

Haze Phenomenon in Malaysia: Domestic or Transboundary Factor?

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Abstract-- Malaysia has been plagued for decades by periodic haze from large scale forest fires on Indonesia's Sumatra Island, with regular spats over responsibility. There are at least three factors causing this problem. First, which classified as main factor are the actions of several oil palm plantation companies that use a slash-and-burn method to clear land for their plantations. The first factor is under the responsibility of Indonesia. Second is a nature factor, the wind that carries the haze to Singapore and Malaysia. Third factor are domestic factors in Malaysia, which activities such as industry, motor vehicle and open burning contributed and make the haze situation worst. As awareness of the source and dangers of smoke haze spread, Southeast Asian governments increasingly came under pressure from the public and civil society at the national, regional, and international level to address the haze issue.

Keywords-- Haze, Malaysia, Indonesia, forest fires, palm oil plantations

I. INTRODUCTION

HAZE is defined as the presence of fine particles (0.1–1.0 μm in diameter) dispersed at a high concentration through a portion of the atmosphere that diminishes the horizontal visibility, giving the atmosphere a characteristic opalescent appearance [1]. Haze is most likely to occur during the months from January to February and June to August every year. Several factors such as prolonged dry weather, a stable atmosphere, and an abundant supply of pollutants from urban or rural sources are the ideal ingredients for the formation of haze. Winds and weather also play an important part in transport of pollution such as haze locally and regionally.

Haze persists as a regional pollution problem in Southeast Asia year after year. To date, the 2013 Southeast Asian haze affecting several countries in the Southeast Asian region, including Brunei, Indonesia, Malaysia, Singapore and Southern Thailand, occurring from 13 June 2013. This is the worst of haze episodes which affecting Malaysia since 2005, starting with the Air Pollution Index (API) hitting 172 on 19 June. On 20 June, the haze in Malaysia worsened where Johor and Malacca remained the worst-affected states. In Johor for example, Muar recorded a hazardous API reading (383), which was one of the worst among the readings.

In Thailand, the haze has only affected the southern parts area such as Yala, Pattani and Satun. Among the seven Southern Thailand provinces affected by the haze, Narathiwat had been hit the worst, with particulate matter levels there reaching 129 micrograms/cubic metre, a level which is considered adverse to health.

For Brunei, on 23 June, the Asean Specialised Meteorological Centre (ASMC) in Singapore detected 642 hotspots, which were scattered mostly in parts of central and west Borneo that caused a haze in Brunei and other parts of Borneo. Thus, in Singapore, on 19 June 2013, the 3-hour Pollutant Standard Index (PSI) reading of 321 breached the *Hazardous* zone for the first time in the nation's history, surpassing its previous record of 226 (Very unhealthy) during the 1997 haze. However, due to the wind patterns, most parts of Indonesia have not been hit by the haze except Province of Riau where many parts of Riau recorded hazardous PSI readings. In Dumai, one of the worst-affected regencies in Riau, visibility was reduced to less than 500m after the PSI hit a hazardous record of 900.

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Since 1991; haze has been a particularly acute problem, Indonesian forest fires burnt to clear land being the reason (in 2013, the fire in Riau, Indonesia had engulfed more than 3,000 hectares (7,400 acres) of plantations and forests). For example, in September 1997, for a fifteen-day period, the API in Kuching, Sarawak, Malaysia reached or exceeded 850, and visibility was down to about 10 metres. In Peninsular Malaysia as well, API readings hovered in the 200-300 range during the same period. A few episodes of worst haze where severally forced Malaysia to close down schools and declare a state of emergency in parts of the country. As of 23 June, more than 600 schools in Johor that are located in several areas where the API readings had exceeded the hazardous point of 300 had to be closed while schools in areas with the API reaching 150 are advised to avoid outdoor activities. In addition, on 23 June, two southern districts, Muar and Ledang in Johore declared emergency after the API values increased badly.

During the hazy period, the Department of Environment has issued a ban against open burning activities in Selangor, Malacca and Johor to prevent the situation becoming worsened. Those convicted of an open burning offence can face fines of not more than RM500,000 (S\$199,400); or a maximum imprisonment of five years; or both according to Section 29AA(2) of the Environmental Quality (Amendment) Act 2001. Furthermore, the public was also advised to regularly check the API, follow the health advisory and seek immediate treatment at any nearest hospital or health centre if they feel unwell due to haze.

On Indonesia side, the government sent more firefighters to fight the fires, take sanctions against firms behind forest fires, and begin cloud seeding and water bombing in order to minimize the impacts of haze to neighbouring countries. In Pekanbaru for example, there were more than 22 water-bombing operations carried out.

