

**COMMUNITY KNOWLEDGE, AWARENESS AND  
PARTICIPATION IN CONTROLLING FOREST  
FIRE IN KLIAS PENINSULA PEAT SWAMP  
FOREST, SABAH.**



**NAJJAH SALFINAS BINTI MAT FISAL**

**UMS**  
UNIVERSITI MALAYSIA SABAH

**FACULTY OF TROPICAL FORESTRY  
UNIVERSITY MALAYSIA SABAH  
2023**

**COMMUNITY KNOWLEDGE, AWARENESS AND  
PARTICIPATION IN CONTROLLING FOREST  
FIRE IN KLIAS PENINSULA PEAT SWAMP  
FOREST, SABAH.**

**NAJJAH SALFINAS BINTI MAT FISAL**



**UMS**

THESIS SUBMITTED IN FULFILMENT OF THE  
REQUIREMENTS FOR THE DEGREE OF MASTER OF  
SCIENCE

**FACULTY OF TROPICAL FORESTRY  
UNIVERSITY MALAYSIA SABAH  
2023**

**UNIVERSITI MALAYSIA SABAH**

**BORANG PENGESAHAN STATUS TESIS**

JUDUL : **COMMUNITY KNOWLEDGE, AWARENESS AND PARTICIPATION IN CONTROLLING FOREST FIRE IN KLIAS PENINSULA PEAT SWAMP FOREST, SABAH**

IJAZAH : **SARJANA SAINS**

BIDANG : **PERHUTANAN**

Saya **NAJJAH SALFINAS BINTI MAT FISAL**, Sesi **2014-2023**, mengaku membenarkan tesis sarjana ini disimpan di Perpustakaan Universiti Malaysia Sabah dengan syarat-syarat kegunaan seperti berikut:-

1. Tesis ini adalah hak milik Universiti Malaysia Sabah
2. Perpustakaan Universiti Malaysia Sabah dibenarkan membuat salinan untuk tujuan pengajian sahaja.
3. Perpustakaan dibenarkan membuat salinan tesis ini sebagai bahan pertukaran antara institusi pengajian tinggi.
4. Sila tandakan ( / ):

SULIT

(Mengandungi maklumat yang berdarjah keselamatan atau kepentingan Malaysia seperti yang termaktub di dalam AKTA RAHSIA 1972)

TERHAD

(Mengandungi maklumat TERHAD yang telah ditentukan oleh organisasi/badan di mana penyelidikan dijalankan)

TIDAK TERHAD

Disahkan Oleh,

---

**NAJJAH SALFINAS BINTI MAT FISAL**  
**MF1321003T**

---

(Tandatangan Pustakawan)

Tarikh : 14 April 2023

---

(Dr. Walter Lintangah)  
Penyelia Utama

## **DECLARATION**

I hereby declare that the material in this thesis is my own except for quotations, equations, summaries and references, which have been duly acknowledged.

27<sup>th</sup> September 2020

---

Najjah Salfinas Binti Mat Fisal  
MF1321003T



**UMS**  
UNIVERSITI MALAYSIA SABAH

## CERTIFICATION

NAME : **NAJDAH SALFINAS BINTI MAT FISAL**  
MATRIC NO : **MF1321003T**  
TITLE : **COMMUNITY KNOWLEDGE, AWARENESS AND PARTICIPATION IN CONTROLLING FOREST FIRE IN KLIAS PENINSULA PEAT SWAMP FOREST, SABAH.**  
DEGREE : **MASTER OF SCIENCE**  
FIELD : **FORESTRY**  
VIVA DATE : **27<sup>TH</sup> SEPTEMBER 2022**



**CERTIFIED BY;**  
**UMS**  
UNIVERSITI MALAYSIA SABAH  
Signature

**1. MAIN SUPERVISOR**

Dr. Walter Lintangah

---

**2. CO-SUPERVISOR**

Mr. Musri Ismenyah

---

## ACKNOWLEDGEMENT

I praise to Allah s.w.t., for not rejecting my prayers or withholding his unending love from me when he said, "Then remember Me; I will remember you." "Be grateful to Me, but do not reject Me" (Surah al-Baqarah 2:152).

My heartfelt thanks go to my family, especially to my husband, Mohd Saifuddin Chua @ Chua Yun Ling, for his unending love, motivation, prayers, and financial support. From the beginning to the end, I am grateful to my beloved parents, Mat Fisal Bin Abu Bakar and Salmah Binti Ramli, for their unending love, prayers, motivation, and trust in me. With everyone's help, I was able to finish my task and finish the thesis with ease and peace of mind.

