

## Public Sector Responses to Sustainable Haze Management in Upper Northern Thailand

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### Abstract

This research focuses on urban haze in Upper Northern Thailand (UNT), where smoke haze often produce impacts on human health, tourism, and transportation. The objective was to better understand how the public sector responded to the haze impacts in policy review interviews and analyses of compiled haze-related data during 2007-2011. Moreover, integration of haze adaptation policy and coherency was also explored. The results revealed that Thailand has mainly implemented three National Haze Action Plans since 1997, together with laws and regulations for haze management. Further examination of haze policy at all levels of governance disclosed only vertical integration, whereas cross-boundary integration was reported only with the data and budget. Practically, manpower and function have not yet brought satisfactory outcomes. Moreover, the extent of state responses has been centralized –not decentralized from their centralized political structure. Low participation of people living in both urban and rural areas and cooperative efforts were identified as the main factors contributing to failures in combating smoke haze. Therefore, individuals are of utmost importance for effective solutions. There is a continuous need for prevention campaigns to enhance local people's understanding and participation as well as local communities' networking for solutions to the haze problem.

**Keywords:** public sector response; sustainable haze management; Upper Northern Thailand

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### 1. Introduction

Smoke haze problems in the Upper Northern Thailand (UNT) have become a great concern and a challenge for the country. It is more severe in the dry season (February-April) each year when the level of particulate matter in the ambient air is elevated due primarily to forest fires and open burning. Forest fires in the UNT increase during this season as a result of dry weather condition (Manomaiphiboon, 2007). Additional burning of agricultural residues to prepare land for next-cycle plantation also worsens the smoke haze. Geographically, the UNT is characterized by mountainous areas with north-south-aligned hill ridges, forming a number of valleys, where the cities of Chiang Mai, Lamphun, Chiang Rai and Lampang are situated. Such geographical features can also reduce the transport of air pollutants out of a valley. One of the worst air pollution episodes in the UNT took place in March 2007, when elevated smoke haze pollution was prolonged for 2-3 consecutive weeks, and the 24-hr average ambient small-sized particulate matter (PM<sub>10</sub>) concentrations exceeded the national ambient air quality standard (Pollution Control Department, 2012). A study from Chiang Mai

demonstrated that forest and agricultural fires contribute significantly to ambient particulate matter (Sopajaree *et al.*, 2007). Sangon and Penchai (2007) further pointed out that transboundary transport of the smoke haze originating from neighboring areas contribute to the haze pollution in the UNT during a dry season.

It is increasingly recognized that smoke haze problems negatively affect tourism, air and land transportation, mobility, and most importantly public health. Smoke haze is a complex problem posing a number of questions needed to be clearly answered. Public sector response for haze impacts in the UNT is one of overriding scientific questions of this study where it is attempted to address and review haze mitigation policies, regulations, and plans in Thailand. The shortcoming in the existing policy, institution, socio-economic and management framework were also examined using the prevention and correction approaches. Functions and responsibility of the central government from a policy point of view and local governments in forms of response and budget allocation to manage the forest fires in their respective areas were examined and analyzed in combination with compiled haze-related data during 2007-2011.

## 2. Policy and legal framework review

### 2.1. Thailand National Haze Action Plan

Experience of the haze impacts from Indonesian forest fires in 1997 stimulated active response of public sector, and the Thailand 1<sup>st</sup> National Haze Action Plan (1<sup>st</sup> TNHAP) was then formulated, aiming at minimizing environmental and health impacts. Linkages of various strategic aspects under the 1<sup>st</sup> TNHAP (Jaafar, 1999) are shown in Fig. 1. The 1997 haze was one of severe forest fires, and transboundary air pollution exerted huge impact on the environment, economy, health and society. The mitigation measures and activities implemented during the haze episodes provided valuable experience for Thailand and other ASEAN countries in dealing with widespread forest fires. The attempt on source control proved difficult due to transboundary transport of haze. National efforts and regionally cooperative actions were too late and modest as the source was still releasing smoke into the air. Some preventive measures recommended may have been inappropriate based on the best available knowledge (Phonboon *et al.*, 1999). Cooperation between government agencies was not clear and the central government played a major role in tackling the problem as decentralization was not yet introduced.

