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Human Dimensions of Coexistence with Elephants in Agricultural Landscapes in Malaysia

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Abstract

This thesis explores human-elephant coexistence in Malaysia's agricultural sector, focusing on the palm oil industry. This study employs an interdisciplinary approach that combines the psychological, social and ecological factors of conflicts to investigate the human dimensions of coexistence. The research was conducted across four states in Malaysia and involved 223 questionnaire respondents, 12 focus group discussions, and 75 participants in stakeholder mapping exercises. The questionnaire utilised constructs from The Theory of Planned Behaviour (TPB) and the Norm Activation Model (NAM) to examine the drivers of conflict mitigation intentions and ideas of coexistence. The respondents included executives from the private sector as well as organised and independent smallholders. The findings from Partial Least Squares-Structural Equation modelling (PLS-SEM) reveal that norms towards the government (β=.407 p<.001), negative attitudes (β=-.204, p=.001), and self-efficacy (β=.151, p=.015) significantly explained behavioural intentions (R^2= 0.277). Notably, norms towards the government emerged as the strongest predictor, contrary to the findings of previous studies. The extended model incorporating Norm Activation Model constructs improved explanatory power by 12%, with moral obligation, awareness of consequences, and norms towards the government as significant predictors of behavioural intentions (R^2= 0.398). The model also investigated the ideas of coexistence through these theories. In the first model, Behavioural intentions (β=.253 p=.004) significantly explained Coexistence ideas (R^2= 0.065). However, the extended model revealed that awareness of the consequences (β=.337 p<.001) is the strongest predictor variable for coexistence ideas (R^2= 0.154). Next, results from reflexive thematic analysis of the focus group discussions with organised smallholders under the Federal Land Development Authority (FELDA) scheme provide a nuanced understanding of the perceived barriers and opportunities for coexistence. Failed mitigation strategies and financial instability owing to crop damage have resulted in prolonged stress

and multigenerational debts for settlers. Responses to these conflicts were categorised as "fight", "flight", or "freeze", reflecting accumulated stress from unresolved conflicts. Finally, stakeholder analysis maps key actors within the conflict landscape, revealing their influence, support for coexistence, and potential for collaboration. Non-governmental organizations, village heads, religious leaders, and individuals directly affected by conflict were identified as influential and supportive stakeholders across all four states. The analysis also revealed a trend towards higher influence and support for local-level actors compared to state and federal entities, suggesting the potential benefits of a decentralised approach to conflict management. This thesis proposes reframing human-elephant conflict to coexistence to help shift the focus towards increasing safety for people and elephants, and the exploration of other types of mitigation methods. This emphasises the need for collaboration among intergovernmental agencies, the inclusivity of local stakeholders, and the potential role of sustainability certifications in promoting coexistence strategies. The study's findings suggest that personal moral obligations have a greater influence than governmental pressure on conflict mitigation intentions. This insight, combined with the significant supportive roles of local stakeholders, presents an opportunity to leverage cultural and religious values to promote elephant conservation in agricultural communities. In conclusion, the thesis provides a comprehensive understanding of human-elephant conflicts in Malaysia's agricultural settings, offering insights into the psychological, social, and governance aspects of the issue. It highlights the potential for coexistence based on moral, cultural and religious values while emphasising the need for increased collaboration among various stakeholders to address this complex challenge effectively.

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List of abbreviations

AC	Awareness of consequence
ACE	Achieving Coexistence with Elephants
ANOVA	Analysis of Variance
AVE	Average variance extracted
BI	Behavioural intention
BISS	Palm Oil and Sago Industry Development or *Bahagian Industri Sawit dan Sagu*
CI	Coexistence ideas
DN	Descriptive norms
DWNP	Department of Wildlife and National Parks Peninsular Malaysia
DYMM	Duli Yang Maha Mulia
FELCRA	Federal Land Consolidation and Rehabilitation Authority
FELDA	Federal Land Development Authority
GDP	Gross Domestic Product
HEC	Human-Elephant Conflict
HTMT	Heterotrait-Monotrait
HWC	Human-Wildlife Conflict
IN	Injunctive norms
IPLC	Indigenous Peoples and Local Communities
IUCN	International Union for Conservation of Nature
MEME	Management & Ecology of Malaysian Elephants
MNRES	Ministry of Natural Resources and Environmental Sustainability
MO	Moral obligation
MPOB	Malaysian Palm Oil Board
MPOGCF	Malaysian Palm Oil Green Conservation Foundation
MSPO	Malaysian Sustainable Palm Oil
NA	Negative attitudes
NAM	Norm Activation Model
NDPE	No Deforestation, Peat, and Exploitation
NECAP	National Elephant Conservation Action Plan
NEP	New Economic Policy
NG	Norms towards government
PA	Positive attitudes
PBC	Perceived behavioural control
PLS-SEM	Partial Least Squares Structural Equation Modelling
QME	Quaternary Megafauna Extinction
RSPO	Roundtable of Sustainable Palm Oil
SE	Self-efficacy
TPB	Theory of Planned Behaviour
VIF	Variance Inflation Factor
WEIRD	Western, Educated, Industrialized, Rich and Democratic

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CHAPTER 1

Introduction

1.0 Chapter 1: Introduction

1.1. Integrating Human Behaviour into Conservation

Since the 1980s, Conservation Biology as a crisis discipline, has focused on the biology of species, communities, and ecosystems impacted by human activities (Soule, 1985). Conservation is fundamentally a human endeavour concerning human impacts on the environment and decision-making, rather than biology alone (Balmford & Cowling, 2006; Mascia et al., 2003). Conservation biologists have addressed these issues through environmental and biological frameworks but acknowledge the insufficiency of their field alone to resolve these problems (Baruch-Mordo et al., 2009; Mascia et al., 2003). Human-wildlife conflict is a growing concern in both developing and developed countries, especially in areas where human populations and wildlife habitats meet. Thus, understanding human behaviour is crucial for expanding the conservationist's toolbox for managing wildlife. However, human behaviour research has long assumed the universal cognitive and affective processes, applying findings from one population universally (Heinrich, 2010). Considering the widespread nature of human-wildlife conflicts, cultural differences can shape how societies view and engage with wildlife, potentially intensifying or mitigating these conflicts (Manfredo, 2004). Hence, achieving global coexistence can benefit from the perspectives and emotions towards wildlife held by individuals outside WEIRD (Western, Educated, Industrialised, Rich, and Democratic) societies.

1.2. Background

In 2024, Malaysia's population reached 34.1 million individuals, coexisting with approximately 3000 elephants on the same land. Malaysia ranks fourth in population density among those Southeast Asian nations with elephant populations,

following Vietnam, Indonesia, and Thailand (UNDP World Population Prospects 2024). The country's economic growth began during colonial times, with mining and extensive rubber plantations forming the foundation. The expansion of oil palm plantations has been a key driver of economic growth, particularly since the 1970s, when demand for palm oil surged in international markets (Hezri & Hasan, 2006). Currently, Malaysia is the world's second-largest palm oil producer after Indonesia. This sector contributes significantly to Malaysia's agricultural Gross Domestic Product (GDP), valued at RM 36.2 billion. The demand of oil palm will continue to rise along with the pressure to adopt more sustainable practices. Yet, when compared to other oil crops such as soy or rapeseed, yields from oil palm is the highest by producing 35% of all vegetable oil on less than 10% of the land allocated to oil crops globally (Meijaard et al., 2018). Nevertheless, to address concerns over deforestation of natural forests, Malaysia has instituted a limit on oil palm plantation area to 6.5 million hectares by 2023. Consequently, the industry is expected to pivot towards yield optimisation to meet rising global demand. The current rate of replanting in Malaysia is less than ideal (Seng et al., 2012), which has led to government intervention. This is evident in the recent allocation of RM 100 million in Budget 2025, aimed at encouraging smallholders to increase their replanting activities. Concurrently, research indicates that newly regrown areas attract elephants (de la Torre et al., 2019) and are the most vulnerable to crop depredation; hence strategic measures are required to minimise and manage conflicts in these regions (Ghani, 2019). The future of the oil palm industry and elephant conservation are inevitably linked in the foreseeable future.

1.3. Problem statement

In most elephant range countries, habitat loss and forest fragmentation led to more interactions between humans and elephants in a shared landscape and exacerbated conflicts.

Crop depredation is the most common conflict in agricultural landscapes in Malaysia. Mitigation measures to overcome this recurring issue such as guarding and chasing away elephants, electric fences or trenches as barriers and economic pay-outs such as compensation from governments or insurance schemes are short to medium term solutions. In addition, these mitigation measures are trying to solve the problem through one dimension when human-elephant conflict is a problem that involves multiple people and requires careful consideration in its solutions to ensure equitability. Studies to understand the human dimension of coexistence will enable conservation practitioners, protected area managers, and natural resource managers to develop a holistic mitigation plan to hopefully achieve a long-term harmonious coexistence.

1.4. Research aims and objectives

This study aims to explore the use of psychology alongside ecological understanding of elephants to identify factors that influence the agricultural communities' ability to coexist with elephants in Malaysia. Research objectives include:

i) Identify psychological variables that influence the intentions to mitigate conflicts from individuals in the palm oil plantation sector and their ideas of coexistence

ii) Examine the nature of conflicts to determine barriers and potential for coexistence among organised smallholders

iii) Map stakeholders' power dynamic into an influence-support matrix to review the governance of conflict and potential collaborators

1.5 Thesis outline

This thesis is structured into six chapters, each addressing a distinct aspect of the research while building towards a comprehensive understanding of human-elephant conflict in Malaysia from a Human Dimensions perspective. There are three core chapters that focus on the research objectives that integrates its own methodology section, rather than presenting all methods in a single chapter.

- Chapter 1: General introduction

Provides the rationale of understanding human behaviour in conservation practice and the background of human-elephant conflict context in Malaysia. It outlines the problem statement; research aim and objectives.

- Chapter 2: Literature review

This chapter traces the historical trajectory of human-elephant conflict in Malaysia, situating it within broader field of conservation biology to understand how it has become a prevalent challenge globally. It also reviews literature across human-wildlife conflict to coexistence and conservation psychology. This chapter highlights the theoretical frameworks and research gaps that inform the study's conceptual foundation.

- Chapter 3: Psychological Drivers of Intention to Mitigate Conflicts and Coexistence Ideas

Addresses **Objective 1**, identifying psychological variables that influence individuals' intentions to mitigate conflicts and their perceptions of coexistence, focusing on actors in the palm oil sector. This chapter presents the use of a self-report questionnaire and Partial Least Squares Structural Equation Modelling (PLS-SEM) to explore predictors of behavioural intentions and coexistence ideas.

- Chapter 4: Mechanisms of Conflict and its Impact towards Coexistence among Organised Smallholders in West Malaysia

Focuses on **Objective 2**, examining the lived experiences of conflict among smallholder communities to uncover barriers and opportunities for coexistence. This chapter employs qualitative methods, including focus group discussions and reflexive thematic analysis, to interpret social and cultural dimensions of conflict.

- Chapter 5: Stakeholders in Human-Elephant Conflicts

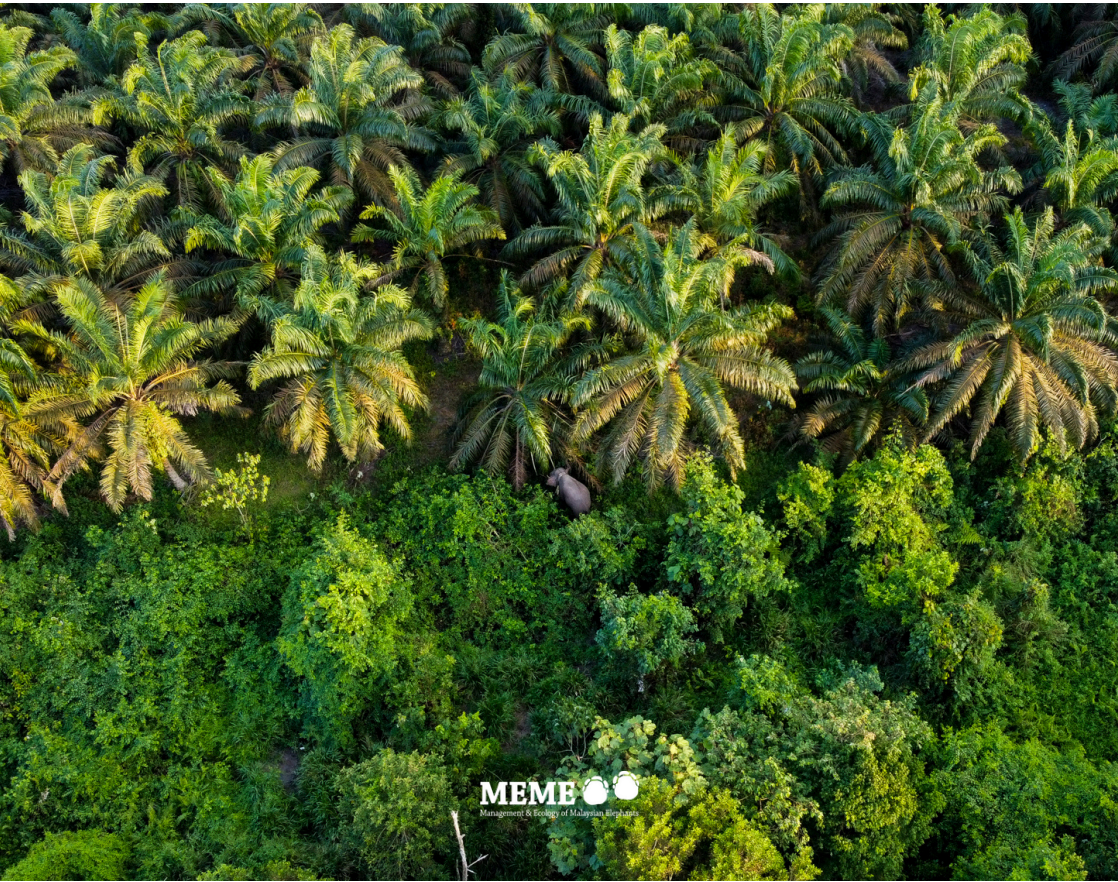
Explores **Objective 3**, analysing stakeholder dynamics through the construction of an influence-support matrix to assess governance structures, institutional gaps, and potential collaborators. This chapter analyses participatory stakeholder mapping by palm oil smallholders and reviews relevant policies from intergovernmental departments to understand gaps in the governance of human-elephant conflicts in Malaysia.

- Chapter 6: Consolidation and conclusions

Synthesises key findings across all objectives, discusses theoretical and practical implications for human-elephant coexistence, conservation practice and provides recommendations for future research and stakeholder collaboration.

CHAPTER 2

Literature review



2.0. Chapter 2: Literature review

2.1.Framing the research

2.1.1. Post colonial Malaysia, rural development and the expansion of the agriculture sector

The Federation of Malaya gained political independence from Britain in 1957. The Federation of Malaysia was officially formed in 1963, comprising Malaya (now Peninsular Malaysia), Singapore, Sabah, and Sarawak,. However, in 1965, due to conflicting political ideologies between the leaders of Malaysia and Singapore, Singapore separated from the federation and became an independent republic. When Malaysia gained independence in 1957, it inherited a thriving plantation, timber, and mining industry established by British colonial rule (Kangayatkarasu, 2017). During the colonial period, mining and large-scale rubber plantations were the two major economic sectors for the region (Hezri & Hasan, 2006). This heavy reliance on natural resources continued from the colonial days until the 1970s. The extractive development by the British colonisation has brought about spatial and structural imbalances as well as societal economic inequality (Mamat et al., 2016).

Rural communities, particularly Malay populations in the east coast of Peninsular Malaysia, face significant economic challenges. The mean household income for Malays in 1957/1958 was significantly lower than that of the Chinese and Indians, who populate the more developed west coast of Peninsular Malaysia highlighting the economic disparity among ethnic groups in different regions (Kusnic & DaVanzo, 1982; Vokes, 1984). Rural Malays, who primarily engaged in agriculture, experienced lower income levels compared to their urban counterparts, such as the Chinese and Indians, who were more involved in trade and modern economic sectors due to the

mining and rubber economic boom (Kusnic & DaVanzo 1982). Although the aristocrat Malays were involved in mining, agriculture and administration roles, but the manual labour on the ground was largely from the Chinese and Indian communities brought in by the British. This economic disparity was a major concern for the newly independent nation, prompting the government to implement various policies aimed at alleviating rural poverty and addressing ethnic income imbalances through the New Economic Policy (NEP). NEP's poverty eradication strategies prioritised rural development and industrialisation to uplift the socio-economic status of the *Bumiputera* community. This phenomenon is also recognised as rural social engineering and can be observed in the governance of other countries after independence from British rule (Six, 2024). The main goal of rural social engineering is to create a more organised and productive society to help them adapt to the process of decolonisation. However, this process of decolonisation is not clear cut. The Federation of Malaya (Malaysia after 1963) has been regarded as a classic 'neocolonial' state, as the Malaysian ruling class remained subordinate to British interests, particularly evident in the continued British ownership of about 708,000 hectares of rubber plantations, representing over 60% of the total rubber acreage on the Malay Peninsula in the 1960s (White, 2000). Additionally, the National Land Code 1965 was amended several times to impose restrictions, particularly in the agricultural and residential categories, aimed to balance foreign investments while protecting local interests (Jomo & Hui, 2010; White, 2000).

The Federal Land Development Authority (FELDA) was established in 1956 to facilitate land development and resettlement schemes which provided land and resources to poor rural families, enabling them to engage in productive agriculture (Hussin & Abdullah, 2012; Mamat et al., 2016; Manaf & Ibrahim, 2017). While the scheme was deemed the most successful land settlement organisation by the World

Bank in 1987 (Sutton & Buang, 1995), others have highlighted the high cost and ineffectiveness of solving rural poverty (Mehmet, 1982). Nevertheless, the stable democratic governance system in Malaysia was the key to the success of FELDA as a public constitution compared to countries like Sri Lanka; despite the technical assistance from the World Bank, land settlement schemes failed due to changes in governments and political parties in power (Barau & Said, 2016). In contrast, the FELDA schemes have also played a significant role in shaping Malaysia's political landscape. More than half of Malaysia's Parliamentary constituencies are in rural areas where these development projects play an integral role to the Malay rural political-economy and identity (Khor & Chia, 2020). Therefore, it is in the government's interest to maintain this structure of rural development and agriculture by allowing these land allocations to be transferred to future generations. The continuation of this sector within families is of concern and the parallels are seen between oil palm replanting economic decision-making and voting behaviour (Leng, 2014).

Aside from the social factors that contribute to Malaysia's agriculture industry, 61% of this industry is owned by private conglomerates, making them the largest stakeholders in the industry (Kristanti et al., 2021), most of which are managed by plantation companies such as IOI Plantation and SD Guthrie (formerly known as Sime Darby Plantation Sdn Bhd) (Seng et al., 2012). The transition and transformation of ownership of major plantation companies previously run by the British, namely, Sime Darby, Guthrie and Harrison, and Cross field (later, Golden Hope Plantations) started in the 1980s as a strategy to ensure the economic benefits of the sector within Malaysia (Seng et al., 2012). Other strategies include incentives for local ownership through financial support, tax incentives, and favourable regulatory conditions to encourage local investment, thus increasing the industry’s private sector (Seng et al., 2012). The private

estates had a fair share of growth covering 558,000 hectares acres of land in the 1980s to 2.9 million hectares in 2010 (Malaysian Palm Oil Board, 2023). Meanwhile, FELDA schemes in the 1960s opened land between 1,620-2,020 hectares, accommodating about 400 settler families (Mehmet, 1982). By the end of 1978, FELDA had a total acreage of approximately 404,685 hectares, and 51,747 settlers and in 2011, the area almost doubled (Kailany, 2011). Following a major policy change in 1991 that switched the scheme's objective to an economic agricultural development strategy, FELDA reported that no new land was developed except for the unused lands in the village areas (Sutton & Buang, 1995).

The rapid expansion of plantations caused several problems, such as the lack of planning that led to the indiscriminate opening of land, as highlighted by the Ministry of Lands and Mines (Mehmet, 1982). Additionally, between 1988 and 2012, the growth of industrial oil palm plantations replacing forests occurred predominantly (over 99%) within a 1km radius of pre-existing oil palm plantations. (Shevade & Loboda, 2019). Moreover, there has been an increase in converted areas with low planting suitability since 2006 (Shevade & Loboda, 2019), signalling that we might be at our limit. In 2019, the then Primary Industries Minister Teresa Kok proposed to submit a proposal to the cabinet to limit Malaysia's total planted area for palm oil at 6.5 million hectares by 2023 (Tan and Ho, 2019). This acreage limit was later formalised in the National Agricommodity Policy 2021-2030 (Ministry of Plantation and Commodities, 2022). As of December 2023, Malaysia's total oil palm planted area was approximately 5.65 million hectares (Malaysian Palm Oil Board, 2023).

2.1.2. Habitat loss and elephant range

Forest cover in Peninsular Malaysia has drastically declined from 80% in the 1940s (Aiken & State, 1994) to 37.7% in 2010 (Miettinen et al., 2011). The decline

can be attributed to the extraction-based industries and agricultural expansion post-independence. While logging activities in the 1960s to 1970s cleared most of the lowland forests in Peninsular Malaysia (Law, 2020), rubber and palm oil plantations expanded through government land development schemes and the private sector (Aiken & Leigh, 1985). Approximately 1.04 million to 1.1 million hectares (55-59%) of the oil palm expansion between 1990 and 2005 in Malaysia originated from the clearance of natural forests (Koh & Wilcove, 2008). Since the late 1970s until 2017, Asian elephants in Peninsular Malaysia have lost 68% of their range in human-dominated landscapes (Tan, 2016). However, the remaining areas in agricultural landscapes shared by humans and elephants are considered prime habitats for elephants and not marginal areas used in the absence of other options (de la Torre et al., 2021). Elephant movements in Peninsular Malaysia were more likely in areas of disturbed vegetation such as forest gaps, secondary forests, and areas of regrowth (de la Torre et al., 2019). Elephants were also seen adjacent to new growth areas of newly planted and replanted plantations but avoided areas with high coverage of plantations (de la Torre et al., 2019). In more isolated landscapes such as the Lower Kinabatangan Wildlife Sanctuary where small-scale agriculture is abundant, elephants utilise large scale plantations instead to avoid encountering people (L. J. Evans et al., 2020). Both elephants in Peninsular Malaysia and Kinabatangan avoid moving in areas of high human densities such as roads and villages (de la Torre et al., 2019, Evans et al., 2020). Insights on elephant movement in these landscapes highlights their presence in both mature forest and agriculture areas. This high ecological overlap between elephants and people suggests that conflicts are likely to persist where both species share landscapes (de la Torre et al., 2021; Xu et al., 2024) including in fragmented habitats (Othman et al., 2013; Ancrenaz et al., 2007). Therefore, it is important to support agricultural communities in managing conflict and

regard them as important stakeholders to help safeguard wild elephants in the shared landscape. The expansion of commodity crops, while economically beneficial, has caused significant environmental repercussions especially for Malaysia's elephant populations.

2.1.3. Human-Elephant Conflict (HEC) in Malaysia

Studies by Management & Ecology of Malaysian Elephants (MEME) has shown that in landscapes where we have people and elephants, conflicts were reported in 68.5% of the range (Tan, 2016), with crop damage being the predominant form of human-elephant conflict (Saaban et al., 2011). The ecological overlap between elephants and people has caused financial losses due to crop depredation in Peninsular Malaysia of up to an estimated RM 42.5 million (equivalent to USD 575,500 today) from 2015 to 2021 (NECAP 2.0). This estimate only accounts for direct losses and could be significantly higher when considering management costs, mitigation cost, losses from expected yields, and unreported incidents to the Wildlife Department. There is an estimated 1223 to 1677 wild Asian elephants (*Elephas maximus indicus*) in Peninsular Malaysia (Saaban et al., 2011) and another 1000 to 1500 Bornean Pygmy Elephants (*Elephas maximus borneensis*) in Sabah (Sabah Wildlife Department, 2020). In Peninsular Malaysia, HEC cases are reported to the DWNP by the victims through phone calls or filing a report to their respective state offices. From 2006 to 2016, DWNP received a total of 11,162 reports, averaging to 1,015 reports a year spread across Peninsular Malaysia (DWNP, unpublished data). The states of Johor, Pahang, and Kelantan registered the highest number of reports at 37.4%, 21.0% and 13.5% respectively (Zulaikha, 2018, unpublished data). The type of conflict most frequently reported was crop raiding where the top three crops affected are palm oil (65%), rubber trees (14%) and banana trees (12%) (Zulaikha, 2018, unpublished data). This has

resulted in conflict mitigation measures such as translocation of over 600 elephants from year 1974 to 2010 into protected areas (Saaban et al., 2011).

The governance of biodiversity faces significant challenges from the current federal system (Kangayatkarasu, 2017). The interesting history to the formation of Malaysia has largely influenced how matters on wildlife are managed today. Malaysia operates as a parliamentary democracy with a constitutional monarchy. Historically, the sultanate in Malaysia has had considerable influence as the state's supreme ruler. Sultans played pivotal roles in governance, overseeing public administration and finances. Nevertheless, their authority was often exercised within the framework of colonial influence, particularly during British rule. The British established a governance system aimed at controlling the state’s financial administration. They employed an "advisory" approach rather than a direct rule, maintaining a facade of local authority while effectively managing public expenditure to suit their interests (Azizan et al., 2024). The British colonial government recognised the importance of collaborating with Malay establishments to secure local community support, which was crucial for implementing their policies and maintaining order in Malaya (Firdaus & Zakariya, 2017). During the independence process, the British attempted to impose a unitary government system, but this was resisted by Malay Rulers (Kangayatkarasu, 2017). To resolve this, the British suggested a federal system in which rulers would retain autonomy in their respective states (Kangayatkarasu, 2017). The Reid Commission, which comprises non-Malaysian members, drafted the federal constitution in 1957. The negotiations primarily focused on issues such as the position of the Malay ethnic majority to gain support from Malay Rulers and most citizens. In this context, environmental matters were considered minor and local (Haque, 2000), resulting in jurisdiction over land and forests being allocated to states without significant debate.

The Constitution outlines the allocation of powers between the federal and state through three categories: the federal, state, and concurrent list. Post-independence, the government took over plantations, timber, and mining industries established during British colonial rule (Kangayatkarasu, 2017). With land under state jurisdiction, states can generate revenue from these industries, which leaves the protection of land, forests, and water for conservation purposes a less economically advantageous option. Paradoxically, international environmental treaties such as the Kunming-Montreal Global Biodiversity Framework are typically signed by the federal government. This mismatch between state jurisdiction over land and federal commitments to international agreements is at the core of the many environmental challenges in Malaysia. The federal government recently announced an increase in ecological fiscal transfer funding from RM 200 million in the previous year to RM 250 million to support wildlife and forest protection in their respective states (The Malaysia Budget 2025). However, implementing a robust system to share information on the disbursement and usage of funds is crucial for transparency (Loft et al., 2016).

The Ministry of Natural Resources and Environmental Sustainability is responsible for the management of natural resources, environment, climate change, land, mines, minerals, geoscience, biodiversity, wildlife, national parks, forestry, surveying, mapping and geospatial data. As such, the management of biodiversity and forestry falls under one of the three sectors under the natural resources division. Its main objective is mainstreaming biodiversity management and wildlife conservation efforts according to the set policies and international agreements. In addition, it functions as a monitoring body for the implementation of policies and authoritative figure to conduct public awareness programs. Recently, the ministry reviewed and renewed its National Policy on Biological Diversity to align its goals with the Kunming-Montreal Global

Biodiversity Framework. The updated policy document that is aimed for the year 2022 to 2030, outlined 61 actions whereby two were related to the management of human-wildlife conflicts. The first action focuses on the goal to significantly reduce the direct and indirect pressures on biodiversity (Goal 2), and is targeting to have Malaysia's agrofood, agricommodities and fisheries production to be managed and harvested sustainably by 2030 (Target 6), by implementing the action below (Action 6.1):

> *"Action 6.1: To strengthen sustainable agrifood and agricommodity practices. We must: g) Conduct targeted capacity building programmes to harmonize agriculture and agricommodity operations with biodiversity conservation efforts, especially in monitoring wildlife movement and minimising human wildlife conflicts"*

The next action is highlighted under Goal 3 where all key ecosystems, species, and genetic diversity are safeguarded. One of the targets is to have targeted management actions in place to enable the recovery of threatened species by 2030 (Target 11) by implementing the action below (Action 11.4):

> *"Action 11.4: Adopt scientific and co-existence approaches to address Human-wildlife conflicts. We must: a) Establish collaborative partnerships between plantation companies, smallholders, IPLCs, and researchers to develop and implement holistic and science-based adaptive management strategies to reduce and mitigate human-wildlife conflicts in agriculture landscapes, b) Scale-up outreach and education programmes for key stakeholders including local governments and local communities to reduce and mitigate human-wildlife conflicts in urban areas, c) Review relevant legislation*

to incorporate regulations pertaining to safe, ethical, and humane human-wildlife interactions."

Through this document, the ministry highlights the importance of collaboration between all levels of the government and segments of society to ensure the success of the policy. The implementation framework section mentions the role and responsibilities of which include the Federal government, State governments, private sector, civil society, indigenous peoples and communities, researchers and educators, and the public.

The management of biodiversity is enforced by the Department of Wildlife and National Parks Peninsular Malaysia (DWNP or PERHILITAN) and Sabah Wildlife Department. These two agencies fall under separate ministries namely the Ministry of Natural Resources and Environmental Sustainability (MNRES) and the Ministry for Tourism, Culture and Environment Sabah respectively. PERHILITAN enforces the Wildlife Conservation Act 2010 and the management of human-elephant conflicts are based on the guidelines in the National Elephant Conservation Action Plan 2.0 (PERHILITAN, 2023) . Meanwhile, the Sabah Wildlife Department is the enforcement agency of the Wildlife Conservation Enactment 1997 and its strategies for managing conflicts are outlined in the Bornean Elephant Action Plan 2020-2029.