I would like to sincerely Thank Dr. Walter Lintangah, my supervisor, and Mr. Musri Ismenyah, my co-supervisor, for their unwavering support of my Master's study and research, as well as their patience, motivation, enthusiasm, and vast knowledge. Throughout the research and writing of this thesis, their advice was invaluable. For my Master's programme, I couldn't have asked for a better advisor and mentor.

Aside from that, I'd like to dedicate the rest of my thesis to my friends, Hamzad Fahmi, Wellden Durin, Tracy Chua Ying Yen, Zaharin@ Eton and many more, who were willing to spend their time assisting me in collecting data in the field and were always there for me when I was at my lowest, on the verge of giving up. Even though some of them are no longer with us, they always had faith in me and kept me going until the end. Only God can repay all the kindness shown from the beginning to the end of the process.

Najjah Salfinas Binti Mat Fisal  
27<sup>th</sup> September 2022

## ABSTRACT

In Malaysia, human negligence and agricultural activity are the main causes of forest fires. Peat swamp forests, secondary forests, forest plantations, and logged-over forests are among the Malaysian forest types where fires commonly occur. In agricultural and plantation areas, slash-and-burn practices are consistently used as the most economical method for land conversion. The Klias Peninsula's peat swamp forest is still in danger of further degrading due to attempts to convert land and sporadic fires. The Sabah government is aware that protecting forests by themselves will not be sufficient to maintain the integrity of the peatlands region. As a result, they understand the need to increase community awareness of the causes and effects of human activity and their participation in maintaining the integrity of these ecosystems. The community's lifestyle decisions predict peatland forest fire, which shows a lack of understanding of the importance of peat swamp forests. This study was conducted in Klias Peninsula, Beaufort, Sabah, to determine and evaluate the level of community awareness and their participation in forest fire prevention. A random sample size of 30% of the population was selected based on the total number of villages in the three forest reserves used for this study: Klias Forest Reserves, Binsuluk Forest Reserves, and Padas Damit Forest Reserves. Four hundred respondents received the questionnaire through the village head or JKKK Village, but only 227 returned it in full. Non-probability and household-convenient samples were used in this study's sampling procedures. The community's level of awareness, perception, and preference participation towards community development projects is determined using descriptive analysis. These were highly validated by scientific analysis such as Kruskal-Wallis analysis, post-hoc testing using Dunn's test with Bonferroni correction, and Spearman's correlation. According to the study's findings, the local population is generally aware of and knowledgeable about preventing forest fires in peat swamp forests. It results from one of the Authority's previous awareness campaign's failure. The campaign's failure can be attributed to the fact that the same people attend the bulk of awareness events because communities' access to knowledge and information is constrained and manipulated by someone irresponsible. Despite having equal attitudes toward forest fire prevention and firefighting techniques, it was shown that men have more knowledge about preventing forest fires than women do. The study also discovered that the majority of the communities in Klias Peninsula believed that modern mechanical forces, followed by natural disasters and human irresponsibility were the causes of forest fires in their nearby forest reserves. Yet, it is reasonable to conclude that irresponsibility and human activity are the primary causes of forest fires in the Klias Peninsula. By collaborating with the relevant authority to prevent and put out forest fires, the community, on the other hand, responds positively. The two community development programmes chosen by the locals from the four offered in this study were the Educational & Awareness Community Development Program and the Agricultural Community Development Program. The community should be more understanding and aggressively promote its status as a burn-free community while preserving the forest reserves' resources for future generations.

Keywords: peat swamp forest, klias peninsula, forest fire prevention, community development program, awareness

## **ABSTRAK**

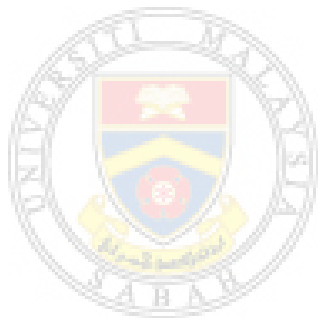
### **PENGETAHUAN, KESEDARAN DAN KETERLIBATAN KOMUNITI DALAM PENGAWALAN KEBAKARAN HUTAN DI HUTAN PAYA GAMBUT SEMENANJUNG KLIAS, SABAH.**