In March 2007, a critical smoke haze developed throughout the UNT with the level of PM10 being exceptionally high. Governmental policy for solving this crisis was taken again as a centralized approach. The Cabinet approved the Action Plan to combat smoke haze and forest fires. It emphasized open burning and forest fire controls and public awareness. However, there was still a lack of mainstreaming adaptation to sectoral policies and sustainable development. Such mainstreaming is an integrated way to synergy between adaptation to haze problem and more immediate

concerns, such as poverty eradication, land use management and disaster preparedness.

As the current situation of haze and forest fires in the UNT becomes a national problem, the Cabinet in 2010 further approved the urgent Article on Solving Haze Problem in the UNT. Moreover, the Ministry of Natural Resources and Environment (MNRE) proposed urgent and long-term strategies which included measures and actions taken both domestically and internationally to control forest fires and open burning.

### 2.2. Thailand's general and specific laws and regulations

Thailand has general and specific laws and regulations for preventing and mitigating forest fires and air pollution to protect public health and environment from the impacts arising from both domestic and transboundary sources. Some haze-applicable legal instruments summarized in Table 1.

## 3. Haze adaptation policy integration and coherency

Incorporation of haze adaptation at all policy-making stages in both non-environmental and environmental sectors is essential. The integration shall be complemented by an attempt to aggregate expected consequences for haze adaptation into an overall evaluation of policy and a commitment to minimize contradictions between haze and other policies. Specifically, policy integration can be divided into vertical and horizontal dimensions. Horizontal integration refers to cross-sectoral procedures by the governmental bodies, whereas vertical policy integration within governmental levels means the incorporation of haze policies into a specific sector (Swart *et al.*, 2009). It also includes sector-specific strategies and decisions made at ministerial levels as well as the integration of haze policy into strategies and

Table 1. General and specific laws and regulations applicable to forest fires and haze.

Sector	Haze-applicable laws and regulations
Environment	1. Enhancement and Conservation of National Environmental Quality Act (B.E. 2535) 2. Automobile Act (B.E. 2522), Land Transportation Act (B.E. 2522), Land Traffic Act (B.E. 2522) 3. Factories Act (B.E. 2535)
Health	Public Health Act (B.E. 2535)
Forestry	Thailand's forestry policy (1985)
Agriculture	National master plan for open burning control (2004-2008)
Applicable to all sectors	1. Criminal Code Article 220 2. Disaster Prevention and Mitigation Act (B.E. 2552) 3. Decentralization to Local Administrative Organizations Act (B.E. 2542) 4. Sub-district Council and Sub-district Administrative Organization Act (B.E. 2537) 5. Disaster Management Plan

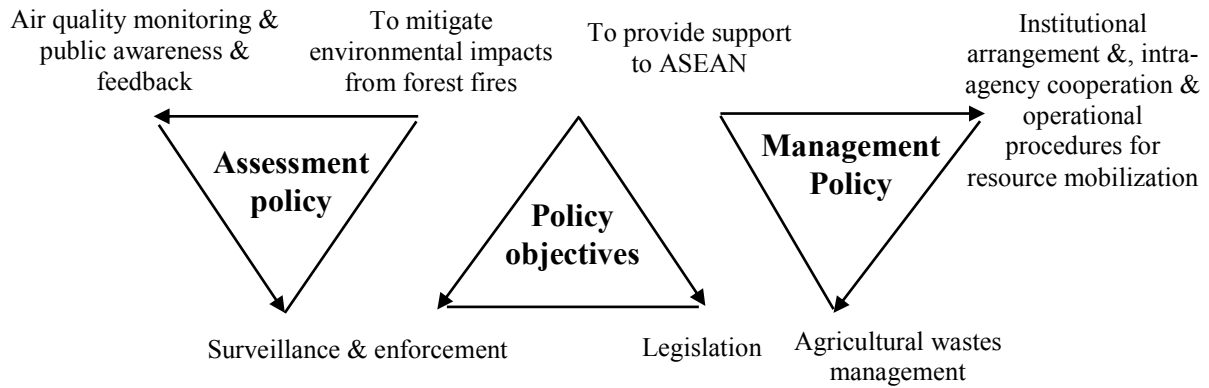


Figure 1. Policy linkages on various strategic aspects of forest fire in Thailand modified from Jaafar (1999).

actions taken by different agencies under the ministerial supervision.

