* (taboo) and would lead to being attacked and killed by an elephant.

In July this year I visited several Chewong villages in and around Krau Wildlife Reserve and confirmed that they indeed had a taboo against hunting elephant. In contrast, the neighbouring Jahut tribe confided that they had hunted elephants in the past. I wondered whether this was due to the fact that the Chewong lived in very small forest communities compared to the Jahut who were more settled and heard that a similar pattern existed in the north of Perak with the semi-nomadic Jahai having more respect for elephants than the farming Temiar (A. Solana Mena pers. comm.). So I was surprised to find that in the 19th century a Malay informant from Negeri Sembilan had recounted the following tale to William Skeat, a British colonial officer:–

A Malay named Laboh went out one day to his rice-field and found that elephants had been destroying his rice. He therefore planted caltrops of a cubit and a half in length [70-cm spikes] in the tracks of the offenders. That night an elephant was wounded in the foot by one of the caltrops, and went off bellowing with pain.

Day broke and Laboh set off on the track of the wounded elephant, but lost his way, and after three days and nights journeying, found himself on the borders of a new and strange country. Presently he encountered an old man, to whom he remarked 'Hullo, grandfather, your country is extraordinarily quiet!' The old man replied, 'Yes, for all noise is forbidden, because the king's daughter is ill.' 'What is the matter with her?' asked Si Laboh. The old man replied that she had trodden upon a caltrop. Si Laboh then asked, 'May I see if I can do anything to help her?'

The old man then went and reported the matter to the king, who ordered Si Laboh to be brought into his presence.
(Now the country which Si Laboh had reached was a fine open country on the borders of Siam. It is called 'Pak Hěnang,' and its only inhabitants are the elephant-people who live there in human guise. And whoever trespasses over the boundaries of that country turns into an elephant.)

Then Si Laboh saw that the king's daughter, whose name was Princess Rimbut, was suffering from one of the caltrops which he himself had planted. He therefore extracted it from her foot, so that she recovered, and the king, in order to reward Si Laboh, gave him the Princess in marriage.

Now when they had been married a long time, and had got two children, Si Laboh endeavoured to persuade his wife to accompany him on a visit to his own country. To this the Princess replied 'Yes; but if I go you must promise never to add to the dish any bamboo-shoots at meal-time.'

On this they started, and at the end of the first day's journey they halted and sat down to eat. But Si Laboh had forgotten the injunctions of his wife, and put bamboo-shoots into the dish with his rice. Then his wife protested and said, 'Did I not tell you not to put bamboo-shoots into your food?' But Si Laboh was obstinate, and merely replied, 'What do I care?' so that his wife was turned back into an elephant and ran off into the jungle. Then Si Laboh wept and followed her, but she refused to return as she had now become an elephant. Yet he followed her for a whole day, but she would not return to him, and he then returned homewards with his children.

This is all that is known about the origin of elephants who are human beings."

There are enough similarities between the this and the Chewong tale to make it most probable that they share a common source. The ethnic affiliation of the protagonist varies depending on who is telling the tale as with the tale of Si Tenggang, the captain of a ship that turned to stone and became Batu Caves, whose race is variously given as Malay or Temuan depending on the race of the informant.

As I continue my investigations into human-elephant interactions among other communities in the peninsula I will be keen to see whether any other communities claim ownership of this intriguing tale.



When elephants still roamed Krau Wildlife Reserve (before the 1980s) the Chewong had to build their houses on even higher stilts!



Tok Kueh, 75, of Kampung Senel, told me that in his youth he and his Chewong family hid up a tree while a herd of elephants passed beneath. They also needed to build tall fences to protect their crops. However, seladang were more feared than elephants.

Appendix IV

Elephant Pathways

MEME Update 12 (July 2016): 3.

Elephant Pathways

By *TeckWyn Lim*

Over the last few months I have been interviewing forest communities regarding their relationship with elephants. Both in Perak and in Pahang rural people still suffer from elephants destroying their crops. The cost of living in the same landscape as mega-herbivores was clear but I was interested in whether there were anything that these people appreciated about the elephants.

I was quite pleased when one theme emerged independently from several respondents: they were glad that the elephants kept the jungle pathways open because without the herds of elephants moving along these paths they would quickly be overgrown, blocked by fallen trees and difficult for people to walk along.