*Di Malaysia, kecuaiian manusia dan aktiviti pertanian menjadi punca utama kebakaran hutan. Hutan paya gambut, hutan sekunder, ladang hutan, dan hutan balak adalah antara jenis hutan Malaysia di mana kebakaran biasa berlaku. Di kawasan pertanian dan perladangan, amalan tebas dan bakar secara konsisten digunakan sebagai kaedah paling ekonomi untuk penukaran tanah. Hutan paya gambut Semenanjung Klias masih terancam semakin rosak akibat cubaan menukar tanah dan kebakaran sporadis. Kerajaan Sabah sedar bahawa melindungi hutan dengan sendirinya tidak akan mencukupi untuk mengekalkan integriti kawasan tanah gambut. Hasilnya, mereka memahami keperluan untuk meningkatkan kesedaran masyarakat tentang punca dan kesan aktiviti manusia dan penyertaan mereka dalam mengekalkan integriti ekosistem ini. Keputusan gaya hidup masyarakat meramalkan kebakaran hutan tanah gambut, yang menunjukkan kurangnya pemahaman tentang kepentingan hutan paya gambut. Kajian ini dijalankan di Semenanjung Klias, Beaufort, Sabah, untuk menentukan dan menilai tahap kesedaran masyarakat dan penyertaan mereka dalam pencegahan kebakaran hutan. Saiz sampel rawak sebanyak 30% daripada populasi telah dipilih berdasarkan jumlah bilangan kampung di tiga hutan simpan yang digunakan untuk kajian ini: Hutan Simpan Klias, Hutan Simpan Binsuluk, dan Hutan Simpan Padas Damit. Empat ratus responden menerima borang soal selidik melalui ketua kampung atau JKKK Kampung, tetapi hanya 227 yang mengembalikannya sepenuhnya. Sampel bukan kebarangkalian dan isi rumah-mudah digunakan dalam prosedur persampelan kajian ini. Tahap kesedaran, persepsi, dan keutamaan penyertaan masyarakat terhadap projek pembangunan komuniti ditentukan menggunakan analisis deskriptif. Ini sangat disahkan oleh analisis saintifik seperti analisis Kruskal-Wallis, ujian post-hoc menggunakan ujian Dunn dengan pembetulan Bonferroni, dan korelasi Spearman. Mengikut penemuan kajian, penduduk tempatan secara amnya sedar dan berpengetahuan tentang pencegahan kebakaran hutan di hutan paya gambut. Ia berpunca daripada salah satu kegagalan kempen kesedaran Pihak Berkuasa sebelum ini. Kegagalan kempen ini boleh dikaitkan dengan fakta bahawa orang yang sama menghadiri sebahagian besar acara kesedaran kerana akses masyarakat kepada pengetahuan dan maklumat ditekang dan dimanipulasi oleh seseorang yang tidak bertanggungjawab. Walaupun mempunyai sikap yang sama terhadap pencegahan kebakaran hutan dan teknik memadam kebakaran, ia menunjukkan bahawa lelaki mempunyai lebih banyak pengetahuan tentang mencegah kebakaran hutan berbanding wanita. Kajian itu juga mendapati bahawa majoriti masyarakat di Semenanjung Klias percaya bahawa kuasa mekanikal moden, diikuti dengan bencana alam dan tidak bertanggungjawab manusia adalah punca kebakaran hutan di hutan simpan berhampiran mereka. Namun, adalah munasabah untuk membuat kesimpulan bahawa sikap tidak bertanggungjawab dan aktiviti manusia adalah punca utama kebakaran hutan di Semenanjung Klias. Dengan bekerjasama dengan pihak berkuasa berkaitan untuk mencegah dan memadamkan kebakaran hutan, masyarakat sebaliknya bertindak balas secara positif. Dua program pembangunan komuniti yang dipilih oleh penduduk tempatan daripada empat yang ditawarkan dalam kajian ini ialah Program Pembangunan Masyarakat*



*Pendidikan & Kesedaran dan Program Pembangunan Masyarakat Pertanian. Masyarakat harus lebih memahami dan secara agresif mempromosikan statusnya sebagai komuniti bebas terbakar di samping memelihara sumber hutan simpan untuk generasi akan datang.*

*Katakunci: hutan paya gambut, semenanjung klias, pencegahan kebakaran hutan, program pembangunan masyarakat, kesedaran*