From a scientific perspective, adaptation is approved in a ‘top-down’ manner (Swart *et al.*, 2009). For example, assessment of global climate change is down-scaled to provide regional and local ‘physical’ vulnerability. The impacts on people then depend on both physical and social vulnerability related to local socio-economic and cultural characteristics and often analyzed in a ‘bottom-up’ fashion (Fig. 2). Policy development is similar to the top-down and bottom-up

reconciliation. Adaptation policies are being developed in a ‘top-down’ manner responding to the concerns about supranational (ASEAN) haze episodes. However, adaptation is not limited to what is captured in the existing ‘formalized’ national adaptation strategies (Fig. 2). Bottom-up response can, to comparable extent, reduce vulnerability to haze impacts. Three crucial questions of multi-level governance in the national adaptation strategies have been raised:

1) What are the different scales of governance that have undertaken responsibility for development

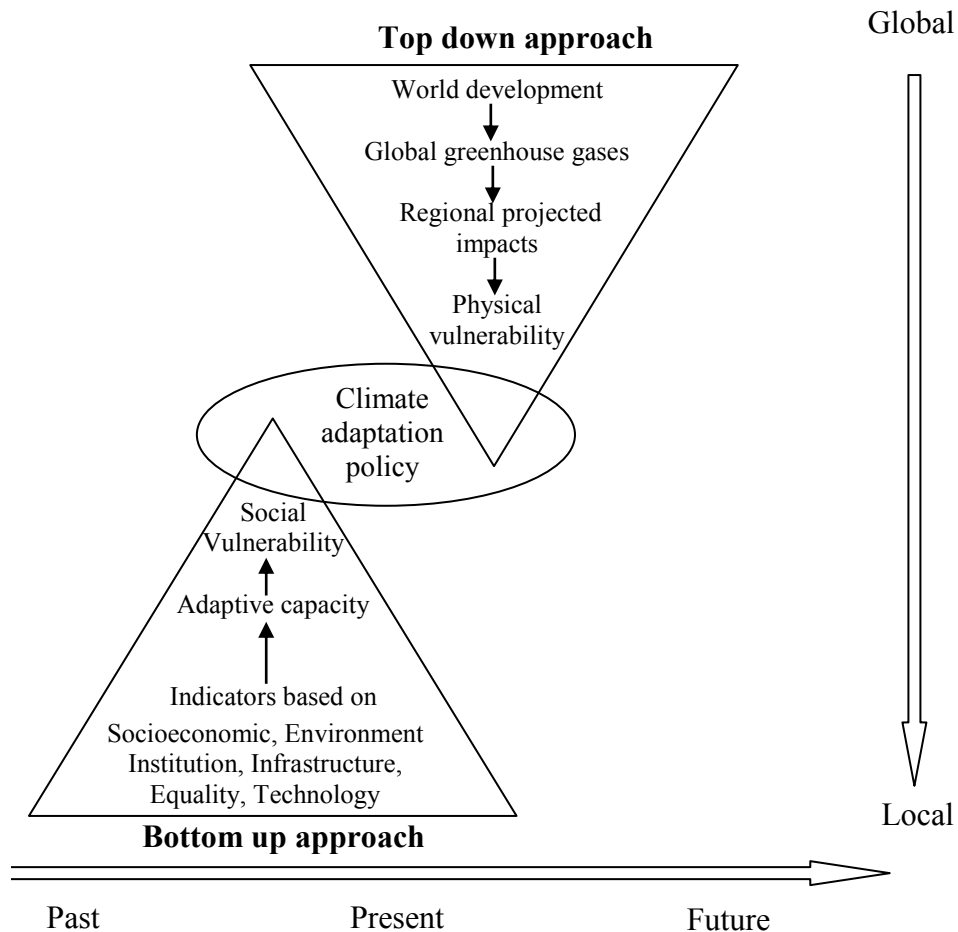


Figure 2. Top-down and bottom-up approaches for haze adaptation policy modified from Partnership for European Environmental Research (2009).

