COMMUNITY AWARENESS & CHALLENGES IN FOREST FIRE PREVENTION: A CASE STUDY AT PEAT SWAMP FOREST, KLIAS FOREST RESERVE, BEAUFORT, SABAH, MALAYSIA.

Najjah Salfinas Mat Fisal
Faculty of Science and Natural Resources
Universiti Malaysia Sabah, 88400 Kota Kinabalu, Sabah, Malaysia
Email: naja_forester@yahoo.com

Walter Lintangah
Faculty of Science and Natural Resources
Universiti Malaysia Sabah, 88400 Kota Kinabalu, Sabah, Malaysia
Email: walterjl@ums.edu.my

Musri Ismenyah
Faculty of Science and Natural Resources
Universiti Malaysia Sabah, 88400 Kota Kinabalu, Sabah, Malaysia
mrieyza@ums.edu.my

ABSTRACT

Malaysia is known as a tropical rainforest country which is one of the oldest and complex ecosystems in the world. Peat swamps are unique forest types that usually found in the lowland of tropical forest area. The risk of peat forest fires is high when the peat was exposed or when the water table has significantly reduced due to manmade canals. The implication of peat swamp forest fire is not only to flora and fauna but also brings negative impact to the human daily routine, health, safety and economic development. Peat swamp forest is an important indicator to having forest fire easily if the community are lack of awareness to controlling their lifestyle which is that can be a reason for fire at the peat swamp area. *In Sabah, forest fire occurrence from 1983 to 1985, was reported involving an area of about one million hectares that caused by the El-Nino phenomenon. The peat swamps of Klias Forest Reserves is known to be a fragile environment. This research was conducted to determine the community level of awareness and challenges in forest fire prevention at Klias forest reserves, Beaufort, Sabah, Malaysia. Finding from this research shows that local community live surrounding the area are slightly lack awareness and knowledge on the prevention of forest fires in the peat swamp forest. This among other is because the community is less dependent on the peat swamp forest as a place to generate income. The less level of awareness could contribute to the occurrence of a forest fire in the area. However, the community gives a positive response of being involved in preventing and extinguish forest fire by co-operating with the relevant authority such as Sabah Forest Department. It was found that the awareness on forest fire prevention among the male gender is higher than female, but they have a similar perception of the techniques on forest fire prevention and firefighting. Extinguishing forest fire in peat swamp forest is a high risk and dangerous task that needs much preparation includes readiness of mental and physical ability. The intractability of villagers, the violating of rules and the unresponsive attitude that related to the prevention of encroachment for agricultures activities in peat swamp forest is posed as a challenge. Besides that, to engaged community live surrounding to have responsibility on preserving Klias Forest Reserves from pollutions & others environmental issues such as conservation of Flora and Fauna as well as their breeding population is also a challenges. As the outcome, the villagers nearby peat swamp forest, Klias Forest Reserves should involve in the "Forest Fire Prevention & Control" project, which applies the technical approach in partnership with the authority to combat a forest fire in peat swamp area. Community development programs that integrates various party to promote forest fire awareness and prevention is suggested as one of the factors that able to contribute to the successful management of forest fire in peat swamp forest.*

KEYWORDS: Peat Swamp Forest, Forest Fire, Klias Forest Reserves, Community, Awareness, Challenges.

