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## Indonesia's fires: smoke as a problem, smoke as a symptom

*The ongoing fires in Sumatra and Kalimantan, which blanketed Indonesia and the neighbouring countries of Singapore and Malaysia in thick smoke, echoed the environmental disaster there in 1994. Both years, the smoke caused poor visibility, air pollution and severe health problems for millions of people in the region. And both years, the main response to the smoke crisis both within Indonesia and in the rest of the world was to call for a ban on all land-clearing fires. But as members of the Alternatives to Slash-and-Burn (ASB) Indonesia Consortium report in this article, that response is as ineffectual as the causes of the fires are complicated. To avert another crisis of this kind, a much more creative and long-term response is in order.*

**W**e must

- fires used as a tool to clear land;
- fires that accidentally got out of control; and
- fires started deliberately as a weapon in social conflict.

The El Niño of 1994 wasn't the first and the one of 1997 certainly won't be the last. That's why it's imperative to make a clear distinction between smoke as a problem and smoke as a

symptom of more complex problems that face Indonesia today, and to find technological and policy solutions that will prevent this kind of environmental disaster from occurring again.

### Fire as a tool

Traditional shifting cultivation systems—or slash-and-burn agriculture—have been used successfully for centuries. An integral part of farming and land clearing in the tropics, they are, for the most part, ecologically sustainable as long as fallow periods are adequate. Slash-and-burn also refers to a technique for land clearing and conversion to other purposes. Slash-and-burn is the preferred method of land clearing in Indonesia—for



*A farmer slashes and burns an old rubber agroforest to replant a new one—an example of traditional shifting cultivation near Muara Bungo, Jambi Province, Indonesia.*

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smallholders and large companies alike—because it is cheap and easy. In addition, fire eliminates field debris, decreases regrowth of weeds, reduces pest and disease problems, provides ash which acts as a fertilizer and loosens the soil to make planting easier. In some ways it is preferable to other land-clearing methods. For example, bulldozers cause soil compaction, erosion and sedimentation.

Slash-and-burn as a land-use system worked well for smallholders for centuries because communities regulated the use of fires. However, when fire is used to convert entire forests to industrial timber or palm oil plantations, obviously there will be excessive amounts of smoke. And if any of those fires spread rapidly due to a combination of negligence and drought, it's a recipe for environmental disaster.

Following the fires in Indonesia in 1994, smallholder farmers—not large, profitable companies—shouldered the brunt of blame for the huge amounts of smoke that covered the region. The 1997 fires wreaked even more havoc in Southeast Asia. But this time,

Development policies for conversion of 'forestlands' contributed to the smoke problems Indonesia faced last year. Forestlands', designated as state-owned lands, represent about 3/4 of the Indonesian land area.

Each year many private companies are granted licences to plant fast-growing timber species on forestland or oil palm on private land (that is, 'converted' state forestland). These companies use fire to clear their fields and prepare them for planting. Therefore the 1997 fires should not have been totally unexpected. In this respect, smoke is an inevitable—if unintended—product of planned conversion.

smallholder farmers had technology on their side: satellite images posted on the Internet made it clear that in fact, large companies—using fire to clear land for plantations—played a major role in causing the smoke problem.

That was the problem in 1994 and in 1997—too much smoke in the wrong place at the wrong time. The objective then, should be to reduce smoke emissions in critical years and during times of the year when smoke disperses slowly because of atmospheric conditions.

### Fire that accidentally spreads

Some fires accidentally spread quickly due to a severe drought in the

*Research shows that even if only 1% of an area is burned, the entire area can be covered in smoke.*

region. And in both 1994 and 1997, the weather phenomenon known as El Niño was a culprit in intensifying the disaster. El Niño caused an air temperature inversion over Southeast Asia, which trapped smoke that otherwise would escape into the upper atmosphere.

Many local communities in Indonesia have created their own effective systems of fines and other penalties that are imposed on people who mismanage fire and cause damage to their neighbours' property. Until recently, no mechanisms have existed to punish large companies for using fire in an incompetent or negligent manner. A monitoring and enforcement system could be developed to detect and punish blatant misuse of fire by large companies. The Indonesian agency charged with environmental protection has already made an impressive start in this direction, but investments in equipment and human resources are needed to strengthen capacity to detect fires, verify their causes, analyze policies, and provide timely, accurate information.