Table 2. Ministries involved in the national committee and their key roles.

Ministry	Key role
Natural Resources and Environment	- Prevention and control of forest fires. - Development of monitoring and warning system of forest fires and haze situation.
Agriculture and Corporatives	- Promotion and dissemination of organic agriculture without burning. - Management and controlling plan for burning of post-harvesting activities.
Interior	- Prevention and control of forest fires by local administrative office.
Transportation	- Controlling and preventing burning of weed and waste along the road.
Education	- Promotion of education on haze pollution and forest fires in the community level.
Public Health	- Development of health monitoring system and health service system.

and implementation of adaptation actions? 2) How is authority and responsibility distributed between the multiple scales? and 3) What are the barriers between the different scales for the successful development and implementation of adaptation policies?

#### 4. Assessment of the multiple-scale governance involved in development and implementation of adaptation measures

The discussions were divided into four levels of governance: supranational (ASEAN), national, provincial, local and individuals/stakeholders (community).

At the supranational level, ASEAN Member Countries have been undertaking joint efforts in monitoring, preventing and mitigating transboundary haze pollution as a result of land and forest fires since 1997. It has been guided mainly by the Regional Haze Action Plan (RHAP) and the ASEAN Agreement on Transboundary Haze Pollution (AATHP) (Qadri, 2001). At the 7<sup>th</sup> Meeting of the Conference of Parties to the AATHP (ASEAN secretariat, 2011), the on-going programs and activities on land and forest fires in the region and its associated transboundary haze pollution were reviewed. Substantial progress was obvious. Implementation of the Strategic Review on Sub-regional Ministerial Steering Committee (MSC) on Transboundary Haze Pollution programs and activities enhanced bilateral collaboration. It is noticed that the policies and relevant measures of the AATHP to combat haze under the vertical integration to manage the problem within their own country require environmental laws and regulations as well as proactive measure such as zero burning to control forest fires. On the basis of the horizontal integration, general agreements were accordingly undertaken in spite of an adoption of AATHP. In practice, the concert cooperation of spatial cross-boundary integration in ASEAN is not yet established. Thus, there were no reports of officers from one country to another in dealing with the haze problem

like the joint operation for wildfires. Therefore, the spatial cross-boundary integration at ASEAN level still requires the joint efforts of all nations to push forward the concrete measures.

National policies and measures for the haze in Thailand were approved by the Cabinet, including the strategic plans to combat the wildfires and the urgent actions to prevent open burning and harmful haze pollution in the North. The Thai government established the national committee at the ministerial level to manage haze problem. Table 2 summarizes ministries involved in the national committee and their key roles. Horizontal integration is operated by a group, which is responsible for facilitating coordination and cooperation among ministries, and other relevant governmental and non-governmental bodies. Cross-sector integration is carried out through the designation of the administrative committee for solving haze problem in the northern region. The problems of spatial cross-boundary integration among relevant ministries are still addressed because each ministry conducts only its own missions and duties, whereas the budget for operations is based solely on its allocated budget. However, special budgets allocated by the government to address urgent crises of disasters are administered through the formation of a steering committee supported by the central budget. Integration under the designated frameworks or special tasks is formed while each task is cooperated by several ministries. With respect to vertical policy integration, haze policies are integrated into a specific sector that includes sector-specific strategies and decisions made at the ministerial level, as well as strategies and actions taken by different departments under the ministerial supervision. The departments then transfer the missions to their agencies at different levels located within provinces and districts.

