Journal of Liberal Arts, Thammasat University
วารสารศิลปศาสตร์ มหาวิทยาลัยธรรมศาสตร์
Journal homepage: https://so03.tci-thaijo.org/index.php/liberalarts/index

The State of Knowledge of Transboundary Haze Pollution: Problems and Challenges with ASEAN Work Culture

Noppachai Fongissara* and Watcharabon Buddharaksa

Faculty of Social Sciences, Naresuan University, Thailand

Article Info

Academic Article

Article History:
Received 28 June 2021
Revised 2 January 2022
Accepted 10 February 2022

Keywords:
The ASEAN way,
transboundary haze pollution,
Southeast Asian,
the state of knowledge

* Corresponding author
E-mail address:
noppachif61@nu.ac.th

Absract

The objective of this study is to survey knowledge of transboundary air pollution problems in Southeast Asia, including Mainland Southeast Asia, or the Mekong subregion, and the southern part of ASEAN, as thoroughly documented before and after the ASEAN agreement on transboundary haze pollution was signed and implemented.

The study found that due to globalization and neoliberalism, haze and air pollution levels have risen in direct correlation with an increase in farming contracts, including the expansion of palm oil plantations, lumber and paper pulp industries, and the livestock corn business. These increases are in response to Asian countries' needs and economic growth, as well as concerns about food security. Furthermore, this study aims to observe the levels of transboundary air pollution in Southeast Asia before and after the signing of the ASEAN Agreement on Transboundary Haze Pollution, a legally binding environmental agreement signed in 2002 by ASEAN member states in an effort to reduce regional haze pollution. However, Indonesia did not ratify the agreement until 2014.

The study finds that the agreement failed. This is because practical processes focused on respecting sovereignty, one of ASEAN's key principles that has been coined the “ASEAN Way”. This is a culturally-sensitive method of considering each nation’s preferred way of addressing problems based on their own political agendas. Therefore, the ASEAN Agreement on Transboundary Haze Pollution must be reconsidered and enhanced to address environmental issues in the context of complex indicators, taking into account various factors including regional politics and economics.

[1] This article is part of Ph.D. dissertation in “The Transboundary Haze Pollution Management in Chiang Rai Province: A Case study of the Single Command Model”. Southeast Asian Studies, Faculty of Social Sciences, Naresuan University, Thailand.

1. Introduction

The Southeast Asian region has been troubled by haze since 1985, repeatedly facing this problem year after year (Varkkey, 2015, p. 18). The haze from a large forest fire in Sumatra and Kalimantan, Indonesia was particularly bad in 2003-2004. As a result, high levels of haze were released into neighboring countries' airspaces, including Singapore, Malaysia, and Brunei, resulting in significant economic impacts and an environmental disaster (Jones, 2004, p. 60). The biggest source of pollution, however, is the resulting haze from burning fallow fields in open areas in preparation for planting next season's crops. Bushfires in damaged woods, on the other hand, were caused by low humidity, a consequence of weather changes attributed to global warming (Nguitragool, 2011a). Additionally, drought has been induced by global warming in many parts of Asia and future water shortages are extremely likely, especially in Mainland Southeast Asia, or the Mekong subregion, and the southern part of ASEAN (Wilson et al., 2017, p. 9). The haze problem was also extremely serious during droughts resulting from El Nino during 1982-1983, 1987,1991, 1994, 1997-1998 and 2006 (Jones, 2004, p. 59; Kraiwatanapong & Mahatthanobol, 2012, p, 28). In contrast, the La Nina weather patterns of 2010-2011 resulted in lower haze levels as the humidity and rains had increased, especially in Mainland Southeast Asia, or the Mekong subregion, which helped to expand cultivated areas across the region (Simachaya, 2001, p. 4).

The agricultural practice of burning fallow fields seems to have a very long recorded history (Jim, 1999, p. 251). The consequences of this practice are exacerbated when fields are burned in open areas, especially when the weather is very dry. Unfortunately, firm laws regulating haze pollution have yet to be established. In addition, another factor relating to transboundary haze pollution is the development of industry and trade, expanding cities, and regional population growth. As a direct result of the 1997 economic crisis, ASEAN countries were economically at risk, demonstrating instability and lack of unity in terms of raising environmental consciousness and allocating budgets for the prevention of burning fallow fields (Nguitragool, 2011a).

Therefore, this article seeks to present (1) the survey results on knowledge of transboundary air pollution problems in Southeast Asia, including both Mainland Southeast Asia, or the Mekong subregion, and the southern part of ASEAN, as documented before and after the ASEAN Agreement on Transboundary Haze Pollution was signed and

implemented; and (2) the outcome of attempted solutions for the issue of transboundary haze pollution both before and after signing the ASEAN Agreement of Transboundary Haze Pollution through the employment of qualitative document analysis.

