

# FIRE REPORT

## **2009**

This report was prepared for  
The Kalimantan Forests and Climate Partnership



**Australia Indonesia Partnership**  
Kemitraan Australia Indonesia



This report was prepared in accordance with the guidelines at the time of writing, including the overview of the KFCP project below. This research was carried out in collaboration with the Governments of Australia and Indonesia, but the analysis and findings in this paper represent the views of the author/s and do not necessarily represent the views of those Governments.

Australia's International Forest Carbon Initiative is a key part of Australia's international leadership on reducing emissions from deforestation. The Initiative will support international efforts to reduce deforestation through the United Nations Framework Convention on Climate Change (UNFCCC). It aims to demonstrate that reducing emissions from deforestation and forest degradation can be part of an equitable and effective international agreement on climate change. A central element of this is the Initiative's focus on developing practical demonstration activities in our region, particularly in Indonesia and Papua New Guinea.

Indonesia and Australia are working together under the Indonesia - Australia Forest Carbon Partnership (The Partnership) to support international efforts on REDD through the UNFCCC. A key focus is on practical demonstration activities to show how REDD can be included in a future global outcome on climate change. Activities under the partnership are funded through Australia's \$200 million International Forest carbon Initiative (IFCI) administered by the Australian Department of Climate Change (DCC) and AusAID.

Australia has committed \$30 million over four years to the Kalimantan Forests and Climate partnership (KFCP). Under the KFCP, Australia and Indonesia are working together to develop and implement a large scale REDD demonstration activity in Central Kalimantan. The KFCP is the first REDD demonstration activity of its kind in Indonesia. It aims to demonstrate a credible, equitable and effective approach to reducing emissions from deforestation and forest degradation, including from the degradation of peatlands, than can inform a future global outcome on climate change. With an overall funding target of \$100 million, the KFCP aims to raise remaining funding through contributions from or coordinated actions with the private sector or other donor countries.

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Australian Agency for International Development, Jakarta

Australian Embassy, Jl Rasuna Said Kav. C15 -16, Jakarta 12940, Indonesia

Ph (62 21) 392 4322, Fax (62-21) 392 4373



**Australia Indonesia Partnership**  
Kemitraan Australia Indonesia



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## **Acronyms**

ADB	: Asian Development Bank
Bappeda	: Badan Perencanaan Pembangunan Daerah
Bappenas	: Badan Perencanaan Pembangunan Nasional
Brigdalkarhut	: Brigade Pengendalian Kebakaran Hutan
CCROM-SEAP-IPB	: Center for Climate Risk and Opportunity Management in Southeast Asia Pacific, Bogor Agriculture University
CKPP	: Central Kalimantan Peatlands Project
EMRP	: Ex Mega Rice Project
ENSO	: El Niño-Southern Oscillation
EWS	: Early Warning Sytem
FDRS	: Fire Danger Rating System
GHG	: Greenhouse Gas
GIS	: Geographic Information System
GoI	: Government of Indonesia
HTE	: High Temperature Event
KFCP	: Kalimantan Forests and Climate Partnership
MPA	: Masyarakat Peduli Api
NOAA	: National Oceanic and Atmospheric Administration
Pemda	: Pemerintah Daerah
Perda	: Peraturan Daerah
PP	: Peraturan Pemerintah
RPK	: Regu Pengendali Kebakaran
SPBK	: Sistem Peringkat Bahaya Kebakaran
SPD	: Sistem Peringatan Dini
UU	: Undang-Undang

# 1. Background

**Site Location and Description.** The KFCP field demonstration activity will be implemented within a single peat dome of approximately 130,000 hectares<sup>1</sup> in the northern part of the Ex Mega Rice Project (EMRP) area in Central Kalimantan (approximately 2° south and 115° east). The site is bordered by the Kapuas River to the west and south-west and the Mantangai River to the east and south east. Within the EMRP area, roughly half of the site is located in the northern part of EMRP Block A, and half to the north in Block E. The demonstration site lies completely within Kapuas District and is divided between the sub-districts of Mantangai and Timpah. The demonstration site is sparsely populated, with approximately 11,000—mostly Ngaju Dayak—residents living in 14 settlements strung out along the banks of the Kapuas River. The residents of these villages use land near their villages for food crop and rubber cultivation, while harvesting timber, non-timber forest products (NTFPs) and fish from more remote parts of the demonstration site. Villages are relatively remote, have limited public infrastructure, and the level of access to and quality of both health and education services is relatively poor. Isolation limits the range of available employment opportunities, and the deforestation of large areas of land since 1996 has greatly reduced livelihood opportunities.

Table 1 below shows the population data for the settlements in the KFCP area.

Table 1: The Northern Section Population Table

Village/hamlet	Status 1	Sub-district	# of households	# of population
Petak Puti	Village Center	Timpah	242	807
Kanjarau	Hamlet of Petak Puti	Timpah	112	353
Tumbang Muroi	Village Center	Mantangai	103	446
Lapetan	Hamlet of Tumbang Muroi	Mantangai	145	604
Taburu	Hamlet of Tumbang Muroi	Mantangai	17	65
Teluk Kajang	Hamlet of Tumbang Muroi	Mantangai	39	173
Tanjung Kalanis	Hamlet of Tumbang Muroi	Mantangai	119	455
Tuanan	Hamlet of Katunjung	Mantangai	29	109
Tumbang Mangkutup	Hamlet of Katunjung	Mantangai	61	272
<b>Total North</b>			<b>867</b>	<b>3284</b>

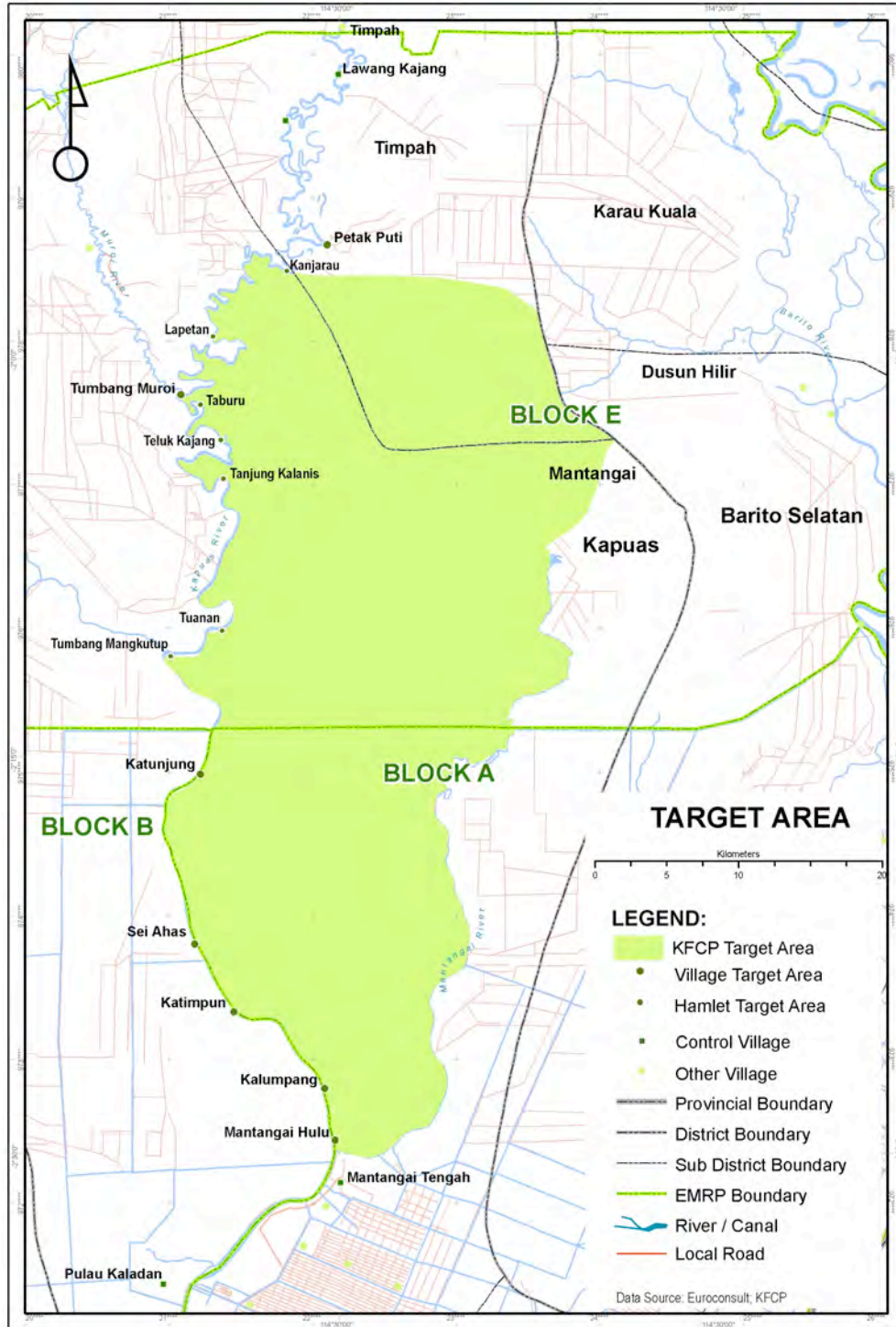
The Southern Section Population Table

Katunjung	Village Center	Mantangai	232	1,066
Sei Ahas	Village Center	Mantangai	223	852
Katimpun	Village Center	Mantangai	244	853
Kalumpang	Village Center	Mantangai	284	1,035
Mantangai Hulu	Village Center	Mantangai	551	1,917
<b>Total South</b>			<b>1534</b>	<b>5,723</b>
<b>Total</b>			<b>3068</b>	<b>11,446</b>

<sup>1</sup> About 80,000 hectares are covered in logged-over forest, while in the southern part of the dome covering 50,000, much of the forest has been cleared and the remainder is very degraded. Emissions from peatland degradation contribute significant GHG emissions globally. About 30% of global peat occurs in the tropics—about two-thirds occurs in Indonesia. Indonesia contains about 22.5 million hectares of peatland (12% of Indonesia’s land area).

Map 1 below shows the KFCP area and the estimated 14 settlements that affect that area.

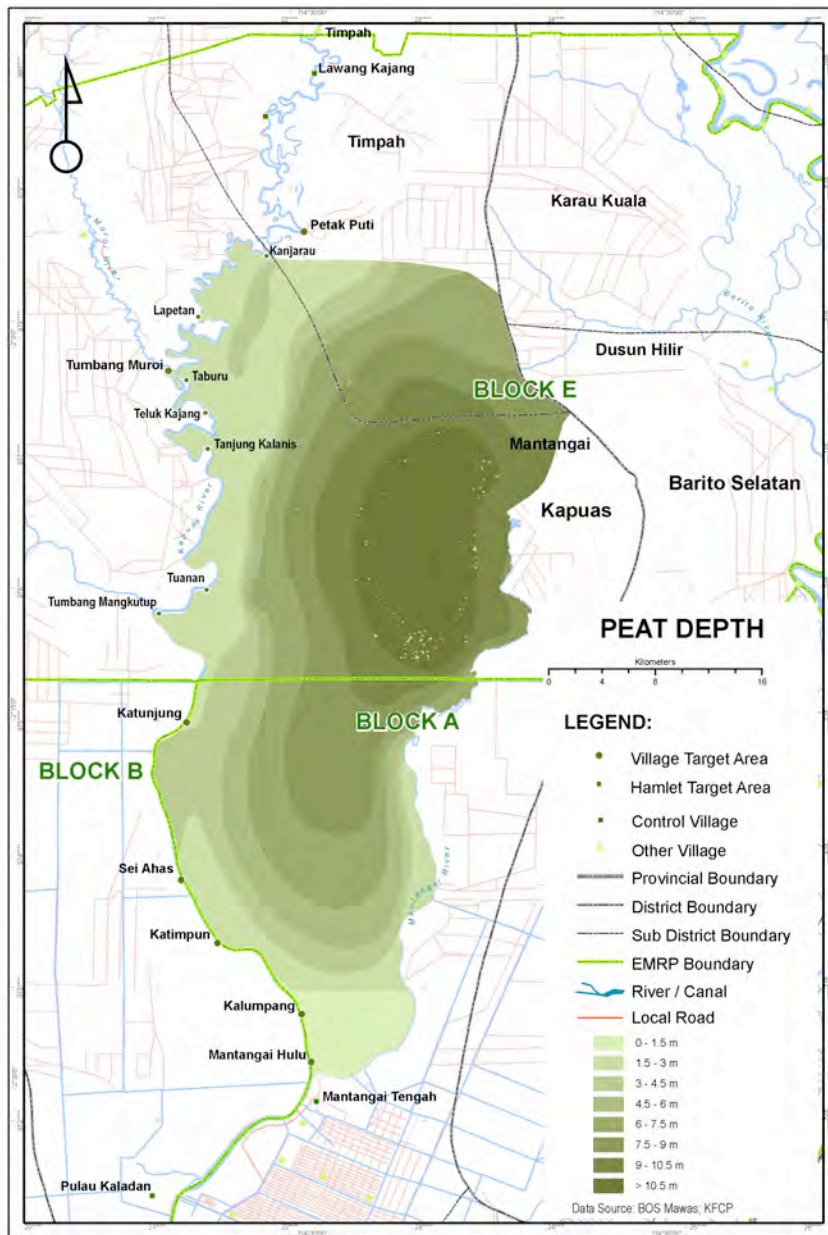
Map 1. Target Area



## **2. Forest Conditions in KFCP Area**

Environmentally, the conditions in the northern half of the dome (Block E) are quite different from those in the southern half of the dome (Block A). The deepest peat, greater than 10.5 meters, covers a large area (7,895 ha) on the eastern side of Block E. In Block A, the maximum peat depth is 9 meters. In addition, due to the Mega Rice Project and the construction of government canals in Block A, Block A has been mostly deforested while Block E retains its forest cover. For this reason Block A and E will be described separately.