As for the horizontal policy integration at the provincial level, a sub-committee was designated under the national committee in response to an implementation of the action plan for the period of 2008-2011 in eight provinces of the North. The spatial cross-boundary

integration is not yet complete. This form of integration relies only on the use of the same budget, while the operation is undertaken to comply with their specific duty. Regarding the vertical policy integration at the provincial level, administrative centers for solving haze and forest fire problem are also established. Chiang Mai province is a good example of such administrative integration, designated haze problem as one of three strategies on natural resources and environment in its four-year provincial development plans. The other vertical policy integration can be seen in Lampang province which takes clear actions and measures of forest fires and haze problem (Fig. 3). Engagement of government and public sector is effective because it consists of various bodies and organizations from top to bottom levels. As various stakeholder committees are established in different levels from provincial to local scales, responsibilities are clearly identified. An example of stakeholder participation is the local action plan in Lampang province.

Implementation of haze prevention and control is spatially bounded by administrative boundaries, since the budget is allocated from central government to local administrative offices under the government decentralization policy. As haze is recognized as a transboundary phenomenon, problems often arise when the source areas are not affected by their emission but the impacts occur in other areas. Municipalities cannot utilize their budget in controlling forest fires which occur outside their administrative boundary. At the district level, committees for haze prevention and control are also established. For example, the San-Sai

municipality sets up the working group aiming at managing haze problem which emphasizes public participation.

## 5. Decentralized responses and grass-root participatory actions

### 5.1. Opportunity, structure and practices to activate participation of people at the grass root

There is an opportunity for the people at the grass root to participate when the implementation is on its way. However, in practice the operation at that level is hardly found, even though it was introduced to the policy mission right after the 1997 haze episode. On the decision made by Ad-hoc committee in the 3<sup>rd</sup> meeting in May, 2011 at the Prime Minister's Office, the mission was transferred from the central government to the local offices that can be categorized into 4 types detailed in Table 3.

### 5.2. Decision on response and strategy made

Basically, decisions on response and strategy at the grass-root level are made in the level of community and village agreement. Such response is done in the Ban Klang, Ban Mae, Sanpatong, Mae Rim and Donkaew sub-district administrations in Chiang Mai province designated the local regulation to prohibit the open burning. Violations are fined. Local community response also includes non-legal commitment. For example, in one district anyone who cuts one tree must plant 10 trees to compensate (Rayanakorn, 2010).