I found the idea of elephants as the builders and maintenance engineers of the highways of the forest to be quite intriguing. Indeed, there is evidence that humans and elephants have been using the same routes up and down the Peninsula for thousands of years. The routes are mainly determined by topography: elephants and people obviously would choose the most flat and accessible routes to move through the landscape.

I find it intriguing that these jungle tracks were originally created by the elephants (and perhaps some extinct species of megafauna) to connect important sites including salt licks, fruit trees and caves in limestone outcrops. People would have then found it sensible to use the same routes to get to these locations, not only for the topography but also because the routes were kept accessible by the elephants.

Archaeologists and historians have identified several trans-Peninsula portage routes that have been used since ancient times. One of these routes was used by the northern states of Peninsular Malaysia to send tributaries of the Kingdom of Siam. The Sultan of Kedah would send the annual tribute via a convoy of elephants along a path that ran up north. Indeed, there are many places named after elephants along the main route up north to Thailand. For example, the town of Changlun in Kedah, means 'elephant fell' in Thai (ช้างล้ง), supposedly the spot where a tribute-laden elephant had fallen into the river.

Another ancient route goes all the way from Melaka to Kota Bharu in Kelantan. One spot along this route is a limestone outcrop inside Taman Negara known as Gua Gajah (Malay for 'Elephant Cave') or Batu Bidan (in Batek Tanum, the language of the local Orang Asli). I recently tracked the 5-km route from the Pos Relau Park Headquarters along a trail that is actively used by elephants, right up to the entrance of the cave. The Batek informed me that this trail was part of a route that had been used by their ancestors to travel from Pahang to Kelantan. Look at the topography of the area (Figure 1) it is clear that the trail follows the valley floor.

People continue to use the old elephant routes even in landscapes that elephants no longer inhabit. Forest trail maintenance without elephant means a constant effort of parang and chainsaw. And even in landscapes that are long cleared of forest the shadow of an ancient trunk remains part of our unrecognised heritage. As we travel on railways and motorways up and down the Peninsula we are unwittingly following trails originally blazed by pachyderms many thousands of years before.



Fig. 1. Trail (black line) from the Pos Relau Jeep Track (red line) to Gua Gajah (approximately 4 km); the area shaded green is Taman Negara.

* TeckWyn is studying human-elephant relationships as part of his PhD research.

Appendix V

A. Questionnaire used for ECG Electric Fence Assessment

1. What kind of fence?
2. What type of wire?
3. How many wires?
4. Height of wire to wire?
5. Distance between posts?
6. What type of posts?
7. What type of lead out?
8. Are the fence posts protected by the wire?
9. Is there an earth wire? If yes, what is the order/position?
10. What type of energizer?
11. What is the power source? Solar/ Battery
12. Any battery backup?
13. What is the size of solar panel?
14. Any lightning diverters?
15. What is the type of earthing for energizer?
16. What type of insulator?
17. Distance to vegetation?
18. Any wire tensioners/ spring?
19. What is the load for wire?
20. When was the fence built?
21. Cost of fence?
22. Who maintains it?
23. Cost of maintenance per month? Salary of villager?
24. Hours of operation?
25. Who built the fence?
26. What is the length?
27. How many people inside the fenced area?

B. Fence Survey Data Sheet - Post-to-Post

1. Date
2. Start
3. End
4. Primary post aka Cement post
5. Voltage (kV)
6. Ampere (A)
7. Changed.post?
8. Post.angle
9. Degree
10. Post.fell
11. Object.fell.on.fence
12. What?
13. Wire.loose
14. Position
15. Wire.broken
16. Position.of.wire
17. Insulator.loose.or.broken
18. Position
19. Plants.touch.wire
20. What?
21. Wire.touch.post
22. Position
23. Wire.touch.water
24. Wire.touch.wire
25. Position
26. Wire.reconnected
27. Dung
28. Distance.from.wire(m)
29. Prints
30. Size(Inc)
31. Distance.from.wire(m)
32. Floodgate controller
33. Energizer.wire
34. Lightning.diverter
35. Changed.post
36. Spring.gate
37. Remarks

Appendix VI

Questionnaire on Community Perceptions on Electric Fences for Protection Against Elephant Depredation. Developed by the Elephant Conservation Group (ECG), 2014.

