

COMMUNITY-BASED FIRE AND WATER MANAGEMENT (CBFiWM)

(*Pengendalian Kebakaran Hutan berbasis Masyarakat dan Pengelolaan Tata Kelola Air (CBFiWM)*)

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ABSTRACT

Misleading information about wildfires and smoke haze issues is caused by a lack of science-based research efforts and studies on wildfire/open burning, smoke haze behavior. A proper and accurate understanding of the breadth of these issues, along with the utilization of appropriate and adequate knowledge of science-based tools and advanced technologies, is needed for fire and haze control and management in upper ASEAN. This paper briefly discussed the development of fire management in Thailand, ranging from local knowledge that includes the land ethic and land management; to the use of science-based and advanced technology such as agroforestry, Integrated Forest Fire Management (IFFM), Community-based Fire Management (CBFiM) and Community Water Resource Management (CBWM). The holistic combination approaches of community-based fire and water management is strongly suggested to develop together into one community management. The integration of indigenous with present knowledge and wisdom is required.

Key words: community, wildfire, smoke-haze, Thailand, water, management

ABSTRAK

Informasi yang menyesatkan tentang kebakaran hutan dan masalah kabut asap disebabkan oleh kurangnya upaya penelitian berbasis sains dan studi tentang kebakaran hutan/pembakaran terbuka, perilaku kabut asap. Pemahaman yang tepat dan akurat tentang luasnya masalah ini, bersama dengan pemanfaatan pengetahuan yang tepat dan memadai dari alat berbasis ilmu pengetahuan dan teknologi canggih, diperlukan untuk pengendalian dan manajemen kebakaran dan kabut asap di wilayah Asia Tenggara. Makalah ini membahas secara singkat perkembangan manajemen kebakaran di Thailand, mulai dari kearifan lokal yang meliputi etika lahan dan pengelolaan lahan; pemanfaatan ilmu pengetahuan dan teknologi maju seperti agroforestri, Integrated Forest Fire Management (IFFM), Community Based Fire Management (CBFiM) dan Community Water Resource Management (CBWM). Pendekatan kombinasi holistik pengelolaan api dan air berbasis masyarakat sangat disarankan untuk dikembangkan bersama menjadi satu pengelolaan masyarakat. Integrasi masyarakat adat dengan pengetahuan dan kearifan masa kini diperlukan.

Kata kunci: masyarakat, kebakaran, kabut asap, Thailand, air, pengelolaan

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INTRODUCTION

Fire has been traditionally used in Southeast Asia. However, climate change and economic pressures have changed the way of local life, including fire use culture. Many forests are too frequently burned for harvesting non-timber forest products (NTFPs). Forested area has shifted from native forest cover (mostly deciduous forest: mixed deciduous and dry dipterocarp forest) to cultivation and agroforestry, in which traditionally, the slash and burn method is still in use, but much less than before, which might lead to uncontrolled wildfires or unwanted or destructive wildland fires. Lately, the rotation crops practice with cultural burn is progressing well where local people do not move around in the forest like they used to be and settle down more.

Moreover, a wildfire is a significant cause of biodiversity degradation in the region and is a direct threat to human life via radiant heat, dehydration, and asphyxiation. A few years ago, a no-burning policy was launched in Thailand to tackle this problem (Chiangmai News 15 January 2017, Ministry of Natural Resources and Environment 15 March 2017). However, this policy does not work in the long term as a fire is still seen as a necessary means by local communities for agriculture and NTFPs activities. Moreover, mixed deciduous and dry dipterocarp forests are fire-dependent ecosystems. Too frequent burning from local people or too much fire prevention from government policy will impact this native ecosystem.

Misleading information about wildfires and smoke haze issues is caused by a lack of science-based research efforts and studies on wildfire/open burning, smoke haze behavior. Without these essential elements quantified properly for the Lower Mekong or Upper ASEAN Region, efficiently controlling and managing fire, smoke and haze are impossible. Fire behavior is also fundamental and of great concern to control and manage fires. A few main factors determine how fast fires can spread and how severe they could be, which are fuel availability, fuel dryness, fuel type, fuel structure, weather conditions, and topographic (terrain) conditions. Moreover, spot fires can travel further away by wind across fire lines, sometimes a few kilometers downwind.

Smoke haze from fires is detrimental to human health and livelihoods, and biomass burning is the dominant source of emissions contributing to premature mortality due to outdoor air pollution in the Lower Mekong (Lelieveld *et al.*, 2015). The smoke haze transboundary issue is indeed an international pollution issue. Smoke haze can travel across countries' borders; therefore, a global effort is required to solve the problem together. The latest severe example was the peat fires at South Sumatra in 2015, with smoke reaching Cambodia (Sassoon 2015) and 2019 (Reuters 2019). The smoke haze has become an annual issue in northern Thailand and upper ASEAN, reaching southern China and Taiwan in March and April annually (Lin *et al.*, 2014).