2. The origin of transboundary haze pollution in Southeast Asia[2]

Southeast Asia has been continually affected by air pollution, also known as haze. The main cause is the burning of fallow fields to prepare the land for planting the following season's crops, as carried out by smallholders, plantation owners, and logging companies (Jones, 2006). In addition, following the 1997 regional economic crisis, Indonesia faced issues of extreme poverty and the resulting income-seeking led to deforestation, which was generally illegal in nations with poor environmental laws, particularly Indonesia and Mainland Southeast Asia, or Mekong subregion, countries (Nguitragool, 2011a, p. 106).

The transboundary haze pollution problem occurs not only in the southern part of ASEAN, but also in the Upper Mekong Mainland subregion (Tonkaew, 2009, p. 69). Some such examples are detailed as follows.

ASEAN Mainland or Mekong subregion countries

In the Mekong subregion there are three main causes for the problem of transboundary haze pollution: the effects of El Nino, the increase in bushfires, and the practice of contract farming. These causes relate to the inability of regional commerce to develop sustainably due to the pressures of industrialization and urbanization brought on by the region's population expansion (Nguitragool, 2011a, p. 106).

First, there are the effects of the El Nino phenomenon. Weather is one factor that can cause serious haze pollution, as is clearly observed in the weather patterns of El Nino which caused a number of bushfires. In contrast, before 2008, the ASEAN region encountered significant La Nina weather patterns, resulting in higher humidity throughout the northern part of ASEAN due to increased rainfall. During this time haze pollution and bushfires were not a serious threat, and therefore, many areas were developed

[2] This study focuses on Chiang Rai, Thailand, Myanmar, and Laos in the Mekong subregion.

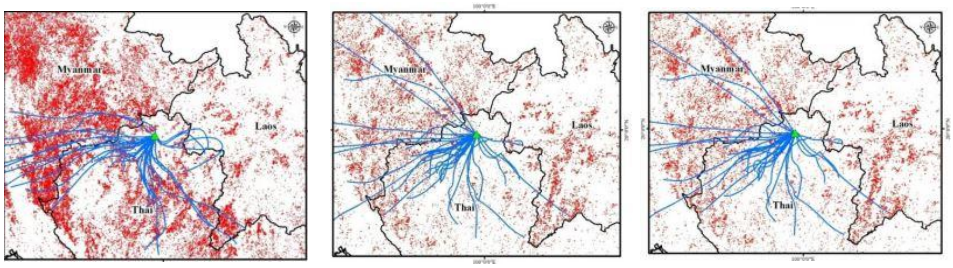
with crops (Simachaya, 2001, p. 4). The situation later worsened when rainfall decreased, becoming even more serious when the climate was very dry due to effects of El Nino and rapid global warming (Jones, 2004, p. 59; Nguitragool, 2011b). Moreover, the effects of westerly winds and high-pressure systems from China led to air stagnation, which occurs when an air mass remains over an area for an extended period of time. As a result, the humidity and heat remain in place, especially in valleys or “pan basins”, causing widespread dust problems (Simachaya, 2001, p. 4).

Secondly, bushfire researchers and scholars noted in their papers that human activities were the main cause of forest fires (NIDA Center for Research & Development Disaster Prevention & Management, 2012; Sirimonkonglertkun, 2014; Sukpherm et al., 2016). They agreed that such human activities were intentional but careless and that these activities were mainly related to the clearing of land for crop cultivation. Traditionally, farmers begin to clear the land before the rainy season and do so until late summer, which is also a time of high-risk for bushfires to occur. While this agricultural burning method is the cheapest, fastest, and most effective way to clear land, it is also the traditional method of many regional cultures (Pasukphun, 2018). According to Adeleke et al. (2017), the method of burning is related to cultural habit, which is unfortunately also the cause of transboundary haze pollution. As such, this issue cannot be categorized as a national issue due to the impacts imposed upon neighboring countries. According Sirimongkonglertkun (2018), thorough evaluation of increasing haze in northern Thailand, Laos and Myanmar found that the majority of hotspots were located in Myanmar (51%), Laos (28%) and Thailand (21%). The study also found that haze spreads in a southwestern direction, which significantly impacts Chiang Rai province, as shown in Figure 1. Lekkham and Singhaputargun (2019) showed that Mae Sai District is one of the best examples of the impacts of transboundary haze pollution. During the Chiang Rai burning restriction from 15 February to 15 April 2019 (extended to 30 April 2019) Mae Sai was not determined as a hotspot, but on 31 March 2019, it experienced the highest levels of PM 2.5 in the world. This is the direct result of agricultural methods that rely on burning fallow land to prepare for farming during the rainy season. Such methods have also resulted in increased burn scars caused by the burning of weeds and agricultural materials used in corn production. This has raised serious concerns about the issue of contract farming. In addition, it has resulted in a pollution crisis that is now taking a toll

in the affected regions of Thailand, Myanmar, and Laos. Every year, from March to April, the region is blanketed by haze pollution, with peak levels of PM 2.5, as shown in Table 1 below.