Map 2. Peat Depth in KFCP Target Area



## 2.1. Forest Cover

Overall, almost 60% of the KFCP area is Peat Swamp Forest. However, the majority of this area is located in Block E. The next most prevalent land cover is shrub land, with just over 19% of the KFCP area classified as such. However, the majority of shrub lands are located in Block A. Recently burnt shrub lands and forest account for 6.5% of total KFCP area, and again, the majority of these lands are located in Block A.

Table 1. Land Cover 2008 per Block (hectare)

No	Land Cover 2008	Block E	Percentage of Block E	Block ANW	Percentage of Block A	Grand Total	Grand Total (percentage)
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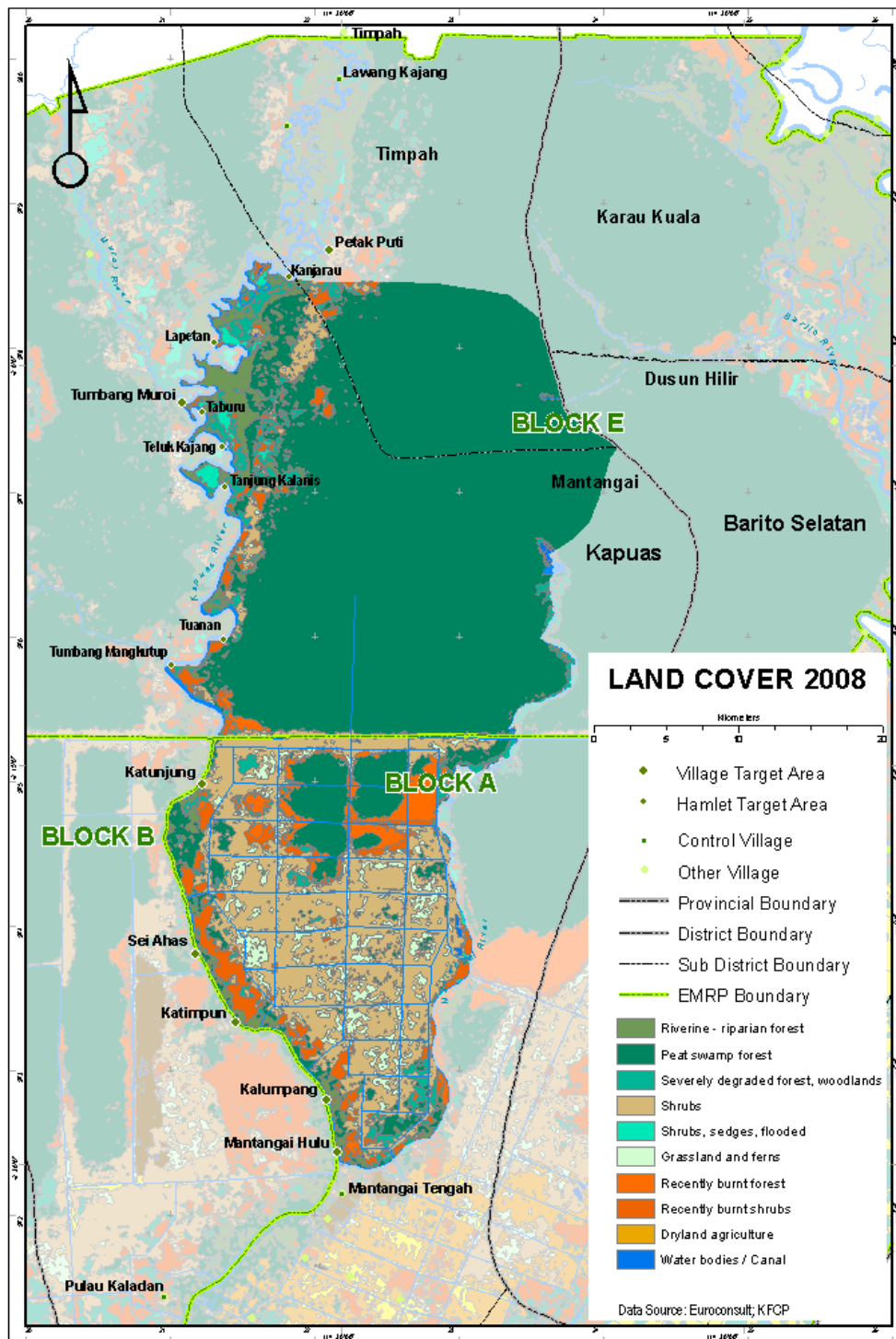


						(ha)	
1	Canal	0	0.0%	978	2.2%	978	0.8%
2	Dryland agriculture		0.0%	1	0.0%	1	0.0%
3	Grassland and ferns	102	0.1%	4,623	10.4%	4,725	3.9%
4	Peat swamp forest	63,945	84.9%	7,809	17.6%	71,754	59.9%
5	Recently burnt forest	233	0.3%	2,533	5.7%	2,766	2.3%
6	Recently burnt shrubs	1,491	2.0%	3,542	8.0%	5,033	4.2%
7	Riverine - riparian forest	3,012	4.0%	1,176	2.6%	4,188	3.5%
8	Severely degraded forest, woodlands	3,400	4.5%	2,196	4.9%	5,596	4.7%
9	Shrubs	1,955	2.6%	21,113	47.5%	23,068	19.3%
10	Shrubs, sedges, flooded	696	0.9%	178	0.4%	873	0.7%
11	Water bodies	463	0.6%	292	0.7%	755	0.6%
<b>Grand Total (Ha)</b>		<b>75,297</b>		<b>44,440</b>		<b>119,737</b>	

As shown in the Land Cover 2008 Map 3 below, the southern section (Block A) of the KFCP area was partially developed by the Mega Rice Project. This development consisted of building a drainage/canal system that opened up access to the forests in Block A; the canals developed by the project are clearly visible on the map. The result has been that a large part of the forest cover has been removed. Table 1 above shows that in Block A only 17.6% of the area remains Peat Swamp Forest. This forest is mostly located in the northeast quadrant of the southern section of the KFCP area. Grassland/Ferns or Shrubs dominate the Block A area covering 57.9% of the area.

Almost 14% of the Block A area is classified as recently burnt shrubs or forests. Of this 14%, just over 49% of recently burnt areas are within 0 to 5 kilometers of the area's settlements. The other half of the recently burnt areas are beyond 10 kilometers with the majority of that (44.5%) area between 10 and 20 kilometers from the area's settlements.

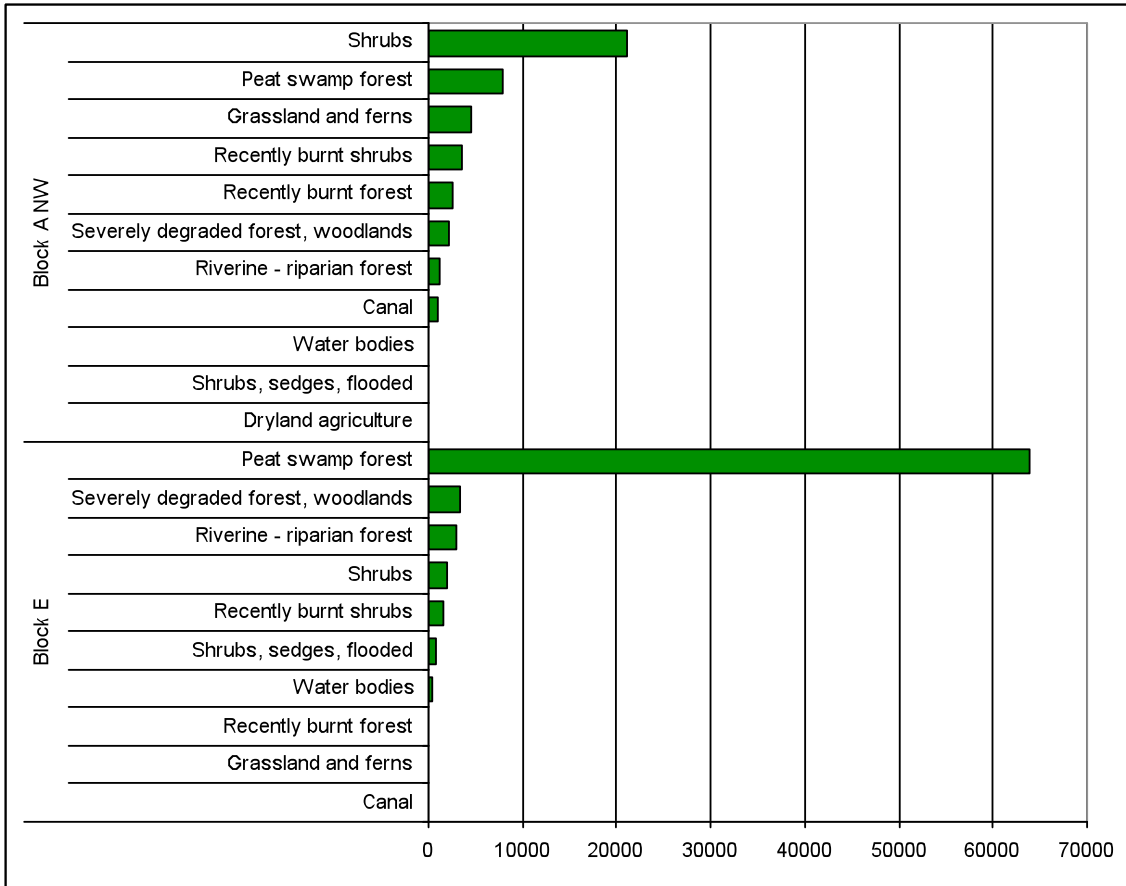
Map 3. Land Cover for KFCP Area



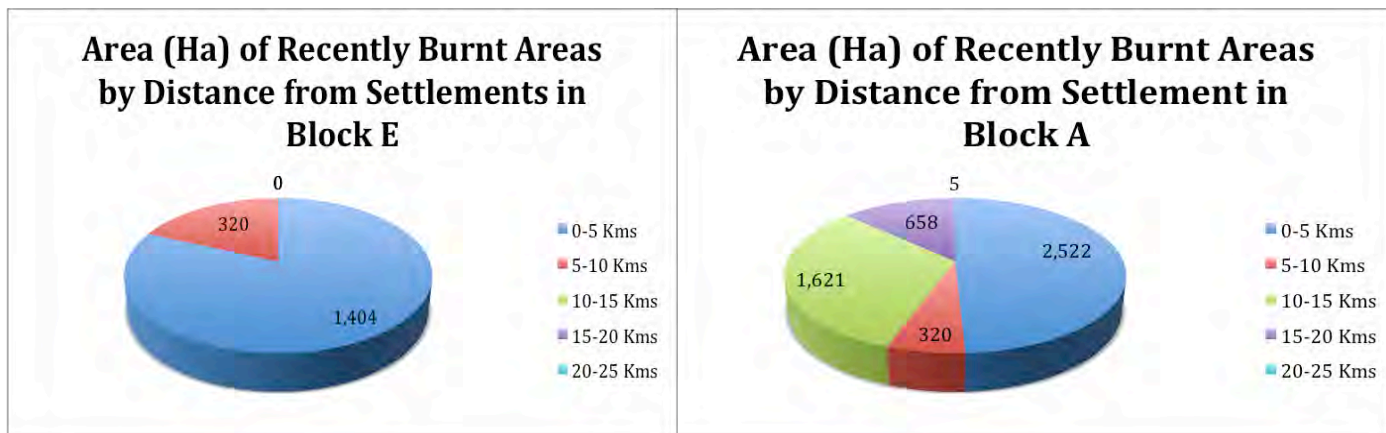
The northern section (Block E) of the KFCP was not developed by EMRP. Canals were not constructed, and without the canals, access to the peat forest remains limited. Therefore, a majority of the area, almost 85%, retains its forest cover. Grassland/ferns and shrubs cover 2.7% of the area near river settlements. Recently burnt areas cover only 2.3% of the area, and again, these areas are near the river and settlements. Of this 2.3% recently burnt

areas, 86.4% are between 0 and 5 kilometers from settlements. The remainder is between 5 and 10 kilometers from settlements (see Graphs 2&3 below). In Block E there is no land classified as recently burnt beyond 10 kilometers from the settlements. These recently burnt areas are located near the Kapuas River, settlements, and the borders of the forested quadrant.