A proper and accurate understanding of the breadth of these issues, along with the utilization of appropriate and adequate knowledge of science-based tools and advanced technologies, is needed for fire and haze control and management in upper ASEAN.

Aldo Leopold's Land Ethics

Aldo Leopold (11 January 1887 – 21 April 1948) was an American author, philosopher, naturalist, scientist, ecologist, forester, conservationist, and environmentalist. He was a professor at the University of Wisconsin and is best known for his book *A Sand County Almanac* (1949), where land ethics was first introduced. Leopold was influential in developing modern environmental ethics and in the movement for wilderness conservation. His ethics of nature and wildlife preservation profoundly impacted the environmental movement with his exocentric or holistic ethics regarding land. He emphasized biodiversity and ecology and was a founder of the science of wildlife management (Wikipedia 2021). Leopold's land ethic rests on the understanding that humans exist within an integrated community of life that includes other animals, plants, rocks, soils, and waters. Particularly in his later years, Leopold referred to this assemblage as the "biotic community" or, more simply, "the land." Leopold contended that humans are "plain members and citizens" of this biotic community. Leopold's ethic has given respectability to ethical stances that extend moral value beyond human communities (tribe, nation, global village) to cover collections and assemblies of living things such as species and ecosystems based on science (Callicott and Frodeman 2009).

King Rama IV's land management concept

King Rama IV's land management concept is based on the Philosophy of a Sufficiency Economy, three pillars. The first is "Moderation": be sufficient at a level of not doing something too little or too much at the expense of oneself or others, for example, producing and consuming at a moderate level. The second is "Reasonableness": the decision concerning the sufficiency level must be made rationally considering the factors involved and careful anticipation of the outcomes that may be expected from such action. The third is "Risk Management": the preparation to cope with the likely impact and changes in various aspects by considering the probability of future situations. Decisions and activities must be carried out sufficiently depending on two conditions. The first is "Knowledge," comprising broad knowledge in the relevant fields and prudence in bringing this knowledge into consideration to understand the relationship among the area to use them to aid in the planning and ensure carefulness in operation. The second is "Virtue to be promoted," which comprises the awareness of honesty, patience, perseverance, and intelligence in leading one's life (Chaipattana 2021). A couple of quotes would explain further what a good economy would mean by King Rama IV Bhumibol Adulyadej as follows.

- "Economic development must be done step by step. It should begin with the strengthening of our economic foundation, by assuring that the majority of our population has enough to live on . . . Once reasonable progress has been achieved, we should then embark on the next steps, by pursuing more advanced levels of economic development."

- "... The important thing is for us to have a sufficient economy. A sufficient economy means to have enough to support ourselves . . . we have to take a careful step backward...each village or district must be relative self-sufficient."
- "I may add that full sufficiency is impossible. If a family or even a village wants to employ a full sufficiency economy, it would be like returning to the Stone Age . . . This sufficiency means to have enough to live on. Sufficiency means to lead a reasonably comfortable life, without excess or overindulgence in luxury, but enough. Some things may seem to be extravagant, but if it brings happiness, it is permissible as long as it is within the means of the individual..." (Chaipattana 2021).

In Thailand, most community developments involve the Sufficiency Economy Concept of some kind. There are many good practices throughout the country, such as Community Water Resource Management (CWRM) which will be explained and provided an example later.

Agroforestry

It is a collective name for land-use systems and technologies where woody perennials (trees, shrubs, palms, bamboos, etc.) are deliberately used on the same land-management units as agricultural crops and/or animals in some form of spatial arrangement or temporal sequence. There are both ecological and economic interactions between the different components. It can also be defined as a dynamic, ecologically based, natural resource management system that, through the integration of trees on farms and in the agricultural landscape, diversifies and sustains production for increased social, economic, and environmental benefits for land users at all levels. In particular, it is crucial to smallholder farmers and other rural people because it can enhance their food supply, income, and health. Agroforestry systems are multifunctional systems that provide a wide range of economic, sociocultural, and environmental benefits. It integrates multiple natural components and is at the crossroads of tradition and modernity; it necessarily brings together people from diverse fields of knowledge: agronomists, animal care specialists, landscape planners, foresters, economists, soil analysts, and many more. This diversity of disciplines is undoubtedly a strength, but its complexity also represents a challenge, notably in coordination and communication (FAO, 2021). It has been used as one of the small concepts under the Sufficiency Economy schema.