II. MATERIAL AND METHODS

This paper involved with secondary data which are collected from journal, proceedings, books and internet sources regarding haze related matters.

III. RESULTS AND DISCUSSION

A. *The Effects Of Haze*

1. *Health*

Haze is traditionally an atmospheric phenomenon where dust, smoke and other dry particles obscure the clarity of the sky. It also contains air pollutants such as sulphur dioxide, nitrogen dioxide, ozone, carbon monoxide and particulate matter. Therefore, is generally harmless to human. Prolonged exposure to high concentrations of particulates can be harmful to health. In general, the research seems to indicate that air pollution can cause increased physical health problems, allergies, cancer as well as pre-term delivery.

Haze contains dust and smoke particles. Due to the small particulate size, the particles that make up haze can go deep into the lungs, and in some cases, enter the bloodstream. The health effects can be classified into local and systemic effects. Local effects can result in eye, nose, and throat irritation. People with history of sinus problems or sensitive nose are more likely to develop nasal congestion, sore throat and coughing. There may be increase incidents of skin irritations as well for those with eczema or other skin conditions. Systemic effects are more serious. These can range from respiratory

conditions such as asthma attacks and bronchitis to worsening of heart diseases such as heart attacks or heart failure [2].

In haze episodes, normally there have been reports of increases in incidences of eye and throat irritations and respiratory difficulties among sensitive groups. Reference [3] showed how the impact of haze from forest fires affects the human lung in Indonesia which the study indicated that there was a significant increase in respiratory and lung complaints. For that reason, people especially children, elderly and patient with medical problems are advised to minimise outdoor activities when the air quality is bad in order to protect their health.

2. Economy

The economy could suffer due to the haze. Tourism, leisure and restaurant businesses stood to lose the most. Furthermore, reduced sunshine because of haze could have negative effects on plantations, while critical haze levels could delay construction projects. Prolong of the haze effected business trading or local business. For example, due to haze, the loading, unloading, berthing and incoming of ships was suspended for several days due to lower visibility, therefore affects the import and export trading. In Singapore, CIMB Research estimated that for each day the haze lingers, over S\$60 million in tourism receipts could be at stake [4]. Meanwhile, the 1997-1998 haze crisis cost Southeast Asia an estimated \$9 billion because of disruptions to air travel and other business activities [5].

3. Social

In aspect of social, the learning process is disturbed as the visibility decreased that causes schools are closed. Communications with others are also limited because people are advised to lessen their activities outside the house, wear mask if they venture and travelling from one place to another becomes trouble since the visibility decreases. All this could increase emotional and behaviour problems on human. Furthermore, haze that occurs due to open burning in Indonesia probably causes the diplomatic relationship between Malaysia, Singapore and Indonesia become distance.

B. Haze in Malaysia: Transboundary or Domestic Factor?

The particles that cause the haze phenomenon can originate from many sources, some of which are natural and some anthropogenic. Natural sources include the oceans, forests and ground surface. However the majority of the particulates are from human activities which include open burning, land clearing, vehicular use and combustion of fossil fuels in industrial boilers. Generally, the components that make up haze are carbon monoxide, sulphur dioxide, nitrogen dioxide, ozone, dust and metals.

Singapore and Malaysia have been plagued for decades by periodic haze from large scale forest fires on Indonesia's Sumatra Island, with regular spats over responsibility. In this case, this is no natural phenomenon: the haze is caused by the illegal burning of forests and peat on Indonesia's Sumatra Island to clear space for local and foreign palm oil plantations. It happens every year and when this happened, the winds are blowing the smoke, dust and particulates, blanketed parts of Malaysia, Singapore and Indonesia as well.

Currently, Malaysian and Singaporean companies hold more than two-thirds of Indonesia's total plantation area [6]. Malaysian investments have an investment value of US\$ 702.4 million and Singaporean investments in the sector amount to US\$ 11.2 million [7]. In this way, oil palm has become an increasingly important economic sector for Indonesia, Malaysia and Singapore [8]. Indonesian companies like Bakrie Sumatra Plantations, Duta Palma, Astra Agro, Makin Group and Musim Mas [9], many well-connected Malaysian and Singaporean companies have also established operations in Indonesia. For example, Sime Darby and Tabung Haji Plantations are prominent Malaysian GLCs, while Genting Plantations, Kuala Lumpur Kepong and IOI Plantations are owned by powerful and well-connected Chinese-Malaysian

tycoons [10]. These companies in their operations to maximize profit accused doing illegal burning to clear space for palm oil plantations and at the same time contributed to haze phenomenon.