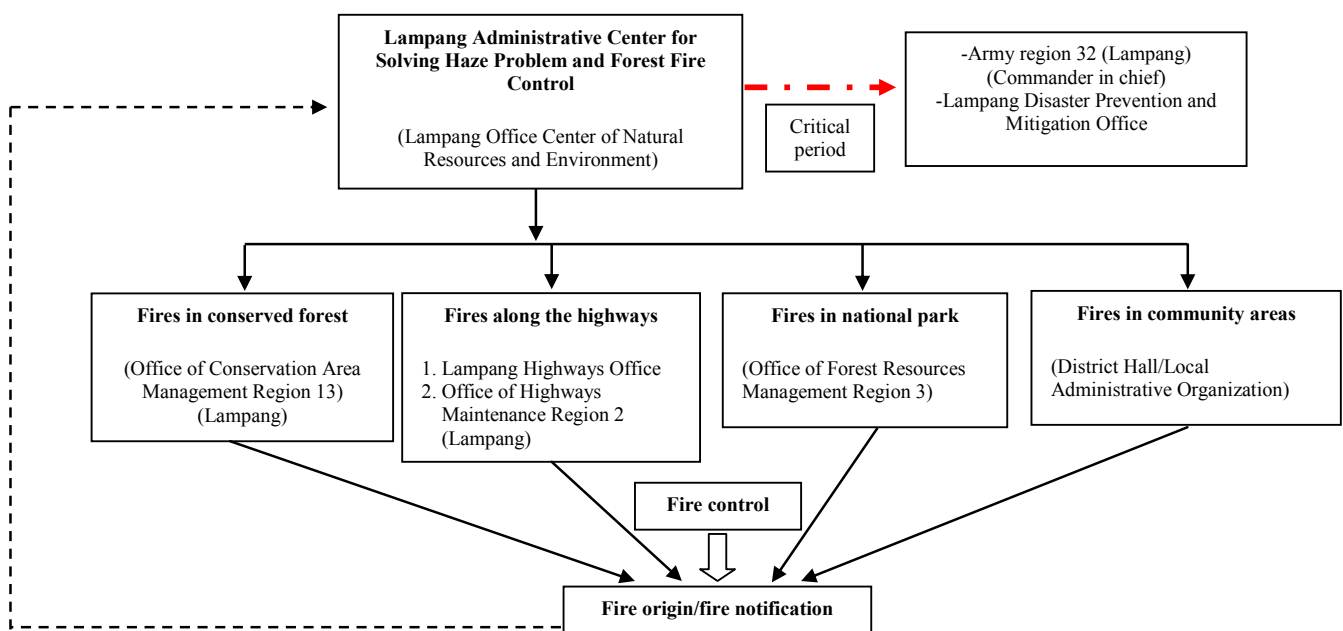


Figure 3. Actions and measures of forest fires and haze management in Lampang province.

Table 3. Missions transferred from the central government to the local office.

Category	Detail
The mission transferred immediately.	Providing laws for the local government to have complete authority in order to perform the functions and processes.
The mission of the state or federal.	Allowing local government to fully act on behalf of the state. The state has duty to supervise the local governments to comply with the regulations and must not be charged with allocating state subsidies.
The mission of the state and local governments.	Performing certain procedures to monitor and evaluate to supervise the operations in accordance with the rules of law.
The mission of the local government self-initiated not contrary to local laws and to the benefit of local people.	On the basis of Institute of Public Policy Studies on 'knowledge and best practices' to encourage farmer behavioral changes in open field burning for sustainable haze management in Chiang Mai province.

### 5.3. *The centralized problem of extent state response*

The reasons for the state response have been very centralized due to the political structure and a budget constraint. Haze is just one of several problems that government handles, but the priority always goes to poverty, drought and flooding which strongly affect mainly local people at the grass-root level. The central government keeps all fiscal budgets and allocates to the local administrations once haze problems arise. Thus, haze problems become the last priority and local governments rely heavily on the central government. The line of command and control is then delayed. On top of this, the law and regulations enabling the higher executive have more power than the local.

### 5.4. *The initiatives and outcomes of grass-root participation at the impacted areas*

Interviews with the concerned officials revealed that urban people agreed to minimize the burning of garbage and tree leaves. A community's haze problem can be alternatively tackled by sorting the types of garbage and promoting the compost making. It was also found that middle-class people in urban areas often blame the rural people for a causing the haze. Consequently, the middle-class people had low attention and participation to jointly combat the haze problem. To alert people on the haze's causes, those urban activities such as the burning of garbage and weed, dust particles for building and construction and exhaust fumes from vehicles should be widely publicized.

Another comment was that the rural people affected by the haze problem previously did not fully pay attention to this problem since it was believably caused by the occasional forest fires in a dry season. They positively hoped that the forest fires brought them various fruitful

plants like 'Phak Wan' and 'Hed Poh'. Meanwhile, some of them demanded clear land for cultivation, and burning was deemed the cost-effective method to deal with garbage and waste. In Lampang province, a number of campaigns to aware the governmental agencies, private companies and general people about health impacts and economical consequences of the haze have been carried out. Community leaders and urban people actively take part in the campaigns by limiting the burning of garbage and waste during critical period. Likewise, the campaign for 'burning-free village' was implemented among communities. Ban Samkha in Hua Sua Sub-district of Mae Tha District of Lampang were successful with this model.

### 5.5. *The initiatives and outcomes of grass-root participation at the source areas*

Results from interviews further revealed several interesting points of grass-root participation at the source areas. It is suggested that the involved communities should take part in handling the problems which are 1) minimum of waste burning in their farming areas, 2) preparation of fire preventing/buffer zones during the dry season and 3) burning practices of weed wastes for farming. Public participation should be more highlighted in addition to promoting awareness on the haze problem. In this regards, the public hearings to jointly analyze and formulate the solutions in each community should be set up by the support of involved organizations. The view expressed by the senior forestry official from Lampang province is that the local leaders should encourage people in their communities to take charge of haze problem by decreasing the burning practices especially during the critical period. A study tour at Ban Sam Kha as the successful model is another way to correct their burning practices.



Figure 4. Haze episodes in the Northern Thailand and their causes.