Figure 1

Wind directions9from outside the country that entered Thailand and impacted Chiang Rai province



March 2014 March 2015 March 2016

Note: Sirimongkonglertkun (2018, pp. 5-6)

Table 1

Number of hotspots in Mainland Southeast Asia, or the Mekong subregion, per month from 2019-2020

Month	Country	Hotpot (point)
Dec 2019	Northern Laos	62
	Upper Northern Thailand	357
	Shan state of Myanmar	72
	Total	**491**
Jan 2020	Northern Laos	212
	Upper Northern Thailand	898
	Shan state of Myanmar	365
	Total	**1,475**
Feb 2020	Northern Laos	3,557
	Upper Northern Thailand	6,438
	Shan state of Myanmar	15,121
	Total	**25,116**
Mar 2020	Northern Laos	19,261
	Upper Northern Thailand	15,753
	Shan state of Myanmar	40,101
	Total	**75,115**

Month	Country	Hotpot (point)
Apr 2020	Northern Laos	10,958
	Upper Northern Thailand	5,637
	Shan state of Myanmar	10,672
	Total	**27,267**
May 2020	Northern Laos	840
	Upper Northern Thailand	670
	Shan state of Myanmar	524
	Total	**2,034**

Note: Greenpeace Thailand (2021)

The issue of contract farming is an additional cause of haze pollution, particularly from the livestock feed industry, as noted in the Ayeyawady–Chao Phraya–Mekong Economic Cooperation Strategy, or ACMECS 2003.The expansion of the livestock feed industry has been enhanced through farming contracts.The economic liberalism employed here has benefitted big investors in Thailand, such as the Charoen Pokphand Food Company (CP), which achieved the goal of the ACMECS by expanding corn production within the Mekong subregion. Corn production for livestock feed makes up the majority of such contract farming, as meat is a staple food for humans. Furthermore, the demand for consumable meat products has increased due to the growing regional population in ASEAN. As such, it makes sense that corn production has significantly increased in Asia, and particularly within China. Currently, China is the biggest producer of feed for the livestock industry in the world, overtaking the U.S. China is also the main variable in CP's significant regional growth, especially in highland areas of Shan State, northern Myanmar, in the beginning of 1990. The main objective of CP's contract farming is to produce corn for animal feed, responding to the needs of livestock industries in both China and Thailand (Woods, 2015, pp. 4-5).

In 2000, Thailand and Myanmar signed an MOU under the ACMECS to allocate approximately 700,000 hectares of wasteland for corn production to serve as livestock feed for CP. However, this led to political challenges with the Karen people who maintain *de facto* authority in Shan State. Later, when the Myanmar government agreed to end the armed conflict with the Karen people, CP began a rapid buildup of the livestock feed industry around Thailand's borders to respond to the domestic need. These contract

