

ASIA LINK PROJECT
“New Educational Tools for Sustainable Management of Peatland in the Humid Tropics”
(PEATWISE)

**Effectiveness of Fire Prevention Action in Tropical Peatland
in Central Kalimantan
(Direct Training)**

By

Suwido H. Limin
Sahara Alim
Yunsiska Ermiasi
Suparjo
Erisa I. Selviana



**CENTRE FOR INTERNATIONAL CO-OPERATION
IN MANAGEMENT OF TOPICAL PEATLAND (CIMTROP)
UNIVERSITY OF PALANGKA RAYA
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PREFACE

This report has accommodated of the local knowledge techniques and modified to suppress the fire. Therefore this strategy and methods have considerable to complete a module of Human Dimension in Asia Link Project : *"New Educational Tools for Sustainable Management of Peatland in the Humid Tropics (PEATWISE)"*, through the collaboration between Wageningen University, Leicester University, UNIMAS and Palangka Raya University.

The failure of Indonesia Government to prevent and suppress the fire since 1997 in Central Kalimantan, because the local people never involved in full responsibility, but they local people in temporary activity with low compensation. During ten years the big fire in Central Kalimantan, the Government action to prevent the fire has just as an project oriented, the same way also conducted by many NGO's. In the other word, the fire will be give benefit for people who join with the Government and NGO's teams.

Since 1997, we have formulated and explained the TSA concept which will giving full responsibility for local community around the fire areas and must be establish their source of income as compensation of their risk job. Based on Central Kalimantan meeting on fire in 2003, the Government has agreed that the management of fire must be one gate, one command and one management through establishment of the TSA in the village. In reality this commitment has just agreed, because the institution which has the budget could not give their budget to the other institution. Therefore, they will conduct the activity without strategy and target or ineffective and inefficient.

The TSA KALTENG (KALTENG Fire Fighting Team) has established under CIMTROP management to follow up the 2003 agreement. Every years the TSA action always different than other group, because we also directly for observation about fire behaviour and evaluate on the effectiveness of team works.

Palangka Raya, December 2006

Suwido H. Limin

I. INTRODUCTION

The strategy for suppressing wild fire (forest and peat fire) as established by the Indonesian Government through the *BAKORNAS* in Jakarta, *SATKORLAK* in Provinces and *SATLAK* in Regencies agencies have been inefficient and ineffective for the last decade, causing communities to trust to Government policies less and less. Since Government law regarding forests enforces the rights of Forest Concession Companies to access the forests (Limin, 1999; 2000a), local communities have been discouraged from protecting the forest or its environment. To recover the community's trust in the government's environmental stewardship, a new approach that is relevant to the local people's backgrounds, abilities and cultures is needed. If regained, this trust could change all of the negative thoughts that communities harbor about Government policy. Government policy should consider and incorporate local knowledge, local initiative and local creativity, which are relevant to their environmental conditions and culture. Without the involvement of local communities and the devolution of responsibility to them, it is unlikely they will give their full support to fire control initiatives and, as a consequence, forest fire in Central Kalimantan will continue to become a bigger disaster year after year.

As a result of human carelessness and natural disasters, wild fires occur every year in Central Kalimantan, especially in the dry season. Two big wild fires, the most disastrous in recent memory, occurred in 1997 and 2002 and totally paralyzed most of the socio-economic activities of the people of Central Kalimantan. The local communities were most affected by the negative impacts of these fires, and they expected greater efforts by the authorities to cope with the forest fires. Of course, local people were extremely disappointed and felt let down by the Government (Limin *et al.*, 2003). Indonesian Government has trained more than thousands people from Government staff, but, when the fire occurred these people have never seen and difficult to give they task. In these emergency conditions, only a small group of local people join with government's team to suppress the fires without strategy and real compensation. From these situation we have developed a new group with typical strategy for suppressing wild fire in the peatland namely ("*Tim Serbu Api*" (TSA)).

II. OBJECTIVES

1. To teach the local community on the important of the environment.
2. To give the local people for experiences and knowledge on the fire prevention techniques and fire threat on the human health and economics problem.
3. To bring local community to the same responsibility on the environment important must be protected from the fire.
4. To give the local people opportunity to develop this country through their ability with real compensate of the work.