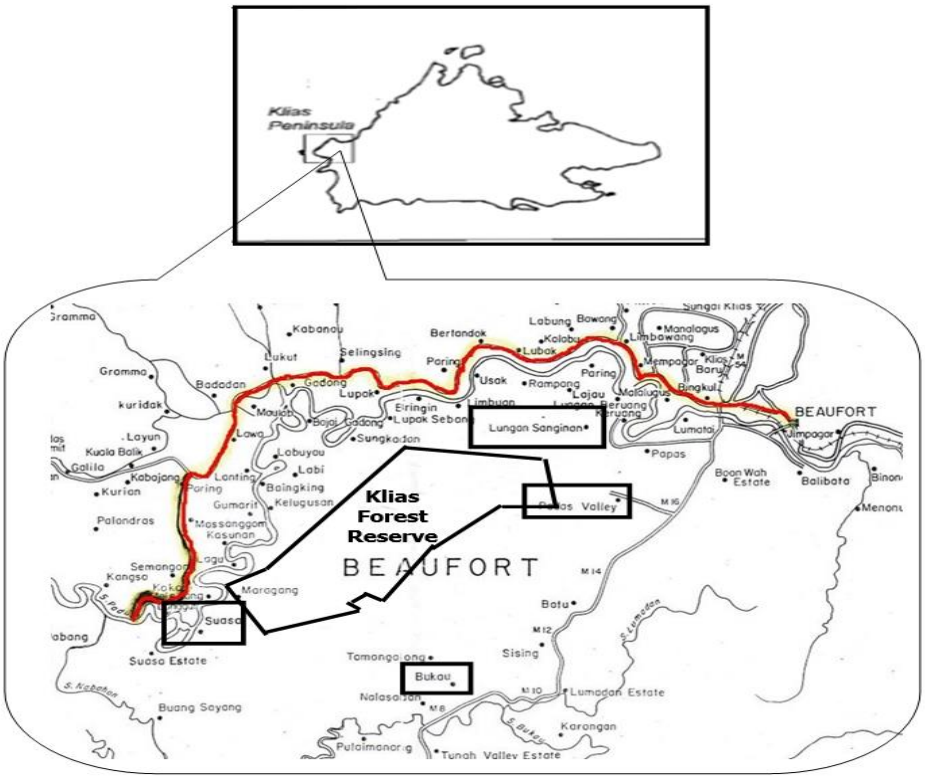
Introduction

Malaysia is known as a tropical rainforest country which is one of the oldest and one of the most complex ecosystems in the world. It has species-rich lowland forests, and other forest types include mangroves; peat swamps and montane forest that are also rich with diverse species. Peat swamps is unique forest types that usually found in the lowland of tropical forest area. It is called 'woody peat' because it contains much woody debris (Sheriza, 2007). Forest fire poses a threat not only to the forest wealth but also to the entire regime of flora and fauna, seriously disturbing the biodiversity and the ecology and environment of the regime (UNDP, 2006). The Peat swamps forest of Klias Peninsula is known to be a fragile environment where the process of peat decay initiated by the changes in the underlying hydrology. Peat swamp contents are developing from the dead vegetation that becomes waterlogged and is accumulating as peat (UNDP, 2006). The risk of peat forest fires is high especially when the peat is exposed or when the water table has been significantly reduced due to humanmade canals. This risk was on high alert during drought period which occurs almost every year, particularly during the El Nino event. The smoke and dust from peat fires

not only poses a severe health hazard to the local communities but usually develops into a widespread haze with enormous potential for economic losses. Haze episodes in the last decade have demonstrated that citizens suffer illnesses from air pollution and that tourism arrivals plummet, which impacts the overall economy (UNDP, 2006). *Forest fire is the most crucial issues in the world including Malaysia. In mid-2013, severe haze was hit Malaysia particularly in Peninsular Malaysia and Singapore as a result of open and uncontrolled burning activities in Indonesia. Millions of hectares of forest including the flora and fauna habitat was destroyed by fire and ultimately bring threat to humans. Implication of this forest fire is not only to the flora & fauna, it's also bring a lot of negative impact on people's live in terms of safety, health, daily life as a well as economic development (FAO, 2007). The worst incidence reported happened from 1983 to 1985 in Sabah, affecting an area at about one million hectares in mostly logged over forest because of severe drought caused by El-Nino phenomenon (Ahmad Zainal, 2003).*

The Klias Forest Reserve that located on the Klias Peninsula (latitude 5° 22' 60N with longitude 115° 45' 0E) is under the jurisdiction of the Sabah Forestry Department (Figure 1). It was gazetted as a Class 1 protection forest in 1984 with an area of 3,630 ha. The Klias peninsular peat swamp forest was the largest remaining piece in the Northern end of Borneo Island with peat layer as thick as 14m. The average annual rainfall was about 3,300 mm but varied between 2,300 to 4,700 mm with the temperature around 26˚c to 30˚c (Mojiol et al., 2010). Klias Forest Reserve is a logged over area and was affected by forest fire during El Nino in 1998. Protecting watershed and maintaining the stability of essential climatic environmental were the main objective of the establishment of protection forest reserve (Sabah Forestry Department, 2006).

Figure 1: Location map of Klias Forest Reserves, Klias Peninsula, Beaufort, Sabah, Malaysia.