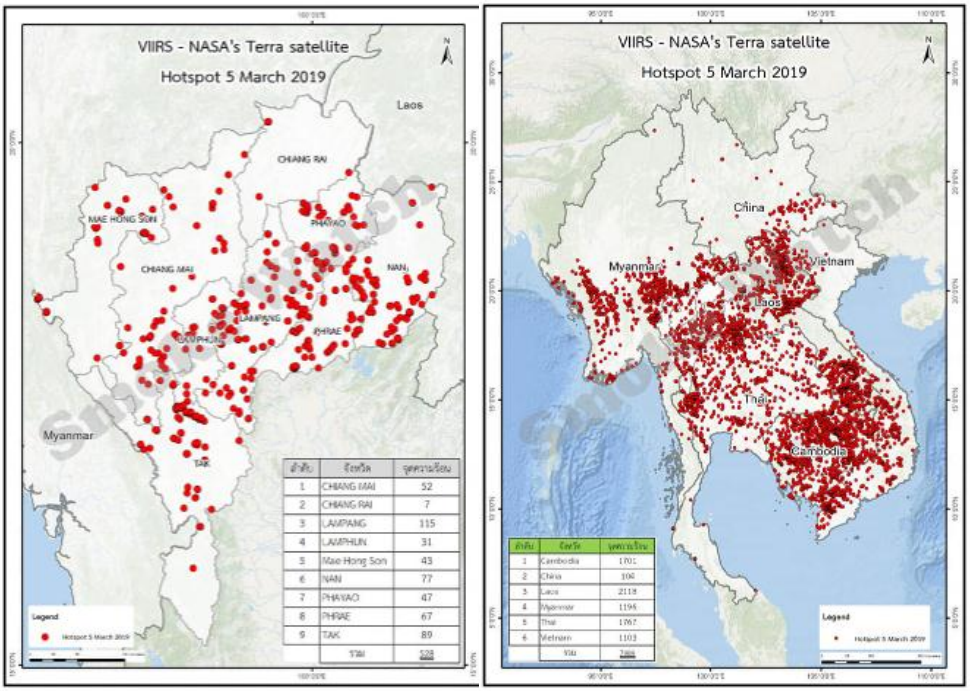
farming projects are also seen as a way to promote agricultural changes in Shan State, transitioning from old methods to participation in the new demand of corn production in river delta areas (Jepsen et al., 2019, pp. 4-5).

In just six months, the land allocated for corn production in Shan State, Myanmar significantly increased from 4,006.60 km^2 in December 2018 to 12,069.33 km^2 in May 2019. Current totals are approximately 16,075.93 km^2. In April 2019, bushfires caused severe haze pollution in the area, but were not traceable to any specific owners (Greenpeace Thailand, 2019).

The expansion of the livestock feed industry, combined with the rise of hotspots and the burning of fallow land, has resulted in a transboundary pollution crisis that is now taking a toll on the affected regions of the ASEAN mainland, or the Mekong subregion, and specifically in Thailand's Chiang Rai province (as shown in Figure 2), which is adjacent to neighboring countries that have greatly expanded contract farming, particularly in the livestock feed industry. Additionally, corn production accounts for 30% of the regional hotspots in three Mekong subregion countries: Thailand's far north, Myanmar's Shan State, and the northern region of the Lao People's Democratic Republic (Borras & Franco, 2018, p. 5; Jaroenpanyanet, 2020, p. 1). This is mainly due to unsustainable economic activities and industrialization, as well as urbanization and population growth (Nguitragool, 2011a). Although Chiang Rai province has tried to solve this problem by reducing burning, obstacles and limitations remain as cooperation from neighboring countries is necessary. It is not sufficient to have cooperation from just one country; international cooperation is the key to address this environmental problem.

Figure 2

Numbers of hotspots in March 2019 in Chiang Rai province and neighborhood countries



Note: Smoke watch (2019a, 2019b)

In summary, the author found that research on transboundary haze pollution across ASEAN, and particularly in northern ASEAN, determines the main factors causing regional bushfires were climate, geography, and human action. Human actions include intentional and careless burning of fallow land, as well as burning to eliminate garbage.

In addition, the growth and development of countries in ASEAN has led to the demand for, and consumption of, more meat products, further causing the expansion of the livestock feed industry in countries around the Mekong subregion. The global economy also plays huge role in producing corn for livestock feed. In order to prepare fallow fields for quick production, burning is the easiest, most effective, and most economical method. However, evidence from an empirical study using the Moderate Resolution Imaging Spectroradiometer (MODIS) concerning wind direction and source of hotspots found that Myanmar has the most hotspots, followed by Laos and Thailand, respectively. Haze pollution from these countries directly affects Chiang Rai province.

Although many studies discuss the problems of haze pollution in ASEAN countries, the problems still remain, especially in northern ASEAN countries, or the Mekong subregion. While air pollution is very harmful to people's health, it also affects transportation, tourism, and various other activities.

While there is a knowledge gap in addressing the haze problem, it has been proven that reducing burning in only a few regions or countries is not enough. The solution requires cooperation from many countries, from the people in every region, and from international organizations. An important key in solving the transboundary pollution problem is to further study regional problem-solving and spatial mechanisms. As such, this study develops an analytical framework through which a better understanding of regional environmental management can be gleaned, including complex political and economic factors.

3. ASEAN Insular land

The main source of haze in southern ASEAN countries was found to be Indonesia. Every year there is a serious haze pollution in both Indonesia and neighboring countries. Due to their geographical location, Indonesia, Malaysia, and Singapore are the most significantly affected (Jones, 2004, p. 60; Varkkey, 2015, p. 4). This is mainly the result of extensive burning, which can be classified into four categories: geographical characteristics of Indonesia, human activities, the impact of neoliberalism in Southeast Asia, and the patron-client system in Indonesia. These issues further result in an unbalanced development strategy due to the following factors.