UMS  
UNIVERSITI MALAYSIA SABAH

# LIST OF CONTENTS

	Page
<b>TITLE</b>	i
<b>DECLARATION</b>	ii
<b>CERTIFICATION</b>	iii
<b>ACKNOWLEDGEMENT</b>	iv
<b>ABSTRACT</b>	v
<b>ABSTRAK</b>	vi
<b>LIST OF CONTENTS</b>	vii
<b>LIST OF TABLES</b>	ix
<b>LIST OF FIGURES</b>	xiii
<b>LIST OF PHOTOGRAPHS</b>	xiv
<b>LIST OF ABBREVIATION</b>	xv
<b>LIST OF APPENDICES</b>	xvi
<b>CHAPTER 1: INTRODUCTION</b>	
1.1 General Background	1
1.2 Problem Statement	5
1.3 Study Justification	7
1.4 Research Questions	8
1.5 Research Objectives	8
1.6 Conceptual Framework	9
<b>CHAPTER 2: LITERATURE REVIEW</b>	
2.1 Concepts and Definitions	11
2.1.1 Fire	11
2.1.2 Types of Forest Fires	11
2.1.3 Awareness	12
2.1.4 Perception	13
2.1.5 Willingness to Participate	13
2.2 Importance of Fire for Ecosystem	13

2.3	Forest Fire Threats and Disturbance	14
2.4	Forest Fire at Peat Swamp Forest at Klias Peninsula, Beaufort, Sabah	15
2.5	Forest Fire Prevention	15
2.6	Community Development Program (CDP)	20

### **CHAPTER 3: RESEARCH METHODOLOGY**

3.1	Study Site of Klias Peninsula	25
3.1.1	Vegetation of Peat Swamp Forest at Klias Peninsula	27
3.1.2	Klias Forest Reserves (KFR)	27
3.1.3	Binsuluk Forest Reserves (BFR)	27
3.1.4	Padas Damit Forest Reserves (PDFR)	28
3.2	Flow Diagram of Research Study	29
3.3	Data Collection and Research Instruments	30
3.3.1	Data Collection	30
3.3.2	Instruments of the Study	31
3.3.3	Questionnaire Design	31
3.3.4	Likert Scale	32
3.3.5	Pre-Testing Questionnaire	33
3.3.6	Sampling Method and Sample Size	33
3.4	Analysis of the Research Study	34

### **CHAPTER 4: RESEARCH FINDING**

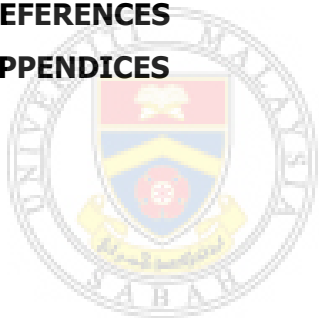
4.1	Data Analysis and Results Presentation	36
4.2	Demographic Profile of Respondents	36
4.2.1	Descriptive Analysis of Sociodemographics at Klias Peninsula	36
4.3	The Community Level of Awareness	39
4.3.1	Community Awareness of Forest Fire and Forest Fire Prevention System	39
4.3.2	The Relationship between Awareness and Sociodemographics	40
4.3.3	The Awareness among three Different Forest Reserves	42
4.4	Community Participation in Forest Fire Prevention and Fire	42

Fighting		
4.4.1	The Relationship between Community Participation and Sociodemographics at Klias Peninsula	43
4.4.2	Level of Willingness to Participate in the different Forest Reserves in Klias Peninsula	45
4.4.3	Community Rank of Action towards Forest Fire Occurrence	45
4.5	Community Perspective on the Forest Fire Management, Suppression and Prevention of Forest Fire at Peat Swamp Forest, Klias Peninsula, Beaufort, Sabah	46
4.5.1	Analysis Factor that causes Forest Fires from Community Perception at Klias Peninsula, Beaufort, Sabah	47
4.5.2	Community Perception on Effective Forest Fire Controlling System in Peat Swamp Forest, Klias Peninsula	48
4.6	The Potential of Community Development Program (CDP) as an Alternative Tool in Preventing and Controlling Forest Fire at Peat Swamp Forest, Klias Peninsula, Beaufort, Sabah	49
4.6.1	Community Understanding on the CDP in three Forest Reserves in Klias Peninsula	50
4.6.2	Community Interest to Participate in CDP to Control Forest Fires in Peat Swamp Forests, Klias Peninsula	52
4.6.3	Respondents' selection of the Suggested CDP for Klias Peninsula	54
4.6.4	The Relationship between Awareness of the CDP and Sociodemographics	55
4.6.5	CDP Based on Agricultural	56
4.6.6	CDP Based on Educational and Awareness	56
4.6.7	CDP Based on Participatory Research	58
4.6.8	CDP Based on Rehabilitation and Collaboration	58