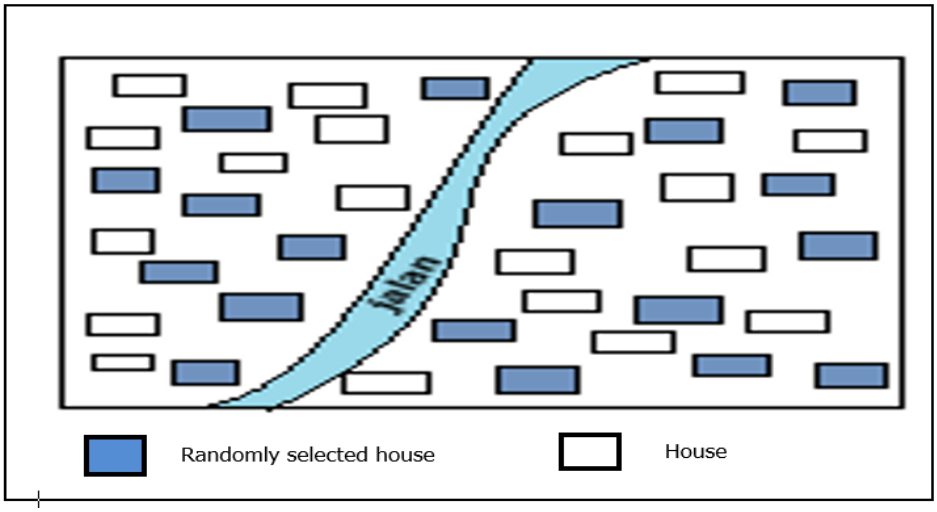
(Sources: Land & Survey Department, Beaufort District, 2013)

Peat swamp forest fire plays an important indicator of lack of awareness of the local community in adjusting their practices. The local communities of the Klias Peninsular are yet to be acquainted with comprehensive knowledge, awareness, willingness and prevention or protection of forest fire in a peat swamp. This attracted the researcher to study the awareness level and its challenges in forest fire prevention at Klias Forest Reserves with the engagement of the community surrounding. This study seeks to gather information on community-based Forest Fire Prevention at Peat Swamp Forest of Klias Peninsular, Beaufort, Sabah.

Materials & Methodology

This study was conducted based on secondary information from literature reviews, books and scientific reports available from UNDP, Sabah Forestry Department Annual Report and others. Field surveys and observation were also conducted in the villages adjacent to or inside the Klias Forest Reserves in Klias Peninsular, Beaufort. The random household sampling was used to select the respondents (Azizi, 2007; Babbie, 2008). The sample size of 30 percent of the population has been chosen randomly based on the total numbers of houses in each village (Najib, 2003) (figure 2).

Figure 2: 30 percent of the sample was randomly selected based on the total number of houses in each village



A set of questionnaire was used as a tool to collect data on the community level of awareness and readiness on fire prevention in the Klias peat swamp forest. It is also gathered information from employees of the relevant government agencies. Apart from determining the causes of the forest fire, it also identifies the best systems of controlling and prevention of peat swamp forest fire at Klias Peninsula from the respondent's point of views. The questions are consists of two forms; open-ended which is using a direct interview and secondly close-ended that give an option to be chosen by the respondent (Babbie, 2008). Likert scale was used to determine and identify the level of awareness, knowledge and willingness on the issue, whereas, the open-ended question used to get the respondents opinion and suggestion that supported retrieval of information from the close-ended question (Bertram, 2003; Bourque and Fielder, 2003).

Result and Discussion

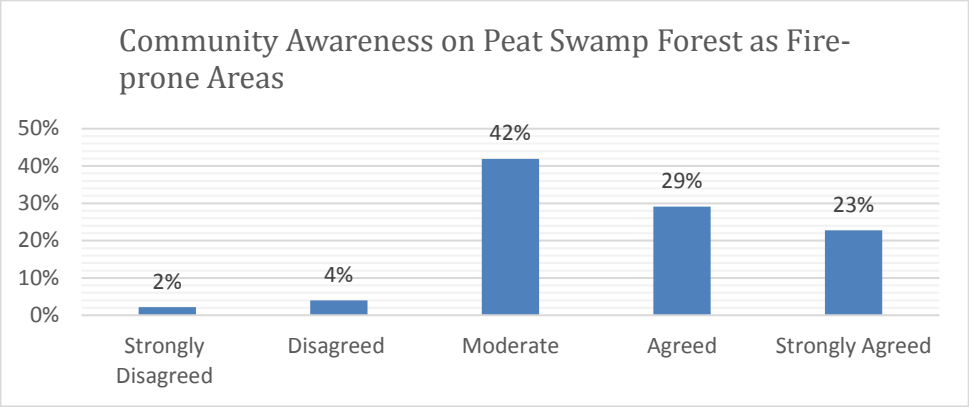
In this survey, there are four villages involved, with 30 percent of the sample was collected based on the number of total houses of each village as per Table 1 below;