First, Indonesia's geographical characteristics include easily burned peat soil. For example, in the 1990s, the emphasis on logging changed to focus on developing more oil palm plantations. Commercial burning for land clearance and conversion into oil palm plantations took place annually and was intense (Varkkey, 2015, p. 51). The intensity was even more serious when the climate was dry, according to Nguitragool (2011a). However, the Indonesian government has yet to effectively address this problem.

Secondly, in terms of human activities, many academics such as Heil and Goldammer (2001), Jones (2004), Nguitragool (2011a), Litta (2012), Varkkey (2015)

and Islam et al. (2016) have stated that the cause of haze pollution is from burning that is similar to the agricultural practice of “slash and burn”. Traditionally, slash and burn practices are used for weed removal and deforestation for agricultural business. However, the most frequent contributors to the problem of land burning are large timber and palm oil plantation companies, which have been criticized for a much larger scale of burning than that of shifting cultivators, pioneer and migrant farmers, and land developers (Jones, 2004, p. 63).

The impact of neoliberalism in Southeast Asia is the increased capitalist pressure to produce goods through economic development. Such pressure has primarily come from the Indonesian government and International Monetary Fund. Additional factors have also been a driving force of capitalist pressure, including the expansion of land for palm oil production in response to the needs of global markets, such as those of China and India. Promoting the use of biodiesel serves as the second most important income source, as alluded to by Bryant and Bailey (1997) and Hirsch and Warren (1998) who have suggested that due to a regional rise in neoliberalism, people throughout Southeast Asia use a lot of environment resources through contract farming. Ironically, by implementing a policy to reduce domestic deforestation, China has played an important role in rapidly changing Indonesia’s lumber industry, especially in Sumatra and the Kalimantan islands.

Lastly is the patron-client system in Indonesia. Many academics, including Nguituragool (2011a), Varkkey (2015), and Kraiwatanapong and Mahattanobol (2012) have explained that the patron-client system in Indonesia has now become the main obstacle in addressing the transboundary haze pollution problem because military personnel and businessmen who had a good relationship with former president Suharto have maintained their authority, even after Suharto’s time. Having made forest concessions and monopolized the lumber industry, these people oversee national resources and hold a monopoly on almost half of the world’s plywood. As a result, efforts have failed to stop the burning in Indonesia.

In summary, this situation has negatively impacted neighboring countries both directly and indirectly, whether it be their people’s health from the short- and long-term effects of haze pollution or their national economies. Furthermore, as Kraiwatanapong and Mahattanobol (2012) outline, this issue also affects Singapore’s diplomatic relations

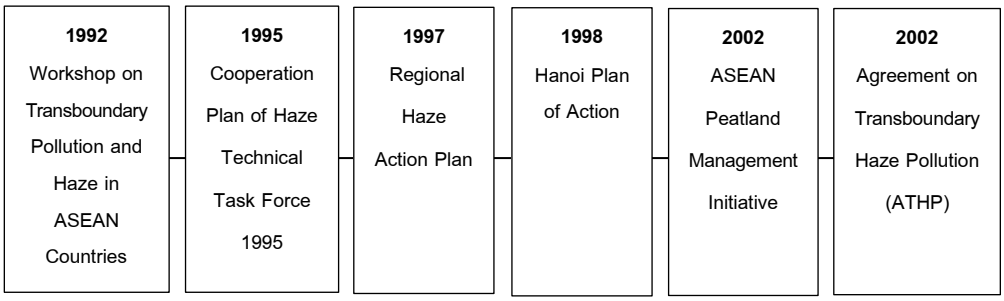
as global warming may cause a rise in sea levels along with the annual haze problem. The overuse of natural resources in Southeast Asia results from neoliberal policies, which in turn contributes to pollution and deforestation. Moreover, Indonesia's patronage system has been determined as the primary obstacle in addressing transboundary haze pollution.

4. Solving the transboundary haze pollution problem

Since 1985, ASEAN has acknowledged that transboundary haze pollution is an ongoing regional issue. In response, ASEAN has attempted to promote cooperation to alleviate the issue through environmental initiatives such as the 1992 Workshop on Transboundary Pollution and Haze in ASEAN Countries, the 1995 Cooperation Plan of Haze Technical Task Force, the 1997 Regional Haze Action Plan, the 1998 Hanoi Plan of Action, the 2002 ASEAN Peatland Management Initiative, and the 2002 Agreement on Transboundary Haze Pollution (ATHP), as shown in Figure 3 (Heilmann, 2015, p. 101; Varkkey, 2019, p. 4).