## **CHAPTER 5: DISCUSSION**

5.1	Result Discussion	60
-----	-------------------	----

5.1.1	Demographic Of The Respondents	60
5.2	Community Level of Awareness in Forest Fire Prevention at Peat Swamp Forest, Klias Peninsula.	61
5.2.1	Gender Influences on the Level of Awareness, Willingness And Participation in Forest Fire Prevention	62
5.3	Fire Occurrence, Perception of Effectiveness of Forest Fire System, And Community Perspective on Forest Fire Management, Suppression and Prevention	64
5.4	CDP as a Potential Tool in Fire Prevention at Klias Peninsula	68
<b>CHAPTER 6: CONCLUSION</b>		
6.1	Conclusion and Recommendation of the Study	74
<b>REFERENCES</b>		78
<b>APPENDICES</b>		101



## LIST OF TABLES

		Page
Table 2.1	: Forest Fires (by Location, Type of Forest and Probable Causes) in Malaysia 1992-1997	18
Table 4.1	: Sociodemographics Information of Klias Peninsula Respondents	38
Table 4.2	: Shows the Forest Fire Incidence and Community Forest Fire Prevention Program	39
Table 4.3	: Awareness of Fire Prevention System and attending courses on Forest Fire Prevention in Klias Peninsula, Beaufort, Sabah, Malaysia (N=227)	40
Table 4.4	: Indicates Weighted Means and Verbal Interpretation of Community Cooperation, Willingness and Participation Factor in forest Fire Prevention	43
Table 4.5	: Indicates the Relationship between Community Participation and Sociodemographics at Klias Peninsula	44
Table 4.6	: Rank of Community Action towards Fire Incident	46
Table 4.7	: Indicates Weighted Mean and Verbal Interpretation on the Effectiveness Forest Fire Controlling System based on Community Perspective at Peat Swamp Forest, Klias Peninsula, Beaufort, Sabah	49
Table 4.8	: Community Interest in CDPs by Gender in three Forest Reserves in Klias Peninsula	53

## LIST OF FIGURES

		Page
Figure 1.1	: Conceptual Framework for the Research Study	10
Figure 2.1	: Community Development Chain	22
Figure 3.1	: Klias Peninsula Map	26
Figure 3.2	: Flow Diagram of the Research Study	29
Figure 3.3	: Sample of Likert Scale used in the Questionnaire	33
Figure 4.1	: The Correlation between Community Sociodemographics and the Level of Awareness at Peat Swamp Forest of Klias Peninsula	41
Figure 4.2	: Community's Perception of the factor causing the Forest Fire in the Peat Swamp Forest Klias Peninsula, Beaufort, Sabah	48
Figure 4.3	: Community Understanding of the Definition and Structure of the CDP	51
Figure 4.4	: Community's Understanding of the Definition and the Structure of CDPs	52
Figure 4.5	: The Community's Interest towards Participation in CDP	53
Figure 4.6	: Selection of the CDP by the respondents at Klias Peninsula	54
Figure 4.7	: Indicates the Selection of the CDP by the Respondent Gender at Klias Peninsula	55
Figure 4.8	: Sub-program Selection of the CDP based on Agricultural	56
Figure 4.9	: Sub-program Selection of CDP based on Educational and Awareness Program	57
Figure 4.10	: Sub-program Selection of CDP based on Participatory Research	58
Figure 4.11	: Sub-program Selection of CDP based on the Rehabilitation and Collaboration Program	59

## LIST OF PHOTOGRAPHS

	Page
Photo 1.1 : Some of the respondents from Kg. Kukuro are answering the Questionnaire	126
Photo 1.2 : Kg. Kukuro gives a Good Cooperation towards this Research Study	126
Photo 1.3 : Female respondents from Kg. Kukuro are limited	127
Photo 1.4 : Submitted the questionnaire documents to the Head of Village, Kg. Bintuka	127
Photo 1.5 : Discussion with Sabah Forestry Department representative regarding the outcome from the research study	128
Photo 1.6 : Results from the research study had been presented to Fire Fighting Units of Sabah Forestry Department	129
Photo 1.7 : Results from the research study had been presented to Fire Fighting Units of Sabah Forestry Department and group photo	130
Photo 1.8 : Some banner that can be found in Klias Peninsula on Forest Fire Awareness	131



