

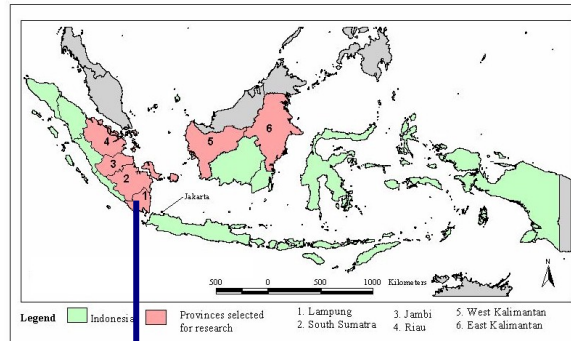
# The Underlying Causes and Impacts of Fires in Indonesia

## Case Study 1: The North- Eastern Fringes of Bukit Barisan Selatan National Park, Lampung, Sumatra

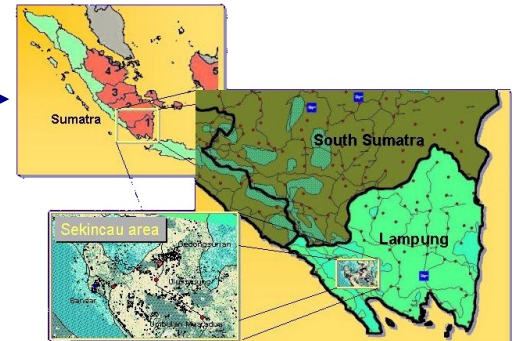
The site is mountainous with an elevation between 800 and 1200 meters. Most of the area falls within a national park with major encroachment from smallholder coffee gardens. In 1997 this area was badly affected by both intentional fires and wild fires.

### Background:

The Center for International Forestry Research (CIFOR) together with the International Centre for Research in Agroforestry (ICRAF) and the United States Forest Service (USFS) are conducting multi-disciplinary research into underlying causes and impacts of fires in Indonesia, as part of a more extensive long-term project. Funds from the USFS support work over the initial 18 month period. The project is carrying out a comprehensive assessment of fire on an island wide scale for Sumatra and Kalimantan with in-depth research on the underlying causes and impacts in eight detailed study sites. The central methodology integrates social science with remote sensing and GIS to provide a powerful analytical tool for assessing the causes and impacts of the fires.

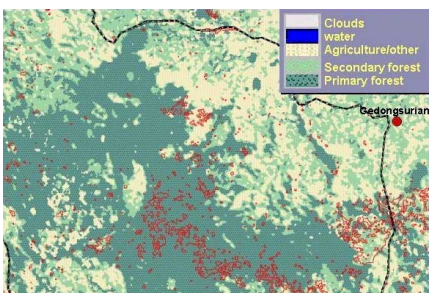


Location of CIFOR/ICRAF Fire Research Sites in Indonesia

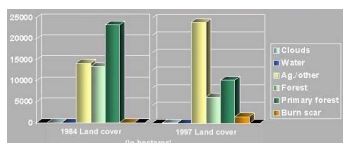


Location of Case Study 1

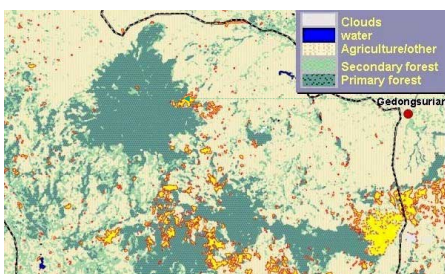
### Land Cover Change Mapping using Remote Sensing



The map on the left shows land cover in 1984 derived from Landsat MSS imagery. The red polygons show primary forest areas that were later burned in 1997.



Land cover change estimates derived from interpretation of Landsat imagery.



The map above shows land cover in 1997 derived from Landsat TM imagery. This map shows that many of the burnt areas (yellow/red) were adjacent to primary forest.

### Field Observations 1997



**In Sekincau, the underlying causes of fires relate to:**

- Deforestation
- Migration
- Land tenure



**Based on information collected at the local level deforestation resulted mainly from two activities:**

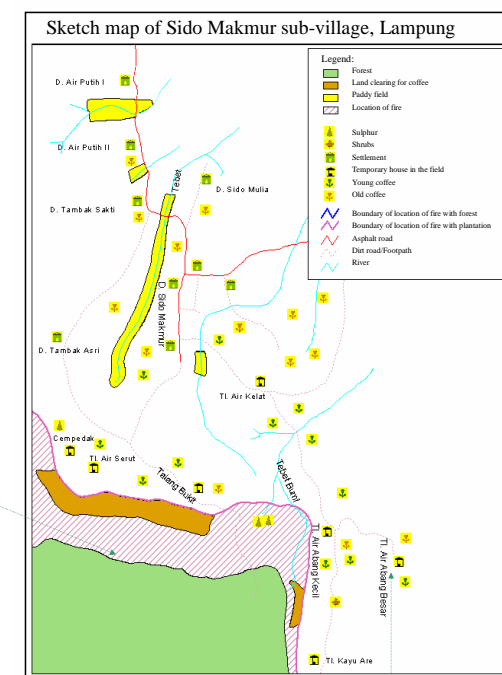
- Establishment of coffee gardens
- Illegal logging activity



**New migration in the Sekincau area:**  
The establishment of coffee gardens has increased as the profitability of coffee production has increased. This has brought migration to the area.