Table 1: Total sample of respondents from each village

Village	Total Houses	Total Sample (30 %)	Sample
Luagan Sanginan	200	200 X 30/100	60
Bukau	143	143 X 30/100	43
Suasa	105	105 X 30/100	32
Lembah Padas	305	305 X 30/100	92
Sum Total			**227**

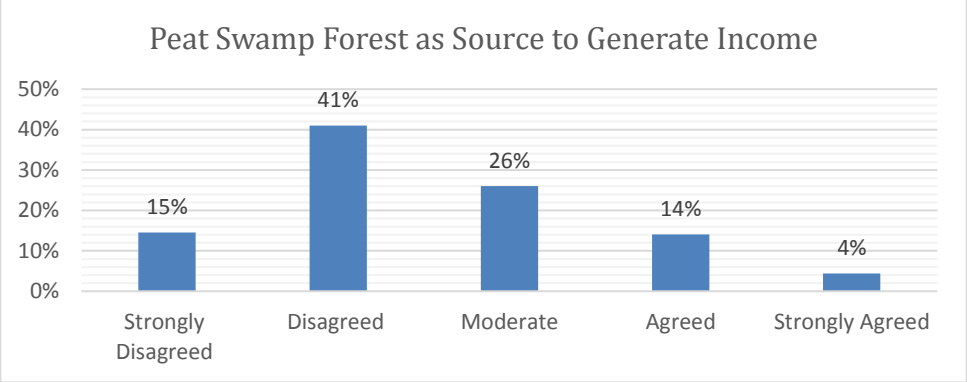
The male respondents showing a higher level of awareness with the percentage of 66.5 compared to female respondents with 33.5 percent. The male is more interested in being with risk and tough activities (Rojas, 2009) and also with a physical strength than a woman (Ghani, 2013). There is only 6 percent of total respondents that disagreed and strongly disagreed on the awareness about peat swamp forest as a fire-prone area (Figure 3). Most of the respondents agree that peat swamp forest is easy to fires and it brings their awareness of forest fire. According to Velasquez (2011), when peat swamp forest fires often occurred, it will cause air pollution such as haze that will affect the daily human activities and make them more aware of this flammable area. However, 48% (118 respondents) from total respondents are less awareness on forest fire and it could contribute to the occurrence of a forest fire in the area in any circumstances.

Figure 3: Community Awareness on Peat Swamp Forest as Fire-prone Areas



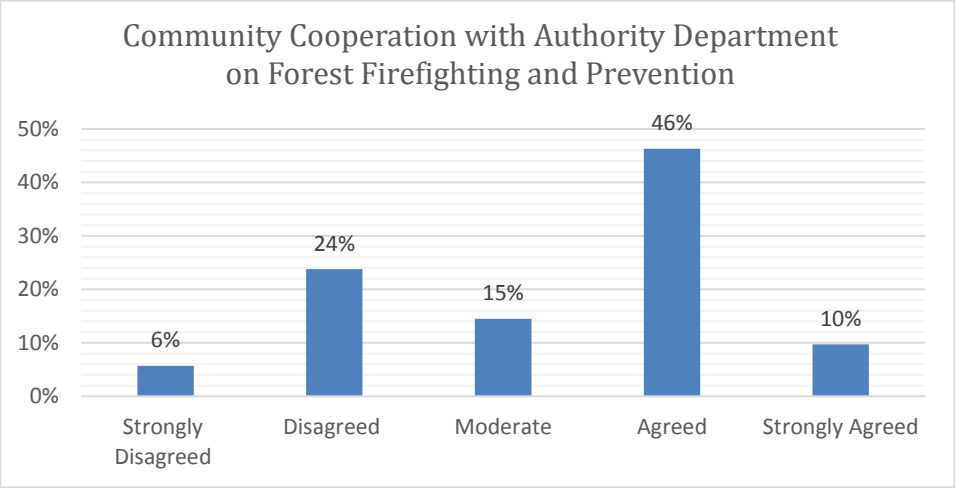
A combine total of 56 percent of the respondents disagrees and totally disagrees that a peat swamp forest is a place for them to generate income (Figure 4). The low level of community dependency on the peat swamp forest determines the level of awareness on forest fire prevention at peat swamp forest. In other hand, combine total of 44% of respondents believes that peat swamp forest area is, however, could contribute as a source of medicinal plants to the surrounding community (Mojiol et al., 2010).