III. METHODS

3.1. Location of Activity

The patrol activity by TSA have just around the Kalampangan Zone (block C of the ex MRP) (Figure 1) and the Natural Laboratory for Peat Swamp Forest Research (NLPSF) Kereng Bangkirai Sabangau (Figure 2).

3.2. Methods and strategy for wild fire suppression

According to Limin (2000b) and CIMTROP of UNPAR (2004), the best methods of fire suppression are (i) KATIR; this is the acronym of "*sekat bakar diair*", meaning the fire transects are watered till saturated, and (ii) BOMTIK; this is the acronym for the Indonesian words "*bom air plastik*", a plastic bag filled with about 1.0-1.2 liters of water and used like a bomb.

The strategy carried out by the TSA team to conduct the two methods can be explained as follows:

- 1) In order to work efficiently, the assigned TSA members have to stay and sleep in temporary tents near the fire hotspots.
- 2) The TSA team members carry out a prior observation of the fire movement and the hotspot, i.e. by climbing up trees for 12 –20 m above ground.
- 3) A transect line is made 20 – 100 m or so away from the fire, depending on the vegetation type and fire spreading speed.

- 4) While one group makes the transect, other members of the TSA are assigned to drill a deep well through the peat to find underground water.
- 5) Coordinates are taken to determine the exact distance for the next deep wells.
- 6) Along the transect, deep wells are drilled every 300 – 500 m, depending on the site condition.
- 7) The ditch or transect must be kept saturated with water to prevent the fire from spreading through the deeper peat layer.
- 8) Only then can the TSA members start to suppress the fire inside the transect line.
- 9) The TSA members are divided into 2 – 4 groups for working at noon and at night or at other times depending on the fire threat level. Under certain conditions, fire suppression has to be carried out nonstop for 24 hours by 4 groups in turn.
- 10) Each group of 5 – 7 TSA members, equipped with 3 hand radios, are assigned to operate one pump machine with 200 – 400 m of hose.
- 11) Dead standing trees ("*punggu*") are felled using a chainsaw, because flying embers can facilitate the spread of fire to a larger area.

Methods and strategy above is one of the eight criterias of the TSA' concept, that are: (1) Institution require, (2) Membership and clarity of tasks, (3) Welfare guarantees, (4) Methods and strategy, (5) Equipment and finance, (6) Multifunctionality of the TSA teams, (7) Experience of Implementing the TSA Concept

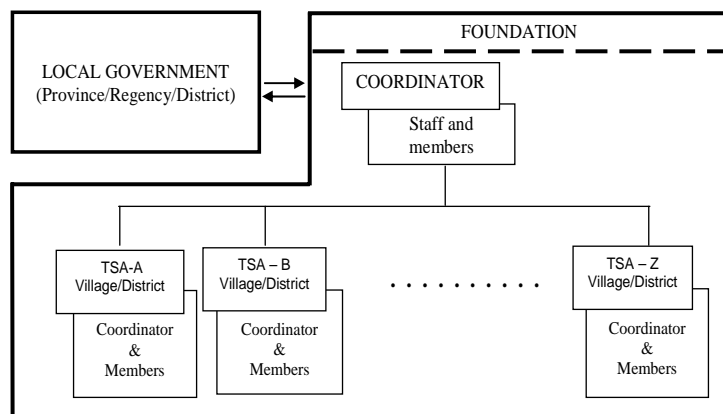


Figure 1: Proposed TSA organizational network

In establishing the TSA, several aspects should be considered, e.g. sensitivity of the area to wild fire, the community's determination to protect against wild fire, and its dedication to implement the TSA program. TSA membership should have the following criteria: 1) 18 – 50 years old, 2) Healthy, free from the color blindness, nearsightedness, deafness, muteness, and heart disease, 3) Capable of working in the open night and day, and 4) Farming background.

All new TSA members must be trained by senior TSA members. Five training program modules have already been written based on TSA's experiences since 1997 and this information will be transferred to new members when the training is conducted (TSA, UNPAR, 1998). All TSA members must be covered by insurance. The TSA members must establish their source of income which is relevant to the carrying capacity of the land and their interests. The income source must be managed according to the cooperative system so they can put money into a joint account for action (TSA UNPAR, 1998).