The governance of palm oil falls under the purview of the Palm Oil and Sago Industry Development division (or Bahagian Industri Sawit dan Sagu, BISS) in the commodity sector of this ministry. Its objectives are to strengthen the sector by increasing productivity, be the leading research figure in palm oil technology, utilise the contributions of the sector for socio-economic development and economic growth and to develop a sustainable and environmentally friendly industry. The function of this

division involves formulating policies, working closely with other government agencies, manage special programmes, address issues related to sustainability certifications and the conservation of the environment. The Malaysian Palm Oil Board (MPOB) which comprises of representatives from different governmental sectors and the private sector, is the key agency under this ministry that serve's the country's oil palm industry. It is also responsible for the implementation of the National Agricommodity Policy 2021-2030 (Ministry of Plantation and Commodities, 2022). In this policy, one out of the five thrusts include sustainability as a guiding principle. Strategy 4 focuses on the increase of environmental conservation and management efforts and the indicator of progress is based on the percentage of funds spent on conservation programmes through the Malaysian Palm Oil Green Conservation Foundation (MPOGCF). The foundation is estimated to collect RM 20 million per year from cess of RM 1 from every ton of crude palm oil produced (Ministry of Plantation Industries and Commodities, 2022). To date, this foundation has funded programmes related to the conservation of Asian elephants, Malayan tigers and Orang utan, through the launch of a public campaign to highlight these endangered species as citizens of the country, referring to them as 'The Other Malaysians' (*The Other Malaysians – MPOGCF*, n.d.). The funded programmes related to elephants involves capacity building for smallholders, habitat enrichment in wildlife corridors, using physical barriers in plantations and the collaring and monitoring of elephants (Malaysian Palm Oil Green Conservation Fund, n.d.).

Interestingly, human-wildlife conflict issues are recognised in policies by the Ministry of Rural Development. Conflict cases are more likely to happen in rural areas, thus, these communities must be equipped to face these challenges. A total of two divisions from this ministry are relevant to the management of conflicts, such as the Rural

Community division and the Institute for Rural Advancement. The former's objective is to sustain the development of human capital in rural communities and empower the role of Village Development and Security Committee as rural transformation agents. Its main functions are to manage the committee, implement ministry policies and oversee village administration. As for the institute, its primary objectives and functions are to act as a knowledge and training hub for rural communities through training programmes according to the needs of the community. The ministry launched the National Policy for Rural Development 2019-2030 and identified biodiversity and a sustainable environment as one of its 10 pillars. The protection of wildlife habitat and biodiversity areas in rural villages is one out of the three policy statements under this pillar. The strategy related to conflicts are as per below (Strategy 9.3.2):

> *"To manage human wildlife conflict in residential areas and rural economic activity zones through these steps: 1) improving the communication network between villages in efforts to reduce human-wildlife conflicts and 2) integrating traditional knowledge and advanced technology in efforts to monitor and reduce human-wildlife conflicts"*

The main target group for these steps are Village Community Management Council as the implementing body. The then Ministry of Water, Land and Natural Resources (now the Ministry of Natural Resources and Environmental Sustainability), the Ministry of Communications and Multimedia, the State Government and the Department of Orang Asli Development were listed as supporting agencies for this effort. Efforts to foster coexistence in rural communities may be made possible by engaging the local leaders from the council.

An interesting angle for biodiversity management in Malaysia points to leveraging on the powers of the monarchy as discussed through the establishment of the Federal Constitution. Malaysia practices parliamentary democracy with constitutional monarchy system where his Majesty the King known as Duli Yang Maha Mulia (DYMM) Yang di-Pertuan Agong, is the head of the country and holds as well, the responsibility as the leader of Islamic faith in the states without Sultan and the Federal Territories. There are a total of nine Sultans in Malaysia and every five years they hold a special meeting of the Conference of Rulers to determine the next DYMM Yang di-Pertuan Agong. In 2023, an interesting outcome from the Yang di-Pertuan Agong who was also the Sultan of Pahang, is the establishment of the Al-Sultan Abdullah Tiger Reserve. The reserve is first of its kind in Malaysia and is proof of the potential role Sultans can play for wildlife conservation. Similarly, Sultans are also recognised as the religious head of their respective state. As an example of the application of this role, conservation organisations used a video of the Terengganu Sultan who described Muslims who conserve wildlife as good caliphs (guardians) to brief governmental officials from Islamic departments (Schaefer et al., 2020). Consequently, Terengganu was the first state in Malaysia to release a fatwa (a formal Islamic legal opinion) against wildlife poaching (Dasgupta, 2015).

2.1.4. Problems with current conflict mitigation measures in the palm oil sector

Although governance on paper calls for collaborative action, the past years we have been solely relying on Wildlife Department to translocate "problem elephants" (de la Torre et al., 2021; Saaban et al., 2020a). However, recent research has suggested that this approach may not be sustainable or effective in the long term. Population viability analysis demonstrated that even low levels of elephant removal through translocation

can negatively impact the survival of the population in Johor (Salman et al., 2019). In the Lower Kinabatangan Managed Elephant Range in Sabah, translocations occur without understanding its impacts on the elephant group dynamics and potentially increasing conflict incidences (Sabah Wildlife Department, 2020). In the same area, electric fences have been deployed to guard against elephant crop raiding (Estes et al., 2012). However, while these fences can effectively separate elephants from human settlements, they also limit access to suitable habitat patches, potentially exacerbating the conflict. In Peninsular Malaysia, a study reported positive perceptions by farmers on the effectiveness of electric fences and the reduction of financial losses (Ponnusamy et al., 2016). However, the study revealed a discussion on the responsibility for the maintenance of fences and its challenges. Other innovative solutions, such as early warning systems and creating buffer zones based on dietary preferences with assistance from DNA metabarcoding, could potentially be new solutions in the human-elephant conflict management toolbox.

The translocation of elephants is a common mitigation measure practiced in elephant range countries including in India and Sri Lanka. In Malaysia, translocation of elephants is a mitigation measure that took place after elephant culling was banned in 1974. The management of elephants and HEC is based on policies such as the National Elephant Conservation Action Plan 1.0 (2016-2020) and the Action Plan for Wildlife Conflict Management (2010-2015) that prioritises the safety of people when in conflict with elephants. Hence, whenever an elephant roams into human-dominated landscapes, the elephants are removed and released into a contiguous forest landscape. This however assumes that the translocation release point is a suitable habitat for elephants. Considering that human dominated agricultural landscapes are prime rather than marginal habitats for elephants (de la Torre et al., 2021), the current mitigation method

of translocating “conflict” elephants can be counterproductive as the elephants often find their way back to the original range. In Sri Lanka, the translocation of ‘problem’ elephants showed variable responses that can be categorised as ‘‘homers’’ which returned to the capture site, ‘‘wanderers’’ that ranged widely, and ‘‘settlers’’ which established home ranges in new areas soon after release (Fernando et al., 2012; Wadey, 2020). In addition, translocated elephants show differences from local resident elephants in terms of glucocorticoid hormones, which is often used as a physiological measure of stress (Viljoen et al., 2014; Wong et al., 2018, Wong, 2018) as well as poor body conditions compared to local elephants (Pinter-Wollman et al., 2009). Furthermore, translocation operations are costly (Saaban et al., 2011) and could cause wider propagation and intensification of HEC (Fernando et al., 2012). Since 1974, more than 600 elephants out of the local population in Peninsular Malaysia have been translocated from conflict areas and released to contiguous forests (Saaban et al., 2011).

In 2009, a pilot project by the wildlife department tested the use of electric fences in HEC hotspots over 8 states in Peninsular Malaysia. A study by Ponnusamy et al., (2016) interviewed small scale farmers found the perception that the electric fences were effective in reducing conflicts that had caused them economic losses. However, the farmers reported low levels of tolerance towards elephants. Additionally, 56% of the farmers (N= 359) were not willing to contribute time to maintain the fence raising a concern over the long-term effectiveness of this mitigation measure. The farmers also showed little concern about the loss of habitats for elephants and one out of four considered killing elephants as an acceptable option.

However, temporary fencing to protect vulnerable crops may be a potential effective solution. Studies have investigated the development of evidence-based policies for conflicts with elephants in plantations and found that young palms were more

vulnerable to crop depredation and the damage reduced significantly after 5 years (Ghani, 2019). Furthermore, research in palm oil plantations in Sabah also support this finding as demonstrated in the Lower Kinabatangan Wildlife Reserve, which is a highly fragmented landscape. Conflicts significantly reduced when fences are strategically placed to protect young replant areas and elephants can safely use mature plantations to move in the landscape (Abram et al., 2022, Cheah et al., 2021; Othman et al., 2019). Overall, electric fences narrowly focus on the wildlife dimension without considering possible interventions that can be taken through the human dimension.

2.2. Conceptual framework

2.2.1. The study of human-wildlife interactions through Conservation Psychology

In the age of the Anthropocene, humanity is faced with a multitude of conservation problems as a consequence of lifestyles and behaviours of billions of human beings. Since the 1980s, the field of Conservation Biology as a crisis discipline has addressed issues related to the biology of species, communities, and ecosystems that are directly or indirectly affected by human activities (Soule, 1985). Interestingly, conservation is also a human endeavour that is primarily about the effects of humans on the environment and other species, and the decisions they make rather than biology itself (Balmford & Cowling, 2006; Mascia et al., 2003). These effects started to take place since Quaternary Megafauna Extinction (QME) where the human biomass grew inversely to megafauna biomass (Barnosky, 2008). Since then, the distribution of resources was utilized by one major species (humans), compared to more than 350 species of megafauna before the QME. In addition, when considering the biomass of all the mammals on earth today 60% of them are livestock, 36% are humans while only 4% are wildlife (Bar-On et al., 2018). Today, the choices we make as a species will

determine the state of the planet and it will require a massive shift in how humans behave to ensure that humans and wildlife can continue to survive. Some scholars even argued that conservation is a goal that can only be achieved by changing human behaviour (Schultz, 2011).

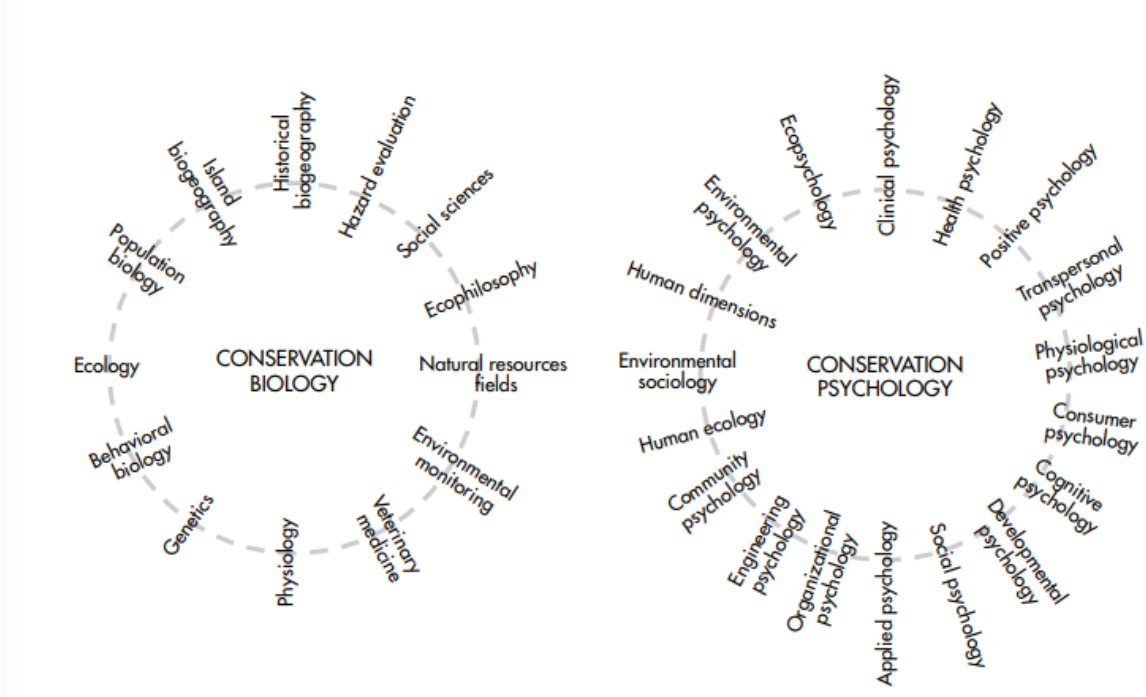


Figure 1. Conservation biology and conservation psychology are both synthetic fields that mobilize contributions from other fields and subdisciplines toward conservation-related missions (Saunders, 2003).

Conservation biologists have attempted to address these issues from an environmental and biological framework and acknowledged that their field alone is not sufficient to solve these problems (Baruch-Mordo et al., 2009; Mascia et al., 2003). Lidicker (cited in Saunders 2003) added that "conservation needs conservation biologists for sure, but it also needs conservation sociologists, conservation political scientists, conservation chemists, conservation economists, conservation psychologists and conservation humanitarians". Moreover, there is growing recognition that social sciences can play a

key role in saving biodiversity and improve human well-being (Sandbrook et al., 2013; Saunders et al., 2006) which leads us to the field of psychology.

Psychologists, as experts in human behaviour have provided useful insights to understanding cognitions, attitudes, motives, beliefs, values, and types of behaviours (Clayton et al., 2013; Saunders, 2003). Realising that research is bounded by the disciplinary homes and frameworks, researchers have explored a new way for natural scientists and social scientists to merge in an interdisciplinary field called Conservation Psychology. Conservation Psychology is defined by Saunders (2003) as "the scientific study of the reciprocal relationships between humans and the rest of nature, with a particular focus on how to encourage conservation of the natural world. Conservation psychology is an applied field that uses psychological principles, theories, or methods to understand and solve issues related to human aspects of conservation. It has a strong mission focus in that it is motivated by the need to encourage people to care about and take care of the natural world."

Dietsch et al., (2020) proposed three pillars of Conservation Psychology that influence of human behaviour. First, one must investigate in what context does the behaviour occur. The role of personal, social, and cultural drivers are the contributing factors to pro-conservation behaviours or lack thereof. Secondly, it is important to remember that human behaviour relies on heuristics derived from prior knowledge (ie. availability bias), established beliefs or emotional responses from experience to help reduce decision fatigue. These biases and heuristics will systematically identify behavioural barriers and help advance conservation (Reddy et al., 2017). Finally, we must recognise that human behaviours are also shaped by people's fundamental life goals and aspirations. Hurst et al., (2020) argues that values, moral foundations, and other guiding principles of life are contributing factors to behaviours. A systematic review by Wallen

& Landon (2020) supports this argument by illustrating that values are the second most studied concept after attitudes in the field of conservation psychology. However, it is important to note that values represent patterns of beliefs and behaviours exemplified by a group of people, and are not predictive in nature, thus underscoring the importance of investigating when and how our values shape conservation-related behaviours (Dietsch et al., 2020). In addition to these three pillars, there is an additional challenge to Conservation Psychology research in this region because the field is disproportionately focused on Western and developed countries conducted by Westerners (Henrich et al., 2010; Wallen & Landon, 2020). A greater representation of the Global South is needed to forge cross-cultural psychological research that will allow the development and testing of theories and interventions to ensure more effective and lasting behaviour changes in the long term.

There is an increasing need for this interdisciplinary approach to not only promote pro-conservation behaviours such as recycling, sustainable energy use, or reducing wildlife trade, but also to address complex issues such as human-wildlife coexistence (Bennett et al., 2017, Baruch-Mordo et al., 2009; Frank, 2016; Kansky et al., 2016; Manfredo, 2008). From the extensive list of classic, applied and interdisciplinary conservation social science fields reviewed by Bennett et al., (2017), studies on human wildlife conflicts or interactions fall under the field of Human Dimensions of Wildlife.

The term ‘Human Dimensions of Wildlife’ was officially introduced by Hendee and Schoenfel in 1973 (Manfredo, 2008) at the North American Wildlife and Natural Resources Conference. Early studies on human dimensions by the U.S. Fish and Wildlife Service focused on people’s recreational uses of natural resources such as fishing and hunting. It was only until the 1990s that studies shift its focused to

understanding attitudes and socio-demographic characteristics of various individuals. Consequently, the journal Human Dimensions of Wildlife was introduced in 1996 while broader natural resource and conservation related journals such as Conservation Biology and Human Ecology Review followed suit. This broadened the field to understanding human-wildlife relationships from the field of applied anthropology. This includes topics such as human-wildlife conflict, wildlife damage compensation schemes, and illegal trade of wildlife (Manfredo, 2008). Human Dimensions research also contributes to the management of natural resources and the implementation of policies (Saunders, 2003). However, at a global scale Conservation Psychology and Human Dimensions of Wildlife are relatively young fields, emerging in the late 20th century.

While these fields have gained traction globally, they remain underdeveloped in Southeast Asia, particularly in Malaysia. To date, there has been limited scholarly work that applies conservation psychology in the Malaysian context, with one of the few examples being Zainal Abidin (2019). This gap is notable, given Malaysia's status as a megadiverse nation where biodiversity and livelihoods are deeply intertwined. Conservation challenges such as deforestation, land-use change, and increasing human-wildlife interactions, especially involving elephants, underscore the urgent need to better understand and influence human behaviour in conservation decision-making. As an example, the annual flooding during the Northeast Monsoon in the East Coast of Peninsular Malaysia is closely linked to deforestation and land conversion for commodities like oil palm. These forests not only support biodiversity but also provide critical ecosystem services such as flood regulation. Deforestation, particularly involving the conversion to palm oil or rubber has increased the number of days flooding has occurred (Tan-Soo et al., 2014). In this case, protecting large patches of

forest not only contributes to the conservation of biodiversity but also helps reduce the annual flood damage cost of USD 274 million (Chan, 2015). This example illustrates that conservation outcomes and human well-being are not mutually exclusive but mutually reinforcing.

Similarly, in the case of human-elephant conflict (HEC), achieving coexistence requires more than ecological knowledge, it requires an understanding of how people perceive, experience, and respond to elephants. The International Union for Conservation of Nature (IUCN) describes as HEC "any human-elephant interaction which results in negative effects on human social, economic or cultural life, on elephant conservation or on the environment". Often, conflicts are understood as physical events occurring as crop raids, elephant attacks, and retaliatory actions of people on elephants (Fernando et al., 2005; Goswami et al., 2014; Palei et al., 2014; Sukumar, 1990). The damage caused by these conflicts affects the economic income of families especially when it involves the destruction of cash crops, orchards, or infrastructure. However, these conflicts also have hidden social costs such as causing poor childcare due to long hours of working, and not being able to go to school or work (Barua et al., 2013; Distefano, 2005). The wellbeing of HEC victims are also affected by emotional distress, lack of sleep and constantly living in a state of fear and anxiety. When left unmanaged, these hidden costs may escalate to cause long term negative effects such as mental disorders, poor quality of life and continued poverty (Jadhav & Barua, 2012). This highlights the multifaceted nature of human-elephant conflict and underscores that addressing such issues through a human dimensions lens extends beyond protecting biodiversity to include the wellbeing of people.

Conservation psychology provides tools to explore these human dimensions, from attitudes and emotions to values and social norms. In fragmented landscapes, where

forest edges meet agricultural land, such psychological insights are essential to fostering behavioural change, building tolerance, and designing more culturally attuned coexistence strategies. Examining this complex relationship between the conservation of wild elephants and the safety and wellbeing of humans in a shared landscape is an area yet fully to be examined in Malaysia.

2.2.2. Transforming conflict to coexistence

Sharing landscapes with wildlife without tolerance or the possibility of coexistence remains a major challenge for elephant conservation in the 21st century. Although Malaysia is a megadiverse country, public attitudes toward megafauna conservation vary significantly (Tan et al., 2020). People living in rural areas were found to be less tolerant to having megafauna species (elephant, tiger, and tapir) in nearby areas, with less than 20% willing to live within a 10 km range from these species. In contrast, urban residents in Kuala Lumpur expressed more tolerant attitudes towards living in proximity with megafaunas and supported an increase of wildlife population sizes (Tan et al., 2020). Interestingly, Malaysians also appear to exhibit a species-specific bias where herbivores are more tolerated than carnivores, and tapirs more than elephants. While more data is needed to fully understand the drivers of these attitudes, such differences suggest that tolerance is shaped not only by proximity or species characteristics, but also by how people experience and interact with wildlife.

This variability in tolerance levels may reflect differences in the intensity, frequency, or type of human-wildlife conflict experienced in different contexts. Understanding the nature of these conflicts is therefore key to designing effective mitigation strategies and fostering long-term coexistence. To better understand this variation, it is important to consider that not all conflicts are equal. Zimmermann et al. (2020) and Madden & McQuinn (2014) describe human-wildlife conflict as unfolding in levels, from surface-level disputes to deeper identity-based struggles. At the dispute level, approaches to mitigate conflict are practical, such as safeguarding their

income (e.g. by installing fences or barriers), providing compensation to reduce losses to an acceptable level or by diversifying income. Communities in this level of conflict may have higher tolerance or appreciation for wildlife and are satisfied with the current mitigation measures. If left inadequately addressed or conflicts become more frequent, such disputes can escalate into conflicts underpinned by deeper grievances, mistrust, or histories of failed interventions. In these cases, practical solutions alone may fall short, and the emotional or symbolic weight of the conflict begins to shape stakeholder responses. At this point, wildlife managers need to focus on fostering constructive relationships and provide collaborative opportunities to ensure successful initiatives for the conflict impacted communities. At its most entrenched, HWC becomes an identity-based conflict, where people perceive their values, identity, or way of life to be under threat. At this stage, mitigation becomes far more difficult and ethically challenging and requires trust-building conversations, power balancing exercises, and often reconciliation between stakeholders. Hence, identifying the level of conflict as part of management plans is an important step to consider different strategies to address these complexities.

These diverse expressions of conflict reflect the broader continuum of human-wildlife interactions, a framework that spans from negative to positive attitudes, which in turn shape behaviours (Frank, 2016). Positive attitudes towards human-wildlife interactions represents the communities' full integration of and respect for wildlife within the landscape. These communities accept certain losses, support conservation of and have a deep affiliation or connection with nature. The neutral zone of the continuum represents apathy or mixed feelings, where tolerance may exist but can shift with changing circumstances. Coexistence may begin in this section of the continuum and can be nurtured towards the positive spectrum. In contrast, communities who tolerate the negative interactions without harming wildlife may grow intolerant over a period of time which leads to the other end of this continuum. Behaviours in

the negative continuum may include instances where intolerance can lead to setting traps or poison, supporting culling policies or engaging in direct harm to wildlife. Recognising where stakeholders lie on this continuum helps explain the variable responses to elephants observed in Malaysia and highlights that these behaviours are not static but influenced by evolving experiences, histories, and psychological drivers.

2.2.3. Studying human behaviour in human-wildlife interactions

Studying human behaviour is essential to address complex conservation challenges, such as those found along the human-wildlife interaction continuum. Clayton, Litchfield, and Geller (2013) argue that conservation and environmental sustainability depend on psychology's capacity to identify and prioritize the behaviours that most influence biodiversity outcomes, offering behavioural interventions beyond the traditional ecological toolkit. Complementing this view, Nielsen et al. (2021) emphasize that achieving conservation goals demands not just ecological knowledge, but also understanding which human actors and behaviours act as potential leverage points to drive sustainable change. Understanding how people think, feel, and act toward wildlife requires examining a range of psychological mechanisms such as cognition, heuristics and biases, and affect (Figure 2).

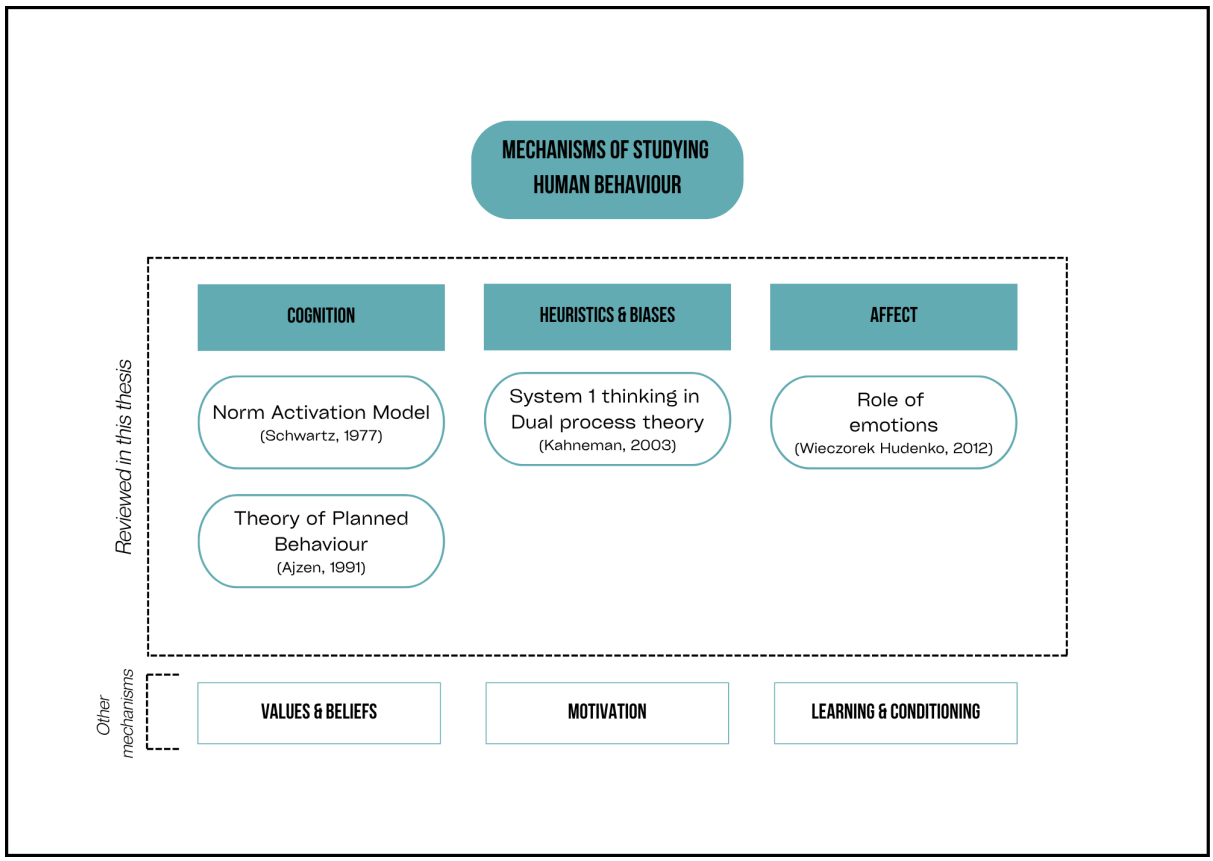


Figure 2. The different mechanisms of studying human behaviour used in human-wildlife interactions literature.

Role of emotions

Emotion, affect, and mood are distinct but interrelated psychological constructs that significantly influence human behaviour and decision-making. While these terms are often used interchangeably, in practice their separation can be challenging, particularly in applied fields like human–wildlife interactions, where conservation biologists must balance interdisciplinary insights, cultural sensitivity and an objective understanding of the conservation issue. Cognitive variables such as attitudes and norms have been the focus of early human-wildlife interactions research (M. Jacobs & Vaske, 2019), though some scholars have emphasized the need to explore the role of emotions and its link to human behaviour (M. H. Jacobs et al., 2012; Manfredo, 2008;

Wieczorek Hudenko, 2012). Emotions are powerful and essential to humans, particularly through biological evolution where emotions are said to emerge earlier than higher-order mental capacities such as using complex language and abstract thinking (Jacobs, 2009). Some studies have explored the generic emotion theory to understand the psychological mechanisms that drive the emotional responses to wildlife (Jacobs, 2009; Manfredo, 2008) while others use self-reporting measures to study specific emotions such as fear (Johansson & Karlsson, 2011).

Fear is a commonly studied emotion in human-wildlife conflict literature related to large carnivores. A study by Johansson and Karlsson (2011) unravelled the subjective experience of fear of individuals in ten different counties in Sweden. The study divided the questionnaires into different sections to study the cognitive vulnerability (i.e. how afraid are you that (brown bear/wolf/rabbit) will cause you damage?), measure phobia-like fears (i.e. I shiver when I think of this species), and fear (i.e. how frightened are you of encountering the following indigenous animals in the wild?) through a rating scale. The results illustrate that fear was primarily linked to the perceived danger the animal represent as well as the perceived unpredictability of a person's response during an encounter with these animals. Hence, to reduce fear, it would be more effective for people to learn more about their own reactions than learning about wildlife behaviours. The study also suggests exposing people that are afraid to bears and wolves to the animals under controlled conditions and guidance (i.e. observing researchers capture and collar bear or wolves) to help reduce and regulate fear. These insights offer different perspectives on how to promote tolerance and coexistence in human-wildlife conflict.

Heuristics and biases

While emotions play a pivotal role in shaping perceptions and responses to wildlife, human behaviour is also influenced by cognitive shortcuts, known as heuristics and biases, which guide decision-making during uncertainty. Heuristics and biases are widely studied concepts in the field of behavioural economics, especially in understanding consumer behaviours. According to the Dual process theory framework (Kahneman, 2003), there are two parallel cognitive process: an automatic, fast, and intuitive process called System 1, and a reflective, slow, and conscious process called System 2. Both systems are interconnected and used to make different types of decisions, however, fields such as marketing and medicine utilise System 1 thinking to encourage behaviour change (eg. The use of vivid images of health consequences of smoking for anti-smoking campaigns to make the risks feel immediate and likely). Heuristics and biases trigger intuitive thinking in System 1 and act as mental shortcuts to help reduce cognitive load and mental energy needed to make a decision risk and emotion (Wieczorek Hudenko, 2012).

The availability heuristic suggests that the more easily an example or piece of information comes to mind, the more likely a person is to judge it as frequent or true (Tversky & Kahneman, 1973; Gilovich et al., 2002). In the context of human–wildlife interactions, Lischka et al. (2020) found that individuals were more likely to adopt bear-proofing behaviours when they knew a neighbour had recently experienced bear-related conflict, illustrating how readily available and salient examples in memory can heighten perceived risk and influence behaviour, even when overall encounter rates remain low. The anchoring and adjustment heuristic occurs when individuals rely heavily on an initial reference point (the "anchor") when making subsequent judgments, often leading to biased evaluations (Tversky & Kahneman, 1973). While this concept is traditionally

applied to numerical estimations, it can also explain how cultural narratives shape perceptions of wildlife. For instance, Mohammadi et al. (2021) found that in western Iran, fear of wolves was not primarily driven by direct experience but was significantly influenced by cultural narratives and past stories of attacks. These narratives serve as anchors, shaping persistent negative perceptions and fear toward wolves regardless of current risk levels. In the context of human–wildlife conflict, understanding how such biases operate can help conservationists reframe messages to counteract negative anchors and support coexistence initiatives.

An advantage of testing the effects of heuristics and biases is the ability to evaluate the causal effects of behaviour through experimental designs (Reddy et al., 2017). Quasi-experimental methods that randomly assign subjects to treatments and controls will allow researchers to draw strong inference about the causal effects (Reddy et al., 2017). However, some scholars argue that such interventions may have limited impact when individuals hold strong pre-existing preferences or values that override heuristic influences (Sunstein, 2013). Heuristics can offer valuable insights into how to frame survey questions and assess public responses to conservation messaging. However, when it comes to promoting behavioural change in situations that require significant effort or lifestyle adjustments such as mitigating conflicts with wildlife, heuristics alone may be insufficient.