Figure 3

ASEAN Initiatives to address transboundary haze pollution



Note: Varkkey (2012, p. 84)

Nevertheless, transboundary haze pollution is still not being effectively addressed despite the cooperation from regional governments. These regional, subregional, bilateral, and multilateral agreements meant to address the haze pollution problem are detailed as follows.

4.1 The ASEAN Agreement on Transboundary Haze Pollution: before Indonesia's Ratification.

According to a study by Jerger (2014), the protocol of the ASEAN Agreement on Transboundary Haze Pollution is ineffective for people who do not follow their government's laws because it lacks complete regional ratification. Moreover, the study stated that the most effective way to reduce transboundary haze pollution was for Indonesia to take ratification seriously, follow the agreement on managing complex problems, and to implement effective problem solving through collaborative regional work. Kraiwatanapong and Mahattanobol (2012) further explained that the lack of effective law enforcement on the Agreement on Transboundary Haze Pollution was due to ASEAN's norms, which limit the ability to solve problem collectively. ASEAN hesitated to judge Indonesia's non-ratification and, as a result, compromised on its own agreement.

For any ASEAN member country that fails to honor the Agreement, law enforcement is used to discuss and negotiate. Therefore, it seems that the ASEAN structure for addressing transboundary pollution is too weak; it cannot persuade people to take the Agreement seriously because its own member countries have not taken firm action to address the issue. Moreover, Tonkaew (2009) discussed that this limitation has led to the inability to effectively address the transboundary haze issue just along Thailand's border. Therefore, a stronger ASEAN agreement that is binding to all member states is necessary in preventing further delay to effectively address this regional issue.

The most urgent issue that needs to be addressed is to change the framework used to solve such problems, including prevention and monitoring, in addition to revising clauses that allow burning. Rather than placing further emphasis on the problems, these recommendations may help to address the root cause. The current framework reflects an approach to economic development without awareness of environment protection, leading to problems within the international community (Suchchindah, 2015). However, Nguituragool (2011b) agreed that although the ASEAN Agreement on Transboundary Haze Pollution failed, that policy attempt demonstrated progress within ASEAN, as each member country relegated, to some extent, their own customs. As ASEAN traditionally avoids problems due to its non-interference principle, prevention and

monitoring may be the best ways to cope with member states' rule violations, particularly in complex regime systems. This type of framework could provide more space for member states to discuss how to address general conflicts and their impact on ASEAN members, including national laws.

4.2 The ASEAN Agreement on Transboundary Haze Pollution: after Indonesia's Ratification

Indonesia agreed to ratify the ASEAN Agreement on Transboundary Haze Pollution in 2014, twelve years after its completion (Robertua & Sigalingging, 2019, p. 7). However, the problem remains. Indonesia is a primary contributor to the haze pollution problem and its ratification of the Agreement has yet to influence domestic policy change. Furthermore, the Agreement was designed in accordance with the ASEAN way and, as such, is not legally binding. Instead, effective implementation is limited by the ASEAN principles of sovereignty and non-interference. As a result, the transboundary haze pollution problem was not resolved due to adherence to the ASEAN way and member states' focus on national benefits. Suggested methods of reducing regional haze pollution were less significant than potential business benefits, influencing member states to prioritise the latter (Ramli et al., 2019, p. 469).

Helimann (2015) and Timwat (2016) reiterated the ineffectiveness of the operational mechanisms of the Agreement due to ASEAN's inability to establish a legally binding regional policy. As a result, the transboundary haze problem continues due to the lack of cooperative mechanisms for effective problem solving. With each member country prioritising its own benefit, the Agreement was ineffective regardless of complete ratification. In addition, ASEAN was founded under the sovereignty of its member states and therefore does not have the authority to force adherence to or application of ASEAN policies. The ASEAN way focuses on negotiation, or quiet diplomacy, which stresses simplicity and consensus (Nguitragool, 2011b, p. 157). Additionally, it is a method of avoiding problems and focusing on national interests. At the same time, however, ASEAN member states do have common needs, and it would be beneficial to determine the institution's direction and to prepare for new challenges within the region (Tay, 2000, p. 73). In summary, the ASEAN Agreement on Transboundary Haze Pollution did not influence any effective regional change and the mechanisms in managing the issue have consistently fallen short (Nguitragool, 2011b, p. 356). Although

every ASEAN member state has ratified the Agreement, it continues to fail as ASEAN countries are still developing and therefore maintain ineffective systems for environmental conservation.