**Graph. 1. Land Cover (Ha) 2008 per Block**



**Graph. 2 & 3. Burt area by Distance from Settlements**



### **3. Fire Situation**

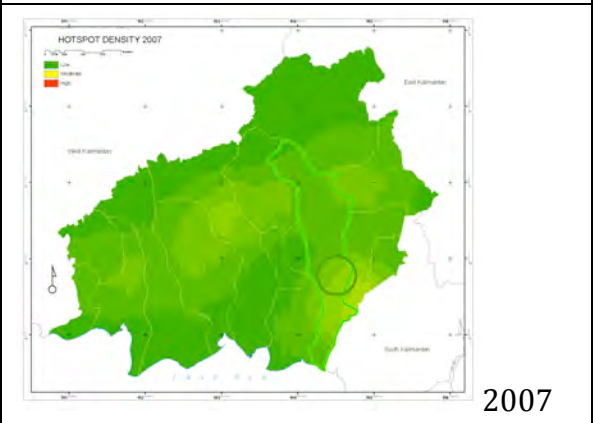
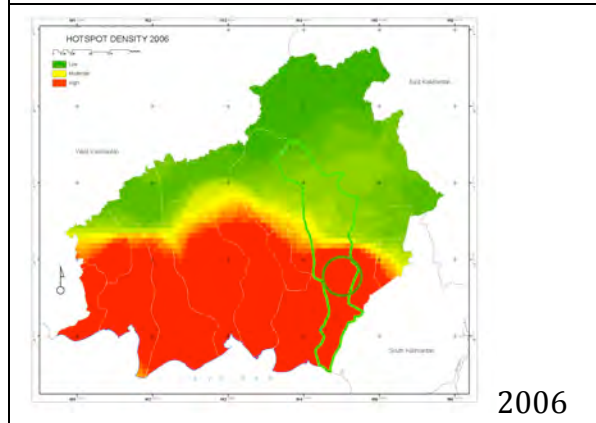
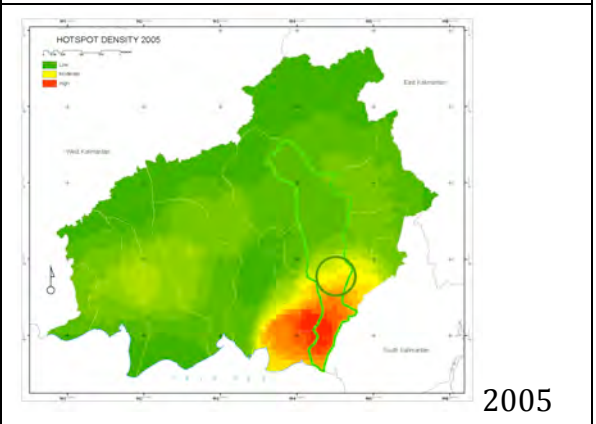
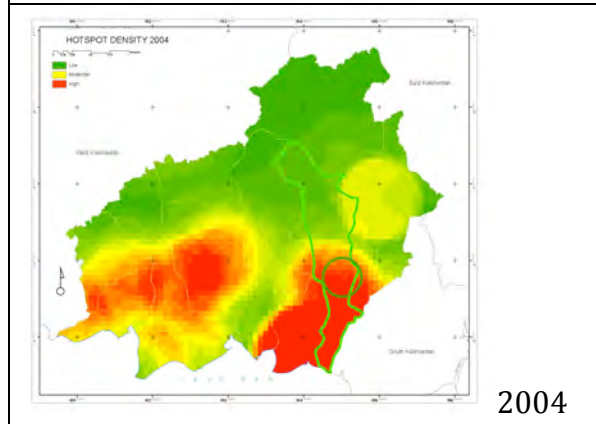
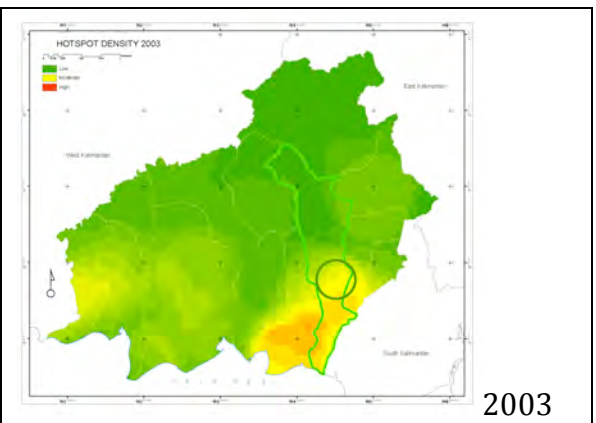
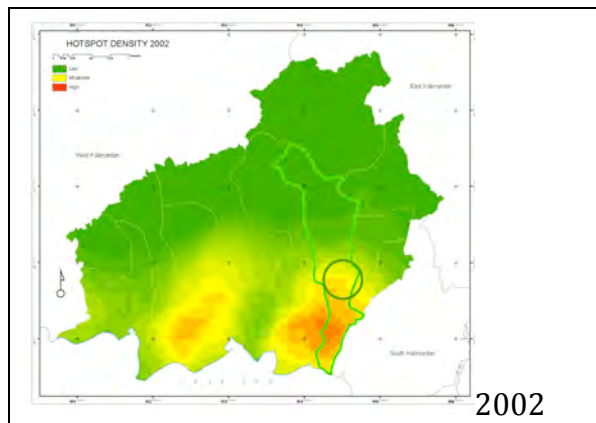
Fires occur mainly in the dry season, especially from August to October, but in higher number during El Niño episodes when conditions are drier. Fires were relatively more numerous in Blocks A and C. In 2006, fires in the southern part of Block C were associated mainly with plantation establishment. Because this is an almost uninhabited, vast, difficult to access area, with a high fuel load (degraded vegetation and exposed peat soils), fires boosted by winds can rage undisturbed for days and even weeks, out of reach of any fire suppression capacity.

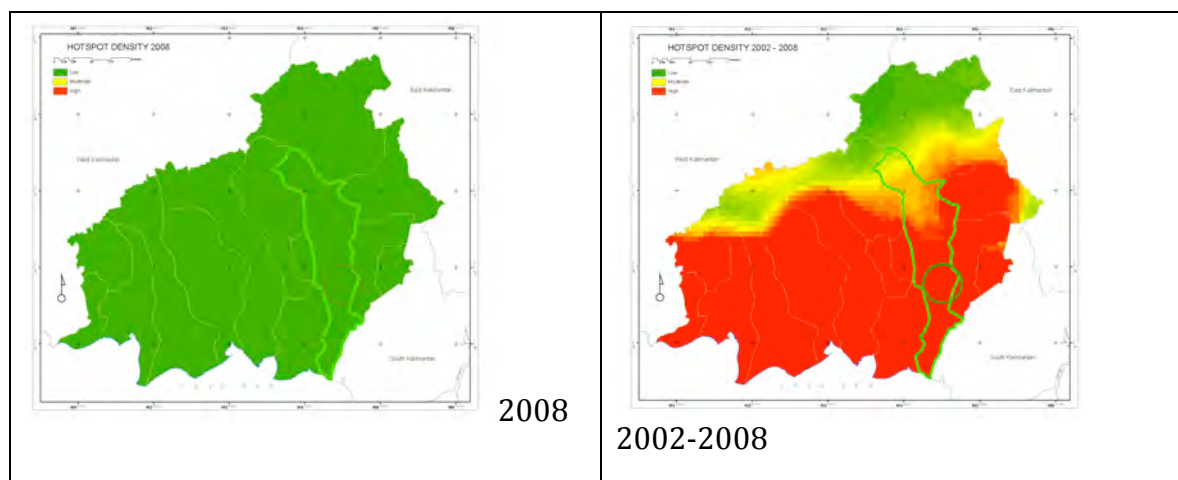
Major fires during the El Niño years 1982/1983, 1987, 1991, 1994, 1997-1998, 2002-2003 and 2006 devastated large areas of mostly logged-over forests, bush and shrub vegetation and drained, degraded and dry peat land. In the infamous 1997-1998 fires alone more than six million hectares of various agricultural and forested lands burned in Kalimantan, 3.5 million of which were forested areas (ADB/BAPPENAS, 1999 in Technical Report Number 1 Forest and Land Fire Management in the EMRP Area, 2008). Although only 20 % of the area burned is assumed to consist of peat swamp forests, fires in these areas contributed about 90 % of the gaseous and particulate fire emissions (Levine, 1999 in Technical Report Number 1 Forest and Land Fire Management in the EMRP Area, 2008).

#### **3.1. Hotspot Analysis**

Fires detected based on hotspot data from 2001 to 2006 have been mapped and summarized by CARE International-Indonesia (Map 4), as part of their work with the Environmental Agency of Central Kalimantan Province and the International Research Institute from Columbia University, USA on developing a fire early warning system. A hotspot is defined as a High-Temperature Event (HTE) or heat signature as depicted by airborne or space borne remote sensing, here the NOAA weather satellite. After data processing and interpretation, hotspots are almost always found to be fires.

The data depicted in the graphics in Map 4 show that the KFCP area (roughly denoted by the circle on the maps below) is relatively prone to fires, particularly in El Niño years. From 2002 through 2006, the KFCP area experienced either moderate (yellow) or high (red) levels of hotspots, with the high measurements coming during the El Niño years of 2004 and 2006.





**Map 4. Hotspot 2002 - 2008 Central Kalimantan**

Within the Province of Central Kalimantan, the District of Kapuas experienced the 4th largest total hotspots from among the 14 Districts/Cities in the Province. The hotspots identified in Kapuas represent 11.7% of the hotspots in the Province over the 6 year data period.

Within the Kapuas District, the sub-district of Mentangai experienced 70% of the hotspots recorded in the District. Between 2002 and 2008, 5,270 fires were recorded in Mentangai. In non-El Nino years, there were an average of 440 fires per year. In El Nino years, the number of fires more than doubled and quadrupled; there were 1,289 recorded fires in 2004 and 2,220 in 2006 in the sub-district.

**Table 2. Hotspot 2002 - 2008 Central Kalimantan**

0	Year							Grand Total
	2002	2003	2004	2005	2006	2007	2008	
Barito Selatan	309	334	346	367	1148	265		<b>2769</b>
Barito Timur	108	90	119	168	267	80		<b>832</b>
Barito Utara	111	348	850	231	325	227		<b>2092</b>
Gunung Mas	24	150	182	124	463	237	14	<b>1194</b>
Kapuas	839	691	1837	845	2903	424	1	<b>7540</b>
Katingan	454	336	612	392	3636	263	11	<b>5704</b>
Kotawaringin Barat	451	513	1404	327	2897	164	11	<b>5767</b>
Kotawaringin Timur	1094	728	2142	340	4590	362	14	<b>9270</b>
Lamandau	52	338	419	136	883	143	19	<b>1990</b>
Murung Raya	54	159	277	252	373	188	2	<b>1305</b>
Palangkaraya	212	47	271	30	589	9		<b>1158</b>
Pulang Pisau	1276	1453	3101	1816	5135	150	1	<b>12932</b>
Seruyan	1198	792	1909	471	4584	195	6	<b>9155</b>
Sukamara	283	290	594	91	1537	42	2	<b>2839</b>
<b>Grand Total</b>	<b>6465</b>	<b>6269</b>	<b>1406</b>	<b>5590</b>	<b>2933</b>	<b>2749</b>	<b>81</b>	<b>64547</b>
			<b>3</b>		<b>0</b>			

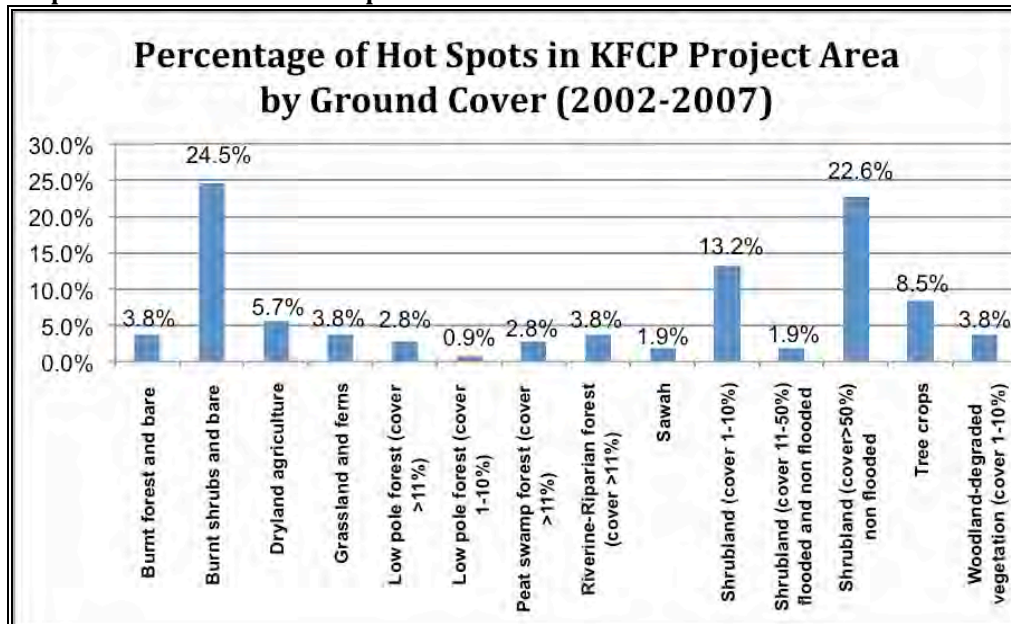
**Table 3. Hotspot 2002 - 2008 Kapuas District**