Land manager

The land manager was developed and evolved from Leopold's land ethics. There are several definitions of a Land manager, such as "Any federal, state, local, or private entity that administers, directs, oversees, or controls the use of public or private land, including the application of fire to the land." Or "Any person who is legally responsible for the maintenance, use, and development of resources for a section of land or piece of property" (Law Insider 2021). Another definition is "they

make sure the property is well maintained, has a nice appearance, operates smoothly, and preserves its resale value" (Zippia the Career Expert 2021). It is good to introduce a land manager concept to Southeast Asia Region since there is no precisely a career in the region. A land manager will help make more efficient care of the land toward sustainable land management.

Integrated Forest Fire Management (IFFM)

Integrated Fire Management (IFM) principles include the involvement of people and their abilities to apply fire in land-use systems safely and in environmentally benign ways. They can prevent and control excessive burning and unwanted wildfires. It attempts to bring together the best knowledge about three aspects of fires: ecology, management, and social factors. A participatory approach means people to get involved in all problem-solving and local development planning processes in fire management, with their own responsibilities and support from government agencies and non-government organizations. The success of the participation of local communities depends significantly on strong local leadership and education level. Other information on fire ecology is also important since people can judge whether they adopt fire plans. However, the application of participatory or community-based practices in countries of Southeast Asia is still very limited. To develop the integrated forest fire management (IFFM) to the given area, "community involvement" for all processes, "fire ecology," and "actual fire management" are very crucial to ensure that the plan will be adopted and implemented. Unless local people agree, it is impossible to sustain the program. Resource utilization on highland for agricultural purposes and gathering non-timber forest products in the forest are susceptible to burning for local people as fire-related cultures. These activities must be discussed and adopted with scientific-based information so that the developed plan will be sustainably applied. During the research processes, knowledge gained from the study will educate our networks in Thailand and Laos PDR.

Community-based Fire Management (CBFiM)

The Integrated Fire Management with the participatory process is used to develop the Community Based Fire Management (CBFiM) (FAO Forestry Paper 166, 2011) plan for open burning. Fuel and fire behavior, fire impacts, fire weather and air pollutant emissions, and transport will be evaluated and presented to achieve this target. Alternatives to human use of fire, like no-burn agroecological practices, will also be offered. After that, communities will consider the above information for developing the CBFiM plan in the workshops, choosing what works best for their own economic, ecological, and public health needs. Understanding fuel and fire behavior in deciduous forests and open burning in highland agroforestry and agriculture will provide information on the nature of fire in these ecosystems. Thus, this will reflect the role of fire ecology on biodiversity and ecosystem degradation (fire-sensitive ecosystems) or even ecosystem maintenance under fire environment (as fire-dependent ecosystems). This project will complete a

holistic assessment of fire use across cultivated (agroforestry and croplands) and wildland ecosystems, including considerations of the economic and management benefits and damages. Form Integrated Highland Wildfire, Smoke and Haze Management in the Upper, Indochina Region, Asia-Pacific Network for Global Change Research (APN) by Wanthonchai, Tanpipat, *et al.* 2019. There are community's rules and regulations that need to be followed within communities, such as Rules of Ban Huay Hin Lad Nai Community, Chiang Rai Province.

Community Forest Conservation:

1. The outsiders cannot cut trees in the community forest.
2. The outsiders cannot collect forest products from the community forest.
3. The outsiders cannot clear the forest area in the community forest.
4. Taking any tree outside the community is strictly prohibited.
5. Chainsaw is strictly forbidden in the community.
6. Burning forest for any reason is not allowed.
7. Poaching is not permitted within a 1 km radius from the community.
8. Fishing/ catching aquatic animals using the following methods is not allowed: 1) poison, 2) electricity, and 3) blocking the water flow.

Land use management:

1. Do not use chemicals in a rotated farm. For another area, avoid/limit using as appropriate and needed under the control and monitor of the community.
2. Using a rotary tiller or machine to turn the soil surface in the steep area is prohibited.
3. Changing land use or production pattern must be approved by the community meeting.
4. Mainly use local or indigenous species for rotated farming and rice farm.
5. The farming area can be utilized after the end of the rotation farming season and can be used for only one cycle/year.
6. Extending farming area outside the defined from the survey in 1:50,000 topographic map.
7. Every time there is a burning in a farm, the community members must help build firebreaks and control the fire to prevent fire spread outside the area.

Sustainable Management

1. There must be written rules and regulations agreed upon by the community members.
2. Land can be inherited to the next generation; however, the committee must be informed when the landowner is changed.
3. Changing the ownership or selling the right to use the land must be done only through the Bank Found, and the new owner must be a member of the community.
4. The outsiders are not allowed to rent or use the land in the community.
5. Each community must be established a committee responsible for monitoring, controlling, and managing land use according to rules and regulations agreed by the community.

6. Survey land boundary by plot and record the information on 1:50,000 topographic map, then create a perimeter to show the boundary.
7. Edit the rules and regulations according to the decision of the three community-network committees.