2.2.4. Theories used in this study

In addition to the approaches mentioned above, there are a few theories widely used in psychology that are useful starting points to study human behaviour in the context of human-elephant conflicts. Since most of these studies are on WEIRD (Western, Educated, Industrialised, Rich, and Democratic) societies, exploring the use of these theories in Malaysia offers potential valuable insight in the applicability in

more diverse societies. The Theory of Planned Behaviour (TPB) is an extension of Fishbein and Ajzen's (1975) Theory of Reasoned Action. Both theories aim to predict and understand human behaviour based on behavioural intentions, which are influenced by variables, such as attitudes and subjective norms. Subsequently, perceived behavioural control was introduces as a variable that can directly influence not only attitudes, but also behavioural intentions and behaviour. Attitudes represent an individual's overall evaluation of behaviour. For example, if someone considers reducing their plastic bag usage, their attitude might be positive if they believe that carrying a reusable bag is beneficial for the environment. This positive attitude influences their intention to use less plastic, which in turn affects their actual behaviour. Subjective norms represent the perceived social pressure to perform a behaviour. For example, a wildlife photographer's decision to attract birds from the forest by broadcasting calls is influenced by the approval or disapproval of other photographers or naturalists in the vicinity. Perceived behavioural control (PBC) refers to the perceived ease or difficulty one associates with performing a behaviour. For example, although individuals may desire to recycle their domestic waste, they will perceive the task as challenging if recycling facilities are not readily accessible. Several studies support the addition of self-efficacy and its distinction from perceived behavioural control (Armitage & Conner, 2001). Self-efficacy extends the understanding of perceived ease or difficulty in performing a task to investigate the internal cognitive perceptions of control, such as self-confidence. However, studies often merge these two constructs causing challenges when trying to compare results from different societies. Nevertheless, the two constructs remain as a useful measure to explain behaviour.

Figure 3. The Theory of Planned Behaviour (Ajzen, 1991).

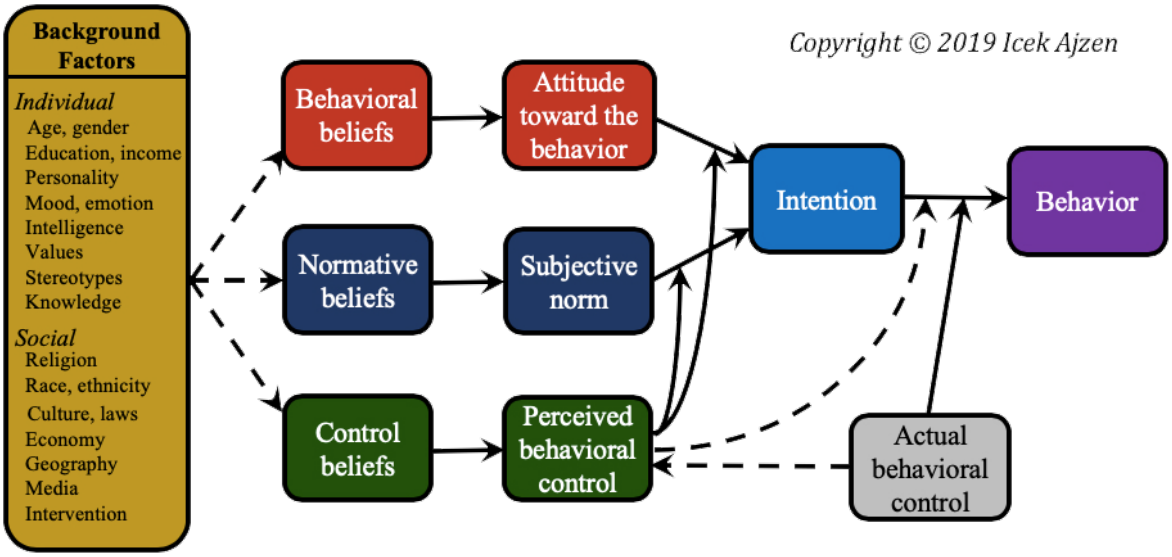


Table 1. Definitions of the terms used in the Theory of Planned Behaviour.

Terms	Definition
Attitude toward the behaviour	the degree to which a person has a favourable or unfavourable evaluation or appraisal of the behaviour in question.
Subjective norm	perceived social pressure to perform or not to perform the behaviour
Perceived behavioural control	perceived ease or difficulty of performing the behaviour and it is assumed to reflect past experience as well as anticipated impediments and obstacles
Behavioural intention	decision to engage with the behaviour
Behaviour	the action carried out after going through logical reasoning

The TPB is most widely used theory in human dimensions of wildlife research (Manfredo, 2008). Due to its flexible framework that can be adapted to a variety of behaviours, the TPB is used to support research on hunting (Hrubes et al., 2001; Shrestha et al., 2012), wilderness food storage (S. R. Martin & McCurdy, 2009), recycling (Kraft et al., 2005) as well as non-conservation related studies such as sport spectator behaviour (Lu et al., 2011) and organ donation (Browne & Desmond, 2008).

The Norm Activation Model (NAM) has emerged as a significant theoretical framework for understanding and predicting pro-environmental behaviour (De Groot & Steg, 2009; Onwezen et al., 2013). This model posits that personal norms, activated by awareness of consequences and ascription of responsibility, are determinants of altruistic and environmentally conscious behaviour (Onwezen et al., 2013; Zhang et al., 2018). According to NAM, personal norm activation follows a sequential process. Initially, individuals must recognize the potential adverse environmental impacts of their actions. This then creates a sense of obligation to act. Finally, if individuals perceive their ability to effectively execute the necessary behaviour, they are more likely to engage in pro-environmental behaviours. In NAM, personal norms are internalized moral standards that individuals feel compelled to adhere to, based on their values and beliefs regarding right and wrong. In contrast, subjective norms in the Theory of Planned Behaviour (TPB) pertain to the perceived social pressure to perform or avoid specific behaviours, based on an individual's perception of the expectations of significant others such as family, friends, or society (Park & Ha, 2014; Zheng et al., 2023). NAM has been applied in various environmental contexts, including recycling, energy conservation, and sustainable transportation. Research has consistently demonstrated the model's efficacy in explaining and predicting pro-environmental behaviours across diverse cultures and demographics. The strength of NAM lies in its capacity to account for the moral and

normative aspects of environmental decision-making at an individual level, which complements the Theory of Planned Behaviour (TPB) and provides comprehensive understanding of behaviour intention.

The use of NAM and TPB together has been used in research relating to farmer's pest management (Rezaei et al., 2019) , predicting binning behaviour of national park visitors (Esfandiar et al., 2021) as well as customers decision to visit an environmentally responsible museum (Han & Hyun, 2017). The use of NAM as a standalone theory has been use in more relevant literature that includes community attachment and stewardship towards managing wildlife (Landon et al., 2020) and achieving environmentally responsible behaviour for tourists in Venice (Confente & Scarpi, 2020). Moreover, studies in the domain of human wildlife interactions are limited to understanding people's behaviour towards conflict causing wildlife (Asadollahi et al., 2023; Broekhuis et al., 2020; Tjamin et al., 2017) or predicting intention to kill or hunt wildlife (Marchini & Macdonald, 2012; Newth et al., 2022).

These theories have yet been used by researchers to investigate human-elephant conflicts in Malaysia due to interdisciplinary nature. Additionally, studies often portrays human interactions with wildlife as a rational assessment of costs and benefits, neglecting the emotional and cultural aspects of these relationships. (Pooley et al., 2021). To combine the quantitative nature of assessments with psychological theories, a large body of research in social science utilise methodologies such as Partial Least Square-Structural Equation Modelling (PLS-SEM). This approach sets itself apart from studies that aim to identify perceptions or attitudes of communities by providing statistical power in explaining behaviour in-sample (Hair et al., 2022). PLS-SEMs have recently been used in human-wildlife conflict related studies (Kansky et al., 2016; Saif et al., 2019) but it is more frequently used in other disciplines such as human resource

management, psychology, and tourism (Hair et al., 2022). PLS-SEMs overcomes first generation regression-type methods that are restricted to processing observable variables such as number of elephants visits, or financial losses from conflicts. Moreover, PLS-SEM can cater to small sample sizes, non-parametric data and studies that are more exploratory in nature.

As with other methodologies, the use of PLS-SEM requires deep understanding of the data that needs to be measured. The challenge of measuring abstract, and unobservable variables is that they exist only as concepts and must be extracted from theories or past evidence to support the research findings (Kyle et al., 2020). Researchers must identify and define the variables as how these variables would be represented by individuals through their behaviour, thoughts, or perceptions. Then, the unobserved latent variables are linked to, with the help of theories and existing literature as well as tools like Likert scales make measurements possible. These observed variables rely on instruments such as questionnaires or interviews (Kyle et al., 2020b). Some scholars argued that explicit measuring instruments (e.g. Questionnaires) are prone to social desirability biases where the respondents provide answers that they believe are socially acceptable or in a manner that the researcher is expecting (Podsakoff et al., 2003; Whitehouse-Tedd et al., 2021).

2.2.5. Literature review summary

To summarise, human-elephant conflict is likely to persist in Malaysia, driven in part by projected rise in palm oil demand globally and the government's initiative to increase replanting efforts in existing plantations. Historically, the rapid expansion of agricultural activities has increased the human dominated landscapes in which the elephants prefer to use (de la Torre et al., 2021). Given these circumstances and existing studies on elephant habitat preference, strategic mitigation measures are needed to

protect young vulnerable crops from depredation. However, the success of these mitigation measures largely depend on people's behaviour to implement them. Through conservation psychology, these behaviours can be understood and used to guide effective policy implementation. Applying widely used psychology theories from other fields to investigate human-elephant conflicts can provide beneficial insights to achieve global coexistence with wildlife. Hence, underlining the dire need of this study to understand the impacts of human-elephant conflict and coexistence through the human dimension lens. The use of these theories together is the first of its kind to study the subject matter in this region and will contribute to understand human behaviour in non-Western, Educated, Industrialised, Rich, and Democratic (WEIRD) societies. This crucial gap in knowledge would potentially help improve human-elephant conflict mitigation efforts in Malaysia and potentially useful for other Asian elephant range countries by answering the question: how do we make human- elephant coexistence a reality in a shared landscape? What are the fundamental aspects of the society's relationship with elephants do we need to consider?

CHAPTER 3

Psychological drivers of intention to mitigate conflicts and coexistence ideas

3.0. Chapter 3: Psychological drivers of intention to mitigate conflicts and coexistence ideas

3.1. Introduction

3.1.1. Malaysia agricultural scenario

Malaysia's economy has historically depended on exporting natural resources like tin, timber, and commodity crops such as rubber and palm oil. In the 1970s, the agricultural sector contributed 28.8% to the GDP, but this declined to 6.6% by 2023 due to the rise of manufacturing and services sectors (Hezri & Hasan, 2006). Initially, Malaysia was a leading producer of tin and rubber. A government crop diversification program in the 1960s expanded palm oil plantations following a drop in global rubber prices. Today, Malaysia is the second-largest producer and exporter of palm oil, after Indonesia, with both countries accounting for 85% of global production (Seng et al., 2012). The sector contributes RM 36.2 billion to Malaysia’s agricultural GDP, with primary export markets in India, China, and the European Union. In the recent years, environmental concerns have reduced demand from European countries, however, this has pushed the market to establish policies to reduce the sector’s impact. Initiatives like the Roundtable of Sustainable Palm Oil (RSPO) Certifications, Malaysian Sustainable Palm Oil (MSPO) Certifications, and No Deforestation, Peat, and Exploitation (NDPE) policies aim to promote sustainability, increase transparency and traceability of palm oil exports. While the adoption of RSPO is voluntary, criticisms on the certification highlight its failure to address the challenges faced by independent smallholders, further enabling their marginalization and exclusion (Hou et al., 2024). Thus, local certifications such as MSPO have gained preference and are increasingly adopted by both industry and smallholders in the country.

Despite these challenges, the sector remains strong, engaging over 600,000 Malaysians for both skilled and unskilled labour (Abubakar & Ishak, 2022). The sector's diversity is evident in the ownership of the 5.6 million hectares of planted area, with 73.5% owned by private and government entities, 14.5% by independent smallholders, and 11.9% by organized smallholders (Malaysian Palm Oil Board, 2023). Independent smallholders manage oil palm plots up to 40.46 hectares with personal or hired labour (Senawi, 2019). Government bodies oversee organised smallholders within rural development schemes, including the Federal Land Development Authority (FELDA), Federal Land Consolidation and Rehabilitation Authority (FELCRA), and various state agencies. Palm oil plantations cover approximately 17% of Malaysia's total land area, with 44.6% in Peninsular Malaysia and 55.4% in East Malaysia (Malaysian Palm Oil Board, 2023). In 2023, Sarawak has the highest total palm oil planted area at 28.7%, while the states in this study represented 26.7% for Sabah, 13.2% for Pahang, 11.9% for Johor, and 6.2% for Perak. To halt the expansion of plantation into natural forests, a policy was embedded within government policies to limit the palm oil acreage at 6.5 million hectares by 2023 (Ministry of Plantation and Commodities, 2021). Although the industry has not formally reached this limit and the allocation of the remaining one million hectares is undetermined, this policy provides an opportunity to address landscape-level conflicts such as elephants crop raiding in palm oil plantations.

3.1.2. Palm oil and habitat loss for elephants

Despite its economic benefits, the expansion of commodity crops has significantly affected Malaysia's elephant populations. Rubber and palm oil plantations replaced extensive lowland forests which are key elephant habitats (Saaban et al., 2011). This conversion raises the risk of crop raiding and human-elephant interactions as habitats become fragmented (Leimgruber et al., 2003). Over four decades, the elephants' range

in human-occupied landscapes in Peninsular Malaysia has decreased by 68% within an area of 3080 km² (Tan, 2016). Conflicts occurred in 68.5% of the current elephant range, predominantly involving crop damage (Saaban et al., 2011). The rapid expansion of palm oil plantations in Sabah since the early 1980s has eliminated most lowland areas necessary for large mammals, including elephants (Othman et al., 2019). Habitat loss is particularly problematic as elephants are extreme lowland/floodplain specialists and continue to attempt using their former preferred habitats, which are now dominated by plantations (Othman et al., 2019). Additionally, GPS telemetry data from 48 Asian elephants in Peninsular Malaysia from 2011 to 2018 indicate that human-dominated landscapes, especially agricultural areas, are primary elephant habitats (de la Torre et al., 2021).

3.1.3. Financial losses, mitigation measures and the need for longer term solutions

The ecological overlap between elephants and humans has caused financial losses due to crop depredation in Peninsular Malaysia, estimated at RM 42.5 million from 2015 to 2021 (PERHILITAN, 2020). This figure only accounts for direct losses and could be higher when including management costs, losses from expected yields, and unreported incidents to the Wildlife Department. Translocation of "problem elephants" has been the primary method in Malaysia to mitigate conflicts (de la Torre et al., 2021; Salman et al., 2023). Concerns about translocation's impacts have arisen as studies show high risks of local extinction from removing elephants in fragmented habitats in the state of Johor (Salman et al., 2023). In the Lower Kinabatangan Managed Elephant Range in Sabah, translocations occur without understanding its impact on elephant group dynamics, potentially increasing conflict incidences (Sabah Wildlife Department, 2020). Electric fences have been used to guard against elephant crop raiding in the same area (Estes et al. 2012). While these fences can effectively separate elephants from

human settlements, they also limit access to suitable habitat patches, potentially worsening the conflict. Potential mitigation measures like temporary fencing around plantations less than five years old may reduce conflicts with minimal barriers to elephant movement (Abram et al., 2022; Ghani, 2019; Tan, 2016). However, these interventions rely on people's willingness to implement and maintain such measures. Studies suggest that balancing biodiversity conservation with human dimensions is crucial for developing management strategies and conflict resolution (Konig, 2020). Hence, insights into psychological drivers influencing people's intentions to mitigate conflicts are beneficial. Additionally, understanding what coexistence with elephants means from the perspective of palm oil plantations is necessary for achieving long-term sustainability goals.

3.1.4. Exploring coexistence with elephants in the palm oil sector

The term coexistence emerged in human-wildlife conflicts studies as a response to the limitations of conflict-focused research. This conflict-oriented framing reinforced a human-nature dichotomy and overlooked the potential for positive relationships between humans and wildlife (Frank, 2016). Despite its exponential increase in publications between 1995 and 2015 (Nyhus, 2016), the term lacks consistent characterisation, thus making its application across intervention frameworks challenging (Knox et al., 2021). Among the limited studies that define coexistence, several conceptualise coexistence as a dynamic state of co-adaptation between humans and wildlife under effective governance (Pooley et al., 2021), a continuum ranging from negative to positive attitudes (Frank, 2016), and a hierarchy starting from tolerance to acceptance to coexistence (Gilkman et al., 2021). In this study, we examined two themes as a measure of coexistence: first, the acceptance of living with elephants, and second, the elephants are not regarded as obstacles to living a happy life.

3.1.5. Research model and newly developed scales

To develop a comprehensive strategy for addressing elephant-human conflicts in a key agricultural region of Malaysia, it is crucial to understand the elements that shape human behaviour. This study employs an extended model combining the Theory of Planned Behaviour (TPB) and the Norm Activation Model (NAM) to examine psychological factors influencing intentions to mitigate conflicts and their relation to coexistence ideas. Despite critiques of TPB's validity and utility (Sniehotta et al., 2014), TPB remains vital in interdisciplinary research, offering a common language between social and natural sciences (Miller, 2017). This research integrates TPB and NAM to provide a robust framework for studying human-elephant conflicts in agricultural landscapes. Both TPB and NAM involve rational decision-making and moral considerations, offering insights into cognitive structures essential for sustained behaviour change (Manfredo, 2008; Ham, 2013; Petty et al., 1992; Petty & Cacioppo, 1986).

Considering the extensive literature on pro-environmental behaviour predictions, like recycling (Park & Ha, 2014) and binning practices (Esfandiar et al., 2021), integrating TPB and NAM offers a nuanced understanding of behaviours to mitigate human-elephant conflicts. While previous studies focused on practical aspects of human-wildlife conflict in Malaysia, this study enhances the field by incorporating psychological theories into the research model, building on recommendations from existing studies (Kyle et al., 2020; Miller, 2017; Lute & Gore, 2019).

The integrated model measures five core latent variables. The first variable of TPB is attitudes, to which this study included both positive and negative sentiments towards elephants. Positive attitudes assess the value of elephants, while negative attitudes address fear and safety concerns. Next, subjective norms are divided into three

components: descriptive norms (tolerance levels), injunctive norms (expectations of tolerance), and norms towards authoritative figures like the government, to understand if they are perceived as pro-elephant or pro-community. The third core latent variable, perceived behavioural control, is measured by the ease of difficulty of carrying out external factors like mitigation measures. It also examines internal factors such as existing knowledge on elephant behaviour and confidence in the ability to coexist with elephants, which quantifies as self-efficacy. The two key components from NAM include awareness of consequences, which examines the level of understanding the conservation status of elephants and ascription of responsibility, which focuses on feelings of moral obligation towards elephant conservation. Finally, coexistence ideas are explored through themes of acceptance of elephant presence and the absence of barriers to a satisfactory life. The measurement items are newly developed for this study, however, the scales and content were adapted based on the existing questionnaires by Perry et al. (2020) and Kansky et al. (2016).

3.2. Methods

3.2.1. Study area

Asian elephants (*Elephas maximus*) are distributed in 7 out of the 14 states in Malaysia. Respondents were sampled from three of these states, which are Johor and Perak in Peninsular Malaysia and Sabah in East Malaysia. This study focused primarily in palm oil plantations where elephant habitats are adjacent to agriculture areas. The elephant groups in these areas are known to roam, pass through and occasionally stay in the sampled palm oil plantations. The existing mitigation method in these areas is electric fencing, trenches and community patrolling.

3.2.2. Data collection

The data was collected in phases through 2022 to 2023 during the reopening of post-covid lockdowns. Respondent recruitment strategies include the involvement of a partnership called Achieving Coexistence with Elephants (ACE) project between the Management and Ecology of Malaysian Elephants (MEME)'s and several leading palm oil plantations in Malaysia. Additionally, conservation organisations such as Seratu Aatai in Sabah and Earthworm Foundation in Johor also helped in the recruitment process by reaching out to their existing contacts to either distribute to the online questionnaire or introduced estate managers for prior engagement.

The data collection process varied according to the type of respondents. For executive officers and estate managers from private palm oil companies, participants were recruited at workshops or via email. In Johor, two workshops were held on the 27th March 2022 and 7th of February 2023 as part of the Achieving Coexistence with Elephants (ACE) partnership. The workshop in February was the first engagement between the different palm oil plantation companies and MEME, hence, the participants were asked to answer the online questionnaire through a QR code that was displayed to the room before any content of the workshop was shared to avoid any biases. However, due to the low response rate from the online questionnaires, physical copies the questionnaire was prepared for the following data collection sessions. In Perak, data collection was held on the 1st of November 2022 at the National Elephant Conservation Action Plan 2.0 drafting workshop organized by the Department of Wildlife and National Park. The workshop was attended by multiple stakeholders involved in elephant conservation. For Sabah, Seratu Aatai helped to recruit participants by distributing the questionnaire via email to their immediate contacts in the palm oil sector and continuously followed up on the request.

To reduce the logistics required to reach the smallholder's plantations, the collection for the smallholder demographic was conducted by two field assistants based in Johor and Perak. For sabah, the author was supported by field assistants from Seratu Aatai's team who are based in Sukau. The field assistants in Johor and Perak were trained with basic knowledge of the human-elephant conflicts, research ethics and sensitivities for collecting data in rural communities. Prior to the respondent recruitment, the field assistants requested a meeting with multiple plantation managers to inform of the purpose of the research. Once a working relationship has been built with the estate managers in Johor and Perak, the respondents gathered on a dedicated day to answer the questionnaire in their physical copies. For independent smallholders in Sabah, Seratu Aatai's field team led the respondent recruitment process by a door-to-door approach around the Sukau village, where upon agreeing to participate in the research, the respondents answered the questionnaire individually in their homes.

Information about the research was shared through formal letters and the consent forms prior to data collection. The respondents are reminded that their participation is voluntary and assured of their confidentiality when signing the consent forms. Several palm oil companies rejected the formal request due to security-related reasons. Additionally, in areas where literacy levels were lower, the questionnaire was guided by the respective field assistants to ensure the meaning of the questionnaire were clearly understood.

3.2.3. Development of measurement model

I conducted key informant interviews with palm oil estate managers on the 25th of January 2022 to gain insights for structuring the questionnaires. To ensure the questions appeared relevant, appropriate, and clearly aligned with the objectives of the study, my supervisors, experts in psychology and wildlife conservation, helped review the questionnaire design for clarity and contextual accuracy. This process established what is known as face

validity, confirming that questionnaire items visibly reflect the intended variables from the theories and its context in human-elephant conflict are accurate. A self-reported questionnaire was developed based on the Theory of Planned Behaviour and the Norm Activation Theory. The variables 'attitudes', 'norms', 'perceived behavioural control' and 'behavioural intention' were adapted from Ajzen (1991) while 'awareness of consequences' and 'moral obligation' were adapted from Schwartz (1975). The questions were measured on a 7-point Likert scale where items were ranked from 1= strongly disagree to 7= strongly agree for all latent variables except perceived behavioural control where scoring is represented by 1= very difficult to 7= very easy. The last section comprised items to determine sociodemographic information of respondents such as gender, age, education background, and if they held any position of leadership in the community or company. Respondents completing the questionnaire online had the option to choose between English and Bahasa Malaysia, whereas the printed version was available only in Bahasa Malaysia. The questionnaire was approved by the Science and Engineering Research Ethics Committee of the University of Nottingham Malaysia (Ethics ID: NZ140222).

3.2.4. Analysis

There are two main elements that are analysed in a Partial Least Squares Structural Equation Modelling (PLS-SEM). First being the measurement model which represents the latent variables and its indicators, and second, the structural model where the latent variables are connected by a single-headed arrows that are represent predictive relationships. According to the handbook by Hair et al., (2022), the adequacy of the measurement model was evaluated using indicator loadings, the internal consistency reliability (reliability coefficient rho_A), convergent validity (average variance extracted [AVE], values of the outer loadings and indicator reliability), and discriminant validity (Heterotrait-Monotrait ratio or HTMT). The thresholds used for outer loadings is lower than the standard to cater to the exploratory nature

of the study as suggested by Hair et al. (2022). Next , the structural model is assessed by the Variance Inflation Factor (VIF) and coefficient of determination (R^2 value). SmartPLS 4 (Ringle et al., 2024) software was used for all the analysis.

3.3. Results

3.3.1. Demographic profile of respondents

From the total of 223 questionnaire respondents, 87.9% were male, 10.8% were female and 1.3% preferred not to say. The age group with the highest representation (37.2%) were 30 to 39 years old. The questionnaire was distributed in three different elephant range states in Malaysia where the respective response rates are 39.5% from Johor, 38.1% from Perak, and 22.4% from Sabah. Almost half of the respondents (44.4%) have an undergraduate level of education and 60.1% of them were in a position of leadership in their respective company, estate or owned their own land.

Table 2. Demographic information for questionnaire respondents.

Variable	N	%
Gender		
Male	196	87.9
Female	24	10.8
Prefer not to say	3	1.3
Age		
21-29	38	17.0
30-39	83	37.2
40-49	44	19.7
50-59	34	15.2

60-69	17	7.6
>70	1	0.4
State		
Perak	85	38.1
Johor	88	39.5
Sabah	50	22.4
Education		
Primary/Secondary	103	46.2
Undergraduate-Diploma/Degree	99	44.4
Postgraduate-Masters, PhD	17	7.6
Other (not specified)	4	1.8
Position of leadership		
Yes	134	60.1
No	87	39.0
Other (not specified)	2	0.9

3.3.2. Assessment of measurement model

Due to the exploratory nature and the newly developed scales in the questionnaire, the latent variable's indicator loadings (or also referred to outer loadings) at 0.40 and above were accepted compared to the standard threshold of < 0.7 (Hair et al., 2022). The reliability coefficient, rho_A was used as an indicator because it lies between the conservative Cronbach's alpha and the liberal composite reliability, rho_C (Hair et al., 2022). The results show that the indicators were above the 0.60 threshold level that is accepted for exploratory

research. Likewise, the average variance extracted (AVE) for convergent validity of all the indicators showed acceptable AVE value of more than 0.5. The measurement model criteria are presented in Table 3.

The discriminant validity of the latent variables was assessed by the heterotrait-monotrait ratio (HTMT) of correlations. The results show that the latent variables vary significantly from each other and presented values below the threshold of 0.9 as seen in Table 4.

Table 3. Latent variables, measurement items, and indicator loadings, reliability and validity.

			Convergent validity			Internal Consistency Reliability
Latent variables, measurement items	Mean	Standard deviation	Outer loadings <0.4	Indicator reliability <0.5	Average variance extracted (AVE) <0.5	Reliability coefficient (rhoA) <0.6
Positive attitude: The presence of elephants is pleasant because…					0.649	0.876
brings economic value to my daily life	2.381	1.513	0.771	0.595		
brings economic value to my community	2.601	1.821	0.864	0.747		
brings economic value to Malaysia	4.269	2.031	0.654	0.427		
makes it enjoyable to live in my area	2.897	1.815	0.849	0.721		
makes me feel very lucky to live in my area	3.202	1.927	0.868	0.753		
Negative attitude: The presence of elephants is difficult because…					0.690	0.944
I constantly must be on the watch	5.570	1.531	0.799	0.638		
I fear for the safety of my family	5.529	1.629	0.841	0.708		
I cannot have a good night's sleep	5.121	1.806	0.867	0.752		

I spend more time dealing with it than I should	4.789	1.811	0.812	0.659		
my family members need to deal with it when I am away	4.516	2.075	0.795	0.632		
I fear that they will injure me	5.238	1.880	0.857	0.734		
I fear that they will injure my family member	5.274	1.969	0.843	0.710		
Awareness of consequence					0.580	0.701
Elephants have nowhere else to go therefore I must tolerate them when they visit	4.507	1.787	0.860	0.739		
The elephant population may decline so I must accept living with them	4.345	1.767	0.871	0.758		
The survival of elephants is important for the future generation	5.901	1.366	0.492	0.242		
Moral obligation					0.623	0.885
I feel that it is my duty to protect elephants	5.404	1.467	0.898	0.807		
I am responsible for the safety and well-being of elephants	5.027	1.618	0.914	0.836		
My community (including myself) is responsible to ensure the survival of elephants	4.996	1.566	0.878	0.771		
Elephants do not belong here thus I have no intent of tolerating them*	4.780	2.038	0.496	0.246		
I am responsible for ensuring the elephant population survives for the future generation	5.453	1.677	0.674	0.454		
Perceived Behavioural Control					0.673	0.888
To guard my crops from elephants would be extremely difficult/extremely easy	3.372	1.807	0.837	0.701		
To continue my current efforts to avoid conflict would be extremely difficult/extremely	3.906	1.595	0.861	0.742		
To follow safety SOPs in high-risk areas would be extremely difficult/extremely easy	4.372	1.673	0.776	0.602		
To allow elephants to pass through certain parts of my plantations would be extremely	3.462	1.826	0.794	0.630		
To achieve coexistence with elephants would be extremely difficult/extremely easy	3.417	1.775	0.831	0.690		
Self-Efficacy: My plantation/I…					0.620	0.844
am capable of setting up mitigation measures to manage elephant presences	4.040	1.657	0.850	0.722		
have the financial capacity to invest in mitigation measures	3.695	1.725	0.865	0.747		
have the knowledge needed to coexist with elephants safely	3.960	1.747	0.735	0.540		
are able to coexist with elephants peacefully	3.332	1.727	0.687	0.472		
Descriptive norms: My community…					0.696	0.816
feels that it's alright to kill an elephant if they have affected their finances significantly	2.022	1.543	0.887	0.787		
feels that it's alright to kill an elephant if it severely injured a community member	2.713	1.926	0.802	0.643		

will punish those who celebrate the existence of elephants in our neighbourhood	2.422	1.641	0.811	0.657		
Injunctive norms: My community…					0.768	0.849
will be willing to tolerate elephants in our landscape	4.305	1.776	0.822	0.675		
expects me to tolerate elephants	4.309	1.733	0.906	0.820		
expects me to accept the existence of elephants in our neighbourhood	3.816	1.819	0.900	0.809		
Norms towards government: My government…					0.596	0.802
expects me to tolerate elephants when they cause a conflict	4.650	1.695	0.786	0.618		
is aware of the situation and doing the best they can	4.987	1.663	0.844	0.712		
sees value in elephants and will protect them	5.318	1.495	0.860	0.739		
has lack of resources to manage elephants	5.013	1.755	0.563	0.317		
Behavioural intentions: I intend to…					0.631	0.884
share my knowledge on conflict mitigation with other plantations	5.807	1.319	0.759	0.575		
subscribe to insurance or safety net to reduce losses from conflicts at the plantation	5.257	1.618	0.680	0.462		
test out different conflict mitigation measures this year	5.351	1.396	0.795	0.633		
follow safety SOPs whenever I go to places with high risk of encountering elephants	6.038	1.162	0.838	0.703		
learn more about elephant movement and behaviour to understand how to manage their	5.901	1.290	0.814	0.662		
share with others the knowledge I gained about managing conflict	5.977	1.192	0.866	0.751		
Coexistence ideas					0.549	0.751
Elephants are not an obstacle for me to achieve what I want in life	5.335	1.716	0.569	0.323		
My life is acceptable as it is with the presence of elephants in the area	4.479	1.712	0.678	0.459		
The elephants in my area cause no further difficulties to my existing life	4.299	1.757	0.803	0.646		
I can accept living a normal life with elephants around my area	4.412	1.748	0.876	0.767		

(*) scores were inverted

Table 4. Discriminant validity my heterotrait-monotrait (HTMT) ratio correlation.