Sub District	Year							Grand Total
	2002	2003	2004	2005	2006	2007	2008	
Anjir Serapat	16	4	22	7	21	1		71
Barimba	4	1	10	1	4	3		23
Basarang	20	3	32	52	32			139
Kapuas Hulu	9	12	55	49	24	43		192
Kapuas Tengah	19	21	52	53	95	66	1	307
Lupak Dalam	28	18	32	9	81	6		174
Mandomai	56	29	60	69	144	15		373
Mentangai	546	515	1289	484	2220	216		5270
Palingkau	55	35	84	61	108	35		378
Sei Tatas	3	4	18	8	19			52
Selat	63	16	119	15	87	3		303
Timpah	20	33	64	37	68	36		258
<b>Grand Total</b>	<b>839</b>	<b>691</b>	<b>1837</b>	<b>845</b>	<b>2903</b>	<b>424</b>	<b>1</b>	<b>7540</b>

### 3.2. Fire Prone Locations and Seasons

Fire season coincides with the dry season and runs from August until October/September. Almost 84% of the hot-spots recorded between 2002 and 2007 occurred during this period. Just over 60% of these fires occurred on shrublands – 24.5% on Recently Burnt Shrubland and Bare Land; 13.2% on Shrubland (Cover 1-10%); and 22.6% on Non-Flooded Shrubland (Cover > 50%). Graph 4 shows the distribution of hot spots by land cover and Table 7 below shows the hotspots recorded in the KFCP project area between 2002 and 2007.

**Graph. 4. Distribution of Hotspot 2007 each Land Cover 2007 in KFCP Area**

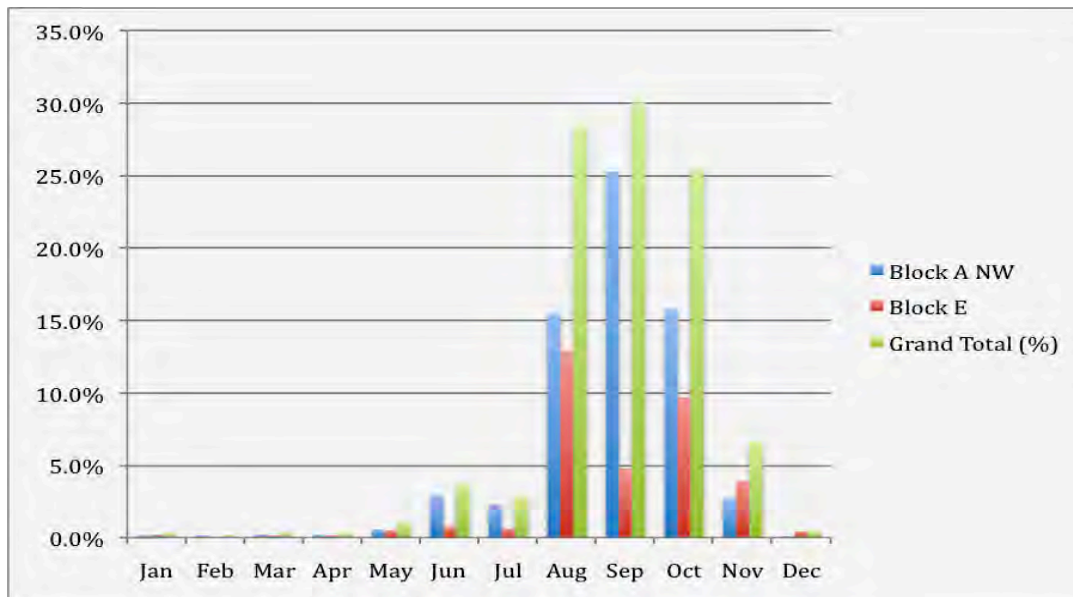


**Table 4. Hotspot 2002 - 2007 in KFCP Target Area each Month**

Month	Year						Grand Total
	2002	2003	2004	2005	2006	2007	
January	2	1	3			5	11
February	1		3		1	1	6
March		5	4			3	12
April	6		4			1	11
May	14	1	12			7	34
June	5	111	4			1	121
July	32	21	1	7	27		88
August	76	75	57	134	219	5	566
September	42	83	54	157	468	31	835
October	30	15	458	71	185	50	809
November	21	16	22	4	142	1	206
December	3		1		11	1	16
<b>Grand Total</b>	<b>232</b>	<b>328</b>	<b>623</b>	<b>373</b>	<b>1053</b>	<b>106</b>	<b>2715</b>

Of the hotspots recorded in the KFCP area, 65.8% were recorded in Block A. Graph 5 shows the percentages of hotspots in each Block broken down by month. Over 56% of the total hotspots occurred in Block A during the months of August through October. This data clearly indicates that the risk of fire is a great deal higher in the accessible and cleared out areas of Block A.

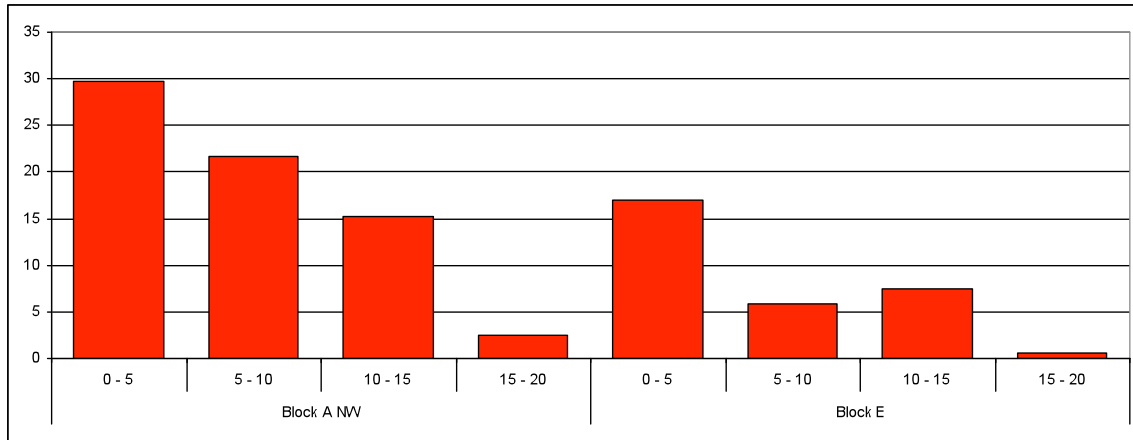
**Graph. 5. Percentage Hotspot 2002 - 2007 in KFCP target Area per Block and each Month**



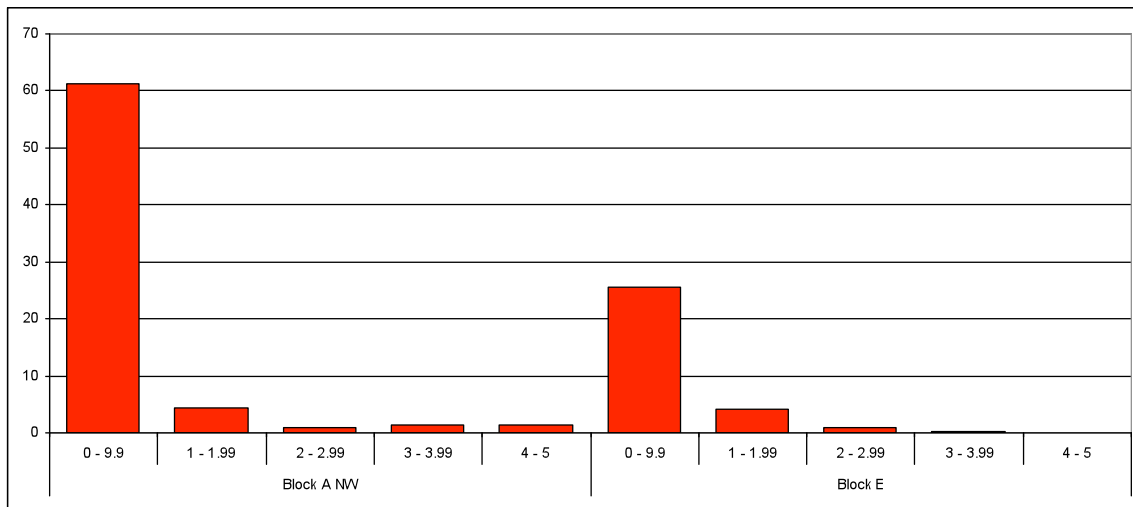


The hot spot data also clearly shows that fires are influenced by proximity to transportation systems (rivers and roads) and human settlements. Over 45% of the hotspots recorded in the KFCP area are within 5 kilometers of a river. The number of hot spots decreases as one moves away from a river, however the fall in hot spots related to distance from river is less in Block A (due to easier access) than in Block E. Roads are also highly correlated with hotspots; over 80% of the hotspots recorded are within one kilometer from a road (Graphs 7 and 8).

**Graph. 7. Percentage Hotspot 2002 - 2007 in KFCP Target Area per Block and Distances (km) from River**



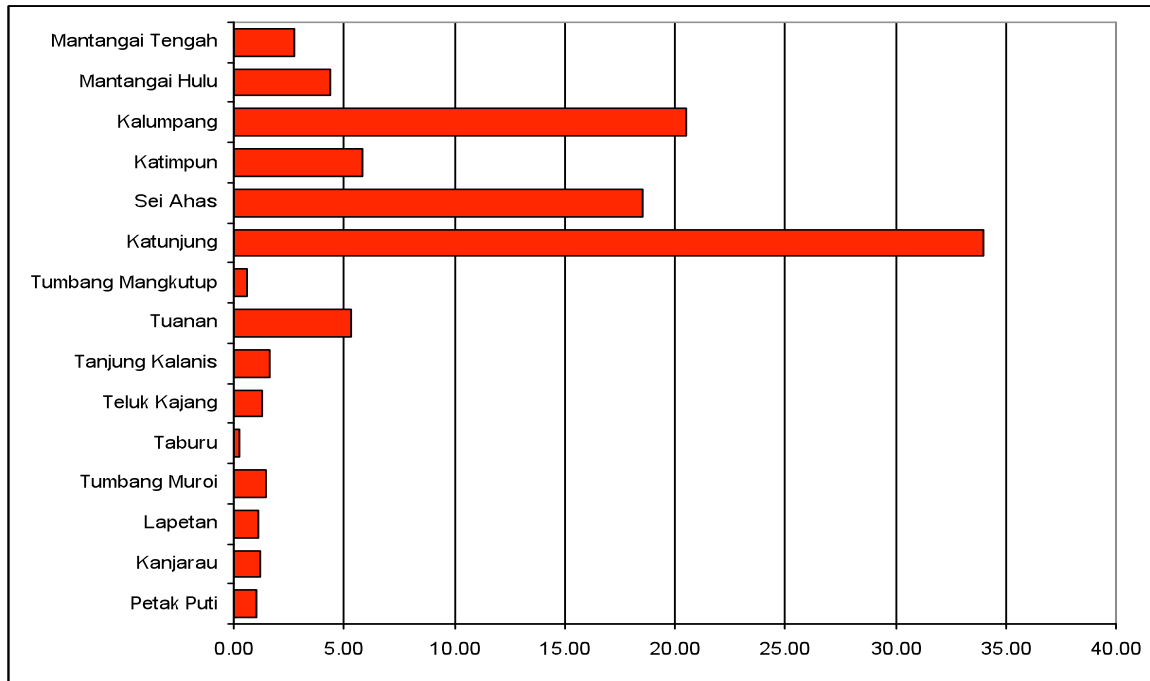
**Graph. 8. Percentage Hotspot 2002 - 2007 in KFCP Target Area and Distances (km) from Road**



As noted above in the discussion of land cover, there was a greater area of recently burnt areas in Block A than in Block E. The hotspot analysis is consistent with this data and shows that over 80% of the hot spots recorded are in Block E. The community with the

largest number of hot spots was Katunjung, with almost 35% of the recorded hotspots. Katumpang (over 20%) and Sie Ahas (approximately 17%) were two other villages with a high number of hot spots (Graph 9)

**Graph. 9. Hotspots Related to Settlement Units**



In conclusion, the data shows that fires are more prevalent in shrub lands, near rivers and roads, and near human settlements. These conditions are more extensive in Block A (the southern section of the KFCP area) than in Block E, and the data shows that fires and hot spots are more common in Block A than in Block E.