ID: _____ Interviewer: _____ Date: _____

Location: _____ GPS: _____

Age: _____ Sex: ☐ M ☐ F

1. How long have you lived in this village? _____

2. What is your main source of income?
☐agriculture ☐business ☐waged worker ☐government ☐others _____

3. What is the distance of your farm from the fence? _____km

4. Is the fence successful in reducing crop damage? ☐Yes ☐Neutral ☐No ☐N/A

4.1. If 'NO', please proceed to answer the following.

4.1.1. Is the fence in the right place? ☐Yes ☐Neutral ☐No ☐N/A

4.1.1.1 If **no**, why? *(There can be more than one answer)*
☐ Elephants are in the both sides of the fence.
☐ Elephants come from other area.
☐ Others (pls state) _____

4.1.2. Is the fence constructed properly? ☐Yes ☐Neutral ☐No ☐N/A

4.1.2.1 If **no,** why? *(There can be more than one answer)*
☐ A river/stream runs underneath the fence
☐ Posts of the fence are not strong.
☐ Not suitable wires.
☐ Incorrect spacing of wires
☐ Insufficient/faulty supply of power.
☐ The fence is not complete or continuous
☐ Others (pls state) _____.

4.1.3. Is the fence maintained properly? ☐Yes ☐Neutral ☐No ☐N/A

4.1.3.1 If **no**, why? *(There can be more than one answer)*
☐ Power is not turned on.
☐ Posts are broken.
☐ Broken wires take a long time to be repaired
☐ Not enough power supply.
☐ Electric fence gate is not closed properly.
☐ Area around the fence is not cleared.
☐ Fence has leakage.
☐ Others (pls state) _____.

5. How was the damage **before** the electric fence was built?
☐ None ☐ Low ☐ Medium ☐ High ☐ N/A

6. How is the damage **after** the electric fence was built?
☐ Increased ☐ Same ☐ Decreased ☐ N/A

7. Who is currently responsible for funding the electric fence and rate their efficiency?
(There can be more than one answer)

_ Don't' know				
_ Government (Wildlife Dept.)	☐ Good	☐ Average	☐ Bad	☐ N/A
_ Government (Other)	☐ Good	☐ Average	☐ Bad	☐ N/A
_ Individual	☐ Good	☐ Average	☐ Bad	☐ N/A
_ Plantation	☐ Good	☐ Average	☐ Bad	☐ N/A
_ Community	☐ Good	☐ Average	☐ Bad	☐ N/A
_ NGO	☐ Good	☐ Average	☐ Bad	☐ N/A
_ Others (pls state) _____	☐ Good	☐ Average	☐ Bad	☐ N/A

8. Who is currently responsible for constructing the electric fence and rate their efficiency?
(There can be more than one answer)

_ Don't' know				
_ Government (Wildlife Dept.)	☐ Good	☐ Average	☐ Bad	☐ N/A
_ Government (Other)	☐ Good	☐ Average	☐ Bad	☐ N/A
_ Individual	☐ Good	☐ Average	☐ Bad	☐ N/A
_ Private Company	☐ Good	☐ Average	☐ Bad	☐ N/A
_ Plantation	☐ Good	☐ Average	☐ Bad	☐ N/A
_ Community	☐ Good	☐ Average	☐ Bad	☐ N/A
_ NGO	☐ Good	☐ Average	☐ Bad	☐ N/A
_ Others (pls state) _____	☐ Good	☐ Average	☐ Bad	☐ N/A

9. Who is currently responsible for maintaining the electric fence and rate their efficiency?
(There can be more than one answer)

_ Don't know				
_ Government (Wildlife Dept.)	☐ Good	☐ Average	☐ Bad	☐ N/A
_ Government (Other)	☐ Good	☐ Average	☐ Bad	☐ N/A
_ Individual	☐ Good	☐ Average	☐ Bad	☐ N/A
_ Private Company	☐ Good	☐ Average	☐ Bad	☐ N/A
_ Plantation	☐ Good	☐ Average	☐ Bad	☐ N/A
_ Community	☐ Good	☐ Average	☐ Bad	☐ N/A
_ NGO	☐ Good	☐ Average	☐ Bad	☐ N/A
_ Others (pls state) _____	☐ Good	☐ Average	☐ Bad	☐ N/A