Latent variable	A	BI	CI	D	IN	M	N	N	P	PB	S
Awareness of consequence											
Behavioural intention (BI)	0.6										
Coexistence ideas (CI)	0.5	0.2									
Descriptive norms (DN)	0.2	0.2	0.3								
Injunctive norms (IN)	0.6	0.1	0.6	0.0							
Moral obligation (MO)	0.8	0.6	0.3	0.3	0.5						
Negative attitudes (NA)	0.2	0.1	0.3	0.0	0.2	0.0					
Norms towards government	0.6	0.4	0.3	0.1	0.5	0.6	0.1				
Positive attitudes (PA)	0.4	0.1	0.4	0.1	0.4	0.2	0.3	0.3			
Perceived behavioural control	0.4	0.1	0.5	0.1	0.4	0.2	0.2	0.2	0.4		
Self efficacy (SE)	0.6	0.2	0.5	0.2	0.3	0.4	0.2	0.3	0.3	0.5	

3.3.3. Assessment of structural model 1

Model explanatory power

Only two indicators in the negative attitude latent variable had VIF values above the acceptable threshold of 5. These were‘The presence of elephants is difficult because I fear that they will injure me’ and ‘The presence of elephants is difficult because I fear that they will injure my family member’ at 5.874 and 5.569 respectively. However, since the indicators were testing for the broader concept of safety, collinearity was expected. Nonetheless, all other indicators showed no issues with collinearity. The TPB constructs explained 27.7% of the variance for Behavioural intentions (R^2 =.277) while Behavioural intentions explained only 6.4% of the variance for Coexistence ideas (R^2 =.064).

Path coefficients and relationships between latent variables

Based on the structural model results (Figure 4), significant relationships were observed between Negative attitudes (β=-.204, p=.001), Norms towards government (β=.407 p<.001), and Self efficacy (β=.151, p=.015) and Behavioural intentions. Next, Behavioural intentions (β=.253 p=.004) significantly influenced Coexistence ideas. Additionally, moderate effect sizes were observed for Norms towards government towards Behavioural intentions with the F-square value of .164.

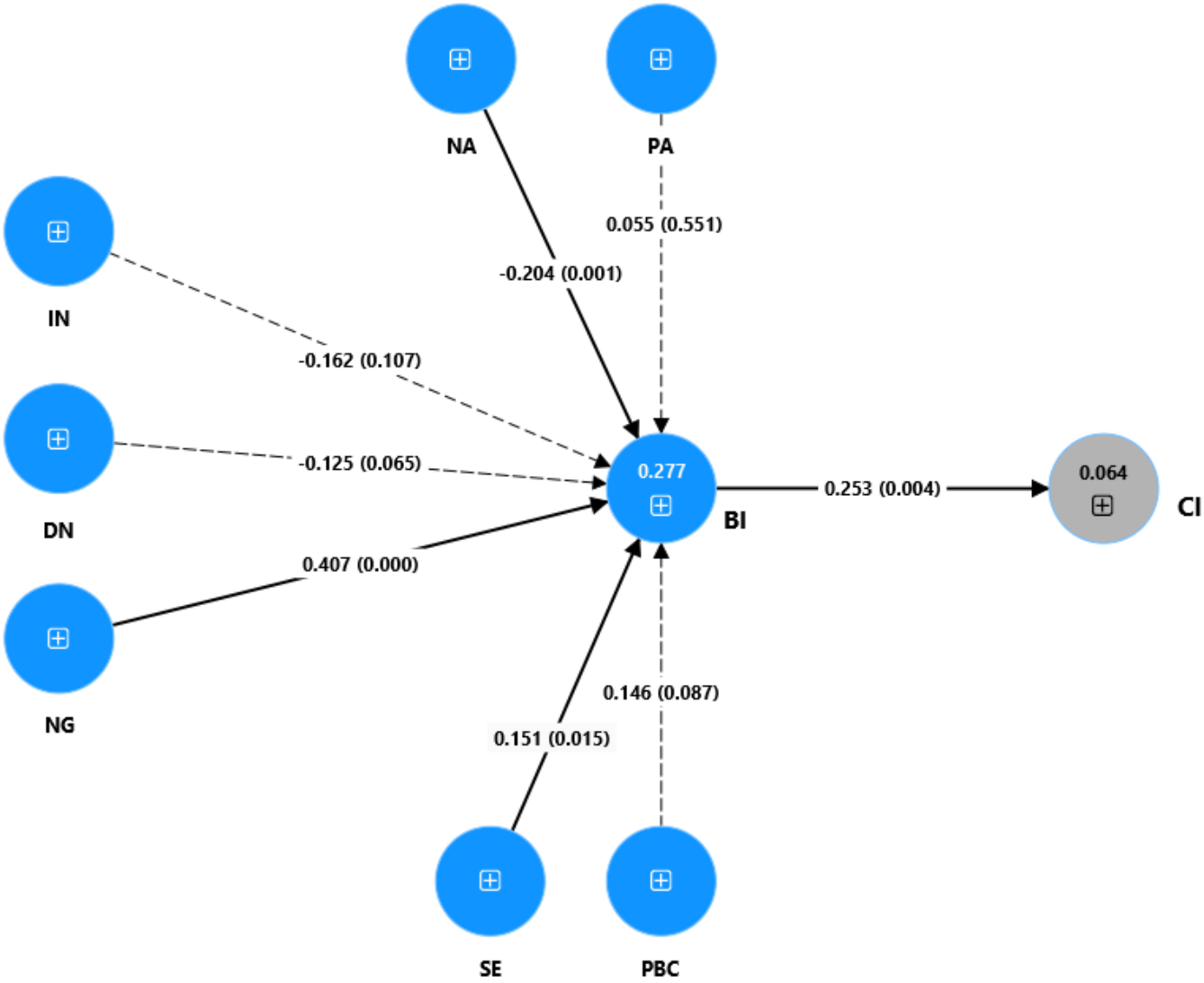


Figure 4. Structural model 1 for Theory of Planned Behaviour. Significant path coefficients are denoted by solid lines, whereas dashed lines are insignificant

relationships. Note: NA= Negative attitudes, PA= Positive attitudes, IN= Injunctive norms, DN= Descriptive norms, NG= Norms towards government, SE= Self efficacy, PBC= Perceived behavioural control, BI= Behavioural intention, CI= Coexistence ideas. Bold lines indicate significant path coefficients. Norm activation model variables are labelled in green while Theory of Planned Behaviour variables are labelled in blue. Variable in grey is not derived from the two mentioned theories.

3.3.4. Assessment of structural model 2

Model explanatory power

The variance explained for Behavioural intention increased to 39.8% (R^2=.398) and 15.4% for Coexistence ideas (R^2=.154) compared to the TPB only model. Additionally, the NAM variables explained 29% of variance for Injunctive norms (R^2=.294), 15% of Positive attitudes (R^2=.154), 6% of Descriptive norms (R^2=.064) and 3% of Negative attitudes (R^2=.039). Overall, the extended model improved the variance explained compared to the TPB only model.

Path coefficients and relationships between latent variables

Based on the structural model 2 results (Figure 5), new significant relationships were observed between Behavioural intentions, and NAM variables Moral obligation (β=.376, p= <.001), and Awareness of consequence (β=.216 p= .010) as well as Injunctive norms (β=-.295, p<.001). No changes in influence towards Behavioural intentions were observed for constructs Norms towards government (β=.208 p= .007), Negative attitudes (β=-.131, p= .013), Perceived Behavioural Control (β=.115 p= .148). Next, the relationship between Coexistence ideas and Behavioural intention (β=-.053 p= .514) is no longer significant. However, Coexistence ideas was strongly influenced by Awareness of consequence (β=.337 p<.001) but not Moral obligation.

Out of the four TPB variables tested against the NAM variables, only Injunctive norms were influenced by both Moral obligation (β=.204, p=.019) and Awareness of consequence (β=.401, p<.001). The attitude constructs were significantly influenced by Awareness of consequence while Moral obligation only influenced the norm constructs. Positive attitudes were largely influenced by Awareness of consequence (β=.426, p<.001) compared to Negative attitudes (β=.232, p=.013). Lastly, Descriptive norms was significantly influenced by Moral obligation (β=-.237, p=.012).

In comparison to the previous model, Moral obligation (F-square value=.116) has a larger effect size towards Behavioural intention than Norms towards government (F-square value=.040). Additionally, the NAM variables showed moderate effect sizes on the TPB variables, specifically Awareness of consequence towards Injunctive norms (F-square value=.156) and Positive attitudes (F-square value=.147). However, effect sizes observed was smaller for Awareness of consequence towards Coexistence ideas (F-square=.090) and Behavioural intentions (F-square value=.039) and Moral obligation towards Coexistence ideas (F-square value=.010).

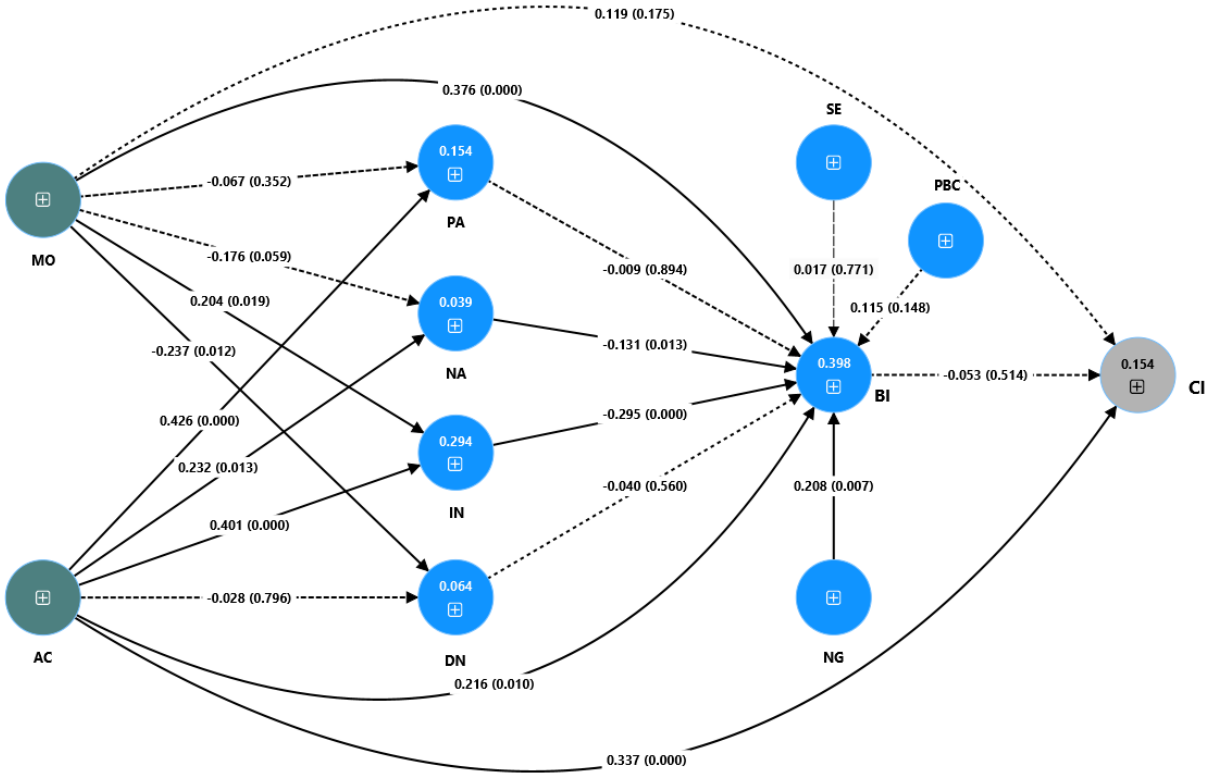


Figure 5. Structural model 2 with the extension of Norm Activation Model. Note: AC= Awareness of consequence, MO= Moral Obligation, NA= Negative attitudes, PA= Positive attitudes, IN= Injunctive norms, DN= Descriptive norms, NG= Norms towards government, SE= Self efficacy, PBC= Perceived behavioural control, BI= Behavioural intention, CI= Coexistence ideas. Bold lines indicate significant path coefficients. Norm activation model variables are labelled in green while Theory of Planned Behaviour variables are labelled in blue. Variable in grey is not derived from the two mentioned theories.

3.3.5. Mediation analysis

Due to the convergence of two theories in the research model, a mediation effect was observed between the latent variables. Injunctive norms have a significant partial mediation effect between awareness of consequence and behavioural intentions (Table 5). However, results from the specific direct effects (Table 6) show Injunctive

norms to significantly mediate the relationship between Moral obligations and Behavioural intentions.

Table 5. Total indirect effects.

	Original sample (O)	Sample mean (M)	Standard deviation (STDEV)	T-statistics (|O/STDEV|)	P values
AC -> BI	-0.151	-0.157	0.059	2.585	0.010*
MO -> CI	-0.018	-0.019	0.028	0.645	0.519
IN -> CI	0.016	0.018	0.026	0.596	0.551
MO -> BI	-0.027	-0.026	0.046	0.589	0.556
NA -> CI	0.007	0.007	0.012	0.587	0.557
NG -> CI	-0.011	-0.012	0.020	0.558	0.577
PBC -> CI	-0.006	-0.007	0.013	0.459	0.646
AC -> CI	-0.003	-0.003	0.011	0.321	0.748
DN -> CI	0.002	0.001	0.007	0.284	0.776
SE -> CI	-0.001	-0.001	0.006	0.149	0.882

Table 6. Specific indirect effects.

	Original	Sample	Standard	T statistics	P values
AC -> IN -> BI	-0.118	-0.124	0.049	2.435	0.015*
MO -> IN -> BI	-0.060	-0.062	0.030	1.998	0.046*

3.4. Discussion

This chapter presents a study that examined components from the Theory of Planned Behaviour (TPB) and the Norm Activation Model (NAM) through a questionnaire administered to agricultural communities in three different states in Malaysia. The primary objective was to determine the psychological variables that influence individuals' intentions to mitigate conflicts with elephants. The two

psychological theories are widely recognized and studied, particularly in understanding pro-environmental behaviour. However, this research represents the first investigation of their application in the context of human-elephant conflicts in palm oil plantations in Malaysia. This study provides findings that contribute to the understanding of the drivers of human-elephant coexistence and the study of human-wildlife interactions globally.

Given the complex nature of conflicts, the high statistical power of the Partial Least Square-Structural Equation Modelling (PLS-SEM) approach allowed this study to propose causal relationships while exploring the extensions of established theories (Hair et al., 2022). Both the measurement and structural model fulfilled the reliability and validity tests, a crucial step which it's absence is often criticised by social scientists (V. Y. Martin, 2019). It is important to note that this study included a variable called Coexistence ideas (CI) in addition to the classic TPB equation where Behavioural intention is the last variable. The added value of this was to examine whether the intention to mitigate conflicts is a driver for coexistence. Overall, the addition of the NAM to the existing TPB model showed notable improvements in explaining Behavioural intentions. However, the relationship between Behavioural intentions and Coexistence ideas diminished while significant relationships with the NAM variables was observed instead.

The Theory of Planned Behaviour model

This model showed significant relationships between Behavioural intention and Norms towards government, Negative attitudes, and Self-efficacy but not with Positive attitudes, Perceived behavioural control and Descriptive or Injunctive norms. Behavioural intention also significantly influenced Coexistence ideas.

The constructs explained 27% of the variance for Behavioural intentions which is consistent with other studies in a meta-analysis by Armitage & Conner, (2001). In this study, however, norms, specifically Norms towards government is the most significant construct, followed by attitudes, and then Self-efficacy, in explaining behavioural intentions. This is contrary to other reviews that investigated a wide range of human behaviours and found norms to be the weakest explanation of intentions among the three variables from this theory (Armitage & Conner, 2001; Nguyen et al., 2019) except in Han (2017), where norms was ranked as the second most significant construct in explaining socially responsible consumer behaviour. The typically poor performance of norms might be due to its multifaceted nature of the construct (Armitage Conner 2001), which this study addressed by investigating three components as opposed to the general subjective norms. Despite this distinction, the research model in this study demonstrates results similar to those in the existing literature.

Norms towards government (β=.407 $p<.001$) has the strongest influence on Behavioural intention in the first model. In contrast, the descriptive and injunctive norm constructs, which examined the subjective norms of the community did not significantly explain behavioural intentions. According to Ajzen (1991), subjective norms are the perceived social pressures that influence individuals to perform or avoid certain behaviours. These norms are salient beliefs that an individual derives from social interactions, and thus shape their normative beliefs. Studies suggests that subjective norms are dependent on normative beliefs weighted by an individual's motivation to comply with those beliefs (Ajzen, 1991; Etcheverry & Agnew, 2004). For instance, different spheres of influence, such as parents or peers, have been shown to correspond to a student's intention to smoke (Gruber, 1986). These studies highlight

the multidimensional role of subjective norms and the importance of testing them in various contexts. Building on the theoretical framework, studies in China and Malaysia highlight the predominance of norms towards the government. The intentions of farmers from major cotton-producing regions to adopt smart agriculture technologies were influenced by superiors (agricultural dealers and local government) to a greater extent than by peer influences (families and friends) (Li et al., 2023). In Malaysia, public health studies demonstrate the government's influence, especially during the pandemic, evidenced by the widespread compliance of the large majority to standard operating procedures (Maung et al., 2022). The results from this study further support this finding, as reflected in the fact that norms towards the government best explain the intention to carry out human-elephant conflict mitigation measures compared to the social norms of the community. This finding underscores the government's strength and potential as a key driver in promoting coexistence with elephants.

The second construct that significantly explains behavioural intentions is Negative attitudes (β=-.204, $p<.001$) towards tolerating elephants. The measurement items examined general themes of safety to indicate why elephant presence is difficult. The inverse relationship between these constructs suggests if safety concerns can be addressed, thus decreasing negative attitudes, then the intention to mitigate conflicts may increase. Frequent encounters with negative events can intensify individuals' fear and risk perceptions, diminishing their tolerance for wildlife in conflicts (Kansky et al., 2016) An additional dimension relating to the subjective experience of fear, a link was found between the perceived danger or harm the animal represents and the perceived uncontrollability of the person’s own response during an encounter (Johansson & Karlsson, 2011). Therefore, learning effective responses during

encounters and reducing negative events may address safety concerns more effectively. Given the variability in conflict contexts, it's crucial to consider how site-specific factors influence negative attitudes and safety concerns. However, to broaden the discussion, Baumeister et al. (2001) argue that, negative events, and particularly single bad events, often have more significant and lasting consequences than comparable positive events, explaining people's inclination to avoid bad outcomes. Within conflict scenarios, cognitive biases, notably loss aversion where individuals weigh potential losses more heavily than equivalent gains (Tversky & Kahneman, 1973) may influence decisions to mitigate conflicts. Consequently, in regions where conflict is recurrent, the intention to mitigate conflicts should be greater, especially among individuals who have experienced negative impacts from conflicts with elephants. Conversely, in situations where conflicts are infrequent or less severe, the challenge of adhering to safety protocols may persist due to complacency. This concept of metacognitive discounting, where people expect negative events to be unlikely even though the events are easily imagined (O'Brien, 2013) may explain this behaviour. These two concerns are potential considerations for conflict management plans and represent avenues for future research.

While one approach to increasing tolerance involves reducing negative attitudes by minimising encounters with conflict-causing wildlife, other studies have highlighted how positive attitudes play a crucial role in fostering coexistence. Research in Kenya has identified positive affect as a key determinant in promoting behaviours compatible with conservation and coexistence with carnivores (Broekhuis et al., 2020; L. Perry et al., 2022; L. R. Perry et al., 2020). These studies argue that positive emotional reactions to wildlife are likely to be reinforced by conservation-related activities (L. Perry et al., 2022) and a greater sense of ownership of wildlife (Broekhuis et al., 2020),

which then formed positive attitudes. Although research in Maasai Mara revealed that community members' attitudes depended on both the benefits of participating in conservation efforts and local conservation politics, positive feedback from local communities remains an encouraging sign (Broekhuis et al., 2020). In the United States, cattle ranchers generally agree on the importance of wildlife and its potential benefits for ranches. This consensus highlights that attitudes are significant in shaping intentions to integrate wildlife management activities (Willcox et al., 2012). Gaining insights into the formation of these attitudes across different regions is extremely valuable, especially when compared to areas such as Southeast Asia, where social psychology studies on conflicts are not common. It is essential to compare these findings while considering cultural differences to help advance conservation efforts and to add to the conservation practitioner's toolbox. Nonetheless, in a broader context, these findings support the notion that attitudes significantly explain behavioural intentions. Perceived behavioural control (PBC) was introduced to the Theory of Planned Behaviour to enhance the prediction of behaviours in situations where individuals do not have volitional control (Ajzen, 1991). Studies in Armitage & Conner's (2001) meta-analysis measures PBC through various constructs, including Self-efficacy, Perceived difficulty, and Perceived volitional control, aiming to dissect the internal and external factors influencing behavioural intention. Furthermore, this meta-analysis revealed that incorporating measures of Perceived Behavioural Control, such as Self-efficacy, improved the prediction of intentions 6% on average. However, Rhodes and Courneya (2003) argues that such improvements may stem from measurement redundancy, not genuine causal effects. Nonetheless, including both constructs aimed to explore potential distinctions, or their interchangeability, between the internal cognitive perceptions of self-efficacy and the volitional control aspects of

PBC (Ajzen, 1991; Armitage & Conner, 2001; Bandura, 1977), specifically within the scope of human-elephant conflict mitigation efforts.

The Self-efficacy construct measurements specifically examined the individuals' confidence in applying mitigation measures and their ability to coexist, in contrast to PBC, which assesses the perceived ease or difficulty of engaging in these mitigation strategies. Despite similar path coefficient values, the results showed that Self-efficacy, not Perceived Behavioural Control, significantly influenced intentions. This finding is similar to that of Armitage and Conner's (2001) review, where there was a distinctive measure between Self-efficacy and Perceived Behavioural Control, Self-efficacy explains intention better. Similarly, measures of self-efficacy were found to be the best explanation for the intention to implement sustainable practices in the agricultural sector. This is evident among dairy farmers in Malaysia (Rathakrishnan et al., 2022) and potato farmers in Iran (Savari et al., 2023). The lack of a cohesive view of this construct often leads to the interchangeable use of these two terms in literature, posing a challenge for comparing and contrasting findings. Despite establishing a clear distinction between the constructs in this study, the results support the differentiation between the two constructs through the discriminant validity measure. Nevertheless, further research is necessary to determine which construct better explains intention. Extending the context further, researchers suggest that Self-efficacy promotes behavioural spillover, enhancing pro-environmental behaviour (Lanzini & Thøgersen, 2014). The concept of behaviour spillover describes the tendency for individuals who have previously engaged in pro-environmental actions to be more likely to participate in additional similar behaviours in subsequent situations. This phenomenon suggests that past pro-environmental conduct can influence the frequency and intensity of future green practices (Lauren et al., 2016). Self-efficacy is considered an effective

mechanism for promoting spillover, as it influences cognitive, motivational, affective, and selective processes (Bandura, 1977). Moreover, studies suggest that encouraging both personal and group beliefs can significantly shape social norms regarding recycling practices (Tabernero et al., 2015). In this regard, leveraging the significant influence of the government while enhancing beliefs in self-efficacy may potentially lead to an overall behavioural spillover effect when implementing human elephant conflict mitigation measures. Future studies should explore the potential of behavioural spillover effects in conflict mitigation across Malaysian plantation.

The extended model with Norm Activation Model (NAM)

Before discussing the results, it is important to acknowledge a limitation in the use of the Norm Activation Model constructs. This study measured ascription of responsibility and personal norms as a single construct, rather than as separate components. While ascription of responsibility refers to acknowledging one's individual role in a particular consequence, personal norms represent the feeling of moral obligation that arises from recognizing that role and its consequences. The conceptual overlap and constraints in questionnaire length led to the decision to combine these two measures into a single construct termed ‘moral obligation’.

Despite this combined measure, the extended model demonstrated improved explanatory power compared to the TPB only model, explaining an additional 11% of the variance in Behavioural intentions. The results mirror those of other studies which found that NAM variables directly influence intention (Morren & Grinstein, 2021) and adding NAM components to TPB improved the predictability of Behavioural intention (Niemiec et al., 2020). Interestingly. while Moral obligation significantly explained Behavioural intention, it did not predict Coexistence ideas. Conversely, Awareness of

consequences significantly predicted both Behavioural intention and Coexistence ideas. Further analysis revealed a mediating role of Injunctive norms in the relationship between Behavioural intentions and both the NAM constructs.

The analysis of these two theories revealed interesting dynamics, especially in the context of the cross-cultural dimension of norms. The NAM constructs accounted for significant variations in behavioural intentions, explaining a greater proportion of this variance than norm towards government in the TPB-only model. In contrast to Morren and Gristein (2021), the findings differ in how personal and subjective norms affect behaviour in collectivist countries, as categorised by the Hoefsted and GLOBE indexes. Collectivist versus individualist views of society have been used as a popular dimension to understand cultural differences between the East and West (Her & Joo, 2018). However, recent studies have demonstrated increasing complexity in these concepts which challenges this narrative (Lomas et al., 2023). One possible explanation is that individuals tend to rely on their moral compass in scenarios where personal attitudes and perceived social expectations (subjective norms) are in conflict, as suggested by Hubner and Kaiser (2004). Applying this concept, it is likely that when individuals believe that their own awareness and moral obligations do not match the government's expectations, their intention to behave is based on moral values. Additionally, knowledge, culture, and religion may influence these strong moral values towards elephant or general wildlife conservation.

While the direct effects of NAM components are observed with behavioural intention, indirect effects are observed through injunctive norms. The mediation analysis revealed injunctive norms as a competitive partial mediator between NAM constructs and Behavioural intention, evidenced by the negative path coefficient of Injunctive norm's (Hair et al., 2022). Competitive mediation suggests that injunctive norms have

a suppression effect which decreases the magnitude of the total effect of NAM components on behavioural intentions (Hair et al., 2022). Injunctive norms are a measure of what most people think they should do (Anderson & Dunning, 2014). The measurement items in this study examined the expectations of tolerating and accepting elephants in the landscape. Hence, when there are higher expectations of the community to tolerate and accept elephants, individuals holding strong pro-elephant personal norms might feel less driven to address conflict using mitigation measures. Given the complexity of human-elephant conflict and the diverse respondents in this research, further research is crucial to support the competitive mediation effect and nuances in this setting. Moreover, integrating moderating variables, such as past interactions with elephants, perceived mitigation strategy effectiveness, or elephant-related fear, could also affect the model's constructs and, consequently, behavioural intentions.

Finally, although focusing on a combined measure, the study uncovered valuable findings on the differences in awareness of the consequences and feelings of moral obligation. Building on previous research indicating that awareness alone is not sufficient to drive pro-environmental behaviour (Wang & Mangmeechai, 2021;Ivles et al.,2018), our findings offer a more nuanced understanding of this relationship. The model specifically reveals that, although both constructs significantly predict intention, moral obligation has a more substantial effect than awareness of consequences, as indicated by the strength of the p-value. In contrast, when analysing their effects on Coexistence ideas, the influence of these two constructs is reversed. The measurement items examined abstract concepts of coexistence compared to practical measures of behavioural intention. The results demonstrate that the awareness of consequence explains a significant proportion of its variance. Therefore,

while awareness of consequences may explain why someone would choose to coexist with elephants, it falls short of explaining their actual intent. Conversely, moral obligations are a stronger indicator of intent to engage in behaviour.

Overall, the use of these two popular theories especially in predicting pro-environmental behaviour have several limitations. Many studies conceptualised the theoretical models in different forms, thus posing a challenge to compare findings (Morren & Grinstein, 2021). Moreover, The Theory of Planned Behaviour has been criticised by many including in human dimension studies (Miller, 2017) and also in health (Sniehotta et al., 2014). Possibly, the integration of other theories and components such as habits and past behaviour can provide a broader understanding of human behaviour (Klöckner & Blöbaum, 2010).

CHAPTER 4

Mechanisms of conflict and its impact on coexistence among organised smallholders in West Malaysia

4.0. Chapter 4: Mechanisms of conflict and its impact on coexistence among organised smallholders in West Malaysia

4.1. Introduction

4.1.1. Rural development strategy in Malaysia

The Federal Land Development Authority (FELDA) was established in 1956 to implement land development and resettlement schemes, providing land and resources to rural poor families for productive agriculture (Mamat et al., 2016 Manaf & Ibrahim, 2017;Hussin & Abdullah, 2012). FELDA, part of Malaysia's New Economic Policy (NEP), aims to combat rural poverty and socioeconomic disparities by developing idle lands for agriculture and offering landless rural population cultivation opportunities (Mohamad et al., 2014). Each settler family received a standard house, a two-acre garden for vegetables and fruit trees, and an eight- to ten-acre rubber or oil palm holding. The state would issue the land title 15 years after settlers fully repaid their share of development costs, as calculated by FELDA (Mehmet, 1982). Under this scheme, average FELDA settlers earned between RM 500-2000 monthly, up from less than RM 200 initially (Mamat et al., 2016). Additionally, FELDA provides health and education benefits for women and youth among settler families (Leng, 2014; Mohamad et al., 2014).

4.1.2. Changes in policy

A typical FELDA scheme includes settlers from various Malaysian states and diverse socioeconomic backgrounds. To promote cohesion and social interaction, settlers were organised under the 'block system', where about 30 settlers collaboratively harvested their plantations while sharing profits equally. However, in 1988, the government abolished the block system due to criticisms of unfair profit

distribution linked to varying work efforts among settlers (Mamat et al., 2016; Sutton & Buang, 1995). Shortly after, FELDA shifted from a social land settlement focus to an economic agribusiness strategy following an internal policy change and alignment with The Sixth Malaysia Plan (Sutton & Buang, 1995). By 2005, settlers began leasing their land to FELDA Technoplant Company Limited to manage their farms for optimal output (Barau & Said, 2016; Ying, 2014). By 2018, 50.1% of settlers had adopted this arrangement, addressing the issue of an aging settler population being unable to perform laborious plantation work (Government of Malaysia, 2019; Hashim et al., 2009).