## LIST OF ABBREVIATIONS

<b>FR</b>	- Forest Reserves
<b>IFFN</b>	- International Forest Fire News
<b>GTZ</b>	- German Technical Cooperation
<b>FAO</b>	- Food and Agriculture Organization
<b>UNDP</b>	- United Nations Development Programme
<b>GEF</b>	- Global Environment Facility
<b>mm</b>	- millimetre
<b>km</b>	- Kilometre
<b>CDP</b>	- Community Development Program
<b>Kg.</b>	- Kampung
<b>JKKKK</b>	- Jawatankuasa Kemajuan dan Keselamatan Kampung
<b>SPSS</b>	- Statistical Package of Social Sciences
<b>KFR</b>	- Klias Forest Reserves
<b>BFR</b>	- Binsuluk Forest Reserves
<b>PDFR</b>	- Padas Damit Forest Reserves
<b>CTIF</b>	- International Association of Fire and Rescues Service

## LIST OF APPENDICES

	Page
Appendix A : Questionnaire Forms	101
Appendix B : Kruskal-Wallis Test on Respondent's awareness by selected respondent's socio-demographic	122
Appendix C : Kruskal-Wallis Test on Respondent's awareness by Different Location of Forest Reserve	123
Appendix D : Hypothesis test summary table	124
Appendix E : Non-parametric Correlations table	125
Appendix F : Photos of respondents from Kg. Kukuro	126
Appendix G : Photos of submitting documents	127
Appendix H : Photos of meeting with SFD representatives	128
Appendix I : Photos during presentations with SFD	129
Appendix J : Group Photo with SFD	130

# CHAPTER 1

## INTRODUCTION

### 1.1 General Background

Malaysia is home to one of the world's oldest and most complex tropical rainforest ecosystems. The tropical rainforest is a type of lowland forest that includes mangroves, peat swamps, and montane forests. Peat swamp forest is a type of widespread forest in tropical rainforests, most notably in Malaysia. Due to the presence of woody waste and a high water table during the rainy season, the peat swamp forest is also known as "woody peat." The retards of the decomposition of dead trees result in the formation of a "peat layer" that evaporates during the extreme season. The component of the peat swamps has a dynamic link between land and water that allows a transition zone where the flow of water and the cycling of nutrients combined with the sun's energy produce a unique ecosystem of hydrology, soils, and vegetation. Stilted roots, buttresses, pneumatophores, and a thick, superficial root mat are all physiological adaptations to regular flooding found in peat swamp forests. These structures play an important role in the peat swamp's hydrology by slowing the rate of surface water runoff. As a result, they ensure a continuous water supply to the peat dome, which is required for peat formation (Joosten, 2008). Tropical peat swamp ecosystems are found primarily in Southeast Asia, with Malaysia accounting for 2.6 million hectares of peat swamp forest (Mutalib et al., 2002), and more than half are located in Malaysian Borneo (Phillips, 1998).

Wildfires are the most common hazard in peat swamp forests. Forest fires have always been one of the most destructive forces on forest ecosystems. Fire has

destroyed millions of hectares of forest, including flora and wildlife habitat, posing a threat to humanity. Forest fires significantly impact human lives, property, and livelihood. Peat swamp forest fires produce more smoke per hectare than other forest types. They cannot be extinguished without restoring high natural water levels, making extinguishment difficult. Forest fires threaten biodiversity and infrastructure, including affecting vegetation (Syaufina and Ainuddin, 2011), wildlife (WWF, 2009), soil (Certini, 2005), and water quality (Ainuddin et al., 2006). Malaysia is no exception to the massive ecological damage caused by forest fires yearly. The worst forest fire incidences in Southeast Asia occurred in Indonesia in the years 1986–1987, 1994, and 1997–1998 due to extreme El Ninos (McPhaden, 1998), resulting in the burning of about 3.5 million hectares, 4.5 million hectares, and 9.5 million hectares of forest area, respectively (Karki, 2002). Indonesian fires have destroyed at least 1.6 million hectares of peatlands, primarily in Borneo and Kalimantan (Boehm et al., 2001). In mid-2013, severe haze struck Malaysia, primarily in Peninsular Malaysia and Singapore, due to open and unregulated burning activities in Indonesia (Mat Isa, 2003).