5. Conclusion

The severity of the transboundary haze pollution problem throughout ASEAN is caused by factors related to globalization, including the expansion of contract farming as an outcome of heightened neoliberal policies across the region. Furthermore, the haze pollution problem is exacerbated by transitions to palm oil production, the lumber and chemical pulp industries, and corporate monocropping of corn for livestock feed, particularly in Shan State, Myanmar. These increased factors are a response to the need for economic growth and food security, and burning fallow land is one of the cheapest and easiest ways to facilitate rapid production.

Both before and after the ratification of the ASEAN Agreement on Transboundary Haze Pollution, the issue remains, demonstrating that the implementation of the Agreement was ineffective. The Agreement did not reduce haze pollution in the region and instead became a tool for ASEAN member countries to seek national benefits, strengthened by the fact that the Agreement was developed in accordance with the ASEAN way. Although the issue of transboundary haze pollution has not been solved, the Agreement did demonstrate progress in terms of the non-interference principle. Similar frameworks may be applied to address future wrong practices, establishing an effective mechanism for a complex, globalized world.

References

Adeleke, A., Apidechkul, T., Kanthawee, P., Suma, Y., & Wongnuch, P. (2017). Contributing Factors and Impacts of Open Burning in Thailand: Perspectives from Farmers in Chiang Rai Province, Thailand. *Journal of Health Research, 31*(2), 159-167.

Borras, S. M., Jr., & Franco, J. C. (2018). The challenge of locating land-based climate change mitigation and adaptation politics within a social justice perspective: towards an idea of agrarian climate justice. *Third World Quarterly*, *39*(7), 1308-1325.

Bryant, R. L., & Bailey, S., (1997). *Third world political ecology*. Routledge.

Greenpeace Thailand. (2019). ASEAN Unity but why can't they deal with Transboundary Haze Pollution? https://www.greenpeace.org/thailand/story/9597/asean-haze-problem/

Greenpeace Thailand. (2021). *The Analysis Results of Hotspots in Burning Areas, PM 2.5 Concentration, and Corn Plantation Areas in the Mekong Sub-Region during 2019-2020.* https://www.greenpeace.org/thailand/publication/19092/food-label-report-pm25-criris-in-mekong-sub-region-2021/

Heil, A., & Goldammer, J. (2001). Smoke-haze pollution: a review of the 1997 episode in Southeast Asia. *Regional Environmental Change*, *2*(1), 24-37.

Heilmann, D. (2015). After Indonesia's Ratification: The ASEAN Agreement on Transboundary Haze Pollution and Its Effectiveness as a Regional Environmental Governance Tool". *Journal of Current Southeast Asian Affairs*, *34*(3), 95-121.

Hirsch, P., & Warren C. (1998). *The Politics of Environment in Southeast Asia*. Routledge.

Islam, M. S., Hui Pei, Y., & Mangharam, S. (2016). Trans-boundary haze pollution in Southeast Asia: sustainability through plural environmental governance. *Sustainability*, *8*(5), 1-13.

Jaroenpanyanet, A. (2020). *Transboundary Haze Pollution and Climate Condition*. The 2nd Conference of International Shan Studies during 4-6 September, 2020 at Mae Hong Son Community College Hall. Tai Yai (Shan) Studies Center, Mae Hong Son Community College and Center for Ethnic Studies and Development, Faculty of Social Sciences, Chiang Mai University.

Jepsen, M. R., Palm, M., & Bruun, T. B. (2019). What Awaits Myanmar's Uplands Farmers? Lessons Learned from Mainland Southeast Asia. *Land*, 8(2), 1-23.

Jerger, D. B., Jr. (2014). Indonesia's role in realizing the goals of ASEAN's agreement on transboundary haze pollution. *Sustainable Dev. L. & Pol'y*, *14*, 35-45.

Jim, C. Y. (1999). The forest fires in Indonesia 1997-98: Possible causes and pervasive consequences. *Geography*, *7*(1). 251-260.

Jones, D. (2004). "ASEAN and transboundary haze pollution in Southeast Asia" in Public Policy-Making', *Asian Journal of Political Science*, *12*(2), 59-77.

Jones, D. S. (2006). ASEAN and transboundary haze pollution in Southeast Asia. *Asia Europe Journal*, *4*(3), 431-446.

Kraiwatanapong, V., & Mahattanobol, W. (2012). Environmental Security in ASEAN. In Seminar on China and Human Security in second years. Chula Research Institute (Chula Unisearch), Chinese Studies Center, Institute of Asian Studies Chulalongkorn University. 35-64.

Lekkham, A., & Singhaputargun, N. (2019). *A Comprehensive Chiang Rai Model for Haze Management: A Case Study of Chiang Rai, Thailand* (pp. 77-90). In the 6th International Conference on International Relations and Development (ICIRD). Chiang Rai: ICIRD Knowledge Network.