The Director of the Phrae Provincial Office of MNRE pointed out several causes of haze problem in the North of Thailand (Fig. 4). He emphasized the need for higher participation of people to effectively prevent and control the burning practices, and payments as incentives to the volunteers. Besides, there should be more education of people about the forest fires and procedures to combat them. The idea from the Tambon Administration Organization shows that people play

the essential role to monitor the problem by forming a group of committee inside their community. However, the difficulty is from farming practices when the locals burn the leftover and agricultural waste after the harvest.

**6. Participatory roles of government and local people toward the preventive measures and solutions to the haze.**

The previous study by Trakansirinon *et al.* (2010), aimed at strengthening the community to effectively combat the haze crises by carefully sorting out alternative solutions and building networks at all levels. This study was further elaborated by discussions via focus group approach together with field surveys in areas where the haze is often reported and communities who were cited as successful models. More than 20 different models were identified and categorized into eight groups, which are 1) farming management, 2) uses of forest, 3) organic fertility making, 4) garbage management, 5) establishment of learning centers in the community, schools and temples, 6) alternative energy, 7) burning campaign in the deserted land and 8) fund raising for environment. The alternative models can be summarized into three major groups:

### 6.1. *The alternative models for farming area management*

Weed plowing instead of burning is one of the best practices for new farming models to grow vegetables and crops. Close cooperation from governmental sectors represented by ministries, departments and provincial offices relating to the policies, short and long-term plans, activities and allocated budgets to raise environmental awareness to farmers is considered as the key role of success. Regarding to the people's sector, community leaders and farmers are targeted to learn new ways of thinking, new practices of farming and new perspectives to adjust their behavior. The governmental sector particularly provincial office should pay attention to promote appropriate methods of organic fertilizer making to local farmers. Necessary equipment and tools provided to the community are identified as an additional key function. The establishment of private companies or local enterprises targeted to produce organic fertilizers by purchasing agricultural leftover in conjunction with local laboring policies is necessary to sustain such local participatory processes. Green and renewable energy, such as corn charcoal, compressed charcoal and biomass power plants are other means for local communities and farmers to minimize forest fires and haze pollution. A successful biomass power plant in Chiang Rai province is often cited. For the local sector, intensive and close cooperation of the local administration are required for the establishment of cooperatives or community enterprises to produce and sustain green energy business. More importantly, people in communities should be encouraged to adjust their attitudes and behaviors toward the new farming methods.

### 6.2. *The alternative models for the green areas and deserted areas*

These alternative models focus on permission to allow people to plant the prohibited and economic trees, rights to rent a forest area, rights to land, tree bank, community forest, fund raising for wildfire prevention, and carbon credit from the forest sector. Attention to the problems and ways to cope with them must be prioritized by the governmental sectors as the national policy. Additionally, flexibility of the governmental agencies in terms of concepts and practices should be increased. Appropriate amendments of the outdated laws and regulations are essential. For the local sector, specific and clear boundaries of forest areas, such as community deeds and fertile land under responsibility of local administrative organization, require the applicable laws initiated and proposed by local people. Monitoring systems for the responsible areas and applications of hotspot data from satellite to detect the burning practices on regular basis are helpful.

To achieve effective local forest management, the local administrative organizations should channel more involvement and assistance from the provincial and district offices to the grass-root level. Thus, local administrators must prioritize the problem and fully assist the operations in all dimensions, whereas awareness of locals to prevent, monitor and protect natural resources should be more emphasized. These operations must be persistently carried out in order to gain more cooperation from the locals, especially burning-free campaigns, natural conservation, water resource management and deforestation-free campaigns. With respect to the people's sector, unions of people inside the village or community are viewed as the essential part to protect their rights.

### 6.3. *The alternative models for management in the city and quasi-city areas*

Burning practices of garbage and household leftover are a cause of haze. Hence, these alternative models deal with management of garbage and organic fertilizer making at home and in small communities. The government sector at provincial and district levels should put more effort to coordinate with the locals to obtain more acceptance and participation. Regulations controlling the open burning and penalties for whoever violates such rules should be fully enforced. The project of a garbage market together with educational activities to raise more awareness among local people and the youths through learning process at community and schools should be established and fully supported by the local agencies, municipalities and Tambon Administrative Organization. All in all, cooperation from people involved will bring high and sustainable quality of living both in the community and city.