4.1.3. Relationship between human-elephant conflict and poverty alleviation

The FELDA program, which was initially successful as a rural social engineering tool aligned with government economic policies, has led to significant environmental consequences that are evident today. Human-elephant conflicts in these landscapes highlight the tension between development and conservation, and the need to find a balance requires several approaches (William. M. Adams et al., 2004; Kochprapa et al., 2024). Currently, the situation is complex. Many original settlers are now too old to work on their plantations, and their children have migrated to urban areas for better opportunities (Sutton & Buang, 1995). While the lack of science-backed solutions for mitigating conflicts in agricultural areas has left FELDA with "a big elephant in the room". Meanwhile, actual elephants, needing to move between areas, are attracted to the crops surrounding their habitat, leading to conflict with settlers (Zafir & Magintan, 2016). These conflicts have consequences beyond economic losses. While studies on conflicts in agricultural landscapes often focus on economic impacts such as compensation schemes, loss quantification, and mitigation

measure effectiveness (Borah et al., 2022; Fernando et al., 2005; Pooley et al., 2021), they also reveal hidden social dimensions (Barua et al., 2013; Madden & McQuinn, 2014; Nyumba et al., 2020). These include opportunity costs and their effects on mental well-being (Jadhav & Barua, 2012; Sinha, 2021; Thondhlana et al., 2020), highlighting the multifaceted nature of human-wildlife conflict in developed agricultural areas.

The interconnectedness of factors in human-wildlife conflicts underscores the importance of an interdisciplinary approach. The responsibility for conflict management arises from understanding the system in which these conflicts occur (detailed in Chapter 5). By understanding local perspectives, policymakers and conservationists can create more effective and equitable strategies tailored to the specific needs and challenges of various community groups (L. A. Evans & Adams, 2016; Tripathy et al., 2022). Research on conflicts, especially for coexistence, requires less conventional methodologies and more interdisciplinary approaches (Bennett et al., 2017). The study of coexistence is limited by unfamiliar methods, such as qualitative techniques, self-reflexivity, and ethical rigor (Pooley et al., 2021). However, focus group discussions are especially valuable, as they provide deep insights into local communities' feelings and opinions, which are essential for understanding human behaviour and thought processes (Nyumba et al., 2018). Engaging with local communities ensures that these initiatives are more equitable and culturally sensitive (Dickman, 2010), ultimately fostering a sense of shared responsibility and participation in wildlife conservation (Rubino et al., 2020).

4.2. Methods

4.2.1. Data collection

Participant selection

A list of FELDA plantations that has had conflicts with elephants was obtained from the Sustainability Department at the FELDA Headquarters in Kuala Lumpur. Official letters were sent to plantation managers to explain the purpose of the study and to request permission to conduct focus groups. Upon agreement and setting a date, managers recruited participants over at least two weeks, based on their gender and experience with crop depredation by elephants in 2023. A participant information sheet was provided to aid recruitment. Although efforts were made to maintain the gender balance, more males were expected due to the nature of agricultural work. Focus group discussions were conducted in three West Malaysian states from May to August 2023, with a minimum of one full day allocated per session. All sessions were held at FELDA community halls prepared by the management. Moderators and facilitators were recruited via online applications and interviews, focusing on rapport building, speaking, and communication skills with elderly groups, particularly in Bahasa, Malaysia. Previous experience in conducting focus groups was prioritised over specific wildlife conservation backgrounds to ensure impartiality and encourage participant responses, as recommended by Nyumba (2018). A minimum of one online meeting was held before each session to share the basic knowledge of the discussion topic.

Procedure

The research team consisted of a moderator, a facilitator, and the author as the lead researcher. The moderator and facilitator alternated between sessions to avoid

information fatigue while I remained an observer. The moderator led the discussions, ensuring that all participants were heard, while the facilitator took timestamped notes. My role was to observe group dynamics and tone, occasionally interjecting questions on underlying issues, although the moderator led the sessions. Each session began with a formal introduction by the FELDA manager, followed by a brief explanation of the activity's purpose and Q&A for clarifications before the participants agreed to join. Upon agreement, the participants were seated at the main table with consent forms and pseudonym name tags. Sessions included two to eight participants, starting by informing them of their right to withdraw, the purpose of audio recording, and confidentiality assurances. Two sets of questions were prepared, starting with 15 minutes of opening questions followed by more complex ones (Table 8), with sessions lasting 30 minutes to one hour, depending on group size. Male and female participants were separated to reduce group bias, except for one session, due to the low number of female participants. These sessions were conducted in Bahasa, Malaysia. Approval was obtained from the Science and Engineering Research Ethics Committee (SEREC) (Code: NZ140222).

Table 8. List of questions used in the focus group discussion.

Intro questions (15 mins)	1. What are the types of conflict you experience here? 2. When did conflicts start? 3. Has it changed over the years? 4. When was the latest visit by elephants? 5. Have you had any significant losses? i.e. death of a relative, troubles with finances due to elephants?

Main questions (40 mins)	1. What are your main concerns when it comes to conflicts with elephants? 2. How are you currently mitigating conflicts? 3. In your opinion, what is the main cause of conflicts with elephants? 4. Are you willing to coexist with elephants? Describe what is an acceptable scenario for you to live with elephants 5. What would you like to see done differently when it comes to conflicts with elephants?

4.2.2. Analysis

A reflexive thematic analysis approach was employed to analyse the transcripts (Braun & Clarke, 2021). Initially, the audio recordings were transcribed in Bahasa Malaysia and then translated into English, retaining some words and notes in Bahasa Malaysia for accuracy. The recordings and transcripts were reviewed at least three times, with reflective notes documented in a separate memo for contextualisation and interpretation. The analysis followed the theoretical assumptions outlined by Byrne (2022) according to Braun and Clarke (2006), emphasising reflexivity, subjectivity, and creativity in knowledge production. These assumptions are crucial for maintaining process integrity and provided context on why this conceptualisation suits the research question (Byrne, 2022). As a researcher sharing an ethnic background with participants, I adopted constructionist epistemology, considering the bidirectional nature of language and relationships. This approach values recurrence and meanings derived from social and personal experiences. To interpret meaning beyond explicit participant communication, I adopted a critical orientation. Open coding (inductive

analysis) was performed using NVivo14, coding the data both semantically and latently. After coding all transcripts, the items were reviewed for context uniformity and shared meanings were identified. The codes were grouped into clusters to form themes that addressed the research questions. Codes appearing in more than six of the 12 sessions were prioritised, with less frequent codes considered supplementary, ensuring fair data representation and avoiding repetitive concerns from a single session or site. The entire reflexive thematic analysis process is recursive, involving revisiting steps, reconsidering or removing codes, and reanalysing themes (Braun & Clarke, 2021; Byrne, 2022).

4.3. Results

4.3.1. Participant demographics and session information

A total of 58 participants were involved in the discussion over three states in Malaysia. The age range of the participants were between 28 to 83 years old with a split of 36% (n=21) female and 63% (n=37) male. The participants from Johor, Pahang and Perak are organised smallholders from FELDA. A total of 13 sessions was successfully conducted in these sites, however, one session with six respondents was not included in this analysis due to a microphone failure causing the recording to stop after 12 minutes. The total number of session used for analysis is 12.

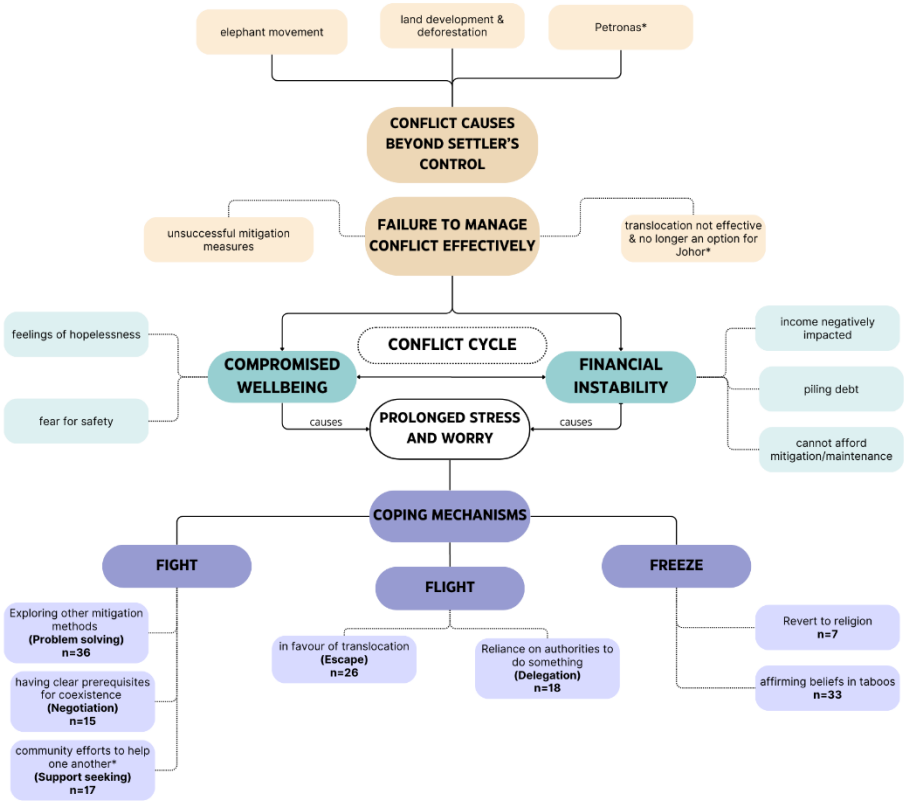


Figure 6. A flow chart of the themes developed through the Reflexive Thematic Analysis. The darker colours represent the themes while the lighter colours stemming from the themes are the codes generated from the transcripts. Note: (*) indicates themes relevant only in Johor.

4.3.2. Overview of themes

A total of six themes were identified during the analysis where five of the themes form a linked relationship. The two main themes (Figure 6, in yellow) represent the root cause of the challenge in mitigating conflicts in the three sites sampled. Two codes, namely 'elephant movement', and 'land development' were clustered to exemplify the common causes of conflict while 'Petronas*' was a code specified to Johor only. Settlers have a baseline understanding on elephant movement in the area and how these movements are interrupted due to land development. This in turn is believed to be the main cause of conflicts in the area. Next, all three sites shared similar experiences with unsuccessful mitigation measures and/or translocation

operations. Mitigation measures that were commonly tried and tested were electric fences and elephant ditches. In addition, each site had reported that translocation of elephants has happened at least once in their site.

The combination of these two situations have led the settlers into a state of financial instability and compromised wellbeing. These two subthemes (in blue, Figure 6) do not follow a linear progression but are in a continuum where a conflict cycle is observed. In facing financial instability, settlers face challenges such as piling debt, income being negatively impacted by the crop damages, and not being able to afford mitigation or maintenance of their plantation. This then contributes to a compromised wellbeing where settler's continuously fear for their physical safety and are left feeling hopeless. These two factors in tandem causes prolonged stress and worry faced especially for settler's who are above 60 years old.

How the prolonged stress and worry was processed is viewed as coping mechanisms. The categorisation of the coping mechanisms was based on higher order classifications of coping in Skinner et al (2003). According to Figure 7, the coded responses from the participants matched coping mechanisms such as delegation, support seeking, problem solving, escape, and negotiation. In this study, two other codes were categorised based on other lower order coping mechanisms such as the use of religion and superstitious beliefs also listed in Skinner et al (2003). All the coping mechanisms were then sorted in a fight, flight or freeze model for this study where 'fight'-based mechanisms are viewed as the positive, 'flight'-based as negative and 'freeze'-based as neutral representations of the participant's reactions to the prolonged stress and worry.

	RELATEDNESS		COMPETENCE		AUTONOMY	
	CHALLENGES to		CHALLENGES to		CHALLENGES to	
	SELF	CONTEXT	SELF	CONTEXT	SELF	CONTEXT
Behavior	**Self-reliance**	**Support seeking**	**Problem solving**	**Information seeking**	**Accommodation**	**Negotiation**
	Shouldering	Comfort seeking Help seeking	Strategizing	Study Observe	Cooperation Concession Committed compliance	Compromise
Emotion	Self-soothing Accept responsibility Concern for others	Trust	Encouragement Determination Confidence	Interest Optimism Hope	Acceptance	Blamelessness Taking other's perspective
Orient	Protection Shielding Positive self-talk	Appreciation	Repair Mastery	Prevention Planning	Commitment Conviction Endorsement	Decision making Goal setting Priority setting
	THREATS to		THREATS to		THREATS to	
	SELF	CONTEXT	SELF	CONTEXT	SELF	CONTEXT
Behavior	**Delegation**	**Isolation**	**Helplessness**	**Escape**	**Submission**	**Opposition**
	Dependency Demanding Clinging Pestering	Withdrawal Freeze	Random attempts Flailing Falling down the stairs	Flight Avoidance	Perseveration Rigidity Unresponsiveness	Aggression
Emotion	Self-pity Whining Shame	Loneliness Desolation Yearning	Self-doubt Discouragement Guilt	Pessimism Despair Fear	Self-blame Disgust	Projection Blame others Venting Explosion Anger
Orient	Abandonment Irritation	Cutting off	Panic Confusion	Procrastination	Obsession Rumination Intrusive thoughts	Reactance Revenge

Figure 7. The 12 higher order coping mechanisms in Skinner et al., (2003).

4.3.3. Conflict causes are beyond the settler's control

Land development and deforestation

The settler's shared similar sentiments across the three sites about land development and deforestation that is causing the lack of food for the elephants. The theme had a total of 30 items coded from 10 out of the 12 sessions. The participants are aware that forests, which is believed to be the natural habitat of the elephants are decreasing and therefore causing them to move into the plantations. The participants assumed that elephants and other wildlife usually stay in the forest and only move away as a response to the decreasing habitat availability. The settlers also added that the conflicts have only been more frequent in the (past decade or so) compared to when they were first settled in the area in the 1960s and 1970s.

(note: format of the quotes is according to study site and the participants ID, e.g. S4-P1 refers to Session 4, Participant ID 1)

Johor

S4-P1: *It's not only elephants in our backyards, the monkeys have a party there too, jumping around because the jungles are all gone, turned into plantations. Because of deforestation, their natural habitat is gone. That is why they are here in the village.*

Pahang

S6-P3: *These elephants, if they have their own habitat, they would not want to get into our plantation and run into humans. But its habitat is getting smaller and their number remains the same.*

Perak

S12-P1: *This is what happens when there's no food for them. Because the jungle has been deforested, it means there's no place for them*

Johor

S2-P3: *It can be said that since the reservoir's existence (in 2016) the incidents have increased. Previously my lot was only visited every 3-4 years*

Perak

S12-P4: *Elephant presence meanwhile are more sporadic. Sometimes they appear, many times they disappear. During the 90s there were no instances of elephant intrusion in the area. Nothing. And then from 2005 onwards, they started to become a problem.*

In contrast, the participants in Pahang experience conflict in different intensities and frequencies depending on where their plots are located compared to Johor and Perak. This can be seen by the two contradicting quotes below. Additionally, the presence of elephants does not always cause significant crop damage at this site.

Pahang

S7-P1: *For more 30 years you know. It has happened twice, the elephant was in the area then they left. They don't stay for long, maybe overnight then they leave in the morning.*

S8-P1: *Almost everyday they get into the plantation because our plot is border with the forest. At Bukit Sagu 1. We don't blame the authorities but this is our income but the management do nothing about it. Since early this year, its been twice.*

Elephant movement

The high number of items coded under 'Local knowledge on elephant movement' (46 references) and 'elephant foraging preference' (21 references) suggest that the settlers are observant towards this matter. They believe the elephants follow a pathway or a fixed route, continuously going in cycles. Although the elephants are not collared nor identified, the participants believe that the same elephants are using the same path implying that this is and will be an ongoing issue.

Johor

S3-P1: *But this route is the path of these elephants. It is their path, hence the elephants will always use it*

Pahang

S5-P2: *For me, I think there is no way to make the elephants not come, there is no way. Indeed, that is where its path is, meaning once or twice a year, it will pass through since this elephant follows a cycle.*

Perak

S12-P2: *From my experience with the elephants, intrusions occur seasonally. This year, they enter the area in June. Afterwards, they will leave for another place. Not long after, around this year still, they will reappear again. They have their own route, (unclear) when the time comes, they'll come here.*

*Petronas**

The settlers from the study site in Johor highlighted that the main cause of conflicts is not dependent on the elephant movement patterns, but the deforestation and lack of food options available for the elephants. All settlers pointed to one main cause of the conflict, which is a development project in 2016 reclaimed a large area of land as a water reservoir to an industrial area more than 100km away. A total of 23 references on "Petronas" from four sessions were mentioned as the cause of conflict in the area. The settlers shared that there was no conflict with elephants before 2016. Additionally, during the process of land requisition, only a few settlers in this plantation received compensation for their reclaimed land. The discussions around this topic caused emotional responses, where some participants remained silent, avoided eye contact and one participant was teary eyed. The participants explained that other settlers, whose yields were not previously vulnerable to crop damage by the elephants, are facing the consequences of the project without any mitigation measures or compensation.

S1-P6: *Before then all the land area was palm plantations, after the Rapid projects in Pengerang by Petronas, the plantations were taken by Petronas and made into a reservoir. The area taken was around 20 acres. What I mean is that ever since the dam was built the elephants have been frequenting our area in large groups with their families.*

S4-P1: *In her (referring to P3) instance, none of her property was reclaimed so she did not receive any compensation however all her crops have been destroyed by elephants and she still has not received any compensation. She had no compensation from the project and now does not have any income from her plantation.*

The settlers expressed disappointment towards the management's oversight of the issue that left them unequipped to mitigate the conflict. This added on to the perception that they had no control over the situation and were not consulted about the issue.

S3-P8: *Felda has signed, and the settlers have signed. The contract has been issued earlier, but they did not think of 'what would happen to me and my neighbours? Will you be responsible for what will happen to my friends and neighbours?'. They should have thought of that before we signed it. There was none of that in the contract they signed. I wouldn't know, I didn't have to sign it. But this is my opinion.*

Moderator: *Yes, it is quite an unexpected consequence*

S3-P8: *Yes, if there was such a clause, we could claim our rights and hold them responsible*

4.3.4. Failure to manage conflict effectively

Unsuccessful mitigation measures

The participants reported the use of several mitigation methods such as electric fences, elephant trenches, and more traditional methods like burning tyres. The ineffectiveness of these mitigation methods was commonly shared across all three sites.

Johor

S3-P8 & P5: *Previously we tried electric fences, trench, making hajat prayers and many more efforts yet conflict still happens.*

Perak

S10-P3: *The other plantations in the area, they face the same problem too. There is no solution! The elephants are already used to the electric fence. To them it's just like an ant's bite. The elephant trench? We do not know what happened to that, if it's not wide enough or what the issue is.*

Pahang

S5-P2: *FELDA has made some barriers to keep the elephants away like digging drains, but this animal's brain is sometimes smarter than humans. The elephants will dig and make a path to leave the ditch, they can do it. When we put up an electric fence, the elephants knock the trees down and ruin the wires, so they could pass through. So, the problem is that, even until now FELDA can't solve it, there is no other way to do it.*

Participants from Johor and Pahang repeatedly mentioned the elephants are 'smart' (21 references) and therefore causing the mitigation measures to fail.

Johor

S2-P1: *They're smart, they can just push a tree down onto it (electric fences).*

S2-P2: *They're smart, they would slide into the trench, when they're in the trench the just go along and climb up when they find a low point.*

Pahang

S5-P2: *I think it's 3-4 meters deep they are digging the trench, and the elephant will find a shallower place, it won't cross like this (physically demonstrating), it will go down on its sides. If there is a cliff, they will follow the cliff. And when they need to pass through, their hands go first. I saw it myself at FELDA Sagu 6 how the elephants go down the hill. It will angle its arms like this, push the soil forward and make like a drain. The mothers will go first then the calves follow. And to climb up they will look for a place that's less steep and it will do the same thing. It's a smart animal.*

S7-P3: *We've got many different steps, one of it in terms of safety. In the past we have put up those electric fences and even the ditch. The ditch we have done but if there are trees next to it, it will not work. The elephants are smart. They will push the trees down, for sure.*

S7-P6: *They (referring to the elephants) outsmarted the electric fences too, it knocked down a tree.*

Most participants spoke in an enthusiastic manner when sharing about how the elephants manage to 'outsmart' the fences and trenches despite feeling frustrated. A participant also physically demonstrated how an elephant would use its legs trying to lower itself into the trench (ie. S5-P2).

In Pahang, a participant shared a vandalism incident that caused damage to two existing mitigation methods (blinking lights and fences at the border of the forest reserve). According to him, the blinking lights were successful at mitigating conflicts with elephants, however, the effort fell short when the settler's felt demotivated to continue buying the lights as it was repeatedly stolen.

> Pahang
>
> S5-P3:
>
> *We are not dealing with animals, these wild animals; we are dealing with humans. If people cooperate, this blinking lights can be used to repel animals. The farmers have to bear the cost of buying these blinking lights multiple times. It goes missing, they have to buy, it goes missing again, they have to buy again. In the end, each of them was disheartened and given up. The farmers are the ones who bear with the costs, only 1-3 of them. If the cost is a thousand then multiply that by 50 people. How much have they already spent on it and people keep stealing it! I am the one who helped them fix the light on the fence together with the (FELDA) staff. We are fed up too. People were also accusing that the staff is not doing their jobs.*

Similar issues were brought up in one of the sessions in Perak. However, considering the low number of references to code for 'vandalising or stealing property', this issue serves as a reminder of potential challenges when implementing mitigation measures in new sites.

Translocation not effective or translocation is no longer an option

Johor and Perak sites have translocated elephants as a form of mitigation measure through the Department of Wildlife and National Parks (DWNP). The elephants are

usually released to the nearest protected area. However, many of the settlers believed that translocation is not effective because the elephants will find their way back (9 references) to the plantation as shared below.

Johor

S4-P3: *When relocated, the elephants always find their way back here.*

Perak

S10-P3: *But you have heard them say (referring to translocation), if that happens, the elephants will find a way to come back.*

The settlers also highlighted the high cost to translocate elephants that they or the management would have to bear (13 references).

Johor

S2-P3: *We and FELDA cannot afford to relocate them at RM50,000 per elephant.*

Pahang

S5-P3: *If we move the elephants away it will cost RM 50,000, RM 60,000 per elephants but what if there are 30 individuals? There is no way FELDA can pay for that cost, if FELDA pays for that, technically the farmers pay for that. There was once we had a meeting, they could remove the elephants but under the condition that the farmers pay for it, are they willing to bear the cost? So for Rm 50,000 they would split it, FELDA pays RM 30,000 and the farmers the other RM 30,000. Even that, we were not willing.*

Perak

S12-P6: *But here, those responsible for the relocation (unclear) to finance the relocation are under the state assemblyman's budget. To relocate an elephant cost around RM 10,000 because of the cost to buy the chains which are expensive, and the tranquilisers also has to be purchased, each dose cost around RM 300.*

In Johor, a participant also shared that they are no longer allowed to translocate elephants out of the state by the instructions from the Sultan (6 references from 2 sessions)

S2-P1: *Another thing is that the elephants are under protection from the crown. You're not allowed to relocate them too far away, so we relocate them to Mersing and within 4 days they've found their way back here. (All participants confirm nod in agreement) Previously we would relocate them to Pahang, but we can no longer do so. It's because the Johor crown believes that elephants would go extinct in Johor. He doesn't want that. Now we can only relocate to Mersing, Endau Rompin and they're back in 4 days.*

The challenge in managing conflict is multifaceted in these landscapes and the following themes presented are interrelated to one another.

4.3.5. Financial instability

Income negatively impacted

As a result of living in shared landscapes with elephants without an effective conflict management plan, crop damages cause financial losses to the settlers. The codes 'crop damages by elephants' and 'income negatively impacted' is referenced 49 times each from 10 out of the 12 sessions. While the degree of losses is varied from site to site, financial instability is mainly driven by the cost to replant damaged crops that had

little to no protection against crop depredation by elephants. The settler's expressed frustration from the ongoing costs to replant the crops multiple times without receiving any yields to make up for their expenses.

Johor

S3-P8: *For me as an example, in terms of finances, my income is definitely disrupted. I only made RM90 this month. During Eid last month, I received extra RM200 or RM100*

S1-P3: *Currently for Block 18, approximately 70 acres is affected by elephants. 70 acres of yield roughly amounts to about RM30,000 loss of earnings a month. When you times that by 5 or 6 years?*

Pahang

S5-P2: *Right now, the ones that the elephant is eating is not a tree that has already been harvested, but trees that have not fruited yet. If the tree has produced fruits, then the elephants are not interested. Then the actual loss is just the value of the tree. Each tree is valued around RM500 usually. If a palm tree is pushed over by an elephant, we lose about RM500.*

S7-P6: *As for me, this elephant when it destroys 1 palm tree, here we only have palm trees right, so 1 palm tree can generate 1 bunch per month which is 12 bunches in year. The tree should produce yields for 15 years, in 5 years it means the elephants has destroyed 60 bunches. So, it's our loss when we have to cut the tree and replant it, we lose up to 3 tons on 1 tree. It's just that we're short with our income, too short. This affects us in the long term.*

Perak

S13-P4: *When elephants intrude an area, they will eat all anything, affecting our income streams. It's a lot that we must shoulder, yes more than half. We must shoulder the cost, even if it means we suffer a deficit.*

S13-P6: *It's a loss because of the need to replant and the heavy work into fixing the place. The returns of the plantation will be delayed, reducing the income.*

S13-P5: *Because when the tree is destroyed, it's back to square one. They will have to replant the tree. It will incur costs that we have to shoulder.*

Piling debt

Participant S3-P8 in Johor showed a physical copy of his pay slip that amounted a total of RM 90 (~USD 20) after all deductions to the management. The deductions were to pay for a loan that was given to him to replant his crops by the management. However, quick calculations during the discussion showed that the amount of debt the settlers have accumulated are not payable within their lifespan and must be carried forward by their children.

Johor

S1-P3: *The rough average of monthly yield is about RM2,000, but our expenses (to harvest) are very high. If I were to calculate it and tell you, it would become more than the yield. Sometimes the management (FELDA) will not charge the costs immediately whereby they will bring it forward as a debt so that the settlers are still given a salary. If they cut all costs, there would be (pause) nothing more than RM50.*

Pahang

S7-P3: *Elephants are very clever; elephants just push down a tree then they can pass through. That was the steps we had to do but the cost of it all was on us. They do all this during replanting in FELDA's system. When the trees are like this (physically demonstrating tall trees), they are tall already. If we were to add on these cost, then our debt goes higher too. Then the farmer communities will be in debt to FELDA a lot more, maybe around RM 100,000 to RM 200,000.*

Perak

S10-P1: *FELDA does the job for us but then it adds up as debt. In tens of thousands of ringgit which means we will be in debt even after we die and up to our grandchildren's lives.*

S13-P5: *The debt will never end because they (FELDA) are the ones incurring it. When the debts are settled, the old trees are cut down and replanted. That will incur debt again. When does it end? Like with buying a car or a house, when we pay it off, there's no more debt with the bank. When the palm oil trees have matured, we have to cut them down and replant them. We got into debt again. It's a never-ending cycle… But if there's an elephant attack, they could slash the debt in half. It's an initiative for the settlers that are affected by elephant attacks (for Felda to consider)*

Cannot afford mitigation measures or maintenance

The ongoing debt paired with the uncertainty of their future yields contributes to the next code under this theme where the settlers cannot afford mitigation measures or the maintenance of their own plantations. The financial instability not only prevents the

settlers from employing mitigation measures but also hinders the maintenance of their plantation.

Johor

S2-P2: *Even the FELDA management are stumped as to how to handle this matter, whether to replant (the trees) in their plantations and wonder whether the crops would just be eaten again. They would double electric fence up, but it would cost a lot. They are currently looking for the funds. It should be easy enough to replant but not if it were to be eaten by the elephants…*

S4-P4: *The minister said that we should provide food for them (the elephants), their favourite foods like sugar cane and pineapple so they do not threaten our livelihood but for how long should we provide food for them? We can't afford to do that.*

Pahang

S5-P1: *To make these fences is not cheap, it is costly. It means we must accept this reality, we share the area with the elephant, so we must take care of our manners. In my opinion, don't talk boastfully and don't do indecent things or the things we know would make the elephants angry.*

Perak

S10-P1: *We have replanted the trees in this area four times, and every time we replant, we must bear the cost.*

Without the certainty that their current livelihoods have a manageable future, many of the settlers expressed worry and feelings of hopelessness that contribute to the following theme.

4.3.6. Compromised wellbeing

Feelings of hopelessness

The compromised wellbeing of the settlers was separated into two subthemes. The first code 'feelings of hopelessness' was referenced 52 times from 9 out of the 12 sessions. The participants expressed a frustrated undertone in their speech when discussing about mitigation measures that did not work. Many implied that they have done everything they could including reverting to religious ways.

Johor

S1-P6: *It's not like we didn't do anything, we even held group prayers in the plantation.*

S3-P8: *One day, I followed the workers went out to collect the fruits from my trees. I sat there and cried, then someone asked me "What's wrong mak cik (aunty)?". In my heart there was this sunken sadness. In the middle of the road, I saw the elephant's dung. We were the ones who felt it, the ones who went to the farm. I went home with a heavy heart that day, truly I could really cry thinking about it. The sadness, only God knows. Others gain their rizq (fortune) but why am I given such travesty. Nonetheless, we were grateful, we made doa (prayers). What we wished for is by making salah(prayer) so this burden would ease.*

Pahang

S5-P2*: For me, I think there is no way to make the elephants not come, there is no way. Indeed, that is where its path is, meaning once or twice a year, it will pass through since this elephant follows a cycle.*

Perak

S10-P1: *We have done all types of efforts like reciting religious scripts in the plantations.*

S10-P5: *We do not know who else to talk to.*

The settlers biggest worry is that the matter will go unresolved and there is no end to it especially for those who have been struggling with conflicts for many years. From the responses below, it appears that the settlers have somehow accepted their fate although in distressing terms.