Most of the forest fires in Malaysia are associated with peat swamps, secondary forests, plantations, and forest-logged forest fires, as reported by Ganz (2002). Fires were frequently used to encourage forest conversion to plantations and agricultural clearing. According to Hassan and Manila (1997), the leading causes of forest fires in Malaysia are carelessness and agricultural operations. Yukili (2015) reported that fires are tools as a source in agriculture practices, plantations, and other development projects in Sabah. Forest fires occurred due to human negligence and spread to forest reserves, destroying natural resources. Forest fires are common in Sabah and Sarawak compared to Peninsular Malaysia, according to historical data. The worst forest fires in Sabah occurred between 1983 and 1985 (Woods P., 1989; Mat Isa, 2003) as a result of the severe drought caused by the El Nino phenomenon, with approximately one million hectares are mostly over-logged forest were burned (Beaman et al., 1985). Between November 1997 and April 1998, Aiba and Kitayama (2002) reported that Sabah experienced a prolonged drought (100mm rainfall for more than 60 days), while majors fires ravaged the Klias Peninsula's peat swamp forest in April 1998 (UNDP/GEF, 2001). The enormous

swathes of grassland in western Sabah, according to Cockburn (1974), are the result of a catastrophic fire that devastated the forest around 1915 and turned it into vast swaths of grassland after a severe drought. The disaster affected nearly 73% of Sabah's total geographical area (Goldammer, 2002). Mat Isa (2003) reported forest fire incidences in most of Sabah's peat swamp forests in 1998, resulting in the burning of 62,331 ha, primarily due to land preparation for agricultural activities.

Peat swamp forest is a good indicator of a community's lack of awareness regarding proper lifestyle management, which may be the primary cause of forest fires in the peat swamp forest (Karki, 2002; Kosoe et al., 2015). Numerous human actions contribute directly or indirectly to forest fires (Karki, 2002). As in Myanmar, fires are frequently used to clear forests for agricultural settlement and road preparation and to sustain grasslands by impeding succession (Sein et al., 1999). According to Gouyon (1999), people also use fire to clear and prepare land for swidden agriculture and to burn over-mature plantations to re-establish new plantations. It also improves access to facilitate the collection of honey, rattan and burnt fallen wood. In Thailand, forest fires conceal evidence of illegal logging (Fehr, 1993).

Furthermore, a forest fire can also divert sites' attention and increase the production of resin and mushrooms (Emerson, 1997; Baird, 2000). In Brunei, forest fires are commonly used through the intentional use of fire on agricultural land and for land conversion. Meanwhile, agriculture practices and human error are Malaysia's major causes of forest fire incidents (Hassan and Manila, 1997; Chew Y.J. et al., 2022). Diemont et al. (2002) investigated human activity related to agricultural land clearing and discovered that most peat fires occurred near poor communities in Southeast Asia. Therefore they proposed international funding to replace the income of peat forest communities to reduce forest fire incidents (Diemont et al., 2022).

Wildfire threats can be reduced by structural and, or social measures, with the structural responses emphasizing the concrete parts of the responses (Cigler,

1988). On the other hand, the social response involves improved decision-making, organization, management, and planning procedures that aid communities in evaluating, supporting, and selecting among the structural responses. According to Steelman and Kunkel (2004), the community's response to a wildfire threat must be carried out and enforced as well as anticipated. Faisal et al. (2017), in their social studies at Klias Forest Reserves, Sabah, highlighted that the community living near the vicinity of the forest were not fully equipped with the essential knowledge to prevent fires in the peat swamp forests. Therefore, such a lack of awareness may lead to forest fire incidents. According to Arifudin et al. (2013), the primary reason for forest fire events in Indonesia has not been resolved since the residents around the forest or peatland area continue to have social and economic issues. Therefore, they emphasize that issues can be remedied by involving and raising community awareness through programmes of community empowerment that result in developing a strategy for managing land resources, energizing village institutions, and diversifying economic activity.