This data suggests a number of possible broad strategies for managing and reducing fires in the area. In Block E (the Northern Section), controlling access to forests and preventing further forest loss will be key to preventing the increase in fires. In Block A, restoring shrub lands to forest conditions and improving fire management and prevention practices will contribute to reducing the fire risk of the area.

## 4. Causes of Fires

Fuel (biomass susceptible to burning), heat, drought and human intervention are the four main ingredients that start a fire. Weather, fuel type and topography are the most significant factors determining the severity and behavior of the fires. The intensity of fires and the rate at which they spread is directly related to wind speed, temperature and relative humidity. Climatic conditions, such as long term drought, contribute further to the number and intensity of fires whilst, in peatland, drainage is also important since it lowers the peat water table, creating a surface peat layer that remains dry for long periods and increases its flammability.

Fires are virtually always initiated by human activity, either accidentally or intentionally. The fact that practically all fires are man-made, can be verified from the location of the hotspots, all of which are within a range of up to 5 km from access points for human activities, such as roads, rivers, canals, villages and, furthermore, within areas and vicinity of plantation, mining and forestry camps and illegal loggers or hunters' camp-sites. Fires may be unintentional, accidentally lit by cigarettes, cooking fires or camp fires. Often though, fires are intentionally lit.

Intensive logging, affecting most of Kalimantan including the EMRP area, has left mostly fragmented forest patches, individual trees, bare forest soil and tree debris. Exposed to sun and wind, the intrinsic moist micro-climate of the forest is gone and the degraded forests dry out and become highly susceptible to fire in the dry season. The fast growing pioneer grasses, shrubs and bush vegetation that emerge in degraded forest areas add even more to the fire risk after a long dry spell.

The threat and impact of fires are particularly high in the exposed, drained and degraded areas of peat land, especially where, in addition to destruction of the peat forest, peat domes have been dissected and drained by the canals. The abandoned drainage canals facilitate illegal logging, making access and log transport far easier.

Agricultural practices that use fire in land preparation carry a high risk of the fire getting out of control and developing into large fires in adjacent opened up and dried out degraded forest and/or peatland that have high fuel loads (biomass susceptible to burning). Once established, these fires can spread rapidly in the wind they help to create.

Many of the fires that are lit by local farmers for the purpose of land preparation are often short-lived when managed effectively. Local traditional farmers have such skills and expertise, whereas newcomers (migrants or transmigrants) often lack such experience. The local farmers will only burn small plots, e.g. 1 hectare at a time, and take precautions against the fire escaping into neighboring land by paying attention to wind-direction, making fire-breaks, leaving green-belts, and sometimes burning at night. Burning when it is dark has the advantage that the spread of fire can be better tracked, and suppressed in those directions or places it is not supposed to go. Nevertheless, under conditions of a high fuel load, intense drought and strong winds, fires can easily run out of control. Out of control fires become important because: 1) the community tend to use deep-peat areas to extent their lands, 2) the community still practising slash and burn method in their land preparation, 3) there are no other alternatives to substitute to slash and burn practices with regards to the efficiency (time and budget) and effectiveness (nutrients release, plant diseases and weeds-control, acidity control), 4) most of fires outbreaks happen in deep-peat.

The same is true in the establishment and maintenance of commercial and small-holder plantations, which often use fire as a cheap method for land clearing. The risk here of large enduring fires is even higher because the areas being cleared are large, hence the fires are able to spread further, last longer and become progressively more intense and hot, and

therefore will be harder to contain and extinguish. It is very difficult to prevent these fires from spreading outside of the plantation area.

In Kalimantan, including the EMRP area, much of the deforested land lies fallow. The owners or custodians are the Forestry Department, other government institutions, villagers or urban dwellers, which are not actively managing these lands. Their land lies unproductive, because they simply own them as an investment in property, or they lack the resources, capacity, support and/or experience to manage and utilize the lands. Without an active management, these lands tend to get overgrown with shrubs and bushes, increasing the risk of fire.

Other causes of fires include situations where stakeholders resort to arson in conflicts over land and/or natural resources. Land tenure issues and licensing procedures are often unclear or not transparent, and traditional land and resource rights that many of the rural villagers hold are still incompatible with and unrecognized by formal regulatory authorities. This can cause conflict between villages and outsiders who have gained government sanctioned rights to village or traditionally claimed lands.

An additional cause of uncontrolled fires is that the local traditional farmers, who historically have been careful managers of land and forest, have lost their interest to care or respond when fires develop in neighboring areas which were once their own under traditional law until these were handed over to forest concessionaires in 1976 onwards. Now, with a feeling of lost ownership and responsibility, local farmers are indifferent to fires escaping in these areas.

Furthermore, a lack of sound and robust land use policies are prolonging the persistence of these unfavorable conditions and practices, even encouraging inappropriate land use, e.g. the clearing and developing of peat land. The trend of Indonesia being a major contributor to the fire and haze problem in the region was compounded by of a lack of government-led comprehensive, long-term, well-coordinated and effective spatial planning and management and rural development programs. The government is working to address this issue through the Presidential Instruction (InPres) 2 of 2007.

#### **4.1. Impacts of Fire**

Most of the EMRP (particularly Blocks A to D, less so Block E) area has been affected repeatedly by fire over the last decade, leaving mostly a grass, fern and shrub dominated vegetation, which is highly susceptible to burn again in subsequent long dry seasons. The peat has also burned repeatedly and an estimate of how much of the surface peat layer was lost in the 1997/1998 fires varies from 25 to 85 cm, with an average of  $51 \pm 5$  cm (95% confidence limit) (*Page SE, Siegert F, Rieley JO, Boehm H-DV, Jaya A, Limin S (2002) The amount of carbon released from peat and forest fires in Indonesia during 1997. Nature 420, 61–65. doi:10.1038/NATURE 01131*).

A study by Page et al. (2002) using satellite images covering a 2.5 million hectare study area in Central Kalimantan from before and after the 1997 fires, calculated that 32% (0.79Mha) of the area had burned, of which peatland accounted for 91.5% (0.73 Mha).

*“Of this fire damaged peatland area, 47.4% (377,814 ha) was PSF (peat swamp forest - pristine, logged and fragmented) and the rest was degraded and deforested peatland. Only 4.5% of the pristine PSF was lost, while 29.2% of logged over and 70.0% of fragmented PSF were destroyed by fire. Severe damage also occurred to forest mosaics (54.1%), bushland (45.2%) and agricultural land (36.9%). The fire-damaged peatland represents 29.3% of the study area and 33.9% of the peatland within it.”*

This same study also estimated the loss of carbon during the 1997 fires, amounted to 0.19–0.23 Gt C (3.5–8.2%) of the total carbon stored in the 2.5-Mha study, while in the EMRP, 0.12–0.15 Gt C (5.6–13.4%) of the peat carbon was transferred to the atmosphere.

Most fires within the EMRP now occur within non-forest, secondary vegetation, i.e. low growing, fern- or grass/sedge-dominated communities, which have replaced the forest in areas subject to repeated fires. This type of vegetation, although having a much lower biomass (and hence fuel load) than peat swamp forest, is highly flammable. Repeated fires on peat lead not only to a total and irreversible loss of forest cover, but also to an increased likelihood of flooding during the wet season since successive lowering of the land surface through peat combustion brings the peat surface closer to the water table. A combination of flooding and fire produces conditions that are unfavorable to the growth of woody species, thus without some form of active intervention (fire control, hydrological control, tree planting), there will be no return to forest vegetation.

## **5. Government policies in management of fire and forest**

The Indonesian Government has promulgated a number of laws and regulations regarding Fire Management in forest areas. These regulations and systems are currently in flux, with new structures planned to be in place by October, 2009.

The following section describes the current systems that are in place or being phased out and the new system being implemented this year.

### **5.1. Prohibition and licensing**

Under law (UU) No. 41/1999 on forestry, each person is forbidden to burn forest and the right or license holder is responsible for any forest fire in their work area. Limited burning of forest is allowed for special purposes; for example, to manage forest fire, eradicate pests and diseases, and manage tree and animal habitat.

Similar policies apply to plantation businesses under Law UU No. 18/2004. Under this policy all plantation businesses are forbidden from clearing and/or managing land by fire that might cause pollution and environmental damage.

In Central Kalimantan, the Provincial Government decree No. 5/2003 on management of forest and or land fire forbids individuals to burn forest and or land except for the specific exceptions of the customary practices of indigenous, or traditional people that clear land for dryland agriculture and or gardens. Related this decree, the following have been issued:

1. Governor of Central Kalimantan decision No. 77 Year 2005 on Implementation Guidelines for Control of Forest and/or Land Fire in Central Kalimantan;
2. Governor of Central Kalimantan decision No. 78 Year 2005 on Technical Guidelines for Control of Forest and or Land Fire in Central Kalimantan; and
3. Governor of Central Kalimantan decree No. 52 Year 2008 on Guidance for Clearance of Farmland and Gardens by the Community in Central Kalimantan

The Governor's decree No. 52/2008 prohibits land clearance and gardens in 'pure deep peat land' (not influenced by tidal flooding of sea water), especially on peat layers with a depth of more than 50 cm. In the coastal peat land (influenced by tidal flooding) limited and controlled use of fire is allowed for land clearance during the rainy season.

The officials who can give **fire** permits are Head of District/ Head of City, and they can delegate their authority according to the proposed area, as follows:

1. Head of Sub District, for land area above 0.5 hectare up to 2.5 hectare;
2. Lurah or head of Village, for land areas above 0.1 hectare until 0,5 hectare; and
3. Head of Neighborhood areas, for land areas up to 0.1 hectare

Note that the regulations are coming from National and Provincial level. The Kapuas District has not yet promulgated similar regulations. This leaves a bit of an administrative and implementation gap.

## ***5.2. Institutions for Managing and Responding to Fires***

Until recently nationally, the institution related to handling forest and or land fires was included in institutions that handle disasters as regulated in Presidential Regulation No. 83 Year 2005 on the National Coordination Body on Disaster Management (Badan Koordinasi Nasional Penanganan Bencana, Bakornas PB). The Presidential Regulation stated that the National Coordination Body on Disaster Management is chaired by the Vice President and the secretary is the Managing Director [*Kepala Pelaksana Harian*] of Bakornas PB

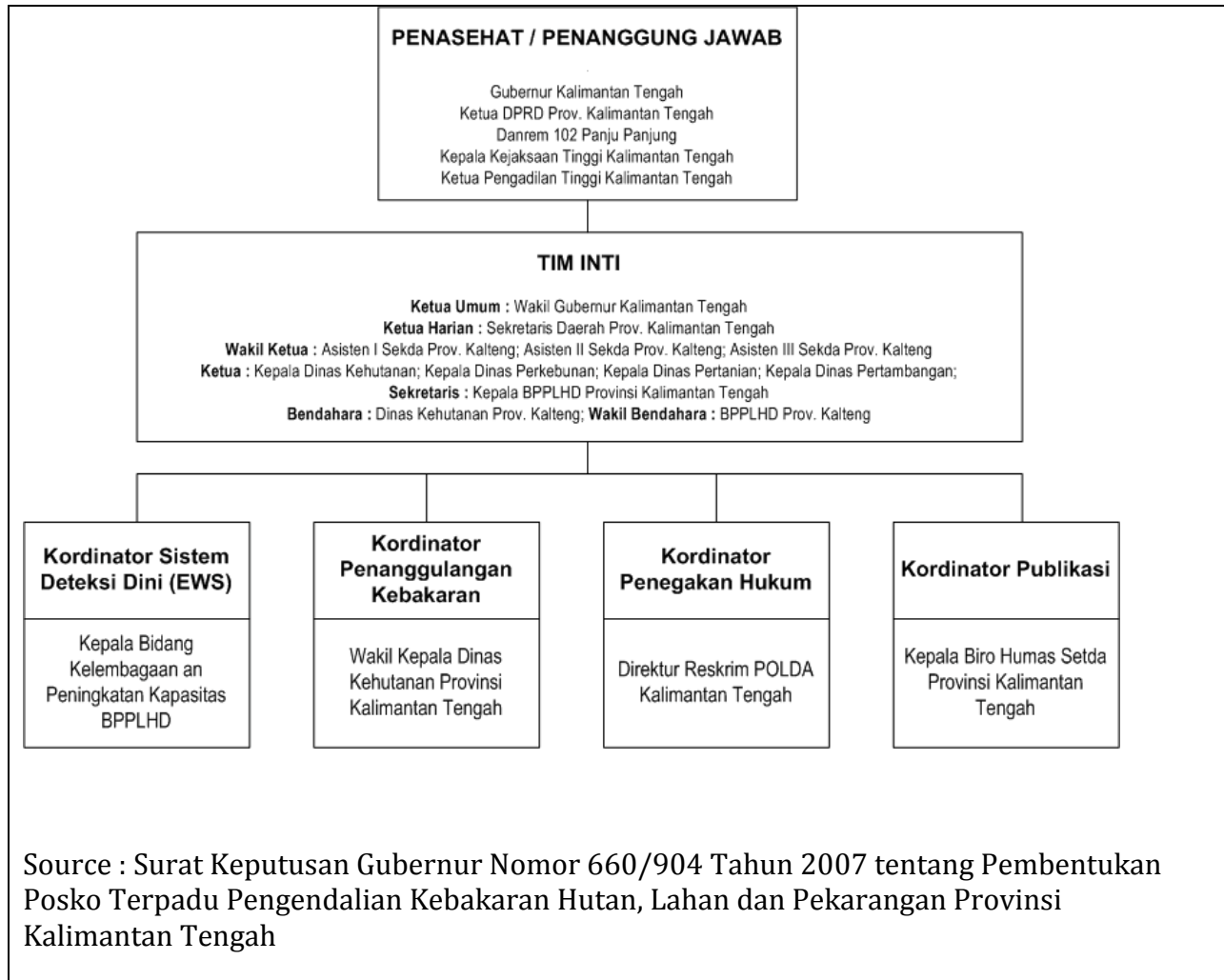
At provincial level, a Disaster Management Implementation Coordination Unit (*Satuan Koordinasi Pelaksana Penanganan Bencana, Satkorlak PB*) has been established. This unit is chaired by the Governor. At District/City level a Disaster Management Implementation Unit (*Satuan Pelaksana Penanganan Bencana, Satlak PB*) has been established and chaired

by the Head of District/ Head of City. In addition, the regulation from Ministry of Internal Affairs No. 33 Year 2006 on disaster mitigation states that:

1. The Governor as the Head of Disaster Management Implementation Coordination Unit is responsible for coordinating the activities of structural and non structural organizations in implementing the general guideline on disaster mitigation at provincial level.
2. Head of District/Head of City as the Head of Disaster Management Implementation Unit is responsible to coordinate, lead and control the activities of structural and non structural organizations in implementing the general guideline on disaster mitigation at district/city level.
3. The Head of the Sub District as the Head of Disaster Management Operational Unit (Unit Operasi Penanganan Bencana) is responsible to coordinate the activities of structural and non structural organizations and community in implementing the general guideline on disaster mitigation at sub district level.
4. The Head of Village/Lurah is responsible for coordinating and controlling community activities in implementing the general guideline on disaster mitigation at village/neighborhood level.

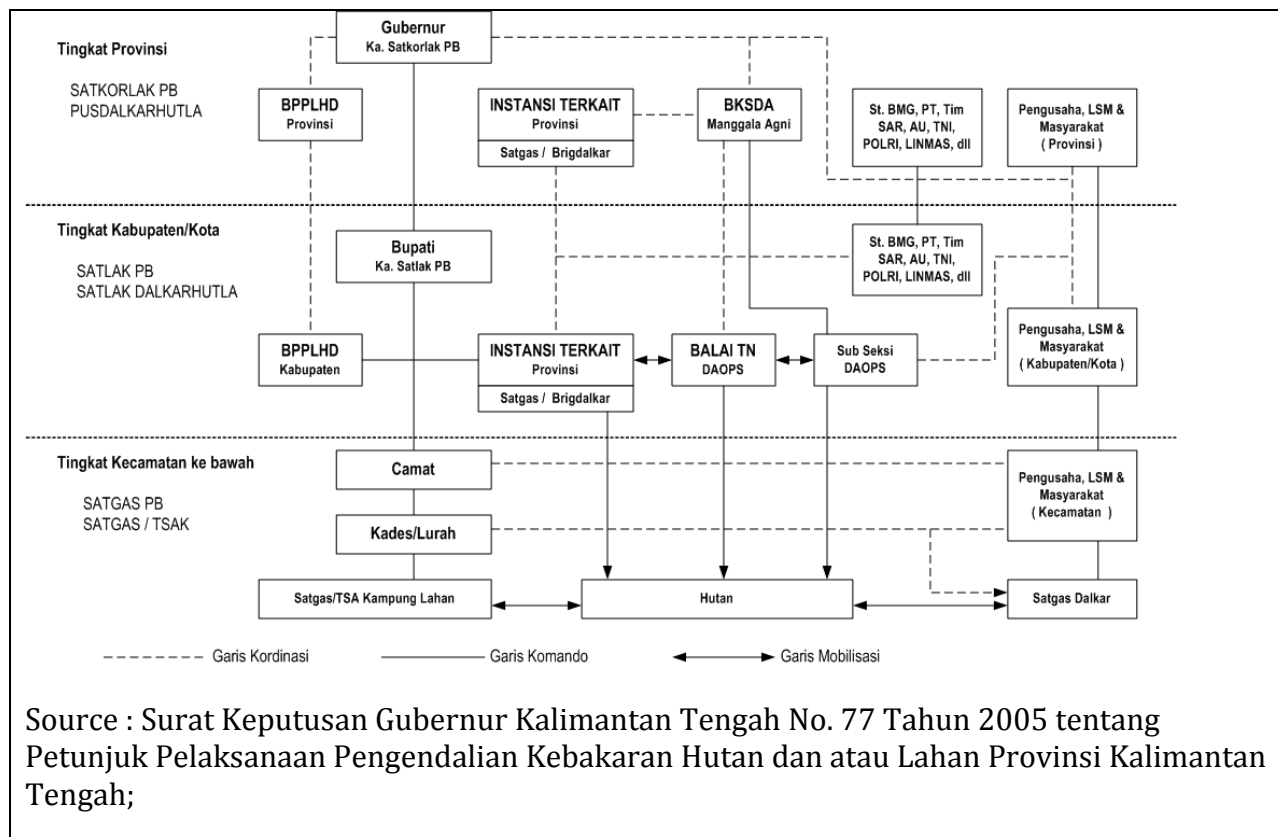
Until now institutions dealing with disaster especially forest and land fires in Central Kalimantan is implemented based on Central Kalimantan Province chain of command as follows:

1. Governor of Central Kalimantan decision No. 660/904 Year 2007 on the establishment of Integrated Command Post for Managing forest, land and garden fires in Central Kalimantan Province (Organizational Chart Below).



2. Governor of Central Kalimantan decision No. 77 Year 2005 on Implementing Directions for Management of forest and or land fire in Central Kalimantan Province (Organizational Chart Below).





3. Governor of Central Kalimantan decision No. 27 Year 2006 on the Establishment of Disaster Management Implementation Coordination Unit in Central Kalimantan Province.
4. Governor of Central Kalimantan decision No. 370 Year 2006 on the establishment of an Integrated Team to prevention and management as well as Legal Measures against Agents who cause forest and land fires in Central Kalimantan Province.

Related to forest fire, the Ministry of Forestry issued a decision of the Director-General of Forest Protection and Nature Conservation No. 21/KPTS/DJ-IV/2002 on Guideline for Establishment of Brigade for Forest Fire Control in Indonesia and No. 22/KPTS/DJ-IV/2002 Guideline for Establishment of a Brigade of Forest Fire Control in North Sumatera, Riau, Jambi, West Kalimantan and Central Kalimantan provinces. In that decision, the Brigade for Forest Fire Control (*Brigdalkarhut*) within the Ministry of Forestry is a sub system in the disaster management system of *Bakornas BP*, the sub system for forest and land fire control. At provincial level, *Brigdalkarhut* is one of the components of forest and land fire management system together in *Satkorlak PB*.

*Brigdalkarhut* is not always established in each district/city; however, one has been established in Kapuas. The working areas of *Brigdalkarhut* at field level is called the operational areas (*Daerah Operasi, Daops*), and the KFCP location is part of *Daops II* Kapuas.

*Brigdalkarhut* will control fire in forest reserves, and if needed the resources from *Brigdalkarhut* can be mobilized to other areas or placed under the control of Fire or Disaster Management Organizations, which have been or might be established.

Law No.24 Year 2007 referred to the existence of a National Disaster Management Body (*Badan Nasional Penanggulangan Bencana, BNPB*), and this was implemented by the Presidential Decree No. 8 Year 2008 on the National Disaster Management Body and Regional Disaster Management Bodies (*Badan Penanggulangan Bencana Daerah, BPBD*). This decree mandated that these bodies be established and the Internal Affairs Ministerial Decree No.46 Year 2008 on Guideline for the Organization and Procedure for Regional Disaster Management Bodies required that they be established at provincial and district/city level by October 2009 at the latest.

With the promulgation of the Presidential Decree No.8 Year 2008, the Presidential Decree No.83 Year 2005 on National Disaster Management Coordination Body, as amended by the Presidential Decree No.3 Year 2007, was revoked and annulled. And with the establishment of BPBD Province and BPBD District/city, the Disaster Management Implementation Coordination Unit (*Satkorlak PB*) Province and Disaster Management Implementation Unit (*Satlak PB*) District/city were dissolved. In the cases where district/city governments have not established a District/City BPBD, disaster management is handled by the most appropriate institutions.

The BPBD at provincial level is chaired by an official one level under the governor or echelon Ib level, and BPBD at district/city level is chaired by official one level under Head of District/city or echelon IIa. In the Internal Affairs Ministerial Decree No. 46 Year 2008 it is stated that BPBD Province and BPBD District/City is ex-officio chaired by the Regional Secretary.

Policy changes have also happened at the Ministry of Forestry. In the past *Brigdalkarhut* was a sub system of *Bakornas PB* at national level, *Satkorlak PB* at Province and *Satlak* at district level. In the new system, in accordance to the Ministry of Forestry Decree No. P.21/Menhut-II/2009 on Control of Forest Fire, the *Brigdalkarhut* are coordinating horizontally with other institution on the same level related to forest fire. For example, at national level, *Brigdalkarhut* is coordinating with LAPAN, BMKG and BNPB; at provincial level coordinating horizontally with the Governor and vertically to *Brigdalkarhut* at national and district/city level. *Brigdalkarhut* at district level coordinates horizontally with other districts/cities and vertically to *Brigdalkarhut* at provincial and other related institutions and operational units.

Institutions related to disaster or forest and or land fire form a “chain” from National, Provincial, District, Sub district to village level. At national level there is the BNPB (formerly *Bakornas PB*) which is equipped with a function. At the provincial level there is *Satkorlak PB* without a functional implementer and with command posts which operate only from June to October. At the District level there is the *Satlak* that work only when a disaster happens and *Daops II Brigdalkarhut (Manggala Agni)* who work mainly in conservation areas. In general at village/kelurahan level in Central Kalimantan institutions

related to reducing risk for disaster are sporadic, only existing in a limited number of locations and in general only functioning when disasters occurs.

The most dynamic institutions are at the provincial level, as shown by the four Governor of Central Kalimantan Decrees which are in effect, and include many initiatives from the provincial level to be implemented in villages/*kelurahan*. These include:

- Communities Concerned About Fire (*Masyarakat Peduli Api (MPA)*) by Ministry of Forestry District office (Dishut) and BKSDA;
- Community Groups Concerned about Fire (*Kelompok Masyarakat Peduli Kebakaran KMPK*) by the Environmental Body (*Badan Lingkungan Hidup, BLH*);
- Neighbourhood Fire Protection Teams (*Tim Serbu Api Kelurahan, TSAK*) by Cimptrop Unpar;
- *Taruna Siaga Bencana Tagana* by the Social Ministry District office; and
- Fire Control Brigade (*Regu Pengendali Kebakaran, RPK*) by several NGOs in Central Kalimantan.

In some villages where KFCP is conducting activities, there are activities related to reducing forest and land fire risk which were established by NGOs such as CARE and BOS. Institutions related to reducing fire in villages have developed following 2 (two) patterns, the first is that they are established within the village government system as separate sections, and the second pattern is as a community institutions (outside of the government structure)

In the KFCP area, the villages in Block A that have worked with the CKPP project have established fire brigades. The northern villages and settlements in Block E, except for Tumbang Muroi, have not established village level fire fighting/management brigades.

The table below shows which villages in the KFCP area have which type (village organized or NGO organized) of Fire Brigades.

	<b>Village Fire Brigade</b>	<b>NGO Fire Brigade</b>	<b>Other Fire Brigade</b>	<b>No Fire Brigade</b>
North	Tumbang Muroi			Petak Puti Kanjarau Lapetan Taburu Teluk Kajang Tanjung Kalanis Tuanan Tumbang Mangkutup
South	Katunjung	Katunjung (BOS)		
	Sei Ahas	Sei Ahas		
	Katimpun			

	Kalumpang	Kalumpang (CKPP)	Kalumpang (BPLHD)	
		Mantangai Hulu (CKPP)		

Related to institutions, especially regional government institutions, there is a National Level Decree, No. 41 Year 2007, about structure of organization of local government institutions at provincial and district/city level. From Government Decree No. 41 Year 2007, the Government of Central Kalimantan has issued policies:

1. Government of Central Kalimantan Decree No. 5 Year 2008 on organization and procedures of the Regional Secretariat and Secretariat of the Regional Parliament (*Dewan Perwakilan Rakyat*) Central Kalimantan province;
2. Government of Central Kalimantan Decree No. 6 Year 2008 on organization and procedure for District offices in Central Kalimantan province;
3. Government of Central Kalimantan Decree No. 7 Year 2008 on Organization and procedure of inspectorate, Local Government Planning Body and Technical institutions of Central Kalimantan province; and
4. Government of Central Kalimantan Decree No. 8 Year 2008 on organization and procedure of Dr. Doris Sylvanus Local Hospital

From the above policies, institutions that have tasks related to disaster are District Offices of the Ministry of Health, Social, Forestry, and *Badan Kesatuan Bangsa Politik dan Perlindungan Masyarakat*. Meanwhile the connection of the District Office of the Ministry of Environment with disaster or forest fire is implicit in its tasks concerned with rehabilitation of environmental destruction.