### Participatory Mapping:

Participatory mapping and group interviews were conducted at the study site. Rural appraisals and sketch maps of the fires were developed for study areas.

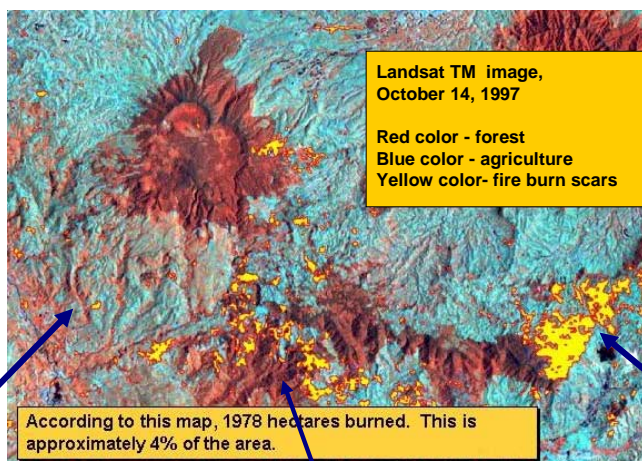


Transect Sketch of and cover in 1977.



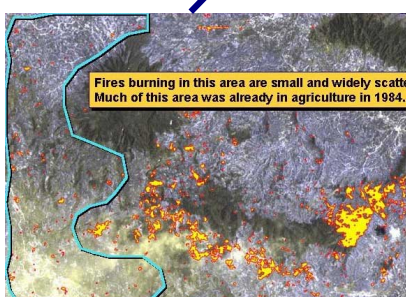
Transect Sketch of land cover in 1997.

### Burn Scar mapping in Case Study 1

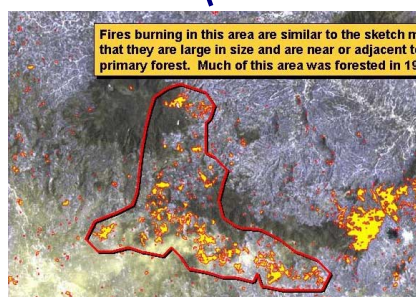


The image on the right shows areas (in yellow) identified as burn scars in October 1997.

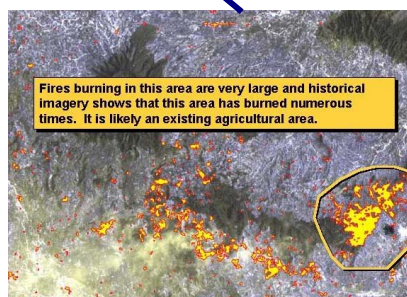
The three images below show different types of burn scar patterns.



Fires burning in this area are small and widely scattered. Much of this area was already in agriculture in 1984.



Fires burning in this area are similar to the sketch map in that they are large in size and are near or adjacent to primary forest. Much of this area was forested in 1984.



Fires burning in this area are very large and historical imagery shows that this area has burned numerous times. It is likely an existing agricultural area.

### Findings:

- **Based on Landsat TM an MSS image classification, we found :**
  1. A high rate conversion of forest to non-forest between 1985 and 1997.
  2. Most of the fire in 1997 were adjacent to primary forest.
- **Research on social science found :**
  1. Fires in 1997/1998 in Sekincau site can be categorized as controlled fires and wild (accidental) fires. Controlled fires resulted from land clearing activities for establishment of coffee garden by smallholders.
  2. We found the underlying causes of fire in Sekincau relate to deforestation, migration, and land tenure.
  3. There are two sources of deforestation: establishment of coffee gardens by smallholders, and illegal logging activity. The establishment of coffee gardens greatly increased with the increase in migration and profitability of coffee production.
  4. The feeling of the security of informal land tenure in the park has increased in recent years, thus attracting more migration to the study site. Approximately half of the migrants are temporary migrants who extract profit from. During a drought period, such as El Niño, fire from land clearing and illegal-logging activities easily spreads to burn natural forest and become an uncontrolled forest fire. The amount of land burned and impacts of uncontrolled fires are much greater than the area burned by controlled fires started intentionally by smallholders.