TSA members must be supported by command posts and equipment. The basic pieces of equipment needed for suppressing fire are portable pumps operated by petrol engines that can be carried by just one or two people and borers for drilling deep wells.

TSA's aim is not only suppressing fire. TSA will also provide education to local communities on how to manage their environment better to obtain sustainable livelihoods. TSA members can relate their experiences about the importance of the environment and explain the negative impacts forest fire has on local communities. They also can also carry out reconnaissance on those destroying the environment and report to the local Government.

IV. RESULTS AND DISCUSSION

41. Participant Background

All of participants are new member of the TSA from Taruna village, Kereng Bangkirai village and Kalamangan village. All of them have not continue their school, so that a part of them just passed in Basic School level. They also do not have permanent income, sometime they must do as labour in the temporary Government project with the low salary.

42. Training Module

Five modules including one Operational Procedure Standard has written based on TSA experiences since 1997 are :

- (1) *Ciri Kabakaran pada Lahan Gambut* (Fire Behavior on Tropical Peatland)
- (2) *Teknik dan Strategi Penanggulangan Kebakaran Hutan dan Lahan Gambut (Techniques and Startegy for Tackling of Forest and Peatland Fire (KATIR dan BOMTIK))*
- (3) *Keselamatan Kerja* (Working Safety)
- (4) *Alat dan Mesin Pemadaman Kebakaran Lahan dan Hutan* (Suppression's Equipments and Machine on Land and Forest Fire)
- (5) *Standar Operasional Prosedur* (Operatonal Procedure Standard)

These modules has use for training 11 gropus of the TSA-Kelurahan that has established by the Local Government of Palangka Raya municiple.

Training in class has just in one day, because the main stategy for training is direct in the field. This method must be implement, because these people unlike for reading too much and difficult to understand. Easier for them to understand, if we show and give example how to use, how to act and how to manage. In the word, we can tell them about theoretical based on what have been done and what will be do.

43. Action for Fire Prevention

During the dry season on July to Ocktober 2006, we have established 10 deepwells, and 2 fire transects. All of TSA member try to operate the equipment for drilling of deepwell, connecting of hose and spray the fire had made for training. The TSA member could protect the wild fire occure at the field research (Kalampangan Zone). The successfull to prevent the wild fire, because the TSA member have act soon when the initiate hotspot founded along the areas. The effort for burning the areas has funded 34 initiate hotspot, but could be stop totally by the TSA member. The initiate hotspot can be divide into three kinds are : (1) made by the owner for land clearing (11 cases); burning by other people (18 cases); (3) under terminal (5 cases). From the 34 initiate hotspots, 12 places need to suppress, because the fire already widely very soon (Table 1). Some of photograph the TSA activities shown in Figure 3.

The initiate hotspot have becomes wild fire at the 12 places because not enough member of the TSA involved, caused by limited budget. Limin (2000a) asserted, standard for TSA concept is 40 persons for each location.

All of the initiate hotspot have occurred from the road where is human access and by human behaviors. Limin (2000a; 2002; 2003) and the Director of Forest Fire Fighting in the Department of Forestry in CIMTROP UNPAR (2003) asserted all of fire caused by human through their behaviours that are direct and indirect action. Limin (2003) forest fires in Central Kalimantan have almost always been caused human access that are road, canal, lake, river, and by human carelessness, such as people throwing away cigarette ends, lighting fire in the forest, clearing and burning land outside the city along the road sides, as well as land clearance for large scale plantations of oil palm and industrial forest plantation. In the other words, where there is access to the forest and peat swamp that is where the hotspots started. Therefore, although the TSA member have done patrol every two hours for each team, the burning effort could be accurate among the patrol team changes the group. After the fire prevention conducted all of the TSA member has satisfied, because they can cancel the burning effort by people and protected the areas from big disaster. Although, they have act full jobs with low compensation compare than risk of jobs, the responsibility of TSA members has gave benefit for human and thousands people around. Based on experiences on this activity the wild fire could be prevent just by community awareness on the important of environments. Therefore, we must find a strategy how to recovery their view on the environments surrounding, because since the Indonesia Government has divided all of forest areas for Forest Company, the local people around loss their right. Limin (2000b), stated when the Forest Company active to exploit forest since 1970's in Central Kalimantan, local people (Dayakness) becomes difficult to find house materials, although they want to cut tree beside their shifting cultivation area ("*ladang*").