Figure 4: Community perception on peat swamp forest as a place to generate income



Through this surveys, it was found that the communities agreed on their responsibility to be involved in firefighting and prevention at peat swamp forest. Azhar (2013) indicate that the villagers had little knowledge on the techniques of prevention and forest firefighting as well as less exposure to community interest in forest fire prevention and extinguishing. In this study, it showed that the cooperation between the authority and the community in preventing and extinguishing forest fires could be of more efficient (Figure 5). The result also indicates that respondents gave a positive response to get involved in forest fire fighting and prevention. The government and the relevant authority should take the initiative to ensure the community to be exposed to the techniques and activities on forest fire prevention at peat swamp forest.

Figure 5: Community Cooperation with Authority Department on Forest Firefighting and Prevention



The perception of community sensitivity on the techniques of forest fire prevention and suppression of both gender is quite similar (Table 2). The community does not have sufficient knowledge to engage them in the prevention and firefighting in peat swamps forest. Forest Firefighting in the peat swamp forest is a dangerous, and a high-risk work. Those who involved in firefighting must have a strong knowledge of the techniques of firefighting and capability in term of mental readiness, and physical ability. The cooperation and involvement of the community are essential in providing information and also in the enforcement activities.

Table 2: The mean value of community sensitivity to the forest firefighting and prevention based on gender

Parameters	Gender		
	r	p	N
The willingness to extinguished forest fire	-.365**	.000*	227
Identified the causes of forest fire	-.361**	.000*	227
Reduces activity that results in forest fire	-.289**	.000*	227
Confident to involved in firefighting	-.322**	.000*	227
Identified the extinguishers tools	-.308**	.000*	227
Having tools for firefighting	-.009	.897ns	227
Knowing the procedure of forest firefighting	-.312**	.000*	227
Dare to take a risk	-.325**	.000	227
Having a Authority Department contact number	-.226**	.001*	227
Physical and mental readiness	-.325**	.000*	227
Act fast in case of fire	-.355**	.000*	227
Be sensitive to the environment that affects prevention and extinguishing efforts	-.368**	.000*	227
Adhere to the rules	-.322**	.000*	227

**Significant value at 0.01 (*2-tailed*); *Significant value at 0.05 (*2-tailed);*ns = not significant

One of the challenges to protect the peat swamps forest in Klias Forest Reserves is to educate the community and to control their practices from doing anything that could trigger forest fires. Besides that, to engaged community live surrounding to have responsibility on preserving Klias Forest Reserves from pollutions & others environmental issues such as conservation of Flora and Fauna as well as their breeding population is also a big challenges. The enforcement of the law is essential to prevent the community from doing any encroachment activities, especially for agriculture purposes and environmental issues. The community has to alter the mentality of highly dependent on relevant authority or agencies to take action on any forest fire occurrence.

The "Forest Fire Prevention and Control" project that is applying the partnership approach with the local authority to reduce fire hazard and improve fire suppression capabilities should be considered by the villages nearby the Klias Forest Reserve, Peat Swamp Forest for implementation (Goldammer, J.G. 2002). Awareness programs by relevant authorities and agencies also could help for successful management of forest fires, since the community surrounding the Klias Forest Reserves are still lack with awareness, readiness in prevention and firefighting at peat swamp forest. Further research is necessary to study the complex interrelationship of the community practices, education, forest fire prevention and suppression technique at the local community level. The community should be involved and be taught by the relevant authority on the techniques to control and prevent the forest fire in peat swamp forest. Traditional techniques could be combined with the latest technology, which could result in a best-integrated approach and also uplift the community obligation to protect and preserve peat swamp forest. *As reflected in these studies, the underlying reason for the local population's failure to control fires is not only depending on a lack of awareness or carelessness but rather a lack of incentives to protect forest resources. Some of the community thought that why should protect forests when they are owned by the state and utilized by outsiders. Therefore, the collaboration among the local government authorities and other agencies include NGOs in developing a community development program could be introduced and implemented to the community in order to keep the forest reseouces sustainability and preventing from* wildfire.