Johor

Moderator: *In your opinion, what is the most worrisome thing about this conflict?*

S1-P6: *That this matter will continue to go unresolved. Simply put, this issue is unresolvable. FELDA keeps telling us to bring it to our plantation manager. (We are) afraid that an issue may arise if we don't have children here to take over.*

S3-P1: *These elephants have lived here years, and we disrupted their path. We cannot control the situation, and we know how sensitive these elephants are.*

Pahang

S8-P1: *We believe the plants they ate are their part. We can't get angry. We don't get angry anymore towards the elephants. It's been 2-3 months since the last incident. Whatever left is our part. We can't do anything about it anymore.*

S8-P2: *We'll just share our livelihood. Even the management can't do anything, let alone us.*

Perak

S10-P3: *The other plantations in the area, they face the same problem too. There is no solution! The elephants are already used to the electric fence. To them it's just like an ant's bite. The elephant ditch? We do not know what happened to that, if it's not wide enough or what the issue is. We really think that moving them away is the only way if we want to solve the conflict. Since 1969 until now, it's been the same. We do not have a solution, and this problem cannot be solved.*

S10-P2: *We have given up.*

Fear for safety

In addition to feelings of hopelessness, participants expressed fear for their physical safety. This code was referenced 34 times from the 10 out of the 12 sessions held. The concerns around safety were not limited to their individual safety but also extended to the safety of the labour workers in the plantation. Participants also expressed worry or fear that the elephants intrude into the settlement areas where they live. Others shared that they no longer visit the plantations because they fear they might encounter elephants.

Johor

S4-P1: *As long as they (the elephants) are around, we do not feel safe, as if we were living in the past when wild animals were all around. When we first moved here, I never saw a single dog or boar, only ever heard stories from other people, but now they are always around seen in our own back yards. Macaques and monkeys, the large monkeys can be very aggressive, they retaliate when we try to shoo them. We feel threatened in our own homes.*

Pahang

S5-P1*: We farmers are too afraid to enter the farm in case we might encounter the elephants.*

S7-P2: We're just feeling worried, that's all, we are worried that the elephants will enter our village. If it so happens right in front of our house, they would also damage the fruit trees there right? You know they say when the elephants come to the houses when they might be in musth, its worrying. Also we do not know when to expect the elephants too, they could arrive all of a sudden.

Perak

S12-P4: *Previously, there were no elephants in the area (unclear) when there were deaths caused by elephants, it was usually accompanied by a loud sound of falling leaves. People would run away as the sound of falling leaves indicates that elephants are nearby. These incidents created trauma and anxiety among us. Whenever we tap rubber.. (unclear) our elders are extra cautious and easily spooked. That was what we meant by being traumatised (of the elephants)*

S13-P5: *Every night the boys would go there. The workers and the Felda manager would go there. It's quite dangerous. It's quite dangerous to patrol Felda Lasah at night.*

Incidences involving human casualties due to elephants was only brought up in Perak. The incident happened in the 1970s. Most of the settlers no longer work on their plantations and rely on labour workers which is a possible explanation for the number of encounters and casualties.

Perak

S10-P3: *It (conflict with elephants) was bad until someone got trampled by elephants.*

Moderator: *There was an incident?*

S10-P1, S10-P2, S10-P3, S10-P4, S10-P5, S10-P6: *Yes, yes, yes*

S10-P3: *I think it was around 1970s.*

Johor

S4-P1: *Alhamdulillah (Praises to god) there have not been any deaths yet. Whenever someone sees elephants they flee quickly.*

Pahang

S5-P3: *When we talk about elephants attacking people, so far there's none here. Alhamdulillah (Praises to god).*

Prolonged stress and constant worry may trigger a reaction that require settlers to cope in a few different ways. The conflict cycle between these four themes led the analysis to detect possibilities for coping mechanisms in the community of settlers.

4.3.7. Coping mechanisms

During the discussions, the moderator followed the flow of questions as listed in the methods section. However, the discussions often circle back to a few recurring topics where participants carried the conversation to. These responses stem from the participants shared experience, where they expressed feelings about the mitigation measures that were tested but were not successful. The analysis revealed responses that were coded into subthemes of coping mechanisms. To help conceptualise the data in relation to the stressors, these coping mechanisms were simplified to fight, flight or freeze. In the fight category, coping mechanisms such as problem solving, negotiation and support seeking were observed. A total of 36 reference were coded as exploring other mitigation measures where participants shared ideas (despite being possible or not) on how to solve this problem, exhibiting problem solving traits.

Johor

S2-P1: *Profits (from other blocks) should be shared to aid our income.*

Pahang

S7-P3: *When we stay in FELDA, the main thing is that FELDA should do engagements with whoever, the government or NGOs. They could work together with NGOs to overcome this problem. Another thing is, if we want our aim to be able to coexist with elephants, that means FELDA or other agencies or NGOs must do something for the elephants so they have a dedicated place that's enough for the, Like the zoos people say. In the FELDA areas, we have a lot of land that is abandoned around 10 acres that can be that place. A space for elephants to stay and if they do not stay and we move them around, since we are in the FELDA community, there is FELDA Cheneh, FELDA Cheroi in*

Kuantan and all FELDAs. If the elephants walk around, they will definitely pass by Chero. They will most likely go through FELDAs, and all FELDAs must do the same. Then only if we do this for a year or two, we will see the elephants and bring our families to see them. They would be used to humans by then. Just like the zoo, nothing bad happens there. There are no raging elephants, people give them food and they do not flip their trunks, just steady. I think that should be it.

Perak

S12-P5, S12-P4: *My brothers have high hopes (for the future). It is better if the university, PERHILITAN and the Malaysian government collaborate and work to create an innovative solution like using drones to detect elephant movements. That would make it easier for us to control the situation. If there's no collaboration between agencies, the problem will not be solved. If there's collaboration between all four agencies, I think we can solve the impossible.*

Next, 15 items from 7 out of the 12 sessions were coded where the participants shared what is needed to coexist with elephants highlighting the process of negotiation. This code also highlighted that the participants do not mind sharing a landscape with elephants if conflicts are under control and their income is protected.

Johor

S4-P1: *We don't want it to be like this, if the elephants remained here but did not affect our livelihood did not destroy our crops we can live with them.*

Pahang

S6-P3: *We can coexist with the elephants, but the monitoring is important. First and foremost, the ditch and electric fence. PERHILITAN must always monitor is there's any elephant's entry and be alert so that they will not enter the plantation.*

Perak

S10-P5: *They (the elephants) want to live too... We would not have any complaints if they do not do anything to us*

In addition, participants in Johor and Pahang shared their efforts to help one another regardless of age groups in a total of 17 references from 6 sessions. Support seeking behaviours in communities can be seen through actions such as making yearly donations during the festive periods, attempts to bring the matters forward to the Headquarters of the plantation company or through a local council.

Johor

Moderator: *Are the younger generations involved in handling the conflict between humans and elephants?*

S1-P2: *Yes. for example, my son is the block leader and has made some trips to HQ (FELDA Johor Bahru). He's the one who goes around with this issue.*

S3-P1: *The community here, when we are celebrating Eid or Ramadan, our friends would collect money as funds for those are fasting as for those who are celebrating Eid. But that happens only once a year, not every month.*

Pahang

S7-P3: *Now we have JKKR which stands for Jawatankuasa Kemajuan & Keselamatan Rancangan (Scheme Development Committee) in FELDA Bukit*

Sagu 2 which is managed by the Land Scheme Manager. Everything that happens in the plantation and the villages are discussed and we gathered a community to always be on guard. If we go to the plantation and see an elephant, we will make a report. Now that we have WhatsApp, we sometimes take photos of the elephant and share. That is the first step but in terms of actions like driving the elephants away we have not done that yet. Only when we have enough staff and people, we will call the relevant authorities, usually PERHILITAN. As for the surveillance the leaders of each blocks and as members of the JKKR we will make the report to inform how many individuals, which area, are there any calves, and other details in that situation. After the damage has been done, then we report that too. That is all the action we take in the early stages.

In contrast, the subtheme flight, settlers often opt for the delegation of their problems and often expressed their reliance on the authorities to solve this problem (referenced 26 times).

Johor

S2-P5: *We can't do anything, just sit at home all day, it's not like we work other jobs. And all of us have FELDA manage our plantations, hiring workers etc. We no longer have the capacity/will to manage this issue*

Perak

S13-P4*: Yes, this issue has been ongoing for very long. The only time the state government helped us was the construction of the electric fence the other day. They were only here for two to three days. It was not effective at all. Hopefully they will help us with a long-term solution. If we do that though, the cost will*

go up anyway. Same thing. We really need to have a good strategy. A definitive one. Animals are actually smarter than us. That's my hope

Under the same subtheme, total of 18 references were coded for participants being in favour of translocation, despite others sharing that translocation is not effective. In addition, some participants are suggesting the permanent translocation of elephants into zoos or closed sanctuaries in order to solve this problem, despite other participants highlighting the extensive cost to main such sanctuaries.

Johor

S2-P3: *The only way is by sending them to Thailand.*

Pahang

S6-P5: *I'd suggest to just move the elephants to Kuala Gandah, the sanctuary.*

Perak

S10-P3: *So if they can, they should take the elephants away.*

Lastly, two codes were categorised as a freeze coping mechanism that did not belong to any higher order coping classifications mentioned above. Although no questions regarding this topic were asked during the discussion, participants repeatedly shared their beliefs in taboos related to elephants. Participants also expressed worry about using the word 'gajah', (elephant in Bahasa Malaysia) during the discussion because they believed it would invite the elephants to their plantation. Affirming believes in taboos were coded in 33 references from 9 out of the 13 sessions and measures related to religion were coded in 7 references from only 5 sessions.

Johor

S2-P3: *The human elephant conflict has no solution. There are things protecting them, they move on instinct, they are smart. Like us humans some are smart some are not, elephants use instinct, which is clearer, they have a better instinct than us ("mata hati" implying they have god's protection). We cannot see the future, we can't question it.*

Pahang

S5-P3: *Maybe my brothers here will agree when I say I think elephants have a gembala (protector). I'm worried if I say this right now, a little bird will inform the elephants. Our elders used to say, be careful what you say especially with the elephants. It is as if the elephants have someone reporting to them, if we say anything bad, they will come. You don't believe me? Ask my brothers here, it's true, if we talk bad about the elephants, or get angry or curse at it, the elephants will come.*

Perak

S12-P4: *However, if we observe previous events, usually with the elephants, they have some sort of instinct. If a settler is being boastful, elephant will go to the house of the person who is being boastful. The incident where someone passed away, the person was already home from the plantation, but the elephant followed. He was the type to speak boastfully.*

As a final resort, the participants shared their efforts through religious methods such as performing special prayers in the plantation or on their individual basis, in hopes to reduce conflicts.

Johor

S3-P8: *We are not angry at the elephants if we encounter them in the plantation. We just recite prayers and maybe question why the elephants chose my plantation over the others, but that is all. We cannot get angry at the elephants because things have already happened. We should not get angry.*

S4-P1: *We've even organised prayers in the plantation, we pray to god so that he distance us from this hardship. the whole area has become barren*.

Pahang

S5-P2: *In fact, this elephant conflict has been going on since 1987. The elephants would come by and we had to call a pawang (a shaman, who specialises in weather and wild animals and spirits) to drive him away. His name was Pokleh. The elephants were in this area to cause trouble and at that time there were not many living people here yet. So, he managed to drive the elephant away and the elephant ran away and stopped coming. This was a while ago and if I remember correctly, the elephants have not visited this area for 10 years.*

S6-P: *We also did some prayers. This is also some kind of effort on our end.*

Perak

S12-P2: *During the first replanting process, we had to be awake at night. At night we would read the Quran and chase the elephants away to the nearby jungle.*

S2-P1: *We are a part of god's creation, so are elephants. We can only put our trust in god, because we can no longer do anything else, only god has the power.*

4.4. Discussion

Conflict causes beyond settler's control – *land development and elephant movement*

In this study, over 65% of the participants were first-generation settlers of the FELDA scheme, aged 60 and above, who had resided in the area for at least 30 years. These settlers shared their observations about landscape changes since the early 1970s, with many agreeing that land development and deforestation were the primary causes of conflict. Since FELDA was established in 1956, lowland forests, which are prime elephant habitats (Saaban et al., 2011), have been prioritised for agricultural development (Aiken & State, 1994). Although FELDA ceased new land development in 1991, except for unused village land (Sutton & Buang, 1995), Peninsular Malaysia continued to lose 0.9% of its forest cover annually from 2000 to 2010 (Miettinen et al., 2011).

These factors have led elephants to inhabit areas where plantations and forest fringes meet, resulting in access to high-value crops such as oil palm, and causing financial losses to settlers (Tennakoon et al., 2015; Zafir & Magintan, 2016). The situation is further complicated by settlers' dependence on FELDA for plantation management due to their advanced age, which adds pressure to FELDA while limiting settlers' autonomy over land development decisions. Without proper management and knowledge of local elephant movement patterns, conflicts are likely to persist.

Failure to manage conflicts effectively- *Unsuccessful mitigation measures and translocation*

The persistent challenge of elephant intrusions into plantations has led to the adoption of various mitigation measures by FELDA, including electric fences, elephant ditches,

and, specifically in Pahang, LED blinking lights attached to the fences. Despite these efforts, elephants have demonstrated the ability to overcome physical barriers, a problem that is not unique to Malaysia. The settlers observed the elephants using tree trunks to disable electric fences, thereby reducing the voltage strength running through the wires. This behaviour is also observed in places like Sri Lanka's Udawalawe National Park, where elephants were observed targeting weak points and their agility to push fence posts (Ranjeewa et al., 2024). Subsequent research efforts have focused on developing detection methods for fence damage, ranging from simpler methods utilising capacitive sensor systems to detect vibrations (Tennakoon et al., 2015) to advanced technologies such as time-domain reflectometry to accurately locate fault points (Kiarie et al., 2024). In Johor, the establishment of a local response team by FELDA is a step forward, however the financial and logistical challenges in maintaining fences remain. There is preliminary research on the potential of virtual fencing, which detects elephant movement through laser beams and theoretically repels them by playing warning sounds, such as bee noises. However, the efficacy of these fences is yet to be tested in the field (Firdhous, 2020). An evaluation of various fence designs revealed no evident correlation between their efficacy and the construction design. Instead, effectiveness depends on an elephant’s prior encounters with fences (Thouless & Sakwa, 1995). Interestingly, unconventional tactics like fence removal have successfully reduced conflicts at Melangking Oil Palm Plantation (Abram et al., 2022), with similar strategies allowing free elephant movement across mature plantations and fragmented landscapes in Sabah, offering promising avenues for conflict mitigation (Cheah et al., 2021). Overall, the use of fences should merely act as a warning sign for elephants rather than as a physical barrier (Thouless & Sakwa, 1995) and should not be the only tool to manage conflicts.

The elephant behavioural responses to the trenches were similar to those observed with fences. According to settlers and plantation managers, elephants choose shallow crossing points to move between the plantations and forests. Studies have shown that trenches are effective in reducing elephant crop foraging in Kibale National Park, Uganda. The success of trenches depends on the frequency of maintenance, dimensions, and the type of crop adjacent to the trench (A. Rogers et al., 2023). In Perak, the trench was expanded to a depth of 12 ft from the previous 8 ft, aligning with the criteria used in this study as an effective barrier. Thus, the newly constructed trench as of September 2023 is anticipated to be an effective measure.

The settlers in Pahang turned to the use of trenches after experiencing vandalism and theft with the use of blinking light deterrents. They found that the use of blinking lights on fences was an effective measure to deter elephants from plantations. An experiment in Botswana observed that elephants were less likely to enter fields with solar-powered strobe light barriers despite the possibility of selection bias (T. S. F. Adams et al., 2021). Nevertheless, repeated thefts and fence damage led to the discontinuation of this method, highlighting the need to address the root causes of vandalism to effectively protect any costly deterrents in the future. Traditional methods, such as using firecrackers and burning tyres, and even spiritual measures, such as prayers in the plantations, also failed to prevent elephants from entering the plantations.

Despite understanding the causes of conflict and the nature of elephant movements, settler communities' distress stems from the failures of these methods in deterring elephants. Unresolved issues may escalate tensions between settlers and wildlife authorities, especially if recurring issues are not satisfactorily resolved (Zimmermann et al., 2020). Approaches to conflicts will need to go beyond providing practical

solutions and focus on building constructive relationships to address past issues (Zimmermann et al., 2020)

Between 2015 and 2021, authorities translocated 271 elephants due to conflict, with a breakdown of 54 in Perak, 49 in Johor, and 47 in Pahang, according to PERHILITAN (2023). In this study, only Johor and Perak FELDA sites translocated elephants from their plantations. However, the continued presence of elephants leads settlers and managers to view translocation as an ineffective conflict management tool. The lack of monitoring after translocation impedes the ability to identify the elephants that return. However, another study demonstrated the involvement of translocated elephants in conflicts after their release (Fernando et al., 2012). The collared elephants exhibited varied behaviours where "homers" returned to the captured site, "wanderers" ventured beyond their normal range and "settlers" established new home ranges, collectively exacerbating and propagating conflicts. Additionally, unpublished data by MEME on GPS collared elephants had similar behavioural findings.

A population viability study emphasised the importance of prioritising methods other than translocation to prevent conflicts. This recommendation stems from the fact that, despite hosting Peninsular Malaysia's second-largest elephant population, the increasingly fragmented landscapes mean that any removal could risk the extinction of local populations (Saaban et al., 2020b). Fortunately, settlers in Johor report that the Sultan prohibits the translocation of elephants and other wildlife out of the state. This said prohibition emphasises the urgency of finding alternative conflict mitigation strategies and the critical importance of fostering coexistence to ensure the survival of elephants in the area.

While often considered a 'first-aid' solution for conflicts, the limited success and high costs of translocation are an increasing concern for settlers. As wildlife authorities decide to reserve translocation operations for situations that involve safety risks (PERHILITAN, 2023, the costs of additional translocation measures in agricultural landscapes could be incurred by the settlers and plantation managers. The logistics of the translocation operation can cost up to RM 40,000 per elephant, where almost half is spent during capture and the rest during relocation (Saaban et al., 2011). Multiple factors contribute to settlers' hesitation regarding translocation efforts. First, the possibility of incurring more debt by covering these operations' costs makes them wary. Second, the continuous income loss from elephant crop depredation hinders their ability to fund costly and possibly ineffective measures. Despite these concerns, the persistence of some settlers in viewing translocation as the sole viable solution highlights complex and divided perspectives within the affected communities. This situation emphasises the need for approaches to comprehensively manage human-elephant conflicts by considering both the ecological and socioeconomic dimensions of the issue (this will be discussed in detail later).

Financial instability- *income negatively impacted, piling debt, and cannot afford mitigation methods*

The Department of Wildlife and National Park estimates conflicts in Peninsular Malaysia caused RM 42.5 million in damage to oil palm trees between 2015 and 2021, with 2019 alone accounting for RM 14 million of these losses. However, these figures underestimate the full economic impact, as they exclude the associated management costs and potential yield losses. Due to physical limitations from old age, settlers in this study relied on FELDA to manage their plantations, and the operational costs were deducted from their monthly income. The results highlight two issues for settlers in

this arrangement. The first is direct losses from reduced yields and inability to replant new trees without incurring debt to management. In response to the conflict over the past years, FELDA oversaw the replanting of most settlers' plantations at least once. However, young oil palm trees are exceptionally vulnerable to crop depredation by elephants in the first five years (Ghani, 2019; Tan, 2016) and could potentially prolong conflicts in the area. In the absence of effective mitigation strategies, settlers' newly planted plots experience significant losses owing to elephant-related crop damage. Since oil palm trees take three to four years to start producing yields, the increased frequency of conflicts further delays the income from these yields (Sinha, 2021).

Additionally, the findings reveal that the continuous cycle of replanting and unsuccessful mitigation burdened settlers with accumulated debts. The main purpose of FELDA's inception in 1957 as a land settlement scheme for rural development was to alleviate poverty. However, the accumulated debt because of poor management of conflicts with elephants will take multiple generations to pay off and start poverty cycle might begin again. This finding was unexpected and further highlights the importance of understanding the socio-ecological dimension of conflict (Barua et al., 2013; Galley & Anthony, 2024; Sinha, 2021). As mentioned earlier, effective measures to reduce plantation conflicts have not yet been identified at the study sites. Consequently, settlers face continuous financial challenges while they struggle to decide the future direction of their plantations.

Compromised wellbeing- *feelings of hopelessness and fear of safety*

The results highlight the psychosocial effects of settlers caused by the failure of mitigation measures to reduce conflict. Settlers expressed feelings of hopelessness due to crop damage, quoting that 'they have done everything' and 'there is no solution'.

Studies have demonstrated that feelings of hopelessness may stem from shared experiences, the contagious power of emotions, and a lack of control (Mair et al., 2012). The settlers, dependent on FELDA management, often meet at community-level meetings where the direct impacts of conflicts are shared and discussed. These social interactions, along with the lack of control over mitigation measures, may affirm feelings of hopelessness in solving the issues at hand. Additionally, feelings of fear and safety concerns are commonly reported in communities dealing with conflicts in other elephant range countries (Borah et al., 2022; Fernando et al., 2005; Li et al., 2018; Thant et al., 2023). Even though most settlers no longer work daily in their plantations, their safety concerns primarily stem from the perceived threat of elephants encroaching on their settlements rather than issues within the plantations themselves. Human casualties caused by elephants at these sites were reported in only one of the 13 sessions conducted. Studies investigating psychological and social impacts reveal that unaddressed human-elephant conflicts can cause severe mental health illnesses (Jadhav & Barua, 2012) and psychological stress from fear of safety (Sampson et al., 2021; Thondhlana et al., 2020). The negative impacts of conflicts on settlers are less traumatic than those experienced in India (Chowdhury et al., 2008; Jadhav & Barua, 2012) however, the combination of financial instability and compromised well-being has led settlers into a state of prolonged stress and worry.

Coping mechanisms- *fight, flight or freeze*

A repetitive pattern was observed upon reflecting on the interactions during the focus group discussion sessions where settlers, even though not asked directly, insisted on several topics, as highlighted in the codes (Figure 6). The results from the other themes led to the conclusion that these topics can be understood through the fight-flight-freeze system. This system is widely understood to be an instinctive response to stress

observed in both humans and wildlife. These responses differ among individuals and reflect how they 'cope' with stress, often based on their past experiences. The prolonged stress and worry from conflicts suggest that settlers' responses reflect how they choose to cope with this stress. Prolonged stress and anxiety lead to decreased mental health and measures of proactive coping style (Shekriladze et al., 2022). This can also diminish an individual's sense of control, thereby reducing their motivation to tackle challenges (as discussed earlier).

According to the hierarchical structure of coping mechanisms in Skinner (2003), settlers' responses match several higher-order and lower-order categories. This system identifies three core concerns initiating coping strategies, and these responses differ if individuals perceive these concerns as a challenge, thereby an opportunity for growth or as a threat, signalling potential danger (Figure 7). The coping mechanisms identified in this study suggest that the settlers responded to three concerns: competence, the need to feel capable of managing conflicts, relatedness when there is a desire for social connection when faced with negative impacts from conflict, and autonomy, as seen in their drive for independence in their choices to coexist with elephants.

The results demonstrate a group of settlers who have higher-order coping mechanisms, such as problem-solving, negotiation, and support-seeking behaviours. This suggests that the settlers still believe in opportunities for growth in the management on conflicts and chose a "fight" response despite facing the negative impacts of conflict. Studies have revealed people's positive sentiments towards elephants, despite being affected by conflict (Pant et al., 2016; Sampson et al., 2019; Tripathy et al., 2022). This could be due to the influence of religious traditions and mythologies, which are prominent in elephant-range countries. Nevertheless, identifying these individuals in the

community can be crucial for uplifting motivations and reducing feelings of hopelessness to manage conflicts in the area.

In contrast, "flight" responses involve avoidance-based coping strategies, where settlers choose to seek escape or delegate issues related to conflicts. As an example from this study, despite knowing that translocation of elephants is an ineffective strategy, some settlers insist that translocation is the only solution to their problem. Some settlers advocate for permanently relocating elephants to zoos or dedicated rescue centres. While this opinion reflect intolerance towards elephants, it must not be viewed as a negative interaction. Further discussions revealed paradoxical views: despite suggesting elephant relocation, settlers also expressed empathy towards the elephants. Findings from other studies, including Malaysia, have demonstrated this paradox as the "not in my backyard" situation which may indicate environmental injustice (Rubino et al., 2020; Thant et al., 2023). Paradoxical responses can also be rooted in tensions between cultural beliefs and fear of safety (Singh et al., 2024; Yeshey et al., 2023).

While higher-order categories of coping mechanisms explore broad concepts with underlying motivations, lower-order categories are the specific actions or thoughts used to cope. Settlers believed in superstitions and taboos, such as insisting that elephants are protected by spirits and speaking in any negative connotations towards elephants, will cause conflicts. Taboos have demonstrated the ability to promote pro-conservation behaviours (Janaki et al., 2021; Suwannarong et al., 2024), but can also act as a barrier when they clash with societal norms (Ngoufo et al., 2014). Other freeze mechanisms demonstrated by the settlers use religious methods to mitigate conflicts, such as performing special prayers in the plantation. While settlers consider these efforts as their last resort, religious efforts to mitigate conflict often involve the entire

community as a form of social solidarity. Sapolsky (2018) suggest religiousness allows individual to cope with stressors due to the community support and the believe that they will be rewarded by fate or in afterlife. Additionally, cultural factors such as religion may be helpful in allaying fear of conflict causing wildlife (Mohammadi et al., 2021)

In summary, this chapter illustrates that the persistence of human-elephant conflict in FELDA settlements is deeply rooted in historical land development decisions, limited mitigation success, financial hardship, and psychosocial distress. While physical barriers like fences and trenches offer temporary relief, their effectiveness is often compromised by elephant adaptability, poor maintenance, and social issues such as theft and vandalism. The high cost and limited success of translocation, coupled with the lack of monitoring of elephant behaviour post-relocation further diminish its viability as a long-term solution. These challenges are made worse by the settlers' financial struggles, where repeated crop losses and mounting debt have left many settlers financially unstable, jeopardising the original goal of FELDA to alleviate poverty. Additionally, prolonged exposure to conflict has severely affected settlers' emotional well-being, resulting in feelings of hopelessness, fear, and reduced autonomy. Nevertheless, settlers demonstrate fight, flight or freeze coping mechanisms ranging from proactive problem-solving to deeply rooted cultural and spiritual practices reflecting both resilience and the urgent need for more inclusive conflict management approaches. The findings reaffirm that addressing human-elephant conflict requires an integrated socio-ecological lens that recognises the lived realities of affected communities.

CHAPTER 5

Stakeholders in Human-Elephant Conflicts

5.0. Chapter 5: Stakeholders in Human-Elephant Conflicts

5.1. Introduction

5.1.1. Understanding conflict as a wicked problem

Although conservation science is acknowledged as interdisciplinary, human-wildlife conflicts are notably more complex than straightforward biodiversity impact issues (Young 2010, Redpath et al., 2013). The complexity of human-wildlife conflicts arises from the lack of universal support for conservation goals. Individuals have diverse interests and priorities, some of which may directly conflict with conservation objectives (Redpath, 2015). Researchers have identified these conflicts as 'wicked problems, without clear solutions that exist within complex socio-ecological systems (Redpath 2015, Mason 2018). Solutions to wicked problems cannot be separated from ethics, values, and social equity because of their significant impact on a wide range of stakeholders (Parrot, 2017). Engaging stakeholders in conservation planning reveals power dynamics and aids in understanding the diverse perspectives, values, and knowledge which are essential for creating context-specific solutions (Reed, 2008; Luyet, 2012; Hage, 2010). The concept of 'wicked problems' is particularly useful in exploratory studies, providing a foundation for considering decentralised, dispersed, and multi-faceted approaches to finding solutions (Lönngren & van Poeck, 2021). The term ‘stakeholder’ has been prominent in public and non-profit management theories and practices since the 1980s (Bryson, 2004). However, this requires significant resources and time investment, often leading to stakeholder frustration and the possible identification of new conflicts (Luyet, 2012).

5.1.2. Stakeholders in human-elephant conflicts

Given the theoretical complexity of wicked problems, the case of human-elephant conflicts in Malaysia provides a concrete example of how these theoretical

challenges manifest in real-world conservation efforts. Human-elephant conflicts in Malaysia are primarily addressed by wildlife authorities and are considered a conservation issue. In Peninsular Malaysia, the number of reported cases has increased from 343 in 2015 to 835 in 2021, mainly in agricultural regions and settlements near elephant habitats (NECAP 2.0, 2023). This increase is likely due to the high habitat suitability of agricultural landscapes for elephants (de la Torre et al., 2021). In Sabah's Kinabatangan floodplain, elephants spend 57-73% of their time in palm oil estates, feeding, or moving between forest patches (Abram et al., 2022). These conflict-prone zones are inhabited by diverse groups such as plantation companies, rural communities, conservation NGOs, and wildlife researchers, but are managed by a few entities such as the state government and wildlife authorities. This disparity and differing perspectives often result in land development that overlooks wildlife impacts and neighbouring areas. This underscores the importance of understanding stakeholder perspectives, which is crucial for effective conflict resolution and management (Mosimane et al., 2013). Federal policies recognise the need for stakeholder collaboration in managing human-wildlife conflicts, particularly involving elephants in agricultural areas, as highlighted in Malaysia's National Policy on Biological Diversity. However, the lack of implementation indicates underlying issues.

5.1.3. Biodiversity governance in Malaysia

Forest and wildlife management in Malaysia is influenced by a federal constitution that distributes authority between national and state governments. This division creates challenges in environmental governance, particularly in addressing human-elephant conflicts. Malaysia is a parliamentary democracy with a constitutional monarchy. Historically, the sultanate held significant power as the state's supreme ruler, but British colonial rule altered this by integrating the sultanate within

the colonial system. The British recognized the need to cooperate with Malay rulers to garner local support, essential for policy implementation and maintaining order (Firdaus & Zakariya, 2017). The autonomy of Malay rulers was threatened by British attempts to impose a unitary government system during the process of independence. Consequently, a special commission was formed to draft a federal system that preserved their powers in their respective states (Kangayatkarasu, 2017). At the time the constitution was being drafted, environmental issues were overshadowed by concerns over the protection of Malay ethnic status, leaving land and forest jurisdiction to the states (Haque, 2000). The Constitution divides powers into three categories: federal, state, and concurrent. The concurrent list, necessitating state-federal cooperation, includes the protection of wild animals, wild birds, and National Parks. This arrangement adds complexity and increases the number of stakeholders involved in human-elephant conflicts.

Researchers have employed various stakeholder analysis methods to address environmental issues. This includes mind mapping to understand mental models (Mosimane et al., 2013), assessing power-interest relationships for engagement strategies (Salman et al., 2023), and using multi-stakeholder partnership frameworks based on wicked problem principles (Dentoni et al., 2018). In the context of rising conflicts in Malaysia, stakeholder analysis provides wildlife managers, policymakers, and industry players with insights for improving conflict management strategies. Stakeholders in human-elephant conflicts operate at three jurisdictional levels: federal stakeholders include ministries responsible for the environment, agriculture, and tourism; state stakeholders consist of government law enforcement, NGOs, and political representatives; and local stakeholders encompass community leaders and individuals in conflict-prone agricultural areas. Site differences in this study reveal

how stakeholder roles vary geographically. Stakeholders were mapped as an influence-support matrix to identify key actors fostering coexistence with elephants. This study aims to move beyond a 'one-size-fits-all' approach by addressing the problem as wicked issue, providing nuanced insights for potential management and implementation (Alford & Head, 2017).