Although in the areas under control the TSA have occurred several hotspots, but this effort have successful, because they can stopped the fire move to the wide areas. The TSA activities during the dry season has effective, although budget available is still in low compare than budget standard with amount US \$ 6,061.70/group/month. This job must be conduct by our team, because they have know the negative impact of fire on environments and human socio-economic. Limin (2003) asserted, the major threat of peatland in Central Kalimantan is fire. Although the Government could plant million hectares through the reforestation program, but without protection program, everything will be nothing. The left forest must be maintain and free from the fire threaten.

The implementation of TSA Concept in the dry season in 2006, also documented by the BBC in the beginning of November 2006. They have satisfied, because they can meet just TSA member still working for fighting the fire, although atmosphere of Palangka Raya still covered by thick smoke.

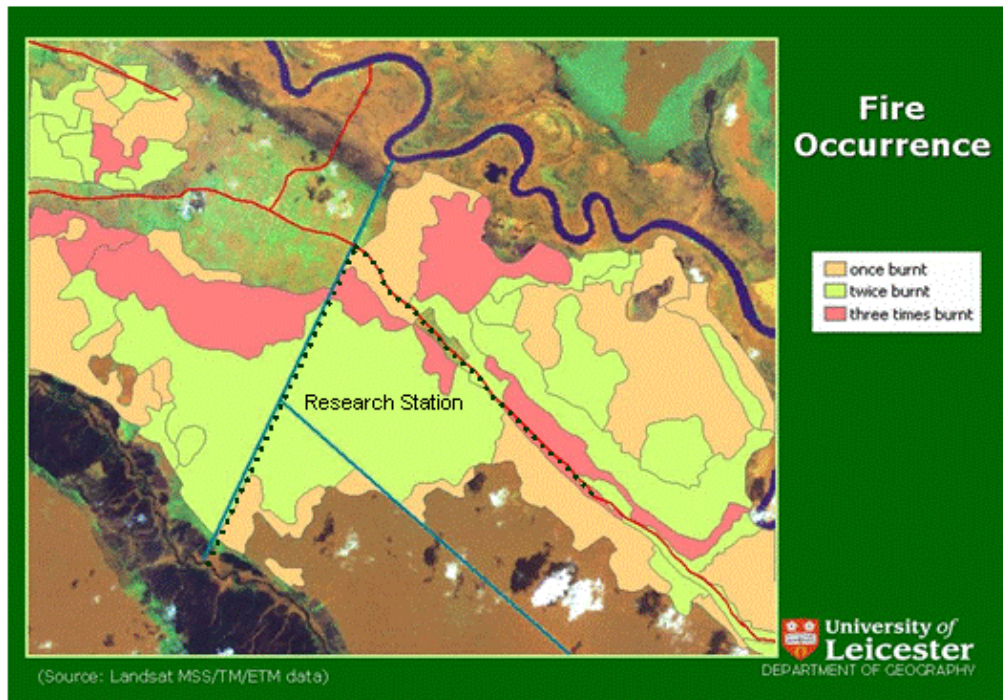
V. CONCLUSION

The strategy for suppressing the forest fire as established by Local Government through the *BKSDA* agencies has been inefficient and ineffective because, for the several years ago, the awareness and responsibility of communities have never changed as indicated by the fact that fires occurred everywhere in the dry season.

1. The lost community rights to the environment must be restore back to the people, because before the regulation for forest exploitation, communities lived in harmony with their environments.
2. The TSA concept has a stated and full objective that provide a unified platform which to invite all of the community to be of the same opinion and devote their attention to the importance of the environment to ensure its survival to support future generations. Implementation of the TSA concept could change and increase community awareness and following by the income guarantee.
3. Government policy should be recovery of community trust concerning their environments need a new approach and consider on the local knowledge, local initiative and local creativity which are relevant to their environments condition, background, ability and culture. Without the involvement of local communities and the devolution of responsibility to them it is unlikely they will give their full support to fire control initiatives and, as a consequence, forest fire in Central Kalimantan will become a bigger disaster year to year.