### Fire as a weapon

Millions of people live in the forestland areas but because they have no security of tenure, they can be evicted at any time to make way for development projects. Large companies have burned land to drive out smallholders. Smallholders have burned trees established by large

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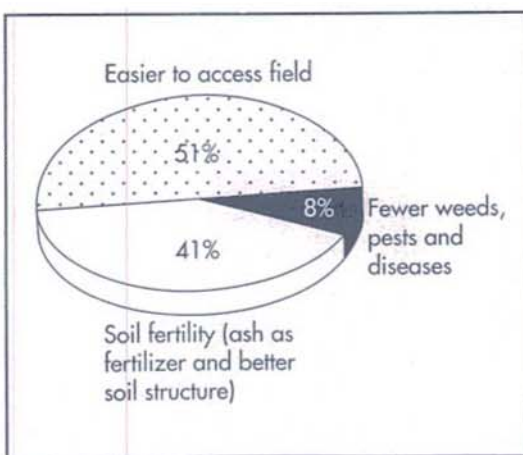
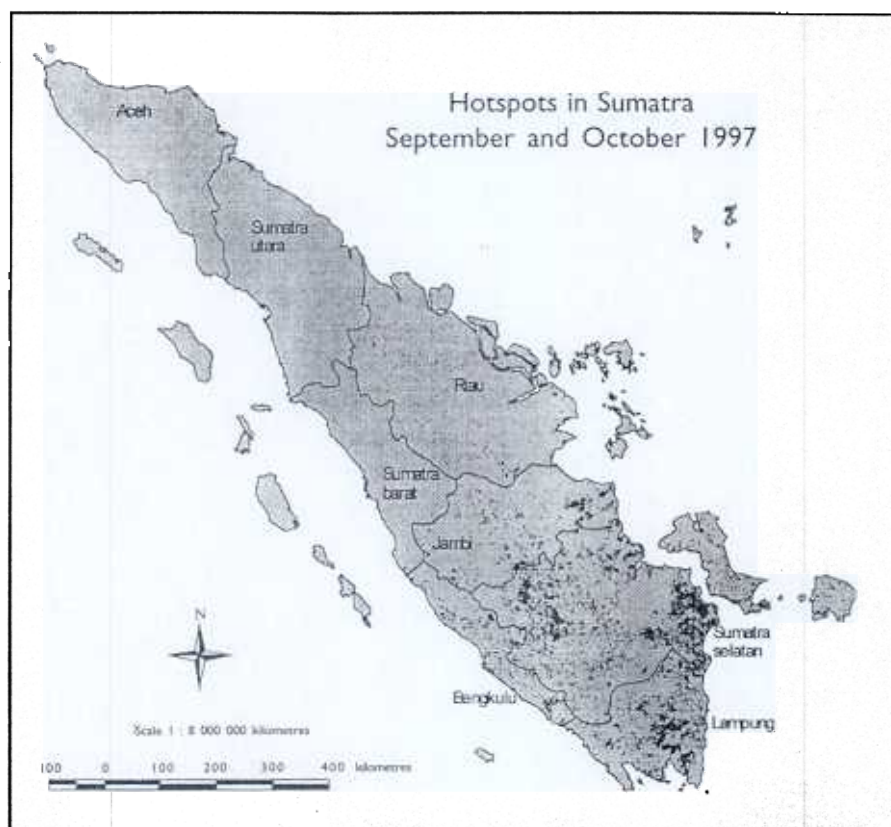


Figure 1. Main reasons given by farmers in Jambi for using fire in landclearing to rejuvenate rubber agroforests.

Source: ICRAF



The National Oceanic and Atmospheric Advanced Very High Resolution Radiometer Satellite can detect areas that are warmer than their surroundings. These are the so-called 'hotspots'. A picture element (pixel) can be assigned as a hotspot if a fire occurs in the satellite's resolution cell of 1 square kilometre. Initial findings in south Sumatra indicate that a pixel can be detected as a hotspot when a fire larger than 50 metres wide occurs.

While the fires in Indonesia are usually referred to as 'forest fires', this term is misleading. During September and October, 12 000 hotspots were detected in Sumatra, the majority of them in the provinces of South Sumatra (7000), Lampung (3000), Jambi (1000) and Bengkulu (700). In these 4 provinces, 12% of all fires were in protected areas, 44% were in forest areas and 6% occurred in grassland fields. So, in fact, more than 50% of the 'forest fires' were not actually in forest areas.

companies to retaliate for perceived injustices. At the heart of this problem are conflicts over land, resulting from unclear and insecure property rights and from land allocation policies that take too little account of established—albeit informal—local claims. Aside from contributing to social conflict, 'land grabs' that displace local people also undermine incentives at the community level to prevent, report and fight fires. If land allocation policies con-

centrate holdings while destroying incentives for on-the-spot fire prevention and management by local people, there is a great risk that the 1997 situation will be repeated.