Community Regulations

1. The community has the right according to the Constitution.
2. Conserve and restore culture, belief, and local wisdom,
3. Burning in the farm must be well controlled by building a firebreak
4. All wild animal merchandising is prohibited.
5. A community meeting is convened monthly.
6. The community must continuously learn about the situation outside the community.
7. The committee must participate in decision-making regarding community development in all forms.

Penalty for breaking the community rules

1. In case of breaking the community rules, the following measure will be enforced.
2. Arrest
3. Seizure (Take Over) of property
4. Prosecute the regulation or impose a fine as appropriate.
5. All the decision was made by the community committee.

Rights

Assign co-ownership for land management, and apply community title deed to certify land use rights. Those rules are from villagers, so they all agreed before those been announced, so everybody in the village needs to abide by them or get punished.

Community Water Resource Management (CBWM)

It follows H.M.King Rama IV's concept of "Connect - Understand - Develop" as a guideline for any developer looking for sustainability. Anyone who would like to follow such a concept needs to truly understand every dimension of that particular area, physically and socially. It is a so-called holistic approach to sustainable development. The first most important task that needs to be established is a trust from local people and concept buy-in before any process begins; therefore, sincere communication is required. Moreover, a strong community leader committed to the approach is the crucial instrument and factor because sometimes they will be the missing link in an unexpected situation. Then the field data collection, secondary information such as remote sensing imageries, digital topographic maps, weather, and climate data, and so on by using geoinformatics technology and tools to have sufficient hydro informatics information to understand water demand and supply or water balance of that selected geospatial over a long period. The main three topics are focused on water security and water resource management, food security and community economy, and Public-Private - People Partnership (PPP) (HAI, and Public-Private - People Partnership (PPP) (HAI,

2016). By December 2020, there will be 1,773 villages with 60 core communities within 19 river basins.

Two examples of good practices from those 60 core communities are provided here. The first is Lao River Basin Community Network, Wiengpapao District, Chiang Rai Province under "Forestry-based Disaster Risk Reduction Builds Resilient Livelihoods," which got four main results as follows:

1. "Lao River Basin Communities Network" manages the water, forest, and natural resources covering 256 km² of 41 communities in four sub-districts.
2. Two thousand five hundred twenty-eight check dams have been constructed, providing water to 14 communities, 881 households, and 2,740 people.
3. The "Three Forests and Four Benefits" that are applied by planting organic tea, coffee, herbs, and other vegetables, bring the extra household's incomes throughout the year.
4. A youth group named "La-On-Hug-Nam-Lao" was established and applied science and technologies to collect data, report on the water situation, and maintain Disaster Monitoring Network

The second is Huai Pla Lod Community, Mae Sod District, Tak Province under "Suitable Crop Calendars for Natural-Rich Life," which got four main results as follows:

1. The "Three Forests and Four Benefits" applied by planting coffee and other vegetables bring the extra household's incomes throughout the year, the forest cover is plentifully and protected.
2. Efficient water resource management through science and technology with water balance concept with hydro informatics technology.
3. Crop rotation calendar to meet water supply and market for higher incomes.
4. Sustainable land use management plan and practice with exact details land use land cover maps using geoinformatics technology.

Community-based Fire and Water Management (CBFiWM)

It combines Community-based Fire Management and Community Water Resource Management since "where is more water there will be less fire concept."

More water means more income, improving livelihood in the community, and sustaining such a management approach. With sufficient water supply all year round, local people can have more cash crop choices to select for, so they can have more flexibility to adjust to the market's needs, generating sufficient incomes to sustain CBFiWM.

Sustainability and adaptability to Climate Change are the ultimate goals!!!

Science to policy makers

The Science to Policy Makers is essential and needed for decisions at a political level to be science-based since oftentimes, those high-level officers and politicians do not reach out to the science-based findings

and facts as it might take too much time or crate conflict of interests. Therefore, an easy and reliable mechanism of two-way communication is needed. The existing science and social information need to be in an informatics system that can be easily searched, extracted, and visualized, so those are ready to be accessed and understood at will. When the policymakers understand fire management and control under fire, smoke haze, and social science, the better CBFiWM plan based on the IFFM process should be accepted since this is a science-based and participatory-based program.

CONCLUSIONS

The holistic combination approaches of community-based fire and water management need to develop together into one community management. The integration of indigenous with present knowledge and wisdom is required. The modern prescribed burning integrated with cultural burn is the way. Conservation, preservation, perhaps environmentalism, or deep ecology as a land manager is needed.

The sufficiency economy concept of King Rama IV is the self-sustainable approach which will lead to sustainability and adaptation to natural hazards and disasters. It is time to revisit "Think Globally, Act Locally" and make it the primary concern all over the world again. It is time for Climate Action! as we are in Climate Crisis. The theme for Earth Day 2021 is "Restore Our Earth!!".

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