## 7. Institutional and policy framework discussion

As smoke haze pollution shares common points in its social-political framework and interconnection between local, national and regional environmental challenges, regional efforts have been made to develop specific action plans to address transboundary problem. Since the early 1980s, ASEAN member countries have launched several national and regional initiatives to control the fire-and-haze problem (Kamal, 2001). Formulation of the co-operation Plan on Transboundary Pollution in June 1995 followed by the Regional Haze Action Plan in December 1997 was considered a turning point in the region's approach to preventing and mitigating the damages from recurrent fires and haze (Qadri, 2001). These international agreements set out the broad policies and strategies as well as an overall framework to be made at various levels for the strengthening of the region's capacity to address transboundary haze pollution problem.

However, the above-mentioned plan was not as formal as in other regions, like Europe, which dealt with long distance transboundary harms. The plan recognized that the region was a single ecosystem, and emphasized the need to build on both national and regional efforts. It also recognized that while all countries have a common attempt in preventing and mitigating smoke haze pollution, they have different abilities and responsibilities in working towards a solution. In this respect, it gives expression from a regional perspective to the principle of '*common but differentiated responsibility*' recognized in Principle 21 Stockholm Declaration and in Principle 2 Rio Declaration which are considered as customary law consisting of a duty not to cause environmental harm to other countries (Tay, 2001). In comparison to other treaties, the SEAN cooperative haze plan did not address liability and compensation to hold one state responsible to another.

Despite the claim that the agreement is the first regional arrangement for tackling transboundary haze pollution from land and forest fires, this instrument alone has not proven to be effective, since Indonesia has not yet entered into this agreement. This failure has not been so much in its principle but in its implementation. The issues that underscore the difficulties in addressing this environmental challenge are especially inter-state cooperation, legal recourse and public participation. The member states of ASEAN, for example, have held too strictly to the norm of non-intervention in the domestic affairs of each state (Tay, 2001). Additionally, social-political framework to allow space for civil society and non-governmental actors to express their concern over the haze issue is weakly encouraged. Such an important element of institutional and policy

framework must be strengthened and greater room allowed for public participation and attention to cross border and regional concerns. This should be in concert with enhancement of vertical and horizontal policy integration at provincial and local levels in the context of decentralization to fully empower and allocate sufficient resources to the local administrations who are the front of the haze problem.

## 8. Conclusions and recommendations

It is concluded and recommended for future framework of policy and implementation as follows;

1. Thailand has mainly implemented three National Haze Action Plans since 1997, including other general and specific laws and regulations for haze management.

2. Evaluation of coherency in haze policy integration of the UNT disclosed only the vertical integration but the spatial cross-boundary integration only with the data and budget. In fact, the manpower and function have not yet brought satisfactory results. Therefore, there is a continued need to build the capacity of governmental officers especially at provincial and district levels.

3. It was found that the state responses have been very centralized –not decentralized for their centralized political structure.

4. Low participation of people living in both urban and rural areas and cooperative efforts from the concerned parties were identified as the main factors contributing to failures in combating the haze. In the successful perspective, individuals are viewed as the key mechanism for the effective solutions. Accordingly, there is a continuous need for prevention campaigns to enhance local people's understanding, awareness, and participation as well as local communities' networking in the quest for sustainable solutions to the haze problem.

5. With close attention and involvement from all stakeholders, the haze crisis would be effectively prevented and minimized.

6. As transboundary haze pollution from a regional point of view is a problem too large for one agency to manage alone, it requires concrete actions collaboratively undertaken by various agencies and stakeholders, together with a considerable amount of resources in terms of time, financial and technical inputs.

7. From the long-term perspective, the haze problem should be addressed at different levels, ranging from regional to local in the context of sustainable development which takes social, economic and environmental issues into account in a balanced manner. In this respect, institutional and policy frameworks and public involvement are firmly integrated as a holistic approach to address dynamic, complex

and multi-dimensional environmental problems such as smoke haze problem.

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