Conclusion

A serious dimension of problem caused by forest fires in peat swamp forest in the ASEAN region especially Sabah, Malaysia needs to be addressed sufficiently. The natural environment of forest reserve that have peat swamp forest layer have been devastated, resulting economic losses of billions of dollars to the government authority, natural environment degradation and irreversible losses of valuable biology for future generations. For last two decades, namely in 1982/83, 1990, 1991, 1994 and 1997/98 we experienced of forest fires and haze, it's should serve us an useful parameter to be more cautions and undertakes all control measures that we prepare in the future. Our country preparedness to facing the crisis with fully supported and cooperation by the community will determine the intensity level of the problem, as well as the degree in which we are able to implement the various preventive measures successfully.

Acknowledgement

The authors wish to thank villages that involved in this study for their kindness and response to compiling this paper during the field work

References

Ahmad Zainal Mat Isa (2003). Forest Fire in Malaysia: Its Management and Impact on Biodiversity.

Azizi Yahaya. et.al. (2007). Mastering in Research Method. Pahang: PTS Publication & Distributors Sdn. Bhd

Azhar bin Ahmad. 47 Tahun. Bukau village residents, Beaufort. Interview session for "*Persepsi dan Tahap Kesedian Komuniti Untuk Terlibat Dalam Pencegahan dan Pemadaman Hutan Paya Gambut di Sekitar Hutan Simpan Klias, Beaufort"*. 6 November 2013.

Babbie E, 2008. *The Basics of Social Research*. 6th edition, Thompson Higher Education, USA.

Babbie E, 2008. The practices of social research. Third Edition.

Bourque, L.B., & Fielder, E.P. (2003). How to conduct self-administered and mail surveys. Thousand Oaks, CA. National Academy Press.

Dane Bertram, 2003. Likert Scale are the meaning of life

FAO, 2007. Fire Management – Global assessment 2006. FAO Forestry paper 151. Rome, Italy.

Ghani Bin Mohammad. 45 years. Suasa village residents, Beaufort. Interview session for "*Persepsi dan Tahap Kesedian Komuniti Untuk Terlibat Dalam Pencegahan dan Pemadaman Hutan Paya Gambut di Sekitar Hutan Simpan Klias, Beaufort"*. November 14, 2013

Goldammer, J.G. 2002. Forest fire problems in Southeast Europe and adjoining Regions: Challenges and solutions in the 21st Century. Paper presented at the International Scientific Conference "Fire and Emergency Safety" 31 October – 1 November 2002, Sofia, Bulgaria.

Sheriza Mohd Razali, 2007. Forest Fire Hazard Rating Assessment in Peat Swamp Forest Using Integrated Remote Sensing And Geographical Information System

Jabatan Perhutanan Sabah, 2006. *Pencegahan dan Pengawalan Kebakaran Hutan*

Land & Survey Department, Beaufort District, Sabah, Malaysia. Map of Klias Peninsula. 2013.

Mohamad Najib Abdul Ghafar. 1999. Penyelidikan Pendidikan. Universiti Teknologi Malaysia, Johor.

Mojiol, A. R., Adella, A., Kodoh, J., Lintangah, W., & Wahab, R. (2010). *Common medicinal plants species found at burned and unburned areas of Klias peat swamp forest, Beaufort, Sabah Malaysia. Journal of Sustainable Development,* 3(1), 109.

Rojas M, 2009. *A Field Guide for Project and Implementation*: *Women in Community Forest, Integrating Gender Consideration into FAO Forestry Project*. FAO, Rome.

Sabah Forestry Department, 2005 Klias Peat Swamp Forest, Sabah, Malaysia: *Hydrological Processes and Strategies for Water Management,* Sandakan, Sabah, Malaysia

United Nations Development Programme (UNDP). 2006, *Malaysia Peat Swamp Forest.* Kuala Lumpur, Malaysia.

Velasquez, H.R. (Ed.). (2011). Pollution Control: Management, Technology and Regulations. New York, United States of America: Nova Science Publisher, Inc