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..... : Patrol area by TSA

Figure 2. Fire prevention areas in Kalampangan Zone

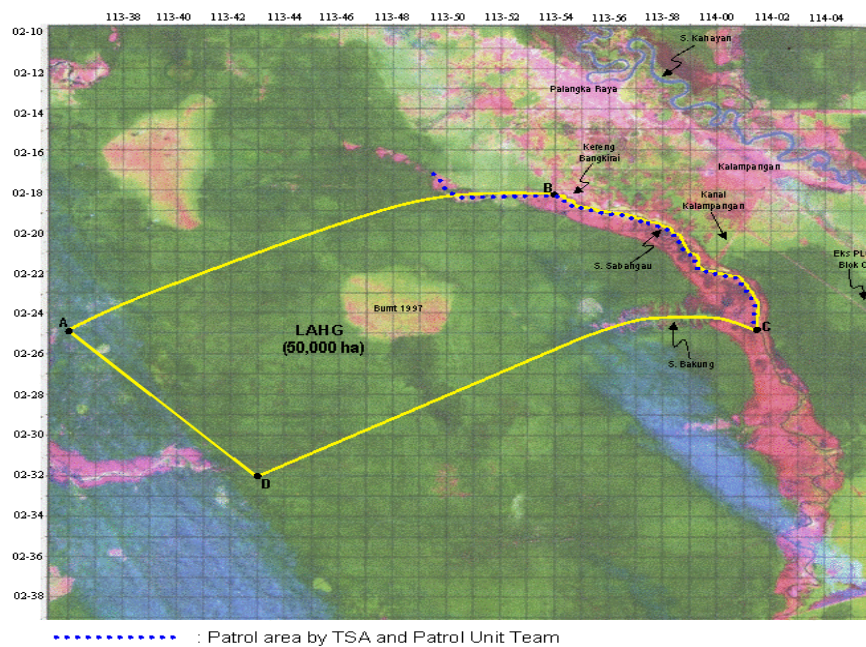


Figure 3. Fire prevention areas in Natural Laboratory for Peat Swamp Forest (NLPSF), Sabangau-Kereng Bangkirai, Central Kalimantan

Table 1. Initiate Hotspot has suppressed by TSA KALTENG in 2006

NO.	DATE	COORDINATE	WORKERS	TIME WORKS	NOTES
1.	20/8/2006	S 02°19' 15,9" E 114°03' 46,2 "	9	6 hours	Fire at km 25 Jl. Mahir mahar
2.	26/8/2006	S 02°19' 15,9" E 114°03' 46,2"	5	2 hours	Reburning at km 2.5 Jl. Mahir mahar
3.	7/9/2006	S 02°17' 47,8" E 114°02' 18,5"	7	2 hours	Fire at km 21 Jl. Mahir mahar
4.	10/9/2006	S 02°19' 15,9" E 114°03' 46,2"	8	8 hours	Reburning at km 21 Jl. Mahir mahar
5.	28/9/2006	S 02°19' 06,5" E 114°03' 39,8"	13	6 days	Fire at km 25 Jl. Mahir mahar (Taruna village)
6.	7/10/2006	S 02°16' 44,1" E 114°59' 22,4"	4	4 hours	Fire at km 7 Jl. Mahir mahar
7.	7/10/2006	S 02°17' 18,6" E 114°01' 57,1"	12	4 hours	Fire at km 20 Jl. Mahir mahar
8.	28/10/2006	S 02°19' 10,3" E 114°54' 43,2"	20	5 x 24 hours	Fire at NLPSF Sabangau
9.	1/11/2006	S 02° 20' 05,2" E 114°04' 31,5 "	4	2 hours	Fire at km 30 Jl. Mahir mahar
10.	5/11/2006	S 02° 20' 35,7" E 114°05' 06,8"	9	3 hours	Fire at km 30 Jl. Mahir mahar
11.	6/11/2006	S 02°12' 26,0" E 113°53' 39,7"	6	3 hours	Fire at Jl. Bukit Raya, Palangka Raya city.
12.	8/11/2006	S 02°17' 28,0" E 114°01' 52,5"	9	3 hours	Fire at Kalamangan canal