Litta, H. (2012). Case Study One: Transboundary Haze Pollution. *Regimes in Southeast Asia* (pp. 89-138). VS Verlag für Sozialwissenschaften.

Nguitragool, P. (2011a). Environmental Cooperation in Southeast Asia: ASEAN's Regime for trans-boundary Haze Pollution. Routledge.

Nguitragool, P. (2011b). Negotiating the haze treaty: rationality and institutions in the negotiations for the ASEAN Agreement on Transboundary Haze Pollution (2002). *Asian Survey*, *51*(2), 356-378.

NIDA Center for Research & Development Disaster Prevention & Management. (2012). The Northern Thailand forest fires in the Summer season. http://dpm.nida.ac.th/main/index.php/articles/fire/item/37

Pasukphun, N. (2018). Environmental health burden of open burning in northern Thailand: a review. *PSRU Journal of Science and Technology*, *3*(3), 11-28.

Ramli, D. R. D., Hashim, R., & Mohammed, N. (2019). The Challenges of the ASEAN Way in Managing the Transboundary Haze Issue (pp. 465-474). *In Proceedings of the Second International Conference on the Future of ASEAN (ICoFA) 2017(1)*. Springer.

Robertua, V., & Sigalingging, L. (2019). Indonesia Environmental Diplomacy Reformed: Case Studies of Greening ASEAN Way and Peat Restoration Agency. *Andalas Journal of International Studies (AJIS)*, *8*(1), 1-15.

Simachaya, W. (2001). Haze pollution in the northern of Thailand: Problem and Solution. In seminar of The Global warming crisis, smog pollution, imminent disaster. Pollution Control Department, 1-11.

Sirimongkonlertkun, N. (2014). Smoke haze problem and open burning behavior of local people in Chiang Rai province. *Environment and Natural Resources Journal*, *12*(2), 29-34.

Sirimongkonlertkun, N. (2018). Assessment of Long-range Transport Contribution on Haze Episode in Northern Thailand, Laos and Myanmar. In *IOP Conference Series: Earth and Environmental Science, 151*(1), 1-7.

Smoke watch. (2019a). Hotspots 25 March 20019. https://www.facebook.com/Smoke-Watch-286832481894007/photos/946072535969995

Smoke watch. (2019b). Hotspots 25 March 20019. https://www.facebook.com/Smoke-Watch-286832481894007/photos/456986948211892

Suchchindah, A. (2015). Transboundary Haze Pollution Problem in Southeast Asia: Reframing ASEAN's Response. *ERIA Discussion Paper Series*, 1-21.

Sukpherm, K., Boonplook, D., & Lamlert, W. (2016). "Legal Measures to Prevent and Control of Smog Pollution from the Open Burning: Case Studies on Eight Northern Provinces in Thailand". *Sukhothai Thammathirrat Open University Journal*, *29*(1), 26-43.

Tay, S. S. (2000). Fires and haze in Southeast Asia: Challenges to regional cooperation in ASEAN and Asia pacific (pp.49-67). Community Building in Asia Pacific: Dialogue in Okinawa, Japan: Japan Center for International Exchange.

Timwat, P. (2016). Collaboration Dealing with Haze Pollution from Neighboring Country to Thailand under ASEAN Agreement on Transboundary Haze Pollution. The 4th International Conference on Magsaysay Awardees: Good Governance and Transformative Leadership in Asia, 31 May 2016.

Tonkaew, S. (2009). *Problems and prospects concerning the implementation of ASEAN agreement on transboundary haze pollution and relation to Thailand* [Unpublished master's thesis]. Chulalongkorn University.

Varkkey, H. (2012). The Asean way and haze mitigation efforts. *Journal of International Studies*, *8*, 77-97.

Varkkey, H. (2015). *The haze problem in Southeast Asia: Palm oil and patronage*. Routledge.

Varkkey, H. (2019). The Political Future of Haze and Peatlands in Southeast Asia. In proceedings of the 6th International Conference on International Relations and Development (ICIRD).

Wilson, A. M., Gladfelter, S., Williams, M. W., Shahi, S., Baral, P., Armstrong, R., & Racoviteanu, A. (2017). High Asia: the international dynamics of climate change and water security. *The Journal of Asian Studies*, *76*(2), 457-480.

Woods, K. (2015). CP maize contract farming in Shan State, Myanmar: A regional case of a place-based corporate agro-feed system. *BRICS Initiative for Critical Agrarian Studies (BICAS)*. 1-25.