It is important to note that part of the land granted to companies is not 'empty' forestland but land that has been occupied by farmers—often for centuries. These farmers have developed their own systems of land use, which they have to give up when the company takes

over. Some companies try to accommodate farmers' needs but others don't, which leads to conflict. And in conflict, fire is a powerful weapon for both planters and farmers.

These changes in land use disturb pre-existing social systems. They erode traditional techniques and social rules for fire control and increase social inequities and the perception of these inequities in rural areas.

When lands are converted into estates, some smallholders may find jobs on the estates; some may be allowed to retain control of a piece of the land through the 'nucleus estate' scheme; some may move to other forestlands; and others will be forced to move to crowded urban centres, becoming part of the already large group of urban poor.

Seen from these angles, it is reasonable to conclude that the risks of fires can only increase in the coming years unless social and policy issues are addressed along with the technical causes of fire and smoke. This needs to be carried out at 2 levels: by understanding how present policies affect smallholders and by recognizing the wider consequences of all policies related to land allocation and land conversion, from both an ecological and a social perspective.

### Options for managing fires and smoke

Banning fires has *not* been effective and won't be as long as fire is the cheapest way to clear land. Until a workable mix of regulations, incentives, and sanctions is in place for the large companies involved, there is a risk that the brunt of enforcement may fall on

a few unlucky smallholders. This would simply add to the burdens of the rural poor, and would have very little effect on the smoke problem. (The exception may be to ban fires on peat swamps, which can smoulder underground for months and produce much more smoke per unit area than do fires that occur on upland soils.)

Fortunately, banning burning is not the only option for managing smoke emissions. Some others are listed below.

### **Develop alternatives to unsustainable forms of slash-and-burn agriculture**

In contrast to bans on burning, Indonesia's partnership with a number of international organizations in the global Alternatives to Slash-and-Burn (ASB) Programme has received scant media attention. The aim of the programme is to improve farmers' welfare and protect the environment by developing land use practices and policies that offer farmers sustainable and profitable alternatives to slash-and-burn. Community forestry and agroforests are 2 good examples of viable alternatives that are good for people's livelihoods, good for the economy and good for the environment.

### **Clear land without burning**

There are a number of land clearing techniques that do not produce smoke. These include biological methods to accelerate decomposition and various mechanical techniques that chip or shred biomass, either for mulching on-site or for transport

off-site for disposal or sale. All of these 'no-burn' techniques are less effective and more expensive than burning.

Research may be able to reduce the costs of some environmentally benign techniques such as mulching. If subsidies for adoption of these techniques are administratively feasible, such payments *may* be an efficient means to reduce smoke emissions. To determine whether subsidies for adoption of no-burn techniques are appropriate, the social and economic costs of smoke must be compared with the costs of alternatives.

### **Burn when it does less harm**

It is not feasible to regulate burning by the many smallholders who clear plots of a hectare or so. But government permits regulate land clearing by large companies. So, one option is to allow less clearing in El Niño years, which can be predicted. Another option is to require burning permits for large companies and to enforce sanctions on those that burn without permits or burn more than specified in their permits.

Selective restrictions have been used in other countries to prohibit burning when smoke would linger because of atmospheric conditions. Implementation of these options would require an effective monitoring system using remote sensing combined with on-site verification, stiff penalties, and certain enforcement. Offering permits through an auction could improve the efficiency of distribution among companies when rationing is needed but may not be socially acceptable.

### **Reduce the amount of timber that is burned**

Indonesian forestry policies have been designed to depress domestic prices of timber relative to world prices. Policies that depress prices of wood products increase the 'waste' that must be disposed of by burning or other means. If these policies were eased or removed, more of the wood felled in land clearing would be sold for timber, thereby reducing the amount that is burned. And if wood were sold instead of burned, there would be less smoke. The attractiveness of technological alternatives to clear land without burning discussed in the 2nd option above—or the level of subsidies required for adoption of these techniques—also is influenced by national policies.

In addition, since conversion forests are being planted mostly to oil palm, it is important to study alternative uses for the vast amounts of oil palm wood that will be available in the future.

### **Recognize long-standing land claims**

It is important to have balanced consideration for the community, the economy and the environment. Involving members of the community in decisions that affect their livelihoods and their tenure security would help to minimize conflicts over land allocation, thereby reducing use of fire as a weapon. Moreover, improved tenure security would probably be an important incentive for community-based resource management. ☺