Other policies are the issuance of Governor Central Kalimantan Decree No:188.44/150/2009 about Integrated Team for the Joint Movement for the use of Abandoned Land (*Tim Terpadu Gerakan Bersama Memanfaatkan Lahan Terlantar, Geber-MLT*) along the left and right sides of main roads. This team was established at provincial and district level and involves all structures in the local government down to the Head of Sub District and Head of Village/Lurah, business association and NGOs, and is under the responsibility of the Governor of Central Kalimantan with funding from APBN (Anggaran Pendapatan Belanja Negara; Indonesian State Budget), APBD (Anggaran Pendapatan Belanja Daerah; Regional (provincial and district) Budgets) and support from other unrestricted resources.

The activities, implemented from April 2009 – December 2010, aim to identify and inventory abandoned land that is (could?) to be developed into productive land/ponds.

Joint Movement for the use of Abandoned Land (Geber-MLT) in the left and right of the south side of Trans Kalimantan road and in the provincial roads in all District/City will develop productive land as follows:

1. Selected plantation trees such as: rubber, sago palm, coconut, cashew, oil palm, and *nilam*, for land conservation and also function to prevent and control fire;
2. Agriculture crops such as: rambutan, durian, papaken, cempedak (like jackfruit);
3. Animal husbandry for areas with community (non Muslims will be given pigs);and
4. Fisheries such as *nila*, *patin* and *gurame*.

### **5.3. Summary of Key Institutions as of 2009**

In summary, there are a number of key coordinating bodies at national and sub- national levels that are responsible for organizing and coordinating fire management and response policies and efforts. These include:

- National Disaster Management Body – *Badan Nasional Penanggulangan Bencana (BNPBB)*
- Provincial Disaster Management Body – *Badan Penanggulangan Bencana Daerah (BPBD)*
- District Disaster Management Body – *Badan Penanggulangan Bencana Daerah (BPBD)*
- Ministry of Forestry Brigade for Forest Control in Central Kalimantan – *Brigadalkarhut* (control fires on national forest reserves at Provincial level and Operational Areas)
- *Tim Terpadu Gerakan Bersama Memanfaatkan Lahan Terlantar (Geber-MLT)* at provincial and district levels to identify and manage abandoned land, particularly land on either side of highways and roads.
- At village level there are potentially:
  - *Masyarakat Pekdul Api (MPA)* set up by Ministry of Forestry District Offices and BKSDA
  - *Kelompok Masyarakat Peduli Kebakaran (KMPK)* set up by Environmental Agency (*Badan Lingkungan Hidup – BLH*)
  - *Tim Serbu Api Kelurahan (TSAK)* set up by CIMPTROP (Center for International Cooperation in Sustainable Management of Tropical Peatland) of the University of Palangara

- *Taruna Siaga Bencana Tagana* set up by the Social Ministry District Office

The national, provincial, and district level systems are in the midst of changing to comply with the newest national regulations. At the village level, there are a number of actors that have the potential to work with villages to set up fire management/fire fighting groups. However, from the government side, only the villages in Block E of the KFCP area have established fire-fighting groups either under the government or outside the government system with the NGOs of the CKPP program.

Brief discussions with government officials, show that a key weakness of the systems as described is the lack of coordination between the fire fighting units managed by national, provincial, district, and village levels. In addition, the national and provincial level groups recognize the need to improve their capacity to reach into the village and effectively work with village government and members to organize fire management and prevention groups and activities.

#### **5.4. Planning for Fire Control**

The paradigm for control or management of disaster has moved from crisis management to risk management, partly due to UU No. 24 Year 2007 in which disaster management strategy has the following steps:

1. The first strategy is to prevent disasters from happening by eliminating or significantly reducing the possibility and opportunity for the destructive phenomena to happen.
2. If the first strategy is not enough, then the second strategy is to have several measures to reduce the intensity and the massiveness of the event by changing the characteristic of the threat, predicting or detecting the potential of the threats occurrence, or changing the structural and non-structural aspects of the society.
3. If the threat cannot be avoided or reduced, then the third strategy is to prepare the government and community to avoid or respond to the event effectively to reduce losses.
4. The last strategy is to rapidly rehabilitate the community victims of the disaster. Developing and strengthening them to face the possibility of another disaster in the future. So the strategy of disaster management is not only emergency response.

Related to the above strategy, the type of forest fires and land fires which tend to occur in June – October happen more slowly (slow onset) compared to earthquake or tsunami; therefore, it is highly feasible to have an early warning system for forest and land fire prevention.

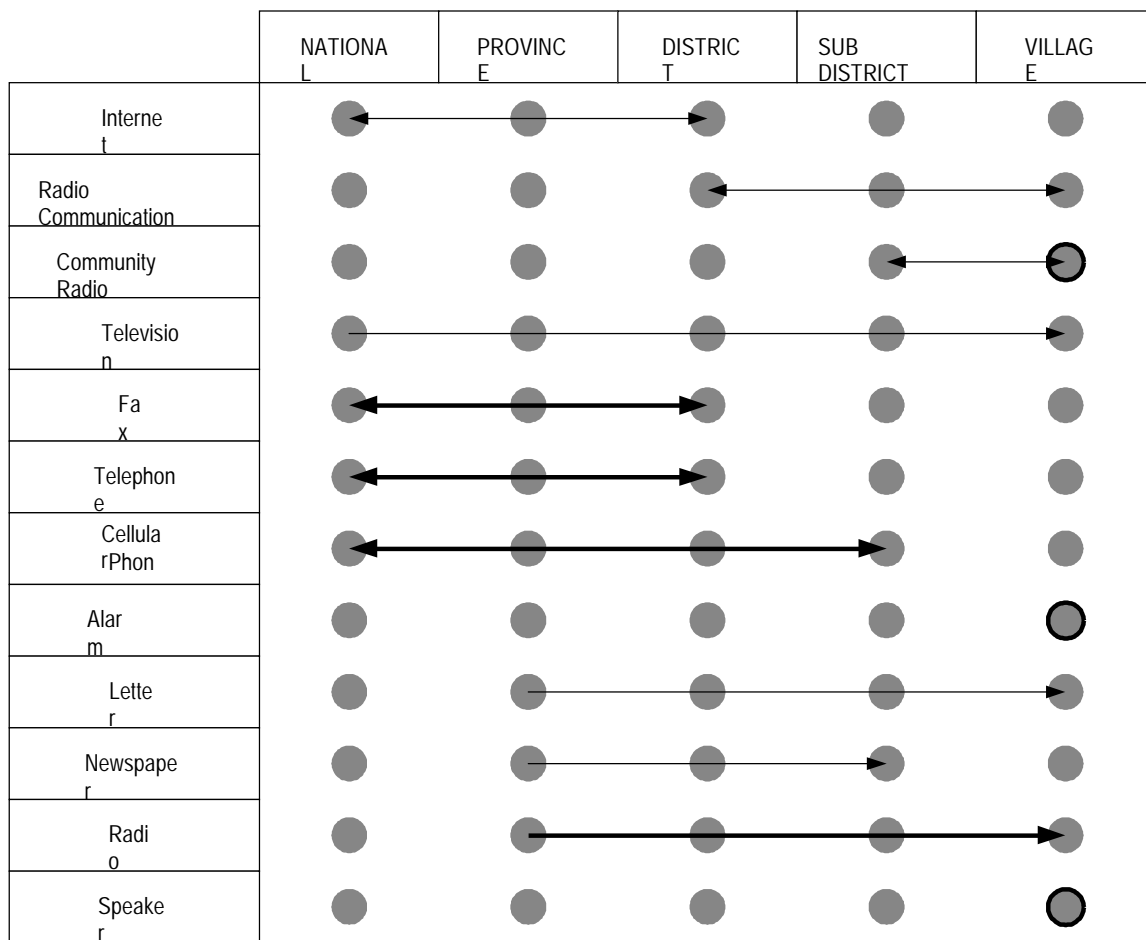
An early warning system for forest and land fire consists of three main activities, (1) data and information collection, (2) data and information processing; and (3) information distribution. With these three activities, early warning systems are directly related to

institutions, both those institutions which do monitoring and analysis, as well as those which can handle distribution of information to the community and vice versa.

In practice monitoring and analysis based on *Information Technology and Computer* has been and can be done by government institutions at provincial level. The problem faced is the lack of a network from provincial level to distribute information and message to the community.

To solve this problem there is a need for government institutions at the district level that relate to disaster, especially forest and land fire, are supported by a network that extends to sub district and village level. Especially at village level, it would be better if the institution is *built into* farmer groups working in one landscape. In this scenario information given is not only about fire prevention, hotspots, level of fire danger or disaster risk, but also other information such as good farming practices and the price of essential commodities at local markets, etc.

Below is a model showing information flows and methods from national to village level:



Until now, the EWS developed are internet based and at a global and national scale, while at regional level the EWS messages stop and accumulate at provincial level. This problem occurs because there is no institution dealing with disaster, especially forest fire, below the provincial level, and because a communication system that can provides information such as threat levels down to village farmers has not been developed yet.

## **6. Fire Prevention Activities<sup>2</sup>**

Forest and land fires prevention is among the earliest program agreed by the PCPs, mainly due to the very serious situation of fires in Central Kalimantan in 2006. During the first semester of the project all PCPs agreed on a preliminary mechanism for distribution of operational funding for fire fighting activities across the project area. Although there was some hesitation in proceeding with training and fire fighting activities prior to signing of the workplan by the Governor, given the acute situation in second semester of 2006, the PCPs agreed to proceed.

The Government supported this decision, as show by the fact that they requested information on what had been done in order to ensure coordination between CKPP and the local government.

During the fire events of that year the project provided training and equipment to community fire brigades in the target villages through close cooperation among PCPs. UNPAR and CARE worked together on the preparation and delivery of training in villages in Katingan and Pulang Pisau, where 11 village level fire brigades with 220 members were established, well trained and capable in utilizing and applying fire prevention and suppression equipments and techniques. BOS finalized MoUs with 15 fire brigades, provided training in Block E and A – north area and facilitating fire suppression by village fire brigades on some 650 ha. for about 47 working days, involving no less than 310 fire brigade members. In addition, two BOS fire fighting teams also suppressed 20 fires events in block AB involving 310 fire brigade members in 4,000 ha. for 171 working days. WWF dealt with the forest prevention program in Sebangau National Park. A fact sheet and leaflet on peat fires prevention and control were also published by WI-IP.

To support the continuation of fires prevention and control by local communities, CKPP also provided communication facilities and training on the operation of this communication equipment

in order to improve information, communication and coordination among villages with fire brigades and between villages and PCPs, and monitoring of fire incidences and damage in the project areas. A workplan for the development of community radio was finalized, followed by provision of seven community radio units and 25 mobile radios to be used by fire brigades. Permits for the use of these communication facilities were issued by the local

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<sup>2</sup> This section is taken directly from Central Kalimantan Peatlands Project (CKPP) Lessons Learned, March 2008 by Yus Rusila Noor



government. At field level, to provide adequate and readily available water resources for fire fighting in the high risk areas, a total of 50 wells were developed in the Block E area, 75 units along the Trans Kalimantan Highway and some others in villages in the buffer zone of Sebangau National Park. The wells were developed by fire brigade members following training. This activity was also linked to the provision of clean water for daily use.

The establishment of village level fire brigades and other community-based related interventions (including village land use plans and land management to reduce fire risks and other disaster in the communities) have proved very helpful in the prevention and control of forest and land fires. Based on the public consultation by BOSF, for example, it appeared that a number of other villages are willing to take part in similar initiatives. The brigade's working program include development of yearly fires calendar, fire patrols and development of hydrant and long fish ponds (locally known as "beje"), which also functioning as fire breaks (apart from providing livelihood options). The effectiveness of fire control was complimented by the regular joint patrols, which not only targeted fires but also on illegal activities, such as illegal logging and destructive methods of land clearing.

It was observed, however, during the implementation of the forest fires prevention program that not all fire brigade activities complied with the objective of the establishment of the brigades. This was mainly due to the lack of commitment of brigade members as they were engaged with other (livelihood) activities, and need for improvement of fires suppression training. This leads to a significant concern about the sustainability of the program beyond project completion. In addition, although generally the project's efforts were well received by local government, as shown for example by the interest of BPPLHD (Regional Environmental Management Agency of Central Kalimantan) in adopting CKPP's model of establishing fire brigades at the village level, by December 2007 this interest had not been translated into a concrete commitment of on-going support for the brigades, thus raising questions about the sustainability of the brigades beyond the project's life.