10. Who should be responsible for funding the electric fence? *(Rank top 3 answer)*
☐ Government (Wildlife) ___ ☐Government (Others) ___ ☐Individual ___
☐Private Company ___ ☐Plantation ___ ☐Community _
☐ NGO ___ ☐ N/A ___

11. Who should be responsible for constructing the electric fence? (*Rank top 3)*
☐ Government (Wildlife) ___ ☐Government (Others) ___ ☐Individual ___
☐Private Company ___ ☐Plantation ___ ☐Community __
☐ NGO ___ ☐ N/A ___

12. Who should be responsible for maintaining the electric fence? *(Rank top 3)*
☐ Government (Wildlife) ___ ☐Government (Others) ___ ☐Individual ___
☐Private Company ___ ☐Plantation ___ ☐Community__
☐ NGO ___ ☐ N/A ___

13. What is your contribution to the maintenance of the electric fence now?
(There can be more than one answer)
☐ Money (How much per month? RM _____)
☐ Labour (How many hours per month? _____)

☐ Nothing ☐ Others (pls state) _____

14. What are you willing to contribute to the construction of an electric fence in future?
(There can be more than one answer)
☐ Money (How much per month? RM _____)
☐ Labour (How many hours per month?_____)
☐ Nothing ☐ Others (pls state) _____

15. What are you willing to contribute to the maintenance of an electric fence in future?
(There can be more than one answer)
☐ Money (How much per month? RM _____)
☐ Labour (How many hours per month?_____)
☐ Nothing ☐ Others (pls state) _____

16. In your opinion what will be a well designed fence? *(There can be more than one answer)*
☐ Don't know.
☐ Is durable.
☐ Sufficient supply of power.
☐ Fence is not broken.
☐ No leakage of fence.
☐ Enclosed fence.
☐ Transferable fence
☐ Location
☐ Trench
☐ Others (pls state) _____.

17. Under the present conditions, will you accept elephants living in this area?
☐ No ☐ Yes ☐ Don't know ☐ No other choice

18. What else could be done to reduce the elephant problem? *(There can be more than one answer)*
☐ insurance ☐remove problem elephants
☐ compensation ☐economic benefits from elephants
☐ nothing ☐Don't know
☐others _____

19. Are you willing to bear some loss due to elephant raiding?
☐ No ☐ Yes ☐ Don't know

19.1. If **no**, why? _____
_____

20. Do you think economic compensation is appropriate for such loss?
☐ No ☐ Yes ☐ Don't know

20.1. If **yes**, what type of economic compensation? *(Rank top 3 answer)*
☐Don't know
☐Insurance ____
☐Cash compensation from Wildlife Dept___
☐Cash compensation from other government agencies.
(Pls state-_____) ____
☐Cash compensation from NGOs ___
☐Cash compensation from local politicians ___
☐Agricultural aids (seeds, fertilizers, etc)
☐Others (pls state - _____) ___

21. Are you willing to consider insurance for such loss? ☐ No ☐ Yes ☐ Don't know

21.1. If **yes**, are you willing to pay premium for such protection?
☐ No ☐ Yes ☐ Don't know

21.1.1. How often are you willing to pay the premium ?
☐ Monthly ☐ Quarterly ☐ Biannually ☐ Annually

21.1.2. How much premium are you willing to pay? (State an estimate: _____)

21.1. 3. Are you willing to engage an insurance agency to provide such protection?
☐ No ☐ Yes ☐ Don't know

21.1.4. If there is an insurance coverage, are you willing to tolerate some crop damage?
☐ No ☐ Yes ☐ Don't know

22. If the electric fence is effective, do you think translocation is necessary for HEC mitigation?
☐ No ☐ Yes ☐ Don't know ☐ No comment

22.1. If **yes** why? _____
_____

23. Are you content with **more** electric fences compared to translocation to mitigate HEC?
☐ No ☐ Yes ☐ Don't know ☐ No comment
☐ Do both

24. Is translocation necessary if there is economic compensation?
☐ No ☐ Yes ☐ Don't know ☐ No comment ☐ Do both

25. Overall, what is your opinion on translocation?
_____
_____
_____