01. Equipments



02. Equipments



03. Equipments



04. Equipments



05. TSA members



05. TSA members

Figure 4. Profile of the TSA KALTENG



07. Try to suppress the fire



08. Try to suppress the fire



09. Try to suppress the fire



10. Move to the field for drilling deepwell



11. Drilling deepwell and stay in the tend



12. Drilling deepwell and stay in the tend

Figure 4. Profile of the TSA KALTENG

Table 2. Budget estimation according to the activity

OPERATIONAL STANDARD FOR ESTABLISHMENT ONE GROUP TSA AND YEARLY PROGRAM IMPLEMENTATION
(ACTIVITIES SHCEDULE AND BUDGET)

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
A. INVEST					a1. Facilities, Equipment (establishment, shoping, etc)							
					a2. Managing TSA's Income and Private Business							
Total (Invest) : US \$ 53,420.91												
B. PREVENTION					b1. Intensive Action :							
b1. Intensive action (6 months)					Controlling and Fighting Soon Action							
b2. Temporer activity (6 months)					(6 months : US \$ 36,370.20)							
					\$ 6,061.70	\$ 6,061.70	\$ 6,061.70	\$ 6,061.70	\$ 6,061.70	\$ 6,061.70	\$ 6,061.70	
\$ 440	\$ 440	\$ 440	\$ 440	\$ 440	← b2. Temporer activity →						\$ 440	
Total B (12 months) : US \$ 39,010.20												
					C. Full Time Fighting Action							
					TOTAL C (4 months ; US \$ 52,418.08)							
					\$ 13,104.52	\$ 13,104.52	\$ 13,104.52	\$ 13,104.52				
D. INSURANCE					Total D (12 months) : US \$ 333.40							
Grand Total (A + B + C) : US \$ 144,960.79												

A. Cost Invest for Establishment one Group of the TSA

No.	SPECIFICATIONS	Number/ Unit	COST In USD (\$)	TOTAL (US \$)
1	Pump Machine	6 units	300,00	1.800,00
	Sub total 1			1.800,00
2	Hose			
	Fire hose (1.5 " ; 20 m long)	1400 metres	1,40	1.960,00
	Spiral Hose 2" per meter	30 metres	3,50	105,00
	Small Hose 3/4 "	20 metres	0,67	13,40
	Sub total 2			2.078,40
3	Nozzle	5 pieces	11,11	55,55
4	Drill for deepwells	1 unit	325,00	325,00
5	Supporting equipments			
	5a. Electric cable and cable	20 metres	3,33	66,60
	5b. Accu for communication radio 12 volt	4 pieces	33,33	133,32
	5c. Lamp accu	20 pieces	1,11	22,20
	5d. Petromac lamp	2 pieces	33,33	66,66
	5e. Lantern lamp (big)	3 pieces	3,33	9,99
	5f. Solar cell (small)	1 unit	300,00	300,00
	5g. Helmet	30 pieces	5,56	166,80
	5h. Boot	30 pasang	6,67	200,10
	5i. Glove	30 pasang	2,78	83,40
	5j. Mask	30 sets	2,23	66,90
	5k. Head Flash lighth	30 sets	9,44	283,20
	5l. Flash lighth	5 pieces	8,89	44,45
	5m. Vacum glasses	30 pieces	7,78	233,40
	5n. Storage box	4 pieces	12,22	48,88
	5o. Stretcher	2 pieces	11,11	22,22
	5p. Fan	1 piece	7,78	7,78
	5q. Chain Saw	1 unit	700,00	700,00
	5r. Saw	5 pieces	4,44	22,20
	5s. Axe	5 pieces	3,33	16,65
	5t. Big knife/Dayak's Parang	25 pieces	16,67	416,75
	5u. Hoe	10 pieces	4,44	44,40
	5v. Shovel	2 pieces	3,33	6,66
	Sub total 3 - 5			3.343,11
6	Communication equipments			
	6a. Handy Talky (HT)	10 pieces	205,00	2.050,00
	6b. VHF Transceiver + Anthena	1 unit	500,00	500,00
	6c. Radio band	2 units	30,00	60,00
	6d. Telephone/fax machine	1 unit	200,00	200,00
	Sub total 6			2.810,00
7	Camera digital	1 piece	333,34	333,34
8	Telescope	2 pieces	77,78	155,56
9	GPS (Geographical Position System)	1 piece	555,56	555,56
10	Camping Unit (mattres, kitchen, utensil, e	1 unit	401,09	401,09
11	Post commands	1 unit	5.000,00	5.000,00
12	Car/Pick up/Truck	1 unit	12.000,00	12.000,00
13	Motor bike	2 units	1.700,00	3.400,00
14	Slow boat	1 unit	2.800,00	2.800,00
15	Source of income	available	15.000,00	15.000,00
16	PC Computer	1 unit	1.200,00	1.200,00
	Sub total 7 - 16			40.845,55
	Total 1 - 16			50.877,06
17	Contingency (5%)			2.543,85
	GRAND TOTAL			53.420,91