5.2. Methods

5.2.1. Determining stakeholders

Together with members from the Management and Ecology of Malaysian Elephants, I listed the possible stakeholders involved directly and indirectly when human-elephant conflicts occur in Peninsular Malaysia. The list was further refined after discussions held during a human-elephant coexistence workshop attended by major palm oil plantation companies. Other stakeholders, including religious leaders and celebrities, were also included as additional stakeholders. As for the participants in Sabah, a group of wildlife conservationists working in the area was consulted to add or remove any stakeholders from the existing list to contextualise the exercise from a local perspective. Two blank spaces were provided on the exercise sheet for participants to suggest any other stakeholders with whom they had interacted in the past or any governing bodies they believed should be involved in this matter. The exercise sheet listed 13 stakeholders designed in a 10-point Likert-scale style to rank the stakeholders' influence and support scores, with the value of 1 representing lowest influence and support and 10 as highest influence and support. To simplify the exercise for participants, the design was changed from a Cartesian plane map to a Likert-scale format (see the Supplementary for both the original and revised exercise sheets). Other demographic details included their pseudonym, age, and education

level. At the end of the exercise, a final total of 20 stakeholders (see table 9 for full list) were identified, including additional stakeholders suggested by the respondent.

5.2.2. Data collection

Given the potential for heightened tension among respondents, the exercise was conducted after a focus group discussion to understand the severity of conflict in the area as well as the stakeholders involved in mitigating and managing the conflict. This approach provided context and facilitated conversation during the exercise. The researcher led the exercise while other team members assisted participants, especially those experiencing difficulties with reading and writing due to their age. Each group allocated between 30 to 40 minutes for the stakeholder mapping exercise following the focus group sessions. Although the exercise was conducted as a group to allow for discussions, responses were submitted individually. For respondents from Sabah, the exercise was completed between 15-20 minutes individually following the completion of a questionnaire for objective 1 of this study. The exercise was conducted in Bahasa Malaysia, with the results subsequently translated into English and graphed using Microsoft Excel. The determination of jurisdiction levels was based on the enforcement levels of the stakeholders within the governmental system in Malaysia (Table 9).

5.3. Results

5.3.1. Demographic profile of participants

A total of 75 participants were involved in this exercise from four states in Malaysia. The age range of the participants were between 24-83 years old, where 29% (n=22) were female and 71% (n=53) male. The participants from Johor, Pahang and

Perak are organised smallholders from FELDA and the participants from Sabah were independent smallholders.

Table 9. List of stakeholder code, translation, and respective jurisdiction levels.

Item Code	Abbreviation meaning	Jurisdiction level	Justification for jurisdiction level
MNRES	Ministry of Natural Resources and Environmental Sustainability	Federal	The ministries listed represent the federal administrative body of the government. It is important to note that some ministries have state level agencies, and these agencies are not standardised across the states (e.g. Wildlife Department of Peninsular Malaysia and Sabah).
MTAC	Ministry of Tourism, Culture and Environment Sabah		
MAFS	Ministry of Agriculture and Food Security		
MRD	Ministry of Rural Development		
MPC	Ministry of Plantation and Commodities		
MP	Member of Parliament*		Members of Parliament is dependent on the results of

		the general elections that form the federal government
RSLA	Representative of State State Legislative Assembly	Representatives of State Legislative assembly is dependent on the results of the state elections
Chief Minister	Chief Minister	Chief Ministers, Menteri Besar and Premier are dependent on the political party with the highest majority in the state assembly
NGO	Non-governmental organisations	NGOs here are not limited to wildlife conservation organisations but also humanitarian based organisations that may or may not operate at a larger state-wide scale. It is important to note that there is existing engagement with elephant conservation NGOs in the study site in Johor and Sabah.

Wildlife Department	The Department of Wildlife		The wildlife department here refers to both the Department of Wildlife and National Parks and Sabah Wildlife Department. Although the former is an agency under the federal government, we refer to the state level offices during the exercise to standardise the jurisdiction with Sabah
Police	The Royal Malaysian Police*		The police are the enforcement agency under the purview of the Ministry of Home Affairs. Since this stakeholder was suggested by the respondents, the police is referred as a state level entity for this exercise.
DO	District Officer	Local	The highest government officer of the districts in the respective states
Religious leader	Head of the mosque		Refers to the leader of the local mosque in the area

Individuals	Individuals (experiencing conflict with elephants)		The community within their village or neighbouring estates
Head of Village	Head of the Village		The person in charge of the village and is registered and recognised by the government
Celebrity	Celebrity		Any local celebrity who may or may not be involved in any community activities before or a celebrity who is from their village
Plantation company	Plantation company		FELDA estate managers and the administrative office
JKKR	Scheme Development Council or *Jawatankuasa Kemajuan dan Keselamatan Rancangan**		The community led council under the purview of FELDA
Sultan	Sultan*	Others	
MAF	Malaysian Armed Forces*		n.a

5.3.2. Comparing states and their stakeholder dynamics

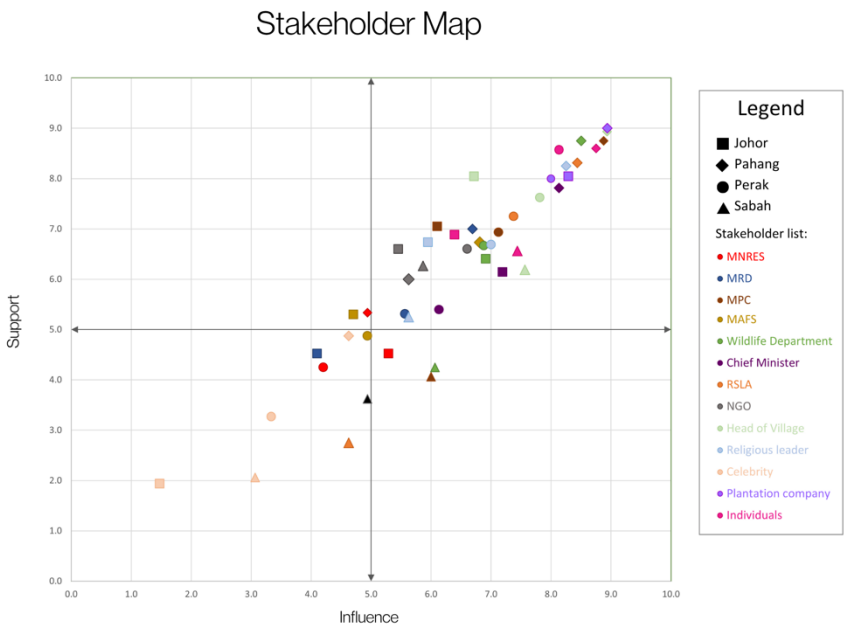


Figure 8. Comparing the different stakeholders from all four states sampled. Note: the shapes of the icon represent the different study sites while the colours represent the different stakeholders.

A total of eight out of the 15 stakeholders listed are in the same quadrant while the remaining seven are scattered across different quadrants. Respondents from all the sampled states ranked the Chief Minister, non-governmental organisations, head of the village, religious leader, plantation companies and other individuals who are facing conflict to have high influence and high support to achieve the goal of coexisting with elephants. In contrast, their views on the level of influence and support differed for stakeholders such as the Ministry of Natural Resources and Environmental Sustainability (MNRES), Ministry of Agriculture and Food Security

(MFAS), Ministry of Rural Development (MRD), Ministry of Plantation and Commodities (MPC), Representative of the State Legislative Assembly (RSLA) and the Wildlife Department.

In the high influence and high support quadrant, all the sampled states ranked the non-governmental organisations and the plantation company with similar scores. In contrast, the difference in the influence and support scores can be observed the village head, and religious leader. Meanwhile, all states ranked celebrity as a stakeholder with low influence and low support on this matter, although respondents from Pahang ranked them on the neutral spectrum.

The presence of the seven stakeholders in different quadrants shows the inconsistent opinions on their levels of influence and support among the respondents. To illustrate, stakeholders such as the Ministry of Plantation and Commodities (MPC), Representative of the State Legislative Assembly (RSLA) and the Wildlife Department are ranked similar scores by the states in Peninsular Malaysia and differently by Sabah. The MPC and Wildlife Department is ranked as high influence by respondents from all the states, however the respondents in Johor, Pahang and Perak ranked them in the high support quadrant while the respondents in Sabah ranked them as low support. Similarly, the RSLA is ranked as high influence and high support by Pahang and Perak but as low influence and support by Sabah. Inconsistencies are also observed among respondents within Peninsular Malaysia, specifically for the Ministry of Agriculture and Food Security (MFAS) and Ministry of Rural Development (MRD). Respondents in Pahang ranked the MAFS and MRD as high influence and high support, while the respondents from Johor and Perak ranked them within the neutral spectrum of influence and support scoring between 4-6 out of 10. Lastly, The Ministry of Natural Resources and Environmental Sustainability

(MNRES) is present in three different quadrants, however, the scores for influence and support were within the neutral spectrum for Johor, Pahang and Perak.

5.3.3. Stakeholders in Johor

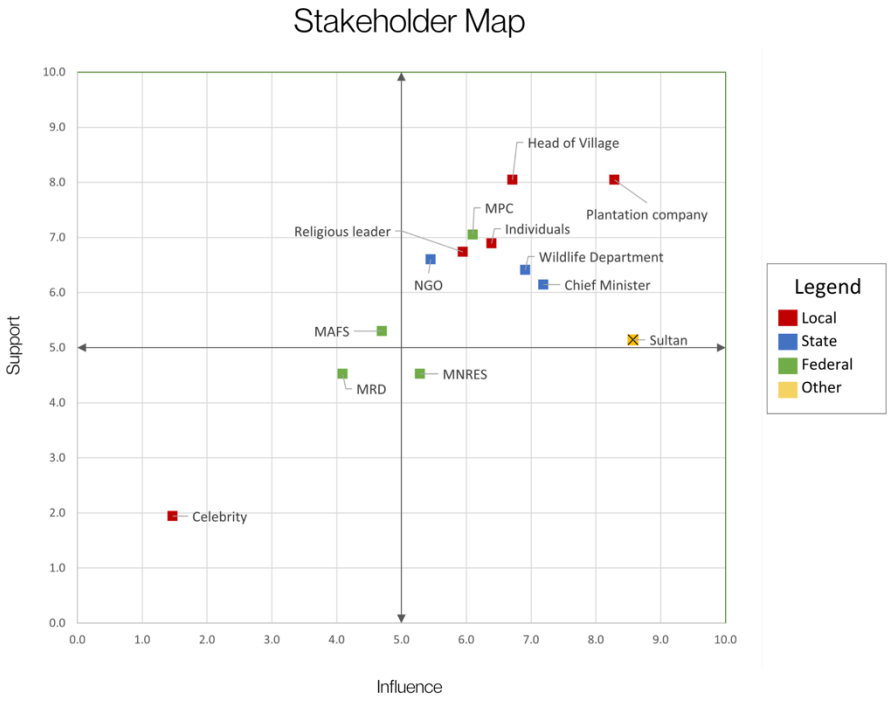


Figure 9. Stakeholder Map for Felda Lok Heng Barat, Johor and their respective jurisdictions. Additional stakeholder suggested by the respondents is demarcated with an X on the marker.

A total of 22 respondents participated in this exercise at FELDA Lok Heng Barat. The gender breakdown was equal while the respondent's age ranged from 49 to 71 years old. The three most influential stakeholders based on the mean scores are the plantation company ($\bar{x}$= 8.286, σ= 2.59, N=21), the Chief Minister ($\bar{x}$= 7.190, σ= 2.182, N=21), and the wildlife department ($\bar{x}$= 6.909, σ= 2.091, N=22), whereas the three stakeholders with the highest score for support are the plantation company ($\bar{x}$= 8.048, σ= 2.202, N=21), the head of the village($\bar{x}$= 8.048, σ= 1.857, N=21), and the

Ministry of Plantation and Commodities ($\bar{x}$= 7.050, σ= 2.625, N=20). Additionally, seven out of 22 participants suggested the Sultan as a relevant stakeholder in this situation and ranked the Sultan as the most influential stakeholder ($\bar{x}$= 8.571, σ= 1.813, N=7), but neutral in support ($\bar{x}$= 5.143, σ= 3.805, N=7). In addition, the highly influential stakeholders are from local and state level jurisdictions, while all the supportive stakeholders are local.

5.3.4. Stakeholders in Pahang

A total of 16 respondents participated in this exercise at FELDA Bukit Sagu. Majority of the respondents are male (87.5%, N=14) and the remaining 12.5% are female (N=2). The respondent's age ranged from 28 to 72 years old and 68.7% completed their secondary school education (N=11). Meanwhile, 31.3% of the respondents stopped their formal education between 12 to 15 years old. The three stakeholders with the highest influence based on the mean scores are the plantation company ($\bar{x}$=8.938, σ=1.298, N=16), the head of the village ($\bar{x}$=8.933, σ=1.482, N=15), and the Ministry of Plantation and Commodities (MPC, $\bar{x}$= 8.875, σ= 1.218, N=16). The three stakeholders with the highest mean scores for support are also the plantation company ($\bar{x}$= 9.000, σ=1.323, N=16), the head of the village ($\bar{x}$= 8.933, σ= 1.482, N=15) but also the Wildlife Department ($\bar{x}$= 8.750, σ=1.677, N=16). Additionally, 10 out of 16 respondents suggested the Scheme Development Council, or *Jawatankuasa Kemajuan dan Keselamatan Rancangan* (JKKR) as a relevant stakeholder in this situation and ranked as the most influential ($\bar{x}$= 9.714, σ= 0.488, N=10) and supportive ($\bar{x}$= 9.714, σ= 0.488, N=10) stakeholder. Aside from JKKR, two out of 16 respondents suggested that Members of the Parliament are also of influence ($\bar{x}$= 7.500, σ= 2.121, N=2) and support ($\bar{x}$= 7.500, σ= 2.121, N=2) in this situation. Moreover, the highly influential stakeholders are from local and federal level

jurisdictions, while all the supportive stakeholders are local. A total of 10 participants believed that the Royal Malaysian Police is a potential stakeholder that is of high influence ($\bar{x}$= 9.200, σ= 0.837, N=10) and support ($\bar{x}$= 9.200, σ= 0.837, N=10) as well. Other potential stakeholders include the District Officer (Influence and support, $\bar{x}$= 9.00, N=1) and The Malaysian Armed Forces (Influence and support, $\bar{x}$= 8.00, N=1). The Royal Malaysian Police, District Officer and the Malaysian Armed Forces have not yet been involved in any matters related to human elephant conflict in this site.

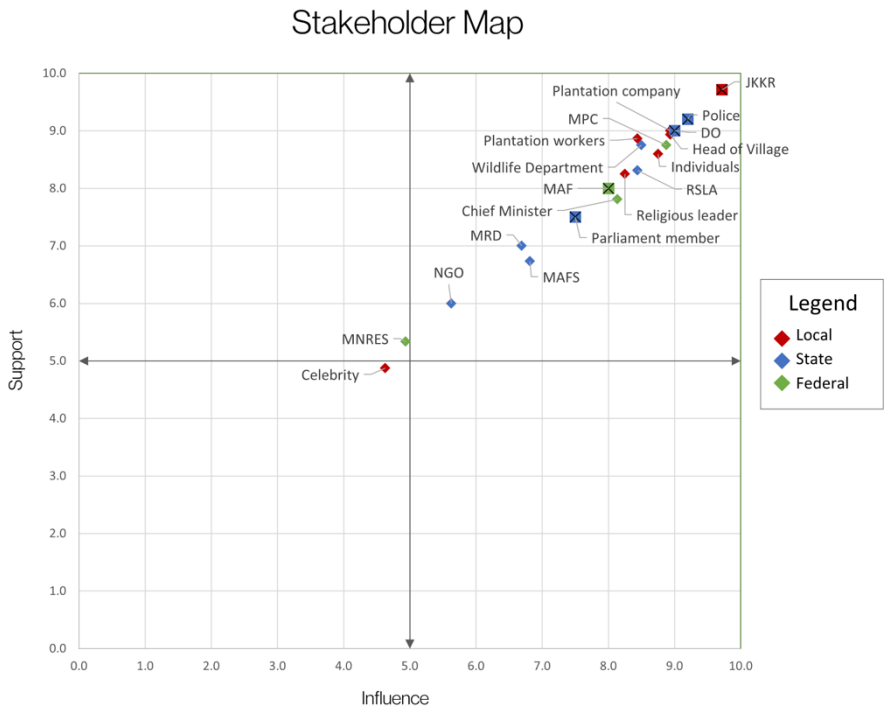


Figure 10. Stakeholder Map for Felda Bukit Sagu, Pahang and their respective jurisdictions. Additional stakeholder suggested by the respondents is demarcated with an X on the marker.

5.3.5. Stakeholders in Perak

A total of 21 respondents participated in this exercise at FELDA Lasah. More than half of the respondents were male (62%, N=13) and the remaining 38% are female

(N=8). The respondent's age ranged from 33 to 83 years old and 62% completed their secondary school education (N=13). The remaining 38% (N=8) of the respondents stopped their formal education between 11 to 15 years old. In Perak, individuals who are facing conflict scored the highest for influence ($\bar{x}$=8.133, σ=2.416, N=20) and support ($\bar{x}$=8.571, σ=4.164, N=18). Next is the plantation company with scores for influence at ($\bar{x}$=8.000, σ=2.619, N=20) and support at ($\bar{x}$=8.000, σ=2.810, N=20). The head of the village obtained the next highest scores for influence ($\bar{x}$=7.813, σ= 2.778, N=20) and support ($\bar{x}$=7.625, σ=2.778, N=20). Additionally, only one out of 21 respondents suggested the Scheme Development Council (JKKR) as a relevant stakeholder and is ranked at the same position as the plantation company (Influence and support, $\bar{x}$= 8.00, N=1).

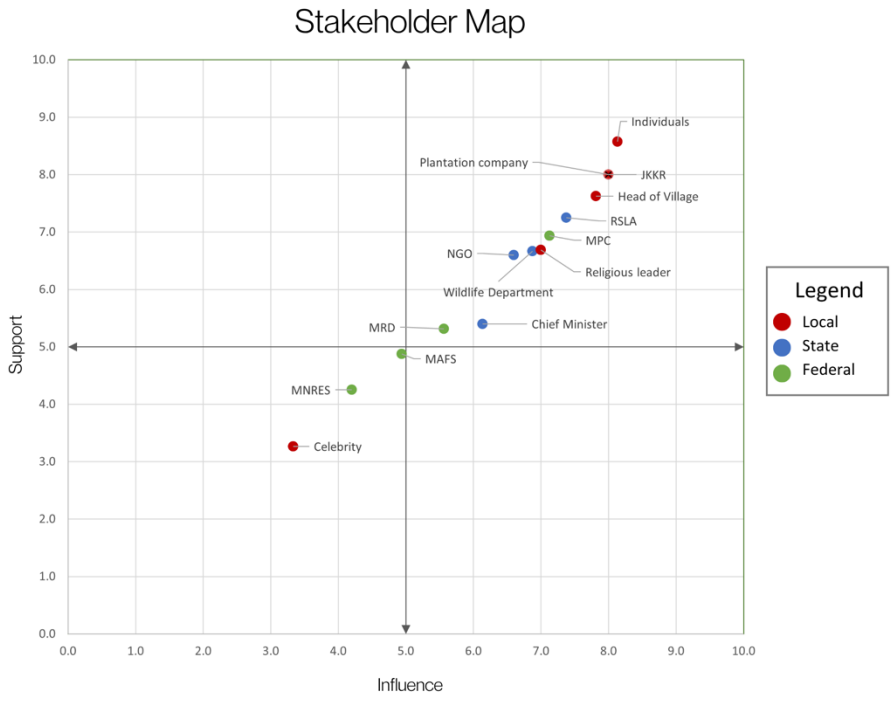


Figure 11. Stakeholder Map for Felda Lasah, Perak and their respective jurisdictions. Note: JKKR, Plantation company and workers obtained the same scores, however only

JKKR is an additional stakeholder suggested by the respondents and is demarcated with an X on the marker.

5.3.6. Stakeholders in Sabah

A total of 16 respondents participated in this exercise in the village of Sukau. Only one of the respondents was female while all the other respondents were male, and their age ranged from 23-62 years old. Most of the respondents completed their secondary school education (50%, N=8) and 18% completed a Diploma (N=3). The remaining 19% stopped their formal education at the age of 12 (N=3) while two respondents did not disclose their educational background. Additionally, four of the 16 respondents are currently working with a local non-governmental organisation on human-elephant conflicts, thus, their response for the stakeholder NGO was removed. The three stakeholders with the highest mean score for influence is the head of the village ($\bar{x}$=7.563, σ=2.032, N=16), other individuals who are facing conflicts ($\bar{x}$=7.438, σ=1.590, N=16), and the District Officer ($\bar{x}$=6.813, σ=3.124, N=16) whereas the three stakeholders with highest mean score for support are other individuals who are facing conflicts with elephants ($\bar{x}$=6.563, σ=2.421, N=16), non-governmental organisations ($\bar{x}$=6.266, σ=3.881, N=12) and the head of the village ($\bar{x}$=6.188, σ=2.738, N=16). Moreover, the highly influential and supportive entities are stakeholders at the local and state level.

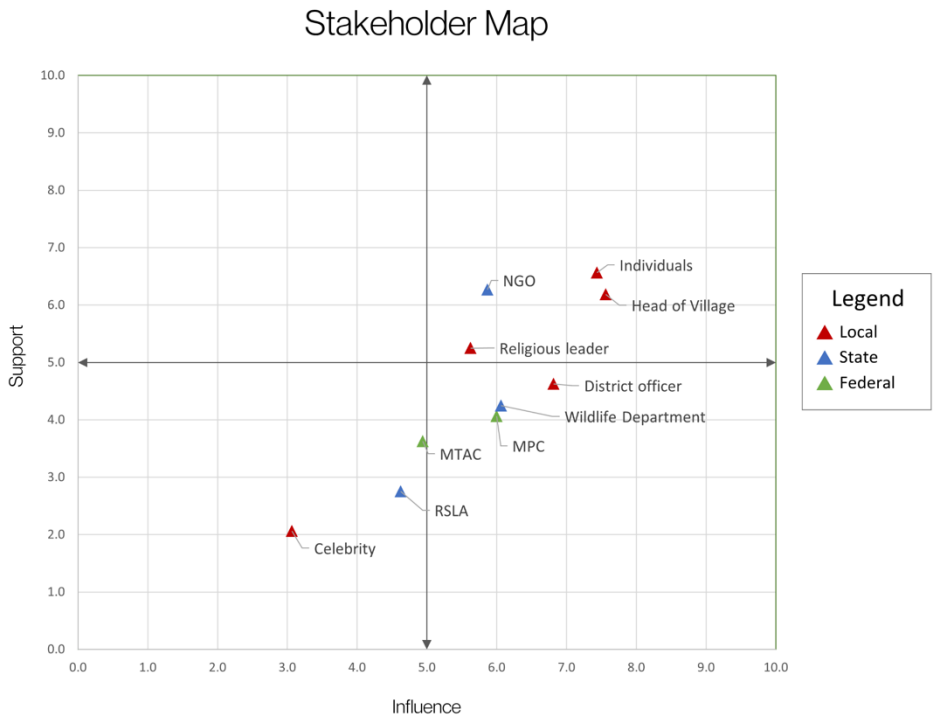


Figure 12. Stakeholder Map for the smallholders of Sukau, Sabah and their respective jurisdictions.

5.3.7. An overview of stakeholders in human-elephant conflict

The top three stakeholders representing the highest influence and support for the community for human elephant conflict related matters are the plantation companies the head of the village and the representative of the state legislative assembly. Additional stakeholders that were suggested by the participants were the Scheme Development Council (JKKR), Member of the Parliament and the Sultan (Table 10). These stakeholders were listed by the participants based on their experience or engagements in relation to mitigating and managing conflicts with elephants. Meanwhile, the participants also listed potential stakeholders such as the Royal Malaysian Police and The Malaysian Armed Forces (Figure 13). These

stakeholders were suggested as potential help to manage conflicts with elephants in the plantations.

Table 10. The stakeholders with the highest influence and support according to each state.

State	Johor	Pahang	Perak	Sabah
		Influence		
Prelisted stakeholders	Plantation company	Plantation company	Individuals	Head of Village
	Chief Minister	Head of Village	Head of Village	Individuals
	Department of Wildlife and National Parks	Ministry of Plantation and Commodities	Plantation company	District Officer
Additional stakeholder	Sultan	JKKR	JKKR	-
		S*upport*		
	Plantation company	Plantation company	Individuals	Individuals
Prelisted stakeholders	Head of Village	Head of Village	Head of Village	Non-governmental organisations
	Ministry of Plantation and Commodities	Department of Wildlife and National Parks	Plantation company	Head of Village

Additional stakeholder	-	JKKR	JKKR	-

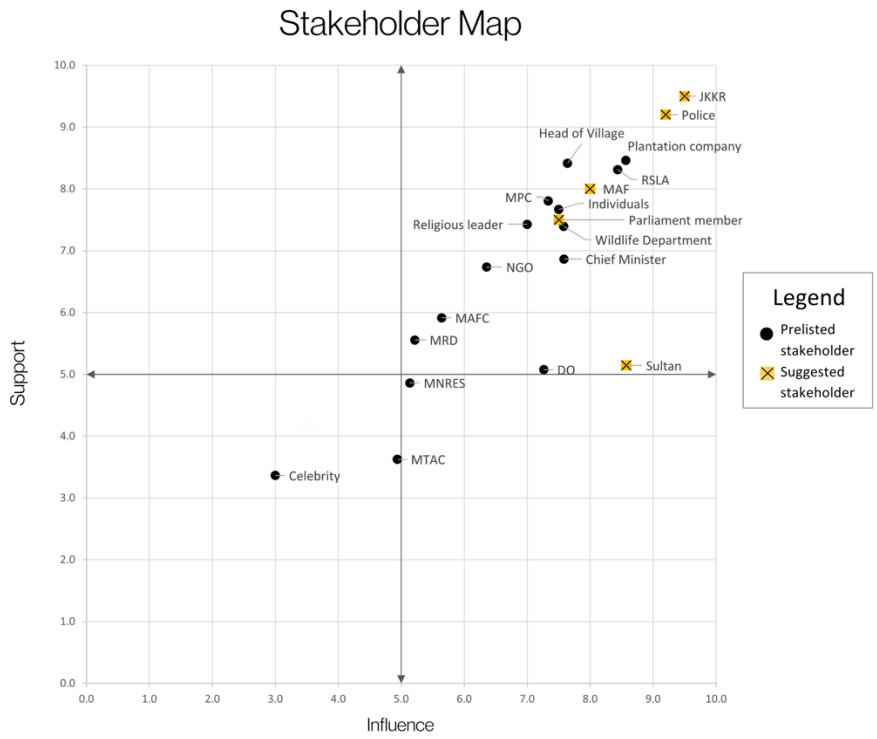


Figure 13. A stakeholder map representing an overview of stakeholder dynamics from all four states sampled. The black markers indicate the prelisted stakeholders while the yellow markers indicate the additional stakeholders suggested by the participants.

5.4. Discussion

The aim of this chapter is to move beyond a 'one-size-fits-all' approach by addressing the problem as wicked problem. To provide nuanced insights for potential conflict management, the relevant stakeholders in managing human-elephant conflicts is reviewed to understand their level of influence and support towards the conflict impacted communities. To ease the understanding of this section, the stakeholders will

be discussed in the following order. First, I list the stakeholders who were ranked in the high influence and high support quadrant. Within that group of stakeholders, I discuss the similarities and differences in scores among the states. Next, I examined the group of stakeholders who do not fall within the same quadrant across all states. The discussion aims to highlight the differences and/or similarities of the scores among the states, the roles, jurisdictions and limitations of the stakeholders, and explore the possible avenues of working with the stakeholder. Finally, the influence and support of stakeholders at specific sites in addition to the stakeholders that were suggested by the respondents, classify their jurisdiction levels and their potential roles in the management of conflicts in the area.

Stakeholders in the high influence, high support quadrant

Perhaps the most striking finding from this exercise is that all respondents agreed to only four out of 13 prelisted stakeholders to be present in this quadrant. These stakeholders are the non-governmental organisations, head of the village, religious leader, and other individuals who are facing conflict. In addition, the Chief Minister and plantation companies were ranked in the same quadrant by the sampled states in West Malaysia but not Sabah as these stakeholders were removed from the exercise. Notably, the absence of enforcement agencies or federal ministries in this list is unexpected and suggests that conflict impacted communities from different states might be unsure of the authorities of these entities or may have contrasting opinions.

Similar scores among states

Among the four stakeholders, non-governmental organisations' level of influence and support were similar across all the states which reflects a cohesive view. Engagement with the community by elephant conservation non-governmental organisations are

only present in the sampled sites in Johor and Sabah. Meanwhile in Pahang and Perak, respondents shared that they have received one-off monetary aid from welfare-based organisations during the festive season to support their losses from crop damage by elephants. Non-governmental organisations (NGOs) in Malaysia have a history of mediating democratic participation, build broad-based social capital and advocating for alternative development (Farouk & Husin, 2015). These groups exist in many realms of discipline including environmental conservation, human rights, humanitarian aid during natural disasters and many more. Typically, NGO interventions bring positive or negative outcomes based on their approaches. Although non-participatory strategies that involve providing relief to those in immediate suffering is meaningful, it also minimises social capital building by increasing people's dependence on others. This then acts as a barrier to address root causes that require fundamental structural changes. In contrast, participatory strategies that include capacity building and advocacy have been a driver for social capital construction (Farouk & Husin, 2015). In Malaysia, a study found the development of structural social capital through the collaboration of multiple NGOs and the local community through a peat swamp forest restoration effort at the Raja Musa Forest Reserve (Alam, 2023). Additionally, environmental NGOs have played significant roles in science communication through media, conducting field research and public education (Abdullah et al., 2014; Saleh & Saifudin, 2017). In this respect, it is important to note that despite the points above, three major challenges persist in how NGOs run their work and their jurisdictions. The first is being dependent on funding availability and priority which presents several limitations when collaborating with local communities in the long term (Aldashev & Vallino, 2019; Bruner et al., 2004). Often, successful community-based conservation programmes have objectives that

include addressing the needs of the community in addition to solving a conservation problem (Garnett et al., 2007; Mulrennan et al., 2012). However, this is often not in line with the priorities of environmental-oriented donors and short-term funding poses a challenge in sustaining the success of the project (Otto et al., 2013). Second, the aims and objectives of each organisation are different and may act as a barrier or an opportunity for collaborative action. Third, NGOs are bounded by permits and laws to conduct research and have no authority to enforce or create laws to overcome the challenges posed. Despite this, the results show that NGOs are still considered to be of high influence and provide high support to the communities to reach the goal of coexisting with elephants.