Thus, the increasing number of fires is a serious issue and is often related to land clearing for major commodity plantations. According to expert, burning forest is 40 times cheaper than use a machine and the most cost-effective way to clear land in preparation for commercial planting, therefore a forest fire in Sumatra are endemic and typically goes unnoticed. However, changes in wind and wind patterns bringing the choking smoke to neighbour countries thus focusing unprecedented regional attention to this endemic problem. For example, in June 2013, the fires' impact on Singapore and Malaysia have been dramatic, with the Air Pollutant Index averaging over 400, a level considered hazardous to health. The fires in June were one of the worst on record since 2001. Furthermore, this contributes to climate change, air pollution and is very detrimental to the health of people in the region.

However, in Malaysia, domestic factors such as industry activities, motor vehicle and open burning were also contributed and make the haze situation worst. All the activities produce pollutants such as nitrogen oxides, VOCs, carbon monoxide, carbon dioxide, sulfur dioxide and particulates. [11] reported that for the past five years the three major sources of air pollution in Malaysia are mobile sources (70-75% of total air pollution), stationary sources (20-25%) and open burning sources (3-5%). Other sources of pollutants included dust and fine particulate, which were contributed by the inefficiency of diesel-powered vehicles and also the smoke aerosol from fires on Peninsular Malaysia, which contributed to the development of haze in the Klang Valley [12], [13]. Motor vehicles, due to their increasing numbers, are major sources of haze particulates, especially in urban areas. Furthermore, iron and steel mills, metal smelters, pulp and paper mills, chemical plants, cement and asphalt plants, discharge vast amounts of various particulates. In addition, many industrial burn fossil fuels to get their energy. This activity created a range of airborne particles and pollutants from combustion which also contributed the cause of haze as well.

In Klang Valley for example, the main sources of pollutants in this area are motor vehicle and industrial emissions. Moreover, the development in this area during the last two decades has resulted in a stream of construction activities including the clearing of agricultural land for building roads, housing estates, industrial parks, airport expansion, etc. In the early 1990s the number of the pollutant sources increased due to the economic boom in the area [14]. According to this, three severe haze episodes during the early 1990s in the Klang Valley, Malaysia were reviewed: August 1990, October 1991 and August–October 1994. The main conclusions can be summarized as follows [15]: (a) The increasing numbers of sources, especially in the urban-industrial areas, and the generally restrictive nature of the atmosphere to disperse and transport pollutants are the reasons behind the haze phenomenon. (b) In the Klang Valley region there are two kinds of haze: shallow localized haze and dense haze. The former, which usually occurs in urbanized areas, arises from trapping of pollutants from anthropogenic emissions, in response to stabilization of the atmosphere. The latter is due either to the injection of suspended ash particles from large-scale forest fires and open burning in Indonesia (October 1991 and August to October 1994), or these external sources combined with local open-burning (August 1990).

IV. CONCLUSION

Haze phenomenon in Malaysia was manmade, which is caused by the illegal burning of forests and peat on Indonesia's Sumatra Island to clear space for local and foreign palm oil plantations. However, domestic factors such as industry activities, motor vehicle and open burning were also contributed and make the haze situation worst.

As awareness of the source and dangers of smoke haze spread, Southeast Asian governments increasingly came under pressure from the public and civil society at the national, regional, and international level to address the haze issue [16]. Therefore, at the regional level, ASEAN has initiated an ASEAN Cooperation Plan on the Management of Transboundary Pollution in order to address issues such as transboundary haze. Under this agreement, the members of ASEAN countries agreed to cooperatively develop and implement measures to prevent, monitor and mitigate transboundary haze pollution by controlling sources of land or forest fires, the development of monitoring, assessment and early warning systems, the exchange of information and technology, and the provision of mutual assistance. Thus, in response to the 1997 Southeast Asian haze, the ASEAN countries agreed on a Regional Haze Action Plan (1997). However, since 2003 nothing has been done to stop the fires because Indonesia has refused to ratify the agreement in order to protect their oil palm sector from scrutiny. The main reason is, this 'soft law' approach was not a legally binding agreement. It was left to the governments concerned to decide what was to be included in their national plans, with the freedom to bypass or equivocate on matters raised [17]. Moreover, there were also no mechanisms under the plan for any member country to ensure that the other member countries fulfilled their obligations [18]. As a result, haze persists as a regional pollution problem in Southeast Asia year after year.

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