B. Cost for Operational and Prevention Action (per month)

No.	Specification	Description in USD	Total (USD)
1	Transportation (fuels)		
	a. Kalampangan zone		
	- Car/gasoline ¹⁾	4 times x 10 l x \$ 0.50	20,00
	- Motor bike/gasoline ¹⁾		
	* Road/canal of research area	11 times/day x 30 days x 1 l x \$ 0.50	165,00
	- Oil ¹⁾	4 l x \$ 1.70	6,80
	b. NLPSF		
	- Motor bike ¹⁾	2 times/day x 30 days x 1 l x \$ 0.50	30,00
	- Slow boat (river 25 km long) ¹⁾	1 time/day x 30 days x 15 l x \$ 0.50	225,00
	- Oil ¹⁾	1 time x 5 l x \$ 1.70	8,50
2	Gasoline for fighting soon action ¹⁾	80 l x \$ 0.50	40,00
3	Food ¹⁾	30 persons x 30 days x \$ 2.23	2.007,00
4	Communication (Battery HT) ¹⁾	252 pc x \$ 0.45	113,40
5	Incentive/Wage ¹⁾	30 persons x 30 days x \$ 3.34	3.006,00
6	Generator fuels ²⁾	30 days x 6 l x \$ 0.50	90,00
7	Documentation, leaflet (printing, etc.) ²⁾	available	50,00
8	Telephone/HP fee ²⁾	available	60,00
9	Meeting, evaluation, etc ²⁾	1 time/month x \$ 40.00	40,00
10	Maintenance equipment ²⁾	available	100,00
11	Stationery (paper, toner, etc.) ²⁾	available	100,00
Total			6.061,70

Notes ¹⁾ Provide for six months prevention (USD 5,621.70/month)

²⁾ Provide for 12 months (USD 440.00/month)

C. Cost for Fire Suppression(30 persons ; 1 month field work)

No.	Description	Amount/unit	Cost in (U\$)	Total (U\$)
1	Materials			
	a. Kerosene	320 litres	0,50	160,00
	b. Gasoline	2920 litres	0,50	1.460,00
	c. Oil	72 litres	1,70	122,40
	d. Sack	24 pieces	0,22	5,28
	e. Inner tube rubber	4 set	5,00	20,00
	f. Plastic	4 set	15,00	60,00
	g. Battery Handy Talky	1008 pieces	0,45	453,60
	h. Battery for flash	160 pieces	0,45	72,00
	i. PVC pipe (1,5 inc)	160 pieces	5,00	800,00
	j. Plastic closet	8 pieces	9,44	75,52
	k. Tarpaulin	16 sheets	22,22	355,52
	Sub Total 1			3.584,32
2	Food	840 days	2,23	1.873,20
3	Transport (motor bike, slow boat, truck, car, etc.)	available	300,00	300,00
4	Medicine, etc.	available	75,00	75,00
5	Insentif/wage	840 mandays	8,30	6.972,00
6	Insurance	30 persons	0,93	27,90
7	Unpredict cost/Contingency	available	300,00	300,00
	Total 2 - 6			9.548,10
	Total 1 - 6			13.132,42

Notes :

- 1 By 30 persons for two weeks field work, they can make 2 km fire transect (fire block), 7 - 8 deep well and 10 - 20 ha the fire completely stop.
- 2 The team will be operated all of six machines during the day and night.
- 3 Part of the team member have a job for logistic and cocker

D.	Description	Amount/unit	Cost in (U\$)	Total (U\$)
6	Insurance	30 persons	11,11	333,30