During fire events it was observed that the project's incentives for fire brigades led to immediate action by the brigades to control and suppress forest and land fires as logistical and mobilization support was made available for the brigades. On the other hand, provision of incentive created a feeling of discrimination among non-fire brigade members, and hampered their full participation in fire prevention and control programs, which were considered the main job of fire brigades. In addition, such incentives will only be effective with proper monitoring and control, to avoid false reports. It is therefore recommended that the incentive provision should be linked with credit for communities who are able to prevent forest and land fire events, rather than going only to the fire brigades. Proper local directives should be developed to regulate this at the village level.

Apart from the empowerment of village fire brigades through the organization of local communities, training and provision of equipment, there is the need for policy and regulations at the village level. This was not actually included in any of CKPP work programs. It was identified that customary traditions related to this exist at the community level but are not yet formalized in the form of written regulations. It is recommended that

such regulations should be developed at the village level through participatory processes as a work-package together with the establishment of village fire brigades. The establishment of the fire brigades should be considered as a collaborative program with local government. The responsibility structure could be defined in accordance with the government's program. The result of fires prevention and control system training and its coordination mechanism was brought to wider attention through the Environment Information Center.

## **7. Lessons-learned**

Under CKPP CARE, BOS, and Wetlands International have worked at the village level to organize fire-fighting brigades. In general, these NGOs have organized groups of approximately 15 members and provided them with material and support (food, transportation) to react to fires identified by community members and work to extinguish those fires.

Key lessons learned from organizing and working with these groups during the CKPP project include:

- The implementation of fire prevention and control-related activities at the earlier stage of the project shows the sense of urgency among project partners and local government on the importance of common action to tackle the problem. It was found that although the coordination mechanism for fires control was in place, the full participation of related stakeholders is still needed to be strengthened;
- Participation of local communities has proved very effective in preventing and controlling forest fires incidences, mainly due to the fact that local communities are one of the sources of fire incidences and local communities are living closer to the fires and can respond more quickly than formal fire fighting teams;
- Community-based fire prevention and control programs require strategic and intensive approach in terms of team formation. The provision of a financial intensive system can easily lead to the creation of a business-like approach, under which local communities will set fires as a mean to receive the incentive. Community members who do not receive incentives might not actively participate in such a program, preferring to let the community brigades handle fires incidences alone. An assessment should be made to find other incentive approaches under which livelihood support systems can be introduced to community groups (or villages) in order to develop a common perspective that forest and land fires will also disturb their livelihood properties (e.g. agricultural land, bee trees, rattan or other non-wood forest products);
- The project has paved the way towards long-term forest fire prevention and control programs (e.g. establishment of community-based fires brigade), however, as experienced by other short- term projects, it cannot be ensured that the initiatives

will be sustainable unless both local communities and local government see the benefits of the initiatives beyond the project period.

Additional issues that need to be addressed in future efforts to develop fire brigades include;

**Problem 1:**

As wildfires are a recognized problem, fire brigades (RPK) are getting recognized by village and provincial governments as important groups in the villages and their social status among villagers has become stronger. Unfortunately this has, in many cases, resulted in RPKs becoming exclusive groups; exclusive to the point where they do not involve other community members in fire fighting and not taking advantage of villagers' fire fighting capacity. This exclusivity has also weakened their important role in raising community awareness on fire risk reduction. They are responsive to CKPP and district government command but tend to neglect the community needs. Most villagers feel that the risk reduction efforts have now become an RPK responsibility instead of a community responsibility requiring joint action. Because of this feeling of exclusivity, the RPK roles and responsibilities must be reaffirmed by Village Governments issuing village ordinances.

Moreover, RPK capability to suppress fires still needs improvement. When wildfires occurred in 2006-2007, the RPKs only extinguished 11% of the total peat land burnt in CKPP villages. CARE believes that increasing the number of RPKs per village is the only way to improve the RPK capability to extinguish fires in their villages. At this moment, there is only 1 RPK per village, which is very low compared to the coverage area ranging from 180 to 600 km<sup>2</sup> among the CKPP villages. Based on the map of fire prone area in CKPP villages, the CARE staff feel that at least 2 to 3 RPKs per village are needed to be able to respond properly fires within each village coverage area.

Finally, the existing RPKs still tend to depend on CKPP operational funding to extinguish the fires. In early 2007, CARE tried to evaluate the fire suppression cost and found that:

- The average cost of fire suppression activity per week conducted by 15 members of RPK reached Rp. 3,451,000.-. Up to 70% of this cost was used for meals and snacks.
- The average cost per month of monitoring activity conducted by 15 members of RPK reached Rp. 3,600,000.-. Up to 33% of this cost was used for meals and snacks.

**Recommendation 1:**

Learning from the above findings, KFCP and groups working with RPK should redesign the criteria of RPK members. It is better to use the existing farmer groups rather than establish a new group. This approach will help integrate fire management, prevention, and suppression into existing village structures and reduce the tendency for members or pure RPK to develop an exclusive group.

It is also suggested to cut-off the meals and snack budget. This will allow the KFCP to use its budgets to procure more tools and equipment in order to develop additional RPK per village. However, RPK will still need operational funds in emergency situations and during the development phase of new groups.

Reducing the amount of operational cost will also mean that it will become more feasible for village governments to cover the cost from their own budgets to sustain the fire prevention and suppression activities, and no longer depend on KFCP. It will be important for KFCP to work with local village governments and possibly district and provincial governments to promote the direction of REDD demonstration and actual funds to support sustainable fire preventions and suppression programs and RPK in the villages of the KFCP area.

### **Problem 2:**

As noted above, shrub areas and areas previously burnt are prone to forest fires and re-burning.

As part of the CKPP fire prevention activities, CARE has empirical evidence showing that converting fire prone areas into agricultural land significantly reduces fire outbreaks. In mid 2007, CARE trained and equipped two farmer groups to be able to develop and utilize fire prone areas. In August and September 2007, these groups worked collaboratively with their community to successfully extinguish fires in their village. These farmer groups also developed firebreaks between their plots and other community land in the fire prone areas at their own cost, without any financial or material support from CKPP. This high level self-sufficiency came about due to their concerns that they might suffer loss of assets and sources of livelihood due to uncontrolled fires. In order to protect their investment, they abandoned a victim outlook and took active measures to reduce fire risk.

### **Recommendation 2:**

Learning from the above experience, it is recommend that KFCP adopt the same approach in conjunction with other conservation efforts, including water management, good agriculture practices, and greening. CARE's experience shows that by integrating fire prevention and suppression into farmer groups and turning high risk fire areas into productive assets, communities will adopt active measures to reduce fire risks and increase cooperative response to putting out fires that do break out.

The procedure for integrating fire management and suppression into farmers groups include:

1. Mapping of fire prone areas and land status information per village.
2. Facilitating fire prevention and suppression through monitoring, evaluation and technical assistance to fire brigades and provide operational funding as long as needed.

3. Reducing fire prone areas by integrating the activities with other results (canal blocking, sustainable agriculture, and regreening activities).

### **Problem 3:**

Information on hotspots is still the primary focus of the various stakeholders that are dealing with fire management at the provincial level. This indicates that fire management is still very much concentrated on detection and suppression of fires, and less so on fire prevention. Fire information such as fire threat maps are less familiar, although such a map is now available from the Environmental Agency.

Up to now, although the forest fire occurrences are getting worse, there is no information regarding forest fire prone areas at the village level. That is why the development of integrated forest fire sensitive zoning by taking into consideration the human and biophysical factors is needed. Wild fire may occur in any vegetation cover type when conditions are favorable for burning. One part of forest fire prevention planning is to make an analysis of the fire risk and causes.

The various types of risks and hazards in the area should be considered in a wildfire prevention analysis. Key risk indicators would include types of vegetation, types of soil, flooding/water levels, and expected rain fall.

In collaboration with the Environmental Information Center for Central Kalimantan (PIL Kalteng), the International Research Institute for Climate and Society-The Earth Institute-Columbia University (IRI), and the Center for Climate Risk and Opportunity Management in Southeast Asia and the Pacific-Bogor Agriculture Institute (CCROM SEAP-IPB), the CKPP consortium has developed a rainfall analysis tool and a forecast of fire activity tool to predict climate (rainfall) up to 3 months in advance. Those forecasting tools keep users up-to-date with rainfall anomalies. All reports can be easily printed and analyzed in software such as Microsoft Excel. Then the users can decide who needs to receive the report, what information the report will contain, and when it needs to be distributed. CKPP CARE, IRI, and CCROM SEAP-IPB have also developed a training manual in Bahasa Indonesia.

Because of its simplicity, the tools have been adopted by the Provincial Government of Central Kalimantan by issuing the Governor Decree No. 52/2008 (August 2008) on 'Guideline of Community Land and Home Garden Clearing in Central Kalimantan'. In the decree, the permission to use fires in mineral soils will be given to the community only if the fire-risk index is shown to be low. The index is based on the rainfall anomalies forecasting system developed by CKPP.

### **Recommendation 3:**

Since climate forecasts are available have already been adopted in a government regulation, KFCCP is in a position to also use it, such as for fire disaster risk reduction, agriculture, and health. However the tool still has a weakness as the scale of the fire-risk index is general for Central Kalimantan although the rainfall monitoring has already downscaled to sub-district. Therefore, the key recommendations are to:

- Continue work to downscale the fire-risk index to the district level.
- Support efforts by provincial and district governments to provide forecasting and monitoring information to sub-districts, villages, and village groups so that they may act on the information and reduce fire risks.
- Train communities on fire risks and how to monitor them.
- Conduct behavior change campaigns to educate communities on fire risks, risky behaviors, and behaviors required to prevent/reduce forest fires.

## **8. Conclusion**

The data on land cover and hotspots show that fires are greatly more prevalent in areas that are close to human settlements, waterways, and roads, and cleared and covered by shrubs and/or have been recently burned. These conditions are more prevalent in Block A than in Block E and, accordingly, Block A has, and continues, to experience more fires than Block E.

August through September, the dry season, is also the fire season, and the El Nino cycle has a great impact on increased fires during this period. El Nino seasonal forecasts are of use in fire predictions.

High fire risk areas are exposed, drained, and degraded areas in proximity to settlements or economic activities. Fires are started by community farmers clearing land, commercial enterprises clearing land, and by human carelessness when handling fire, such as cigarettes, matches, camp fires, etc. Occasionally fires are set as part of a conflict over land.

Community management of fires appears to be declining due to a number of factors including loss of control of traditional lands, forest concessionaires, outsiders unaware of fire management practices, and absentee ownership (either by government or private owners) of fallow/unused land. All of these are contributing to a feeling on the part of communities that they are not responsible for fires on lands that were once under their management.

National and sub-national government have adopted progressive policies regarding the use of fire in forests and on peat land. However, positive policies are not strictly implemented. Institutions have been developed to manage, prevent, and put out fires; however, they are underdeveloped with low capacity to work with and collaborate with local communities and face coordination issues between different levels of government and within each level of government.

The government approach to fire management still focuses a great deal on identifying hot spots and responding to fires identified. There is less focus on identifying high risk areas and times for fires and implementing interventions to reduce fires in those areas and at those times. In addition, communication systems and ESW from the province down to

village level are un-developed, making the delivery of information on fire risks and fire locations difficult.

At the village level, CARE has found that developing new groups as fire brigades tends to lead to brigades feeling that only they are responsible for putting out fires, decreasing their effectiveness by excluding other community members from joining fire fighting efforts. There are also a number of groups and government departments potentially developing fire brigades that then need to be coordinated at the village level.

On the other hand, efforts to incorporate fire management and fire fighting roles into farmers groups and turning high fire risk areas into productive land has proved positive in changing behavior as a collaboration to extinguish fires and improve land management to prevent and control fires.

Key recommendations based on these findings are:

- Implement efforts to reduce the amount of shrub land and other fire prone areas through reforestation and/or working with farmer groups to use that land;
- Work with all levels of government to improve coordination among stakeholders in fire risk reduction, prevention, and response;
- Work with all levels of government to improve their capacity to develop community fire prevention organizations and practices;
- Continue the development of the risk prediction tools already adopted and real time monitoring tools so that preventative interventions can be planned at appropriate times and response interventions are effective;
- Continue supporting efforts by Provincial and District Governments to provide forecasting and monitoring information to sub-districts and villages so that they may act on the information and reduce fire risks
- Implement BCC campaigns on preventing fires, managing fire responsibly, and responding effectively to fires;
- Increase the number of Fire Brigades in each village so that each village has the capacity to cover the village area and develop village government capacity to coordinate and support the fire brigades in the village;
- Retrain fire brigades emphasizing BCC roles and mobilizing village volunteers to fight fires;
- Incorporate fire prevention and fire fighting into farmer group activities;