The next stakeholder who also obtained similar scores across the three states sampled is the plantation company. The plantation company was excluded in Sabah because the respondents were independent smallholders compared to respondents in Johor, Pahang and Perak who are settlers under FELDA. Respondents in Johor and Perak shared closer scores compared to respondents in Pahang where the influence and support scores were the highest. More importantly, the overall influence and support score for the plantation company is the highest among the listed stakeholders. This result may be explained by the fact that the settlers have been dependent on FELDA following a major policy change in 1991. FELDA's initial role as a land settlement agency was switched to an agribusiness land development agency, thus changing its management strategies (Sutton & Buang, 1995). Consequently in 2005, settlers started to lease their land to a subsidiary company called FELDA Technoplant Company Limited in efforts to manage their farms for optimum output (Barau & Said, 2016; Ying, 2014). By 2018, 50.1% of FELDA settlers opted for this arrangement and it also helped solve the issue of an ageing settler population who can no longer do laborious

work in the plantations (Government of Malaysia, 2019; Hashim et al., 2009). This switch in practice resembles a top-down approach which may be beneficial to address the needs of the settlers and manage conflicts concurrently. Unfortunately, opportunities to leverage on FELDA's management is dependent on the strategies and priorities of the Federal Government. Since its inception six decades ago, FELDA was praised as one of the very few successful land settlement schemes globally (Sutton & Buang, 1995), yet today following the change in structure, it has not recorded an annual profit since 2013(Kang, 2024). In 2019, a White Paper by the government includes a new model to manage settlers land, however the direction of the paper fell short due to a change in government that resulted from political instability in 2020. Recent development in 2023, the Ministry of Finance from the new government announced its commitment to implement a recovery plan for FELDA which focuses on the settlement of settler's debt of RM 8.3 billion (Ministry of Finance Malaysia, 2023). In this aspect, issues pertaining crop damages by elephants may not match the current priorities of the government and FELDA. However, it can be argued that the losses from the crop damage contribute to such debts and is not mutually exclusive. Therefore, an opportunity arises to utilise the government's recovery plan to include strategies for effective human-elephant conflict management. Overall, FELDA has high potential for promoting coexistence with elephants especially since the settlers regard the entity with high influence and high support.

This section discusses the stakeholders who are in the same quadrant, however, their influence and support scores differ from state to state. The two stakeholders that can be discussed in tandem are the head of the village and the religious leader. Based on the overall results, the head of the village is considered more influential and supportive

compared to the religious leader. The respondents from Pahang ranked these two stakeholders with higher scores than those from Johor, Perak and Sabah.

Historically, the three types of traditional leadership that are observed in rural Malay communities are kinship leaders, magico-religious leaders and political leaders (Ali, 1968). The head of the village is considered a political leader and is defined as 'those who have some kind of political and/or administrative jurisdiction over a group of people who settle in the *kampung* (village) units. A village or multiple units of this village usually has a person whom members respectfully regard as their major source of leadership thus referring to him as the *Ketua* (head). The administration of villages by the head of village (or *ketua kampung*) in Malaysia has been recorded since the 1600s or earlier (Wall & Callister, 1999). Today, the ruler of the State appoints the head of the village and is a formally recognised role in the Village Development and Security Committee (VDSC or locally known as *Jawatankuasa Pembangunan dan Keselamatan Kampung*). This committee is established by the Federal Government to perform village administration and development. It also functions as a medium for channelling any problems or complaints to the parties in authority (Ahmad et al., 2015; Ali, 1968). They also act as an intermediary between the government and people as they are responsible to the district officer and district councils whose scopes include poverty eradication (Ahmad et al., 2015). However, due to the youth brain drain, the competencies of community leadership are challenged especially in acquiring grants or submitting proposals to run programmes that improves the livelihoods of the people (Ahmad et al., 2015). The Institute of Rural Advancement (INFRA) runs courses on leadership and the avenue can be capitalised to include topics on human-wildlife conflicts and fostering coexistence.

Previous studies in Malaysia have highlighted the role of the head of the village and religious leader as mediators for disputes including in agriculture issues (M. L. Rogers, 1975; Wall & Callister, 1999). The magico-religious leaders can further be separated into those who play leading roles in magic such as the *bomoh* and *pawang* and those who play leading roles in various aspects related to Islam are the *imam* and *mualim* (M. L. Rogers, 1975; Ali, 1968). In the context of this study, the religious leader refers to the *imam.* Typically, *imams* are normally seen as highly-respected individuals among the Muslims especially in rural communities (Rogers, 1975; Wall & Callister, 1999). In more formal and official settings, *imams* are those who hold a position in a mosque institution and are recognised by the state's Department of Islamic Religion. *Imams* in Malaysia exercise their role as teachers of the fundamental aspects of the religion that also includes, although less popular than others, the topic of environmentalism (Mokhta & Abdullah, 2014; H. A. Rahman, 2017; N. A. Rahman & Jalil, 2021). Other roles of *imams* include administrating funeral processes, marriages and in rural communities it extends to settling disputes (Mutalib et al., 2016; Wall & Callister, 1999). As Malaysia is a secular country with diverse races and religions, *imams* have limited scopes and do not have the legal authority and power to function in the local community as the government (Mutalib et al., 2016). However, there are scholars in Malaysia who argue for the expansion of job scopes of the *imam* to include administrating charity and the needs of people who live in poverty and increasing the quality of life of the local people (Mutalib et al., 2016). In this aspect, *imams* from these communities should investigate utilising Islamic wealth redistribution tools such as *zakat* that have potential in empowering communities and advancing environmental initiatives (Farisi & Ibadurrahman, 2023). Further, efforts to link religion and conservation have been made in Malaysia to combat illegal wildlife trade of tigers and

turtle eggs (Clements et al., 2009; Dasgupta, 2015; Schaefer et al., 2020). This highlights the potential for faith-based initiatives should environmental conservation programmes have increased involvement from Islamic institutions, especially if they include the Sultans (the ruler of each state) and DYMM Yang di-Pertuan Agong (His Royal Highness, the King of Malaysia, elected among the Sultans every five years), who are officially regarded as the head of the religious affairs in Malaysia (Mokhta & Abdullah, 2016). Considering these options and the community's religious background, *imams* can play a significant role in supporting communities through existing Islamic tools and educating communities on the importance of coexisting with elephants. Working with these two stakeholders simultaneously will not only benefit from familiar practices in the past but provide a better chance of inculcating new norms in achieving coexistence.

The exercise required the participants to consider themselves alongside their peers as a stakeholder. Individuals who are facing conflict with elephants are the next stakeholder in this discussion. Consistent with scores of the other stakeholders, respondents from Pahang showed the highest influence and support scores, while respondents in Perak had similar scores for support but not influence. Respondents in Johor and Sabah showed comparatively overall lower scores compared to the other two sites. A possible explanation based on the focus group sessions, the settlers in Pahang was the only community to have initiated their own mitigation strategy by collectively cashing out their own money to buy the blinking lights. Interestingly, the focus group session in Johor revealed that the wider FELDA community has helped the conflict impacted communities by raising funds to aid in their financial losses during the festive seasons, however, their support scores are the second lowest compared to the other sites. Meanwhile, a likely explanation for the lowest support

scores in Sabah is that they are independent smallholders, compared to those in organised smallholder settlements of FELDA. In both settings, the individual's responsibilities are to report conflict incidents to the Scheme development Council (locally known as JKKR), the head of the village or to the wildlife department. The consequent action that relies on the decision of these two parties highlights the limitation of individuals in this situation. Other studies have demonstrated that people perceive the responsibility to manage conflicts is the government (Tan et al., 2020).

Stakeholders in different quadrants

Differences in West Malaysia and Sabah

The respondents from West Malaysia regard the Ministry of Plantation Industries and Commodity (MPIC) to have high influence and high support while respondents in Sabah regard the Ministry as high influence but low support. Additionally, the highest overall scores are from the respondents in Pahang. Within this ministry, the Palm Oil and Sago Industry Development division (BISS) is responsible for managing palm oil governance and executing the National Agricommodity Policy 2021-2030 (Ministry of Plantation and Commodities, 2022). The policy comprises five key thrusts, with one focusing on sustainability. Strategy 4 of this thrust aims to improve environmental conservation and management. The policy's effectiveness is evaluated by the proportion of funds allocated to conservation programmes through the Malaysian Palm Oil Green Conservation Foundation (MPOGCF). This foundation is expected to amass RM 20 million annually, derived from a RM 1 cess levied on each tonne of crude palm oil produced (Ministry of Plantation Industries and Commodities, 2022). As discussed earlier in the non-governmental organisation section, funding from this foundation runs between two to five years while the management of conflicts in an

area may require more time and stability of resources. Hence, the current role of this ministry through the current policy falls short considering the utilisation of the MPOGCF is the only indicator beyond certification schemes under the said strategy. The remaining five indicators focuses on attaining the Malaysian Sustainable Palm Oil (MSPO) Certification Scheme. The scheme's principles include components related to the protection of workers, forced labour, avoiding high conservation value areas, greenhouse gas calculations (Malaysian Sustainable Palm Oil, n.d.) and less so on the overall management of conflicts with elephants. In this aspect, the ministry lacks a mechanism to address this issue directly which can exacerbate other challenges such as decreasing yields due to climate change.

The wildlife department is present in the high influence and support quadrant by the states in West Malaysia, whereas Sabah in the high influence, but low support quadrant. Interestingly, the management of wildlife in West Malaysia and Sabah are governed by two different agencies. The conservation and protection of endangered or traded wildlife are enforced by the Department of Wildlife and National Parks Peninsular Malaysia (or PERHILITAN) and Sabah Wildlife Department, respectively. PERHILITAN manages human-elephant conflict based on the guidelines in the National Elephant Conservation Action Plan 1.0 (now National Elephant Conservation Action Plan 2.0, 2023-2030, or NECAP). Meanwhile, the Sabah Wildlife Department's conflict management strategy is outlined in the Bornean Elephant Action Plan 2020-2029. The actions listed in these plans require the support from intergovernmental agencies and ministries alongside non-governmental organisations highlighting the challenge behind managing conflicts with elephants. With respect to these policies, the wildlife department is recognised by the local communities as the 'first aiders' when conflict with elephants arises. Often, conflict impacted

communities expect the wildlife department to translocate the elephant and ‘return’ them to the forest. However, elephant translocation is the last resort to address conflicts according to both policies from the wildlife departments. In Peninsular Malaysia, translocations are only done immediately if it threatens public safety according to the current policy. However, as mentioned in the previous chapters, translocation is not a long-term solution and the reliance on the wildlife department must be reevaluated.

Differences within West Malaysia

The Ministry of Rural Development (MRD) is present in the high influence and support quadrant for respondents in Pahang and Perak, while respondents from Johor ranked the ministry in the low influence and support quadrant. It is important to note that while the respondents are part of the rural development scheme, FELDA, which was not an agency under this ministry until January 2024 (Radhi, 2024). The village development council is an agency that is relevant to this ministry, thus emphasizing the influence of community leaders. Additionally, issues regarding human-wildlife conflicts are recognised in policies under this ministry. Hence, potential avenues can be explored to develop a working relationship with these leaders as conflicts with elephants are more likely to happen in rural areas.

The Ministry of Natural Resources and Environmental Sustainability (MNRES) is present in three different quadrants due to its scores sitting in the neutral spectrum. This suggests that the roles and functions of the ministry may not be very clear to the respondents from the West Malaysia states. This stakeholder was removed from the exercise in Sabah as they were deemed to not be relevant by local conservationists in the area. This is further supported by the fact that the agencies under this ministry only

operate in West Malaysia and not in Sabah. The differences in enforcement agencies and their jurisdictions pose a challenge to synchronise management practices of biodiversity in the country. Additionally, as highlighted in the Federal Constitution, the federal-state dichotomy adds another dimension that requires intergovernmental collaboration. This can be further exemplified by the recent change in the National Policy for Biological Diversity 2022-2030 to align with the Kunming-Montreal Global Biodiversity Framework in 2024. Although the federal government is expected to uphold these biodiversity goals, the absence of effective mechanisms to implement them unveils the limitation of the ministry as an entity. The management of biodiversity is complex and intersectional that no single ministry is able to govern. Even though coordinating platforms like the National Steering Committee for the policy is in place, these committees are set to meet only once a year, thus delaying the urgent action needed for the management of conflicts. The onus of implementing these actions is still largely dependent on agencies at the state level.

Site specific stakeholders

In this section, the discussion will focus on determining the stakeholder with the highest influence and support and reveal their level of jurisdiction. The role of the suggested stakeholders by the respondents will also be reviewed. As an overview, local stakeholders have the highest influence and support compared to the state and federal level stakeholders. Respondents from all states except Sabah suggested additional stakeholders during the exercise. The details are discussed in the following section.

Johor

The plantation company stood out as the stakeholder with the highest influence and support according to the respondents from this site. As discussed in the section above,

although FELDA is now collaborating with the federal government through the Ministry of Rural Development, the management of the estates are governed at a local level. Next, it is worth noting that there is an equal amount of local and state level stakeholders and only one from the federal level out of the nine stakeholders in the high influence and support quadrant. The Sultan was also a stakeholder that was suggested by seven out of the 22 respondents in this exercise. Findings from Chapter 4 from the focus group session held in Johor highlights the influence of the Sultan in this state. According to the participants, the Johor Sultan, who is currently the DYMM Yang di-Pertuan Agong (His Majesty the King) issued a decree to disallow elephants to be translocated out of the state. Additionally, the Johor Sultan sternly warned hunters against poaching and urged for increase enforcement in protected areas (Bernama, 2019).

Pahang

An interesting trend is observed in the responses from Pahang, where 12 out of the 14 prelisted stakeholders fall in the high influence and support quadrant. It is also the site that suggested five additional stakeholders which is the highest compared to the remaining sites. The study site in Pahang also acts as a control site because the respondents have had no prior engagements with elephant conservation non-governmental organisations. The top three most influential and supportive stakeholders that were prelisted in this exercise were from the local and federal level jurisdictions. The plantation company is the most influential and supportive stakeholder which is similar in Johor. The head of the village comes in second and the Ministry of Plantations and Commodities in third. However, considering the suggested stakeholders from 10 out of 16 respondents, the Village Development Scheme (or

JKKR) obtained the highest influence and support scores, and the police came in second. The third highest stakeholder is the District Officer although it was suggested by only one respondent. The most important stakeholder remains from a local jurisdiction however the following two can be categorised as state level entities. Other additional stakeholders include the Malaysian Armed Forces and Parliament members were suggested by only one and two respondents respectively.

Perak

The respondents from Perak ranked individuals facing conflicts obtained the highest score for influence and support while the plantation company and head of village came in second and third. Only one out of the 21 respondents suggested JKKR as an additional stakeholder which shares the same scores as the plantation company. Aside to this fact, the local level stakeholders still stood out as the most influential and supportive for this study site.

Sabah

In contrast to Pahang, only four of the 10 stakeholders are present in the high influence and support quadrant according to the independent smallholders in Sabah. Out of the four, three were stakeholders at a local level namely the head of the village, other individuals facing conflict and the religious leader. The fourth stakeholder, non-governmental organisations, are considered state level entities in this exercise due to the varied nature of their work through Malaysia. However, specifically in Sukau, multiple wildlife conservation non-governmental organisations are present. Thus, this stakeholder can be considered a local-level influence for this site. No additional stakeholders were suggested by the respondents however, the Ministry of Tourism, Arts and Culture was added as a prelisted stakeholder for the exercise. Interestingly,

the Sabah Wildlife Department is an agency under this said ministry. However, the ministry is ranked as low influence and low support in the exercise. The District Officer is also an additional prelisted stakeholder only for Sabah due to its active involvement in meetings related to human-elephant conflict management in the area. From this exercise, the respondents in Sabah have identified the District Officer as the most influential stakeholder representing the government.

Identified gaps

Biodiversity governance in Malaysia remains a challenge due to the federal-state dichotomy as listed in the Malaysian constitution (Kangayatkarasu, 2017; Padfield et al., 2016). Reflecting upon the results of this study, there might be considerable benefits to the absence of a single enforcement entity. To take advantage of the distribution of powers as per Malaysia's Federal Constitution, Article 74 and the Ninth Schedule, the management of conflicts can be interpreted and included under several points from the Federal, State and Concurrent list. As an example, conflicts with elephants in the context of this study are linked to point number 20 in the Federal List that enlists 'Control of agricultural pests; protection against such pests', number 3 in the State list 'Agriculture and forestry' and finally number 3, 'The protection of wild animals, wildlife birds and National Parks' under the Concurrent list. Further studies should explore how human-elephant conflicts can be included under these items in the constitution to streamline management efforts and in turn, foster coexistence.

CHAPTER 6

Consolidation and conclusion

6.0. Chapter 6: Consolidation and conclusions

There is increased recognition of the need to manage human-wildlife interactions to achieve coexistence in the recent Kunming-Montreal Global Biodiversity Framework and the establishment of the IUCN SSC Guidelines on Human-Wildlife Conflict and Coexistence. In addition, scientific literature on human-wildlife conflicts has shown exponential growth, confirming that conflicts have become a major challenge in biodiversity conservation (Su et al., 2022). In response to this recognition, this study offers insights into the potential for human-elephant coexistence in the agricultural sector in Malaysia.

Human-elephant conflicts occur regularly in developing countries, especially where agricultural landscapes and wildlife habitats meet. To meet the future increased demand for palm oil while adhering to the land acreage limit set by the government, the palm oil sector in Malaysia is expected to focus on increasing yields from existing planted areas (Seng et al., 2012). However, previous studies have shown that new areas of regrowth attract elephants (de la Torre et al., 2019; Evans et al., 2020), which requires strategic mitigation measures in these areas (Ghani, 2019). These areas often have diverse groups of people, and conflicts do not affect people equally. Although private companies can play an exemplary role in achieving coexistence with elephants (Cheah et al., 2021), smallholders require more support to achieve this, as presented in Chapters 4 and 5. To gain insight into how to effectively mitigate conflicts, a broader view of the issue is examined, which includes an understanding of human behaviour and its drivers.

The interdisciplinary field of conservation psychology provides opportunities to explore the nuances of human behaviour through methodological approaches, such as

questionnaires, focus group discussions, and stakeholder analysis tools. This chapter provides a basis for linking the findings of these approaches to the research aim.

To summarise, this study examined the human dimensions of coexistence with elephants in four states in Malaysia. Over the course of three workshops and visits to rural agricultural landscapes, this study collected 223 questionnaire respondents were analysed through Partial Least Squares-Structural Equation Modelling (PLS-SEM) to investigate psychological drivers of intentions to mitigate conflict and the ideas of coexistence. Next, through 12 focus group discussions, a total of 10 hours in discussions were analysed through a Reflexive Thematic Analysis (Braun & Clarke, 2021) to demonstrate the mechanisms of conflicts and their impact in organised smallholder communities in Peninsular Malaysia, and a total of 20 stakeholders involved in human-elephant conflicts were assessed and mapped by 75 participants across all four states to review the governance of conflicts and identify potential collaborators.

To justify the direction of the study, I review social and ecological factors influencing human elephant conflict and coexistence in the agriculture sector just before Malaysia gained independence from the British until recent years. In addition, I highlight the evolution of human-wildlife interaction studies to move beyond practical evaluations of costs and benefits in addressing the problems through a wicked problem framework. At the same time, this study provides insights from societies that are not Western, Educated, Industrialised, Rich, and Democratic (WEIRD) to compare and evaluate the efficacy of the psychological theories used.

Key findings: Chapter 3

First, the findings from this study that investigated the widely used theory of planned behaviour show results contrary to those in the literature (Armitage & Conner, 2001), where norms are found to be the strongest predictor variable for intentions and not the weakest. This finding is explained by the fact that this study investigated multiple components of norms to measure their multifaceted nature. Regarding its use together with the Norm Activation Model constructs, the findings are in line with those that found the constructs to directly influence intention (Morren & Grinstein, 2021) and increase the predictability of intentions when added to the former theory (Niemiec et al., 2020).

The key outcomes from Chapter 3 reveal that using solely the Theory framework, behavioural intention was found to be affected by norms towards the government, negative attitudes, and self-efficacy. These constructs accounted for 27% of the variance in the model. Norms towards the government are the strongest predictor of behavioural intentions, and the measurement items depict that people perceive the government as pro-elephants. Despite having policies that prioritised people over the environment since the early 60s, this perception may be due to the government's recent response to international pressures on the environmental impacts of palm oil by mandating compulsory Malaysian Sustainable Palm Oil (MSPO) certification for all palm oil players. In this context, the findings suggest that the higher the participants' score on the perception of the government as a pro-elephant as a reflex of internation demands, the greater the intent to mitigate human-elephant conflict among smallholders and corporate actors in the palm oil industry. Next, negative attitudes towards elephants were measured using perceptions of fear and threats to self or family

safety. This inverse relationship suggests that an increase in behavioural intentions can be achieved if the fear of elephants can be reduced to a manageable level. Subsequently, increasing knowledge of mitigation practices and confidence in the ability to coexist with elephants can also lead to increased behavioural intentions. These two constructs suggest that conservation interventions should focus on addressing the fear of elephants and increasing knowledge and confidence in mitigation measures to tackle conflicts. Further research is needed to understand the extent of fear and provide more evidence-based strategies to mitigate conflicts. The combination of these three psychological factors takes precedence over increasing positive attitudes towards elephants, changing community-level norms, and understanding the perceived ease or difficulties of implementing mitigation measures.

The extended model incorporating the Norm Activation Model variables improved explanatory power, accounting for an additional 11% of the variance in behavioural intentions. Moral obligation and awareness of consequences significantly influenced behavioural intentions along with norms towards the government. Moral obligation measured the sense of individual responsibility towards elephant conservation and its importance for the future generation, while awareness of consequence measured pro-environmental values towards elephants. Of the three constructs, moral obligation was the strongest predictor, while awareness of the consequences and norms of the government was similar in strength. This suggests that the prevalence of personal norms is not limited to typical pro-environmental behaviours and extends to human-elephant conflicts. However, the role of injunctive norms in mediating the relationship between NAM constructs and behavioural intentions suggests the presence of intricate relationships between subjective and personal norms. Nevertheless, the findings from

this extended model are in line with those of other studies that use these two theories to predict pro-environmental behaviour.

The ideas of coexistence were examined in both models to outline the current tolerance levels of the agricultural community towards elephants. Interestingly, the above models reveal promising prospects for coexistence in the palm oil sector. Despite accounting for only 6% of the explained variance, behavioural intention significantly explained the ideas of coexistence in the first model. By contrast, the second model shows awareness of consequences as the only significant explanation for ideas of coexistence. Despite being in a sector that has largely faced criticism for environmental impacts, this study has demonstrated that awareness, although not always leading to action, can influence ideas of coexistence. The following discussion support this finding by explaining the related cultural and religious factors.

Key findings: Chapter 4

For organised smallholders under the FELDA scheme, the primary causes of human-elephant conflict lie beyond their control. Over the past four decades, first-generation settlers have observed land development and deforestation in regions surrounding their plantations. Consequently, the presence of elephants in plantations has increased since the early 2000s. Despite the implementation of mitigation strategies such as electric fences, elephant ditches, and LED blinking lights, these measures failed to prevent elephants from accessing plantations. The failure of these strategies can be attributed to the absence of data-driven strategies which require regular maintenance and frequent observation of elephant behaviour in response to physical barriers. Although the presence of elephants in plantations does not always lead to crop depredation, the most significant damage occurs when the trees are replanted. The high replanting costs

cause immediate distress to smallholders, given that these expenses accumulate as debt in FELDA management. The continuous cycle of crop damage, income loss, and unsuccessful mitigation efforts has resulted in financial instability and multigenerational debts for settlers. Additionally, settlers' well-being is compromised by feelings of hopelessness and fear of personal safety, resulting in prolonged stress and worry. Given these circumstances, the settlers' responses during the discussions were categorised as "fight", "flight", or "freeze", reflecting the accumulated stress from these unresolved conflicts. Notably, not all responses were negative, "fight" responses demonstrated problem-solving and support-seeking behaviours, indicating willingness to work towards a solution. "Flight" responses were observed when settlers sought to delegate responsibility to authorities or insisting on elephant translocations despite being aware of its ineffectiveness. Lastly, "freeze" responses involved the affirmation of beliefs in superstition, taboos, or religious reasoning as justifications for ongoing conflicts.

Key findings: Chapter 5

Stakeholder analysis provided valuable insights into the dynamics of biodiversity governance in Malaysia, revealing the nature of human-elephant conflicts as a wicked problem. Of the 13 stakeholders listed in the exercise, non-governmental organisations, village heads, religious leaders, and individuals directly affected by conflict were unanimously recognised by both independent and organised smallholders as influential and supportive stakeholders. This finding demonstrates the importance of grassroots involvement and local leadership in structuring conflict management plans and fostering coexistence with elephants over the long term. In West Malaysia, the Federal Land Development Authority (FELDA) was identified as

a highly influential and supportive stakeholder. Conversely, independent smallholders in Sabah attributed this role to the village head and the individuals affected by the conflict. The analysis also revealed a notable trend in stakeholder influence and support, with local-level actors generally receiving higher scores than state- and federal-level entities. This pattern suggests that human-elephant conflict management may benefit from a more decentralised approach among smallholders, leveraging the strong influence and support of local stakeholders. However, the study also highlighted the challenges posed by the federal-state dichotomy in Malaysia's governance structure, which adds complexity to conflict management efforts. The observed differences in stakeholder perceptions between West Malaysian states and Sabah, particularly concerning the roles of ministries and wildlife departments, reflect the need for region-specific governance strategies. These strategies should be tailored to unique stakeholder landscapes to effectively address conflicts.

Bridging key findings

The findings presented in each chapter contribute to a comprehensive understanding of human-elephant conflicts in agricultural settings. First, collaboration among intergovernmental agencies and inclusivity of local stakeholders are essential for effective conflict management. By framing conflicts as an agricultural pest issue, there may be an increase in urgency, potentially initiating action from the government's agricultural sector instead of relying on a single entity to manage biodiversity in plantations. Compared to the environmental sectors, which have limited jurisdiction and yield no profits from a substantial industry, the agricultural sector has more manpower and funding resources for effective conflict management. As discussed in Chapter 4, the primary cause of conflicts in FELDA lies beyond settlers' control, and

reliance on the Wildlife Department's protocols fails to address these root causes of conflicts. Directives from the Ministry of Plantation Industry and Commodities aimed at managing conflict at the landscape level, led by large plantation companies and agricultural sector stakeholders, may prove more effective because of their broader jurisdiction over plantation management. Increased collaboration between plantations with non-governmental organisations, environmental experts and academia may result in mitigation measures that protect plantation yields, while upholding coexistence values with elephants. The uptake of these measures can also be leveraged through current pressure to attain sustainability certifications. The inclusion of this approach as a requirement in certifications will allow Malaysia to strategically separate itself from other palm oil producing nations. Furthermore, considering the land acreage limit and the push for higher replanting rates, as evidenced by the subsidies offered by the government in the recent 2025 budget announcement, conflicts with elephants may increase exponentially. Thus, strategic action is required to manage conflict and instigate the reality of coexisting elephants.

Chapters 3 and 5 provide complementary insights into the drivers of intention to mitigate conflicts. First, personal moral obligations have a greater influence than governmental pressure on the intention to mitigate conflict with elephants. This finding is encouraging, because maintaining or increasing this sense of stewardship towards elephants can be self-sustaining. Moreover, Chapter 5 emphasises the significant supportive roles played by local stakeholders, including village heads, religious leaders, and individuals impacted by conflicts. These traditional community leaders, who are predominantly Muslim, can serve as stewards of coexistence by instilling pro-wildlife moral values in the community. As the faith-based approach has demonstrated success in anti-poaching conservation efforts in Malaysia (Schaefar et

al., 2020), similar strategies should be replicated to promote elephant conservation in agricultural communities. Additionally, the influence of the monarchy could provide further support based on the findings from Chapter 4. The predominant influence of moral obligations may stem from smallholders' unanimous perceptions of the local, federal, and state-level stakeholders. However, the questionnaire's measurement items may not fully capture the nuances of this relationship. Nevertheless, observations derived from Chapter 4 provide evidence to suggest the existence of a cultural norm among smallholders rooted in religious influence that promotes tolerance not only towards people but also towards wildlife.

Findings from Chapters Three and Five provide potential explanations for two of the three categories of coping mechanisms in Chapter 4. Moral obligation may be the primary motivation for those who fall under the 'fight' category. Individuals with high moral values are likely to willingly engage in problem solving by discussing mitigation methods and seeking mutual support when facing financial difficulties due to elephants. Moral obligations were the strongest predictor of behavioural intentions, which assessed the intent to share and learn new knowledge about how to manage conflicts. Additionally, support-seeking behaviour among communities was observed in Chapter 5, where individuals affected by conflicts were present in the high-influence, high-support quadrant. Lastly, 'freeze' category responses are attributed to the continued relevance and predominance of traditional leaders. Chapter 5 highlights the presence of the village head, village development scheme councils, and religious leaders in the high-influence and high-support quadrant. It can be advantageous for conservationists to understand and acknowledge beliefs that justify conflict from the community's perspective. The common perception that conservationists often prioritise elephants over people can be minimised by lending an ear and encouraging

reflective perspectives. Overcoming this perception can encourage collaboration, which provides opportunities to foster coexistence with elephants alongside the community.

In conclusion, human-elephant conflict in Malaysia is met by a diverse group of stakeholders, a continuous demand from markets, and presents a unique opportunity for the country to set a precedent for achieving coexistence within agricultural landscapes. Considering the acreage limit effective in 2023 and the push from the government to increase replanting rates, the industry will be driven to increase production on existing land. Consequently, the elephants' preferences for young palms will inevitably lead to higher chances of crop depredation unless there are efforts to transform conflict to coexistence by creating win-win approaches for people and elephants. The insights gained from the human dimensions of conflict and coexistence, can help nudge us into the possibility of ensuring an equitable outcome to safeguard both people and elephants. The outlook for coexistence in Malaysia is hopeful because tolerance for elephants is largely supported and influenced by the moral, cultural, and possibly religious values of plantations and agriculture communities. Based on these findings, the only elephant in the room to address is the mechanism to increase intergovernmental, non-governmental, and academic collaborations for running an equitable palm oil industry for people and wild elephants.

7.0. List of references

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8.0. Supplementary materials