The principles of inclusion, self-determination, human rights, and cooperative action are the cornerstones of a holistic approach to community development (Kenny, 2007). Community members can become more empowered through community development activities in which they can identify and question conditions and systems that prevent them from becoming empowered or are negatively affecting their welfare (Ife, 2016). Community development and empowerment programs can help communities become stronger and more cohesive, as evidenced by changes in social capital, civic participation, social cohesion, and improved health (Campbell, Pyett, & McCarthy, 2007; Kenny, 2007; Wallerstein, 2006; Ife, 2016;). Many academics, policymakers, and development workers debate whether communities are capable of combating forest fires (Makarabhirom et al., 2002). In many countries, the community is frequently held responsible for forest fire incidents (Kosoe et al., 2015). Therefore, local communities are considered part of the problem rather than part of the solution (Ganz et al., 2001; Moore, 2003; IFFN, 2003; Kosoe et al., 2015). On the other hand, many fire experts believe that the community is the key to forest survival by integrating indigenous knowledge, conservation values, and sustainable livelihoods

(Makarabhirom et al., 2002; Barnes, V.R., 2008). Managing the forest with full community participation is more effective for fire management if it is an entrenched social responsibility in the first place. (Chamarik and Santasombut, 1994; Wasee, 1996; Sukwong, 1998; Ganz et al., 2001).

## **1.2 Problem Statement**

One of the most critical issues globally including Malaysia are the forest fires, especially those involving peat swamps forest. The devastation of Sabah's forests is commonly ascribed to the prevalence of forest fires. The government, non-governmental organizations, and our society collectively take responsibility for forest protection and conservation as the principal users of the forest. Without cooperation from all parties, forest fires will continue to be the main cause of forest loss, which will indirectly affect both human lives and the biodiversity of the universe. In Malaysia, human activities largely contributed to most forest fires that broke out over periods of dry and hot weather (Ainuddin, 1998). The fundamental cause of the locals' incapacity to control fires is a lack of incentives to protect forest resources, not a lack of awareness or aggressiveness. Several people thought and argued that they were not responsible for the forest's protection because the forests were state-owned and utilized by outsiders such as private company (Fisal et al., 2017).

Forest fires bring a negative impact on human safety, health, and daily lifestyle, as well as social and economic growth. They also bring harm to flora and fauna. According to IFFN (2000), the devastating fire in the peat swamp forest was caused by human activities, notably their negligence. Hence, severe forest fires are frequently attributed to local communities. On the other hand, Dien Duc (1993) noted that peat swamps frequently experienced changes in their water tables as a result of logging and nearby land development. Besides that, a road and canal in a peat swamp forest enhanced access for beekeepers and hunters, making the area more prone to fire, as Razali (2007) reported. This perspective causes the local people to be seen as a source of problems rather than solutions for forest

management and forest fire prevention. As stated in the interview with the Director of the Fire and Rescue Department (FRD), Ahmad (2001) reported a significant lack of public awareness and knowledge in Malaysia, particularly in rural areas, about open burning for agricultural purposes during dry seasons.

Due to the community lifestyle decisions, the inhabitants' disregard for the value of peat swamp forests contributes to peatland forest fires (UNDP, 2006). According to Tan Sri Musa bin Aman, 14th Sabah Chief Minister, during his speech at the 9th Sabah Inter-Agency Tropical Ecosystem (SITE) Research Seminar (2004), peat swamp forests in Klias Peninsula continue to face further degradation as a result of land conversion activities and repeated fire occurrences. A classic example is Binsuluk Forest Reserve, where approximately 80% of the total 12,000 hectares was burned during the 1998 El Nino Phenomenon and would not recover. Additionally, the Sabah government recognizes that forest conservation alone will not suffice to safeguard the integrity of peatlands, as they recognize the importance of increasing community awareness of the causes and effects of human activities and their role in preserving the integrity of these ecosystems (Aman, 2004). The research interest is on improving and determining community awareness, participation, and prevention of forest fires in peat swamp forests, particularly in Klias Peninsula Malaysia, Beaufort, Sabah, Malaysia. It has piqued the researcher's interest to study these topics and highlight the community's attentiveness to being apart of a potential tool for preventing and controlling forest fires in peat swamps forests.

Currently, community institutions are not being seen as actively engaged in forest and peatland fire suppression. Community participation and active collaboration with institutions are critical in reducing fire spread (Thoha et al., 2018). There has been a lack of detailed studies on community knowledge, level of awareness, and community participation in forest fire prevention at peat swamp forests, making access to the actual situation difficult. As a result, a detailed study and further research on the community's knowledge, awareness, and willingness to prevent the forest fire in Malaysia's peat swamp forest should be expanded. For many years, managing forest fires in peat swamp forests was contentious since it